

Colville Tribal Fish Hatchery

**Annual Report
2000 - 2001**



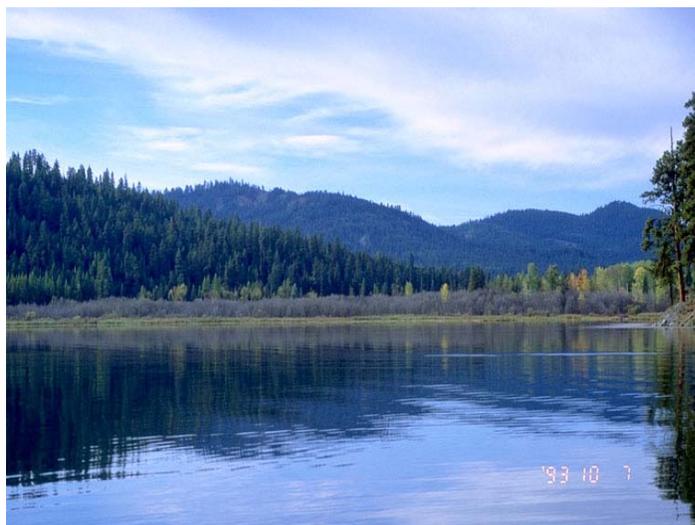
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COLVILLE TRIBAL FISH HATCHERY PRODUCTION REPORT; 2001



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INTRODUCTION

Federal hydropower projects as well as private power utility systems have had a devastating impact upon anadromous fish resources that once flourished in the Columbia River and its tributaries. Several areas were completely blocked to anadromous fish by dams, causing the native people who's number one food resource was salmon to rely entirely upon resident fish to replace lost fisheries resources. The Colville Tribal Fish Hatchery is an artificial production program to partially mitigate for anadromous fish losses in the "Blocked Area" above Chief Joseph and Grand Coulee Dams pursuant to Resident Fish Substitution Policy of the Northwest Power Planning Councils Fish and Wildlife Program. The hatchery was accepted into the Council's Fish and Wildlife Program in 1984 as a resident fish substitution measure and the hatchery was completed in 1990.

The minimum production quota for this facility is 22,679 kg (50,000 lbs.) of trout. To achieve this quota the Colville Tribal Hatchery was scheduled to produce 174,000 fingerling rainbow trout (5 grams/fish), 330,000 sub-yearling rainbow trout (15 grams/fish), 80,000 legal size rainbow trout (90 grams/fish), 196,000 fingerling brook trout (5 grams/fish), 330,000 sub-yearling brook trout (15 grams/fish) and 60,000 lahontan cutthroat trout (15 grams/fish) in 2001.

All fish produced are released into reservation waters, including boundary waters in an effort to provide a successful subsistence /recreational fishery for Colville Tribal members as well as a successful non-member sport fishery. The majority of the fish distributed from the facility are intended to provide a "carry-over" fishery. Fish produced at the facility are intended to be capable of contributing to the natural production component of the reservation fish populations. Contribution to the natural production component will be achieved by producing and releasing fish of sufficient quality and quantity for fish to survive to spawning maturity, to spawn naturally in existing and future available habitat (i.e. natural supplementation), while meeting other program objectives.

In addition to the hatchery specific goals detailed above, hatchery personnel will actively participate in the Northwest Power Planning Council program, participate in the Columbia Basin Fish and Wildlife Foundation, Resident Fish Committee, and other associated committees and Ad Hoc groups that may be formed to address resident fish issues in the blocked area above Chief Joseph and Grand Coulee Dams.

Objectives

The following objectives are identified as components necessary to attain the aforementioned goal:

- (1) Provide hatchery production for 174,000 fingerling rainbow trout (90 fish/lb.), 330,000 sub-yearling rainbow trout (25 fish/lb.), 80,000 legal size rainbow trout (5 fish/lb), 196,000 fingerling brook trout (90 fish/lb.), 330,000 sub-yearling brook trout (25 fish/lb.) and 60,000 lahontan cutthroat trout (25 fish/lb.).

