2009 Cassimer Bar Hatchery Annual Report

Prepared by:

Rhonda Dasher
Kirk Truscott

Colville Tribes
Department of Fish & Wildlife
Anadromous Fish Division - Omak Office
23 Brooks Tracts Rd.
Omak, WA 98841
Phone: 509/422-7424
Fax: 509/422-7428

Prepared for:

Grant County Public Utility District

30 C St. S.W.
PO Box 878
Ephrata, WA 98823

Performance Period: January 1, 2009 to December 31, 2009

Table of Contents

List of Tables

List of Figures

Introduction

Upper Columbia summer steelhead populations have had a long history of decline resulting in protection under the Endangered Species Act (ESA) since 1997. Several reasons for this decline exist including overharvest, habitat degradation/alteration, hydro-system mortality and past hatchery practices.

The Okanogan steelhead population continues to be at high risk of extinction for abundance, productivity, spatial distribution and diversity. NOAA Fisheries 2008 Supplemental Comprehensive Analysis (SCA) identified the Okanogan River steelhead population at high extinction risk for abundance (1996-2006 natural origin geomean abundance of 104 steelhead, compared to the recovery abundance target of 1,000). The SCA assessed the Okanogan population to be at high risk relative to productivity with a recruit/spawner value of 0.06 for brood years 1980-1999 (NOAA 2008). The SCA also identified diversity and spatial distribution as high risk, primarily due to large hatchery influence by non-local stock (Wells stock) and spawner distribution primarily limited to 2 major spawning aggregates in the U.S portion of the basin (NOAA 2008).

For the past decade, the Colville Tribes have been engaged in efforts to identify and address factors limiting steelhead production in the Okanogan River tributaries, primarily focused on habitat improvements and hatchery reform to address non-local steelhead hatchery releases in the Okanogan River Basin.

Historically, most summer steelhead artificial propagation efforts for the Okanogan River Basin were supported by Wells Hatchery operated by Washington State Department of Fish and Wildlife (WDFW) and funded by Douglas County Public Utility District (DCPUD) with additional annual operation and maintenance costs provided by Grant County Public Utility District (GCPUD). The original objective of the Wells Hatchery program releases in the Okanogan River Basin was to provide harvest; however, following ESA listing of summer steelhead, the program transitioned to a conservation orientated program. Currently GCPUD funds a 100,000 steelhead smolt program in the Okanogan basin. This provides both a locally adapted (ad-present) and recreational harvest (ad-clipped) steelhead program.

Broodstock for the Wells Hatchery program are collected at Wells Dam and constitute a composite collection of natural origin Methow and Okanogan River stocks and hatchery origin steelhead from the Wells Hatchery. Wells Hatchery releases in the Okanogan River Basin totals approximately 100,000 smolts annually and are typically hatchery x hatchery (2^{nd} generation hatchery progeny) A major concern with the Wells Hatchery program is the possible negative effect of a composite stock broodstock and large hatchery origin composition within the broodstock would have on the natural productivity and development of local survival attributes of the natural steelhead population in the Okanogan Basin. This concern was reiterated in the SCA (NOAA 2008).

To address the possible impact of the release of non-local hatchery steelhead in the Okanogan River Basin, during 2002, the Colville Tribe, with support from NOAA Fisheries and funding from the Pacific Coast Salmon Recovery Fund, initiated a locally-adapted pilot broodstock program in Omak Creek, a tributary to the Okanogan River Basin.

Beginning in 2007, Grant County Public Utility District (GCPUD), through the Priest Rapids Project Settlement Agreement process began providing, in entirety, the operation and maintenance funding for implementation of a locally-adapted steelhead production program at Cassimer Bar FH. Current production target at Cassimer Bar Fish Hatchery (CBFH)s 20,000 yearling steelhead smolts for release in the Okanogan River Basin. The program is permitted under ESA through Section 10(a)(1)(A)(Permit 1412).