- (2) Hatchery production stocked into reservation waters should support a subsistence fishery that provides a catch rate of 1-fish/hr. and recreational/sport fisheries that provide an angler catch rate of 0.5-0.8 fish/hr.
- (3) Hatchery production should support fisheries that produce rainbow trout that average 342.9 mm (13.5" fork length), Brook trout that average 304.8 mm (12.0" fork length), Lahontan cutthroat trout that average 508 mm (20" fork length), and all species should have relative weights over 100.
- (4) Maintain brook trout brood stock sources and obtain 850,000 brook trout eggs annually from Owhi Lake to satisfy the brook trout production objectives.
- (5) Maintain lahontan cutthroat trout brood stock source and obtain 200,000 lahontan cutthroat trout eggs annually from Omak Lake to satisfy the lahontan cutthroat trout production objectives.
- (6) Develop a marking program for hatchery origin fish.
- (7) Conduct creel surveys for Buffalo, Owhi, Omak, and Twin Lakes to evaluate returns of hatchery production.
- (8) Conduct relative abundance estimates on Buffalo, McGinnis, Twin Lakes and selected remote lakes.
- (9) Determine bull, redband rainbow, and westslope cutthroat trout presence or absence in reservation streams.
- (10) Conduct genetic analysis of redband rainbow, bull, and westslope cutthroat trout collected during presence/absence surveys.
- (11) Contract for trophic cascade study to be initiated to identify fish/zooplankton interactions.
- (12) Provide administrative and technical over-sight for all BPA funded resident fishery projects implemented by the Tribes.

Rainbow Trout Production

Legal Rainbow Trout (Brood Year 2000)

Incubation

The 2000 brood year legal size rainbow trout consisted of Mt. Whitney rainbow stock received as eyed-eggs from the Ell Springs Hatchery (Washington Department of Fish and Wildlife). The Colville Tribal Fish Hatchery received 100,800 eyed-eggs on February 12, 2000. Eggs shipments were surface disinfected immediately upon arrival at the Colville Tribal Hatchery (100 ppm iodophor bath for 10 minutes). The eyed-eggs were then placed into vertical Heath Incubators for incubation, hatch and “button-up” stages. Incubator water flows were constant at 15 liters per minute during incubation and increased to 19 liters per minute after the eggs hatched.

Rearing

Legal rainbow trout stocks were ponded into Capalano and deep troughs as “swim-up” during late- April 2000. The first inventory occurred May 26, 2000, totaling 52,186 fish (1.5 grams/fish). Egg through swim-up survival was 52% low survival was a result of excessive fungus growth during incubation due to formalin treatments not being applied. This problem will be rectified in 2002. The feeding regime consisted of Bio-Diet Starter #2 and #3 feed, apportioned to the fish hourly, to satiation through June and Bio-Diet Grower 1.0 mm- 1.3 mm, 1.5mm; Silver-Cup 1.5 mm-2.5 mm; Moore-Clark 2.5 mm-3.5 mm and New Age Pacific dry 3.5 mm, fed 2-4 times daily through April-May 2001. The fish were reared in the Capalano troughs until September 12, 2000 at which time they were inventoried and moved to the outside rearing facilities (10’x100’ concrete raceways). The September 12, 2000 inventory totaled 42,637 fish, equaling 532 kg. (12- grams/fish) representing an inside rearing survival of 82 percent. The April 2001 inventory of brood year 2000 legal size rainbow totaled fish 37,815 (172 grams/fish) representing an outside rearing survival of 89 percent. Although survival was poor in 2001, the quality of fish was excellent illustrating the need for additional rearing space for this facility.