Components of the current Scope of Work funded by GCPUD include: 1) annual broodstock collection of up to 16 adults from Omak Creek; 2) transfer of broodstock from Omak Creek to Cassimer Bar FH; 3) conduct spawning and egg incubation at Cassimer Bar FH; 4) rear summer steelhead to approximately 18-20 per lbs. by release date; 5) annually tagging of up to 20,000 juvenile steelhead; 6) release of approximately 20,000 yearling steelhead smolts in the Okanogan River Basin; 7) maintain Cassimer Bar FH and provide fish health treatments as prescribed by state fish pathologist; 8) evaluate survival of out-migrating steelhead smolts released from Omak Creek; 9) conduct snorkel surveys and estimate juvenile abundance in Omak Creek and up to three additional tributaries and 10) provide summary report of the program.

Data and information included in this annual summary report for the period of January 1, 2009 - December 31, 2009 include: 1) Brood year (BY) 2009 adult broodstock collection and adult enumeration for Omak Creek and Bonaparte Creek; 2) BY 2009 spawning and rearing; 3) BY 2008 rearing and release; 4) smolt -to- adult return rates (SAR) for completed brood years; 5) juvenile emigration monitoring; and 5) juvenile abundance estimates in Omak Creek and three additional tributaries to the Okanogan River.

Acknowledgements

We would like to acknowledge Grant County PUD, funding agency for the Summer Steelhead program. In addition, we would like to thank the Okanogan Basin Monitoring and Evaluation Program for contributing information regarding adult spawner abundance estimates and protocols for data collection. Data collection was completed by Ernest Timentwa and Oliver Pakootas. Spawning and rearing data was provided by Anthony Cleveland, Hatchery Manager at Cassimer Bar Hatchery.

Methods

Broodstock Collection

Traps were installed in Omak and Bonaparte creeks. Both traps have cod trigger fingers to reduce fish escapement. An aluminum cover prevents escapement and reduces fish stress.

Traps are checked daily to remove debris and captured fish. Large numbers of fish require the trap to be checked multiple times a day to ensure fish health and safety. Fish are netted into a tank with MS-222 and sedated. Adult fish are measured (fork length, FL), sexed, scale sampled, DNA sampled, sampled for a Passive Integrated Transponder (PIT) and Coded-Wire Tags (CWT), Visual Implant Elastomer (VIE) tags, fin clips and any injuries or abnormalities.

Fish not destined for Cassimer Bar Fish Hatchery are placed in a recovery tank and once recovered, returned to the creek above the weir. Fish taken for broodstock are transferred to a tank truck filled with tempered water. The transport tank is supplied with compressed oxygen and is supported with recirculation aerators to provide additional oxygen. Fish transported to Wells Hatchery are checked by the hatchery manager to determine ripeness.

After no fish have been observed in the trap for two weeks, the traps are removed and stored in a secure location for maintenance and repair prior to the next season.

Juvenile Collection

A five-foot rotary screw trap (RST) was installed at the mouth of Omak Creek to collect juvenile fish. Omak Creek RST protocols follow developed procedures by Integrated Status and Effectiveness Monitoring Program (ISEMP). The trap is equipped with a live-box and a self-cleaning screen that helps remove medium to small debris from the live-box.

To minimize stress on fish and comply with limits and restrictions listed in the permit issued under the Kelt Reproductive Success Project (06-09-CRITFC49), when flows are too low (under 25 CFS) or too high (over 70 CFS), the cone is pulled until flows stabilize within the acceptable range. During peak migration the trap is checked multiple times a day to ensure fish health and confirm proper operation.

All juvenile steelhead are measured to the nearest millimeter (mm), scales taken, DNA collected, and scanned for a PIT and code-wire tags. Fish are returned to a recovery tank supplied with compressed oxygen until recovered and then released downstream of the trap.

Spawning

Fish collected for broodstock are held in circular tanks at Cassimer Bar Fish Hatchery (CBFH) until spawned. A 12 gauge needle attached to a flow meter/compressor at 7 psi is used to expel ripe eggs. Males are stripped of milt with a small amount of air into a bag

and kept cool until egg fertilization is needed. Due to the small number of spawners and variability of maturation a 1:2 factorial spawning matrix (one female and two males) to facilitate genetic diversity and ensure fertilization (i.e. avoid complete loss of a females production due to a non-viable male).

Females are lethally spawned and ovarian samples taken for virology tests. Males are live-spawned and are used multiple times for fertilization. After males have been used they are sacrificed for virology tests. All samples are sent to the Washington State Department of Fish and Wildlife Virology Lab in Olympia.