Water flow in the capalano troughs averaged approximately 0.22 cfs (101 gpm), while outside raceways averaged 1cfs (450 gpm.). Flow volume to the rearing vessels is not a concern at this facility, however density as a function of rearing space is problematic. Specific rearing densities were established for this facility during 2001 (Table 1) and legal size rearing densities for brood year 2000 rainbow trout remained below these established guidelines throughout the year because of poor survival. There is no rearing space available outside to accommodate the legal rainbow trout until the sub-yearling brook trout and rainbow trout components have been at least partially distributed into reservation lakes and streams. Changes in hatchery programming and egg timing along with the additional raceway space proposed for 2002 should help eliminate these issues.

Table 1.- New maximum rearing densities and loadings for the Colville Tribal Hatchery calculated using the load factor method (Piper 1970).

Hatchery Troughs						
Max. Flow (GPM)	Length (inches)	Permissible Loadings (Pounds/per trough)	Capacity (Number/trough)	Fish/pound	Loadings Max (lbs/gpm)	Max Density (Pounds/cu.ft)
101	1	110	274594	2500	1.09	0.06
101	2	220	68539	312	2.18	0.12
101	3	330	30480	92.5	3.26	0.19
101	4	439	16783	38.2	4.35	0.25
101	5	549	10929	19.9	5.44	0.31
Outdoor Ponds						
Max. Flow (GPM)	Length (inches)	Permissible Loadings (Pounds/per pond)	Capacity (Number/per pond)	Fish/pound	Loadings Max (lbs/gpm)	Max Density (Pounds/cu.ft)
483	2	1051	327764	312	2.18	0.22
483	3	1576	145760	92.5	3.26	0.33
483	4	2101	80193	38.2	4.35	0.44
483	5	2626	52316	19.9	5.44	0.55
483	6	3152	36561	11.6	6.53	0.66
483	7	3677	26642	7.2	7.61	0.77
483	8	4202	20010	4.8	8.70	0.88
483	9	4727	16300	3.4	9.79	1.00
483	10	5253	13331	2.5	10.88	1.11

Distribution

The hatchery out-planted 6,182 kg of legal size rainbow trout (37,815 fish) during the spring of 2001, averaging 172 grams per fish, ranging in size from 162 grams/fish in April to 189 grams/fish in May (Table 2). Distribution began April 10, 2001 and continued through May 5, 2001. Because of poor survival and disappointing returns of the Mt. Whitney rainbow trout stock, we will discontinue their use as part of our hatchery management practices. Starting with BY 2001 all rainbow trout eggs will be received from the Goldendale Hatchery and triploiding methodologies will be researched.

Goldendale Rainbow Trout (BY-2000)

Incubation

A total of 737,842-eyed rainbow trout eggs were received from the Goldendale Hatchery (WDFW) in two separate shipments. The first shipment arrived December 1, 2000 and the second shipment arrived on December 31, 2000. Eggs shipments were surface disinfected immediately upon arrival at the Colville Tribal Hatchery (100 ppm iodophor bath for 10 minutes). The eyed-eggs were then placed into vertical Heath Incubators for incubation, hatching and “button-up” stages. Incubator water flows were a constant 15 liters per minute during incubation and increased to 19 liters per minute after the eggs hatched. The fingerling component eggs were incubated on ambient water (13⁰C) and survival was approximately 81%

this is acceptable but could be improved with better daily care of eggs and formalin treatments during incubation (i.e. excessive fungal growth observed).

Table 2.- The Colville Tribal Hatchery 2001 distribution of legal sized rainbow trout.

Raceway	Date	Location	Pounds	Number	No.p/lb	Temp
R-3	4/10/2001	L.Goose	345.55	964	2.79	45
R-3	4/12/2001	L.Goose	370.55	1,034	2.79	45
R-3	4/12/2001	Round	539.45	1,505	2.79	46
R-3	4/16/2001	Bourgeau	360.60	1,006	2.79	56
R-3	4/17/2001	LaFleur	357.60	998	2.79	52
R-3	4/18/2001	N.Twin	788.05	2,199	2.79	45
R-3	4/18/2001	S.Twin	1,002.95	2,798	2.79	45
R-3	4/19/2001	N.Twin	1,065.35	2,972	2.79	44
R-3	4/19/2001	S.Twin	601.20	1,677	2.79	45
R-3	4/24/2001	Nicholas	532.80	1,487	2.79	49
R-3	4/24/2001	N.Twin	700.86	1,955	2.79	46
R-4	4/24/2001	N.Twin	392.95	1,140	2.9	46
R-4	4/24/2001	S.Twin	1,081.45	3,136	2.9	47
R-4	4/25/2001	Sugar	345.95	1,003	2.9	52
R-4	4/25/2001	N.Twin	1,028.00	2,981	2.9	48
R-4	4/25/2001	S.Twin	1,033.80	2,998	2.9	49
R-4	4/26/2001	N.Twin	1,129.50	3,276	2.9	48
R-4	5/17/2001	Stanger	218.05	523	2.4	50
R-4	5/22/2001	Lost	311.3	747	2.4	54
R-4	5/23/2001	Wilmont	313.15	752	2.4	64
R-4	5/24/2001	Hall	1,109.85	2,664	2.4	57
Totals:			13,628.96	37,815	2.65	

Rearing

The first shipment of Goldendale, rainbow trout were placed into Capalano troughs as “swim-up fry” on January 27, 2001 and began feeding immediately. The feeding regime consisted of Bio-diet Starter #2, apportioned to the fish hourly, to satiation. The fish were fed #2 Bio-Diet Starter, #3 Bio-Diet, 1.0 mm-1.5 mm Bio-Diet Grower feed the remainder of their rearing period. The second shipment of Goldendale, rainbow trout were ponded on February 2, 2001 and began feeding immediately. These rainbow trout were fed Bio-diet starter #2 and #3 apportioned to the fish hourly, to satiation, then 1.0 mm-1.5 mm Bio-Diet Grower, 1.5mm Moore-Clark and 1.5 mm Silver-Cup for the remaining rearing period, apportioned in 2-4 feedings per day.

The first inventory of Goldendale rainbow trout occurred in late-March 2001 and totaled 598,129 fish (1.05-1.67 grams/fish). They were moved to the outside rearing facilities in early-April 2001, with minimal mortality. The end of April inventory estimate totaled 568,138 fish (2.9 grams/fish) for an estimated March-April survival of 95 percent. Fingerling plants totaling 226,939 fish were removed to reduce loadings for the remaining 341,199 sub-yearling rainbows these fish stayed in the outside raceways until September of 2001. The final inventory in September recorded 318,768 fish providing an April-September survival value of 93 percent.

Distribution

The hatchery stocked 689 kg of fingerling rainbow trout (226,939 fish) and 6,370 kg of sub-yearling rainbow trout (318,768 fish) during 2001 (Table 3). Fingerling distribution occurred between May 1 to May 10, 2001, while sub-yearling distribution occurred between October 2 to October 23, 2001. Fingerling fish averaged 155 fish/lb ranging in size from 122 to 235 fish/lb, while sub-yearling fish averaged 24 fish/lb, ranging in size from 22 to 26 fish/lb (Table 3).

Table 3.- The Colville Tribal Hatchery 2001 distribution of Fingerling and Sub-yearling rainbow trout.

2001 Fingerling Distribution						
Raceway	Date	Location	Pounds	Number	No.p/lb	Temp
T-7	5/1/2001	S.Twin	259.52	38,635	148.87	49
T-8	5/1/2001	S.Twin	222.04	29,600	133.31	49
T-9	5/3/2001	N.Twin	224.76	30,219	134.45	49
T-10	5/3/2001	N.Twin	223.24	33,778	151.31	49
T-11	5/8/2001	N.Twin	229.50	28,004	122.02	52
T-12	5/8/2001	S.Twin	229.60	35,893	156.33	53
T-13	5/10/2001	S.Twin	65.64	15,405	234.69	53
T-13	5/10/2001	N.Twin	65.64	15,405	234.69	52
Totals:			1,519.94	226,939	155.43 average	