Rearing and Release

Eggs are fertilized and segregated into Heath trays for incubation. Heath stacks consist of eight trays per stack with a top tray not utilized for incubation. A steady flow of well water is passed through a degassing tower and filter into each stack. To provide artificial conditions vexar is used as a substitute for substrate in each tray.

Upon egg delivery each female is designated to one tray and water hardened in a solution of 100 ppm Iodophore for disinfection. Dead eggs are picked by hand and egg loss is enumerated. Fertile eggs are weighed and enumerated by weight for each tray. Once eggs reach the eyed-stage of development they are monitored daily and picked to remove unfertilized eggs. The number of eyed eggs and hatched eggs are documented.

Hatched alevins are transferred to a trough and are taught to feed with starter feed. Fry are sampled on a weekly basis to monitor growth and adjust feed frequency. Mortalities are collected daily and recorded. By June fish have reached parr stage and are transferred to raceways.

Raceway released fish are PIT and/or coded wire tagged. Fish destined for Omak Creek are inserted with both CWT and PIT tags. Additional fish for the Similkameen and Okanogan River are coded wire tagged and ad-clipped, so fish can be identified and used as harvest fish in the Okanogan.

Fish will achieve smolt size by March of the following year and at this time half the fish are taken to the St. Maries Acclimation Pond on Omak Creek and the remainder stay at the hatchery for release into the Okanogan and Similkameen Rivers. Acclimation fish at St. Maries are fed twice a week to target size. Random samples of 200 fish are taken weekly to determine growth rates and ensure fish meet size goals prior to release. Mortalities are picked daily.

To release fish screens are pulled at the outflow of the pond so fish can leave volitionally. Remaining fish on station are crowded, netted, weighed, scanned for PIT tags and loaded into transport trucks and direct released into Omak Creek just downstream of the acclimation pond.

Juvenile Migration

Travel times from Omak Creek to Columbia River dams can be determined by an online database http://www.ptoccentral.org/dbaccess/InStrmDtctn/InStrmDtctn_query.html. Detections are filtered and separated by detection site to determine life history patterns. PIT tags can be used to determine juvenile survival and smolt to adult returns.

Results

Adult Enumeration

Adult enumeration in Omak Creek was facilitated by the operation of a semi-permanent weir, approximately 1.61 km upstream from the confluence of the Okanogan River (rkm 51.5), and a temporary weir located on Bonaparte Creek, approximately 0.03 km upstream from the confluence of the Okanogan River (rkm 1.25). The weirs on Omak Creek and Bonaparte Creek were installed on February 20 and 21, 2009, respectively and operated through July 31, 2009.

A total of 47 steelhead were collected at the Omak Creek weir in 2009 (Table 1). An estimated sixteen natural origin steelheads was calculated (Table 6). Percent origin of fish was determined for Omak Creek (Table 6).

At total of thirty steelhead were collected at Bonaparte Creek in 2009 (Table 2). An estimated nine natural origin steelheads was calculated (Table 6). Percent origin of fish was determined for Omak Creek (Table 6).

Broodstock Collection

Adult steelheads were collected for broodstock between 21 March 2009 and 14 May 2009. Broodstock were transported to CBFH for spawning. All steelhead not collected for broodstock were biologically sampled (sex, origin, scale and genetic sampled) and released immediately upstream from the weir.

In 2009 a total of 17steelhead were collected for broodstock from the Omak Creek and Bonaparte weirs (Table 2). Broodstock collected in Omak and Bonaparte creeks included eleven natural origin and five hatchery origin steelhead for a natural origin composition of 68.75% (Table 3).

A low snow pack in 2009 resulted in a low water year for the Okanogan basin. Adult fish remained in the mainstem Okanagan due to limited access to tributaries. Fish entered the creek before the adult trap was installed. Low flow channels were constructed at both Omak and Bonaparte creeks to facilitate fish passage. Multi-year run times for steelhead can identify peak migration patterns (Figures 1 and 2). In 2006 Bonaparte Creek operated for only part of the season due to impeding above passage and the inability to trap fish.