2001 Sub-yearling Distributions						
Raceway	Date	Location	Pounds	Number	No.p/lb	Temp
R-1	10/2/2001	N. Twin	984.20	21,967	22.32	61
R-1	10/2/2001	Bourgeau	168.00	3,750	22.32	
R-1	10/3/2001	N. Twin	1,265.40	28,244	22.32	61
R-1	10/3/2001	S. Twin	1,293.50	28,871	22.32	61
R-1	10/3/2001	S. Twin	269.10	26,769	22.32	
R-1	10/4/2001	LaFleur	1,199.30	6,006	22.32	61
R-2	10/5/2001	N. Twin	1,265.40	29,484	23.3	61
R-2	10/5/2001	S. Twin	1,321.60	30,794	23.3	58
R-2	10/8/2001	S. Twin	1,265.40	29,484	22.6	59
R-2	10/8/2001	L. Goose	221.00	4,995	22.6	
R-3	10/9/2001	N. Twin	1,546.60	33,716	21.8	55
R-3	10/10/2001	N. Twin	1,307.60	28,505	21.8	57
R-3	10/10/2001	S. Twin	956.08	20,843	21.8	56
R-2	10/23/2001	Buffalo	979.15	25,340	25.88	49
Totals:			14,042.33	318,768	24.39 average	

Fingerling and Sub-Yearling Brook Trout (BY-2000)

Spawning

Collection of brook trout eggs (brood year 2000) occurred in late October and early November 2000. Daily observations of the natural spawning brook trout population in Owhi Lake began

during mid- October 2000. Substantial numbers of adult fish were present on the spawning grounds by the third week in October. Three separate spawning operations occurred (October 27, 2000; November 4, 2000 and November 11, 2000). A total of 737,423-brook trout eggs were collected from 382 female fish (315,426 eggs; 305,984 eggs and 116,013 eggs for take #1, #2 and #3 respectively). Spawning activities involved beach seining adult fish from the spawning grounds on the spawning day, sorting fish by sex and ripeness. Retention of fish was limited to gravid fish, which were held in live-boxes placed in Owhi Lake. Fish were spawned without anesthetic, at a 1:1 sex ratio. Sperm activation and egg- rinsing utilized fresh water from the hatchery. Eggs were water-hardened in an iodophor solution (100ppm Iodine) for 30 minutes prior to being rinsed and transported to the hatchery in 19 liter insulated water coolers filled with fresh water from the hatchery. Biological samples (kidney, spleen and ovarian fluid) were taken from 60 spawned adults during the second spawn take and sent to the Olympia Fish Health Center for bacterial and viral analysis.

Incubation

Eggs were surface disinfected with 10% solution of iodophore for 10 minutes before they were placed into the Vertical Heath Incubators. Incubator water flows were 15 liters per minute, per stack during the “eyed stage” and was increased to 19 liters per minute after hatch. All brook trout eggs were treated with formalin (1670 ppm) for 10 minutes daily, up to one week prior to hatch. Brook trout eggs were incubated in ambient water temperatures of 15 °C. Observed eye-up averaged 84%, ranging from a high of 89% for spawn take #1 to a low of 78% for spawn take #2. Eyed-egg inventory contained 619,010 eggs that weighted 477 eggs per ounce.

Rearing

Brook trout began being moved to the inside rearing troughs as “swim-up” on December 16, 2001. The first egg take was moved to the inside rearing troughs as “swim-up” between January 8-16, 2001 and suffered substantial mortality related to a smothering event in which the fish bunched up into a corner of the trough during the first night after ponding. All troughs suffered essentially 100% mortality. It appeared that this component of our brook trout production was “ponded” prior to active “swim-up” activity. As a result, the fingerling plantings will be much smaller than planned but the sub-yearling stocking level identified for the program was fully planted. Survival from eyed egg to first sampling was only 62%.

The first inventory of brook trout occurred during the first week of April 2001 and totaled 385,061 fish from this group 28,062 fingerling brook trout were planted into Owhi Lake on April, 27th. Due to the limited number of brook trout, rearing densities were well below maximum recommended levels (Table 1), and therefore will not be addressed further in this report.

The feed regime consisted of Bio-Diet Starter #1 and #2, apportioned to the fish hourly, to satiation through the month of March. During the remainder of the rearing period, fish were fed #2 Bio-Diet Starter, #3 Bio-Diet, 1.0 mm-1.5 mm Bio-Diet Grower feed at a rate of 2-4 times per day, consistent with the manufactures feed chart. Final inventories were conducted on October

1, 2001 showing 324,507 fish remaining so the April to October survival for brook trout was approximately 91%.

Distribution

The hatchery out-planted 57 kg of fingerling brook trout and 5,465 kg of sub-yearling brook trout, totaling 352,569 fish (Table 4). Minimal fingerling stockings during 2001 were due to excessive mortality suffered during the initial ponding stage. The fingerling component was mostly grown to sub-yearling size to improve returns. Distribution occurred On April 27, 2001 for fingerling brook trout and between October 1 and November 7, 2001 for sub-yearlings. Fingerling brook trout weighted approximately 2 grams at time of release and sub-yearling adipose clipped fish averaged 16.5 grams/fish, ranging in weight from 14.7-24.9 grams/fish (Table 4).

Table 4.- The Colville Tribal Hatchery 2001 distribution of fingerling and sub-yearling brook trout (*-Indicates adipose clipped fish).

2001 brook trout fingerling distribution						
Raceway	Date	Location	Pounds	Number	No.p/lb	Temp
T-16	4/27/2001	Owhi	126.62	28,062	221.62	52
Totals:			126.62	28,062	221.62 average	
2001 sub-yearling brook trout distributions						
Raceway	Date	Location	Pounds	Number	No./lb	Temp
R-5	10/1/2001	Gold	261.40	5,037	19.27	
R-5	10/8/2001	L.Goose	46.80	1,001	21.38	
R-5	10/10/2001	Round	329.30	7,040	21.38	54
R-5	10/11/2001	S. Twin	998.30	18,218	18.25	
R-5	10/11/2001	N. Twin	1,167.00	21,297	18.25	
R-5	10/11/2001	Summit	165.15	3,014	18.25	
R-5	10/13/2001	N. Twin	731.10	13,343	18.25	
R-6	10/15/2001	S. Twin	1,125.00	35,409	31.48	
R-6	10/15/2001	N. Twin	1,125.00	35,409	31.48	51
R-6	10/16/2001	S. Twin	1,026.00	32,311	31.48	
R-7	10/17/2001	N. Twin	1,181.00	36,412	30.83	51
R-7	10/18/2001	Simpson	279.00	8,602	30.83	
R-7	10/18/2001	N. Twin	281.20	8,670	30.83	
R-7	10/18/2001	S. Twin	900.00	27,742	30.83	
R-8*	10/20/2001	McGinnis	167.25	5,021	30.02	54
R-8*	10/22/2001	Buffalo	1,167.00	35,033	30.02	
R-8*	11/7/2001	Owhi	1,096.68	30,948	28.22	
Totals:			12,047.18	324,507	27.5 average	

Lahontan Cutthroat trout (BY-2000)

Spawning

A conscious effort to reduce the Lahontan cutthroat trout egg -take was implemented during 1998 due to management concerns related to large stocking efforts in between 1996 –1998 (approximately 100,000/year) and relatively limited fishing effort on Omak Lake. While limited data do not indicate Omak Lake carrying capacity is being exceeded, the lake has been classified oligotrophic and fishery data is minimal (voluntary angler information), therefore the tribe is managing the stocking from a conservative perspective until monitoring activities provide more concise data for evaluation. The Omak Lake egg takes will continue to provide fish to meet the production objective of 60,000 sub-yearling fish annually.