BY 09 Broodstock Sex Ratio

In 2009 broodstock were collected from Omak and Bonaparte Creek to minimize impact on wild fish in both streams. An even ratio of male to female collection was made to ensure a one to one sex ratio (Table 4).

By 09 Average Fecundity

Average fecundity was 3,444 eggs per female (Table 5). The largest number of eggs taken per female was 5,023 (Table 5). Fecundity between brood years may be variable due to maturation and ocean timing. Females that are gravid when collected may have expelled an unknown number of eggs prior to collection.

BY 09 Spawning

Of the eight females taken in 2009 a total of 33,112 green eggs were collected. This resulted in 31,815 eyed-eggs and 30,505 fry (Table 6). Survival rates to the fry stage were high for both wild and wild hatchery crosses (Table 7).

BY 09 Rearing

Steelhead fry were ponded between late May and early June 2009. Total number of fry was estimated at 30,505 fish (Table 8). A recommended fish per pound (FPP) is listed in the Grant PUD Monitoring and Evaluation Plan (Pearsons, 2009). Collected monthly weight samples indicated a healthy brood year (Table 11). Juvenile survival to smolt size was high (Table 10). Average fork length was 189 millimeters prior to release (Table 11).

BY 09 Tagging

An estimated 24,605 juvenile steelhead were tagged at Cassimer Bar FH. An additional 14,482 parr were dual tagged (PIT tag and adipose-CWT) and the remaining 10,123 parr were ad-clipped-CWT only (Table 9).

Smolt Release

Approximately 8,000 juveniles were transferred to St. Maries Acclimation Pond on 27 March, 2009. These fish were acclimated to Omak Creek water and released on 1 May thru 8 May, 2009. Juvenile steelhead reared at Cassimer Bar FH was direct released into Omak Creek immediately downstream from the St. Maries Acclimation Pond.

Acclimated fish were volitionally released on May 1, 2009- May 8, 2009. Fish held at Cassimer were direct planted below the acclimation pond May 1- May 8, 2009. Remote PIT tag detection sites were utilized to monitor tagged fish as they migrated. Total number of PIT tags released by drainage varied between years (Table 12).

Juvenile Collection

A five foot rotary screw trap was installed in Omak Creek on 20, April 2009 and removed on 18 June, 2009. Trap operation was sporadic throughout the trap period due to low flows.

In 2009, a total of 1,695 juvenile O. mykiss were trapped at the Omak Creek rotary screw trap. This included 906 natural origin juveniles (Table 12). Non-target species included

bridge lip sucker (BLS) mountain whitefish (MWF) and eastern brook trout (EBT) (Table 13 and 14).

Efficiency trials were conducted on days when adequate numbers of fish were available. Percent efficiency for the Omak Creek Rotary Screw Trap was between 36-42 percent depending on flow.

Juvenile Abundance Estimates

While new methods for accurately estimating juvenile abundance in Omak Creek are being reviewed, modifications have been made to existing templates in the OBMEP database to extrapolate data using similar habitat types (Miller et al. 2009). Snorkel surveys are used to estimate juvenile abundance (Table 16). Potential abundance for Omak and Salmon creek are among the highest for tributaries in the Okanogan Basin (Table 16).

Smolt to Adult Return

Locally adapted smolts are stocked in Omak Creek. Prior to 2007, all fish were stocked above Mission Falls in Omak Creek near Stapaloop Creek. Smolt to adult returns indicates a poor juvenile survival for those years fish were stocked above Mission Falls. Adult returns for 2009 were estimated to be 0.06 percent to Wells Dam (Table 15).

References

Arterburn, J. E., and Miller B. F. 2009. Spring Spawner estimates for the Okanogan River Basin (2008). Colville Confederated Tribes Fish and Wildlife Department. Nespelem, WA.

English, K., C. Sliwinski, B. Nass, and J. Stevenson. 2001. Assessment of adult steelhead migration through the Mid-Columbia River using radio- telemetry techniques, 1999-2000.

English, K., C. Sliwinski, B. Nass, and J. Stevenson. 2003. Assessment of adult steelhead migration through the Mid-Columbia River using radio- telemetry techniques, 2001-2002.

Fisher, C. J., and J. E. Arterburn. 2003. Steelhead surveys in Omak Creek. 2002 Annual Report for Bonneville Power Administration project #2000-001-00 April 2003. Colville Confederated Tribes Fish and Wildlife Department. Nespelem, WA.

Galbreath, P. F. Recommendations for Broad Scale Monitoring to Evaluate the Effects of Hatchery Supplementation on the Fitness of Natural Salmon and Steelhead Populations Final Report of the Ad Hoc Supplementation Monitoring and Evaluation Workgroup*, 2009.

Hillman, T. W. 2004. Monitoring strategy for the Upper Columbia Basin. Prepared for: Upper Columbia Regional Technical Team, Upper Columbia Salmon Recovery Board, Wenatchee, Washington.

Miller, Brian, Panther, J., Arterburn, J. 2009. Confederated Tribes of the Colville Reservation, 2009 Okanogan Basin Steelhead Escapement and Spawning Distribution.

Pearsons, T. N., Langshaw, R. B. June 30, 2009. Ephrata, WA. Monitoring and Evaluation Plan for grant County PUD's Salmon and Steelhead supplementation Programs. *In Consultation with the Hatchery Sub-Committee of the Priest Rapids Coordinating committee*.

Tussing, S. P. 2009. A field Manual of Scientific Protocols For downstream migrant trapping. Wauconda, WA. Prepared for: Bonneville Power administration

WDFW, 2009. 2008-2009 Upper Columbia River Steelhead Fishery Summary. Prepared for NOAA Fisheries. Washington Department of Fish and Wildlife, Olympia, WA

Appendix A – Tables and Figures

Table1. Adult steelhead enumeration for Omak Creek Trap, BY 2003-2009

Adult Enumeration- Omak Creek							
Year	Location	H M	H F	W M	W F	Total	Total - Brood
2003	Omak Cr	3	2	1	2	8	5
2004	Omak Cr	63	33	8	2	106	90
2005	Omak Cr	83	62	0	3	148	129
2006	Omak Cr	21	76	2	6	105	94
2007	Omak Cr	39	37	15	5	96	84
2008	Omak Cr	39	15	15	9	78	70
2009	Omak Cr	*22	*9	*12	*4	47	41

Table 2. Adult steelhead enumeration for Bonaparte Creek Trap, BY 2006-2009

	2006-2009 Bonaparte Creek Trap Adult Enumeration data							
	HM	HF	H Brood	Total	WM	WF	W Brood	Total
2006	10		0	10	2		0	2
2007	140		0	140	23		0	23
2008	13		0	13	13		4	9
2009	14	7	3	18	6	3	5	4

Table 3 Multi-year broodstock collection summary for Omak and Bonaparte Creeks, BY 2003-2009.

	Broodstock Collection			
	Omak		**Bonaparte**	
	Hatchery	Wild	Hatchery	Wild
2003	1	3		
2004	8	8		
2005	16	3		
2006	8	3		
2007	7	5		
2008	1	7		4
2009	2	6	3	5

Table 4. 2009 Broodstock collection hatchery/wild percentage and sex ratio.

	2009 Broodstock H/W% and sex ratio					Factorial
Origin	HM	HF	WM	WF	M/F ratio	Spawn M/F
Omak	1	1	3	3	1:01	2:01
BON	1	2	3	2	1:01	2:01
	12.50%	18.75%	37.50%	31.25%		
	Hatchery		Wild			
	Total:	31.25%	Total:	68.75%	Survival:	100%

Table 5. Broodstock fecundity by origin and age, BY 2004-2009.

Year	wild 1 salt	wild 2 salt	Hatchery 1 salt	hatchery 2 salt
2004	3460	5116	3156	4802
2005	1866	7447	3476	na
2006	2856	7075	3282	6641
2007	3877	na	3910	6326
2008	4646	5619	4956	na
2009	3444	5039	3797	5102

Table 6. Spawning and egg take summary for 2009 BY.

Spawn	Take	Tray	Stock	Cross	Grn egg	Eyed	Alevin	Fry
16-Apr	A1	2	bcxbc	WxW	5,079	4,559	4,257	3,975
16-Apr	A2	3	bcxoc	WxW	5,001	4,947	4,887	4,849
21-Apr	B1	4	ocxoc	WxW	4,167	4,138	4,080	4,055
29-Apr	C1	10	bcxbc	WxH	2,907	2,885	2,809	2,691
29-Apr	C2	11	bcxoc	WxH	5,102	4,901	4,888	4,866
29-Apr	C3	12	ocxbc	WxH	4,688	4,496	4,479	4,451
14-May	D1	14	ocxbc	HXW	2,778	2,558	2,395	2,354
14-May	D2	15	ocxoc	HxW	3,390	3,331	3,302	3,264
Total					33,112	31,815	31,097	30,505

Table 7. Brood Year 2009 green-egg to eyed-egg and eyed-egg to fry survival.

Spawn	Take	Tray	Stock	Cross	% Grn/eyed	% Eyed/fry
16-Apr	A1	2	bcxbc	WxW	89.80%	87.10%
16-Apr	A2	3	bcxoc	WxW	98.90%	98.01%
21-Apr	B1	4	ocxoc	WxW	99.30%	97.90%
29-Apr	C1	10	bcxbc	WxH	99.20%	93.27%
29-Apr	C2	11	bcxoc	WxH	96.10%	99.20%
29-Apr	C3	12	ocxbc	WxH	95.90%	94.90%
14-May	D1	14	ocxbc	HXW	92.10%	92.02%
14-May	D2	15	ocxoc	HxW	98.30%	97.98%
Total					96.20%	95.05%

Table 8. BY 2009 monthly rearing and survival.

2009 BY Monthly Rearing and Survival Data									
Month/YR	Beg. Inv.	End Inv.	# of Morts	Monthly Survival	Cumulative Survival	# of FPP	Type of Feed	Feed Size	% BWF
Jun-09	30505	30344	161	99.47%	99.47%	1063	Bio OR	#0-#1	3.50%
Jul-09	30344	30261	83	99.20%	99.20%	326.9	Bio OR	#1, #2	3.00%
Aug-09	30261	30188	73	98.96%	98.96%	197	Bio OR	#3 CRM	3.00%
Sep-09	30188	24679	5509	80.90%	80.90%	79	Bio OR	.9, 1.2mm	2.80%
Oct-09	24679	24578	101	80.57%	80.57%	57.62	Bio OR	1.2mm	2.80%
Nov-09	24578	24605	*	81%	81%	59.67	Bio OR	1.2mm	2.80%
Dec-09	24605	24526	79	80.39%	80.39%	48.53	Bio OR	1.2, 1.5	2.80%

Table 9. 2009 BY PIT tag and CWT numbers by strain.

2009 BY tagging and mortality						
Date	**Cross**	**Number**	**CWT Only**	**PIT/CWT**	**Smalls**	Morts
10/13/2009	HxW	7060	1676	5100	290	-6
10/14/2009	WXW	4489	1517	2516	461	-5
10/15/2009	WxH	6152	2245	3546	368	-7
10/16/2009	HxW	6904	3236	3320	351	-3
Totals:		24605	8674	14482	1470	-21

Table10. 2008 BY monthly rearing data, January 2009-April 2009.

Month/Yr	Beg. Inv.	End Inv.	# of Morts	Monthly Survival	Cumulative Survival	# of FPP	Type of Feed	Feed Size	% BWF
Jan-09	16130	16009	121	**99.24%**	**97.01%**	19..5	Bio-Vita	1.2&2mm	2%
Feb-09	16009	15955	54	**99.60%**	**96.69%**	14.8	Bio-Vita	1.2,2,2.5m	1.80%
Mar-09	15955	15535	420	**97.36%**	**94.14%**	11.1	Bio-Vita	1.2,2,2.5m	1.80%
Apr-09	15355	14932	423	**97.24%**	**90.49%**	6.4	Bio-Vita	2,2.5mm	1.80%
9-May	**Fish released 5/1-5/8, 2009**								

Table 11 2008 BY average monthly length, weight and coefficient of variation (CV), January 2009 – April 2009.

Month/Yr	Avg. Len. (mm)	SD	CV	Avg. Wt. (g/fish)	SD	CV
Jan-09	120.32	16.99	14.12	17.5	6.98	39.86
Feb-09	142.41	17.57	12.33	23.56	10.82	45.92
Mar-09	161.52	19.55	12.10	41.41	14.57	35.17
Apr-09	189.02	11.76	6.22	64.34	18.54	28.8

Table 12. Total number of PIT tags released by drainage and year.

Planting of Juvenile Hatchery Fish In Omak Creek						
Broodyear	**plant date**	**location**	**# fish**	**f/lb.**	**lbs./ fish**	**PIT Tags Released**
2004	4/10/2005	Stapaloop Cr	13232	20.79	636.45	13232
2005	4/10&13/ 2006	stapaloop	19862	17.32	1136.00	19867
2006	4/10&11/ 2007	StMary's pond	9898	37.00	268.00	19772
2006	4/13/2007	Omak Cr	9874	11.10	890.15	
2006	5/10&11/ 2007	Salmon Cr	7447	10.21	729.10	ad clipped
2007	4/4/2008	NinemileCr	5152	17.00	303.05	
2007	4/4/2008	AntioneCr	2856	17.00	168.00	
2007	4/8/2008	Tunk Cr	4993	17.00	293.70	ad-clipped
2007	4/29&30/ 2008	Omak Cr- Haley, Lobe	19914	11.75	1694.55	6735*
2008	5/1-5/8/2009	acc pond, below falls	15505	7.8/lb	1,751.90	13365

Table 13. Total number of O. mykiss collected in the Omak rotary screw trap.

Daily Summary- 2009 Rotary Screw Trap- Omak Creek				
Date	**W. O.mykiss**	**H. O.mykiss**	**Other**	**Total**
4/21/2009	30	0	10	40
4/23/2009	63	182	33	278
4/24/2009	54	273	10	337
5/6/2009	115	57	6	178
5/7/2009	37	55	7	99
5/8/2009	46	64	1	111
5/9/2009	56	33	4	93
5/10/2009	78	10	5	93
5/11/2009	86	12	2	100
5/12/2009	139	28	6	173
5/13/2009	107	26	11	144
5/15/2009	63	23	3	89
5/18/2009	32	26	6	64
Total:	906	789	104	1799

Table 14. Multi-year juvenile trap summary- Omak Creek.

	Omak Creek Juvenile Trapping Summary												
	Hatchery	**wild**							**Total**	**Total**			
Year	**O.mykiss**	**O.mykiss**	**CHNK**	**WF**	**BLS**	**EBT**	**NPM**	**Other**	**Omykiss**	**Other**	Start	End	# Days
2006	457	85	3103								5/1/2006	6/2/2006	32
2007	2393	2213	15	2	107	19	1	7	4606	242	4/4/2007	5/22/2007	48
2008	178	5012	2031	15	387	13	5	64	5190	484	4/14/2011	5/24/2011	40
2009	906	789	10		80	9	2	3	1799	104	4/21/2009	5/18/2009	27
NOTE:	2009 was a low water year which affected trapping time. Trap fished 13 out of 27 days deployed												
	In 2006 the RST was in a different location that lowered trap efficiency. It was moved in 2007												
	to its current location.												

Table 15. Smolt to adult returns (SAR) and Hatchery Return Rate of Omak Creek locally-adapted steelhead back to Wells Dam for 2004 - 2009. Passive integrated transponder (PIT) detections were not corrected for tag loss, residuals or stray rate.

Release Year (RY)	Number of Broodstock (RY-1)	PIT smolts released	Adult Detections at Wells Dam	SAR (%)	#smolts per adult	HRR
2004	4	13,232	22	0.17%	3308	5.5
2005	16	19,862	7	0.04%	1241	0.4
2006	15	19,772	0	0.00%	1318	0.0
2007	11	6,753	15	0.22%	614	1.4
2008	12	13,665	0	0.00%	1139	0.0
2009	8	14,482	8	0.06%	1810	1.0

Table 16. Juvenile abundance estimates by tributary.

Tributary name	Snorkel Density fish/square meter	Wetted Width ave (m)	Reach ave (m)	Available Habitat square meters	Redds mean over years	Potential Abundance juveniles <300mm
**Tonasket Creek	0.02	0.33	2895	946		18
Aeneas Creek	0.01	10.17	943	9588		118
Antoine Creek	0.06	1.91	1347	2568	-	148
*Tunk Creek	0.08	3.26	924	3014	-	243
* Loup Loup Creek	0.11	2.03	3006	6098	-	650
Bonaparte Creek	0.52	2.03	1430	2899		1519
Ninemile Creek	0.29	1.70	8621	14664		4183
**Salmon Creek below we	0.26	3.66	5900	21605		5510
Salmon Creek above weir	0.06	5.59	18530	103538		6167
Omak Creek below falls	0.20	4.43	8173	36241		7155
Omak Creek above falls	0.09	5.59	17790	99455		9384
***Wild Horse Spring Cree	-	-	-	-	-	-
Chewiliken Creek	-	-	-	-	-	-
Chiliwist Creek	-	-	-	-	-	-
Johnson Creek	-	-	-	-	-	-
Siwash Creek	-	-	-	-	-	-
Tallant Creek	-	-	-	-	-	-
Wanacut Creek	-	-	-	-	-	-
Whitestone Creek	-	-	-	-	-	-
						35095

*Used snorkel data above anadromous barrier. Fish observed during snorkeling could have been anadromous or resident.
** Water drys up, actual abundance is minimal because water drys up
***ON Wild Horse, is a zero, but there is potential habitat if it could hold water. Not a huge number

Figure 1. Run Timing for summer steelhead in Omak Creek 2005-2009.

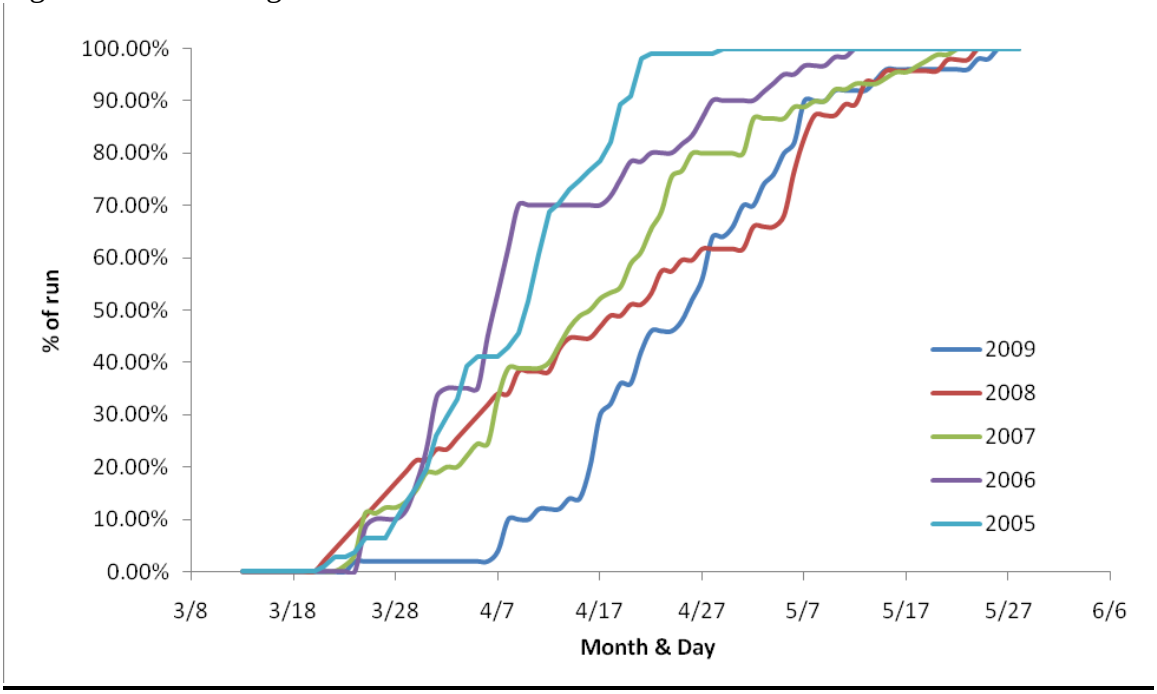

Figure 2. Run Timing for summer steelhead in Bonaparte Creek. 2006-2009.