A total of 108,921, Lahontan cutthroat trout eggs were collected at Omak Lake during two spawning operations (April 26, 2000 and May 3, 2000). Adult brood fish were captured utilizing a Merwin lake trap. The trap site was located in the northern most embayment of the lake near the mouth of No Name Creek and monitored three days per week throughout the adult collection period. Captured fish were separated by sex and held in 10'X10' X 15' holding pens until females were gravid, at which time they were spawned. Spawning consisted of retrieving gravid fish from the holding pens, delivering them to a shore location, where they were held in fresh water until actual spawning. Fish were live-spawned at a 1:1 sex ratio and released back into the lake. Milt activation, eggs rinsing and water-hardening occurred with fresh water from the hatchery. The fertilized, water-hardened eggs were transported to the hatchery in 19 liter, insulated water coolers. Biological samples (kidney, spleen and ovarian fluid) were taken from 60 spawned adults during the second spawn take and sent to the Olympia Fish Health Center for bacterial and viral analysis.

Incubation

Cutthroat eggs were received at the hatchery on the same day as the spawning operation (within two hours), and immediately surface disinfected with a 10-minute iodophor bath (100 ppm) and loaded into vertical heath trays for incubation. Incubator water flows were a constant 15 liters per minute, per stack during the “eyed stage” and was increased to 19 liters per minute after hatch. Observed “eye-up” averaged 77 percent, ranging from a high of 89 percent for the April 26, 2000 egg take to a low of 69 percent for the May 3, 2000 egg take (Table 5). The eye-up observed in 2000 was about normal for this population, which has typically varied between brood years relative to incubation success. Incubation success could be improved by treating eggs with formalin before hatching to reduce fungus formation.

Rearing

Lahontan cutthroat trout were ponded into the inside rearing troughs on June 22, 2000 and June 26, 2000 (egg-takes 1 and 2 respectively). The first inventory of cutthroat occurred in August 1998 and totaled 60,132 fish that averaged 0.32 g/fish. The May to June survival was 72% due to high mortality when fish were in the button-up stage from excessive fungal growth in the vertical heath trays and poor daily hatchery practices. To improve hatchery practices specific

daily duties have been assigned and will be monitored to insure that culturist are held accountable for performing daily inspections and maintenance of heath stack trays. At the time of planting 47,933 fish were inventoried that averaged 26 g/fish. June to March survival was 80% but the reason for poor survival in the raceways is unknown.

Table 5.- Results of the Omak Lake spawning operations and incubation of Lahontan cutthroat eggs in 2000.

Date	Total oz.	Eggs/oz.	Green Eggs	Eyed eggs	% eye	T.U. eye	Females	Eggs/female
4/26/2000	89.62	462.1	41,413	37,037	89	389	18	2,301
5/3/2000	146.09	462.1	67,508	46,880	69	410	28	2,411
Total	235.71	924.2	108921	83917	77%	399.5	46	2356

Distribution

Between the dates of March 14, 2001 and March 21, 2001, the Colville Tribal Hatchery out-planted 1260 kg of fish (47,933 fish) that averaged 26 g/fish (Table 6).

Table 6.-Lahontan cutthroat distributions for 2001

Raceway	Date	Location	Pounds	Number	No.p/lb	Temp
R-1	3/14/2001	Omak L.	900.00	15,525	17.25	43
R-1	3/14/2001	Omak L.	1,091.25	18,824	17.25	43
R-1	3/15/2001	Omak L.	787.50	13,584	17.25	43
Totals:			2,778.75	47,933	17.25	

Brood Stock Development and Fishery Monitoring /Evaluation

Brood stock Development

Adult adfluvial rainbow trout were monitored using “picket weirs” in the San Poil River and in Bridge Creek as part of the Lake Roosevelt Tributary/Habitat Enhancement Project in 2001. Possible red-band rainbow trout were discovered in Bridge Creek and genetic samples were collected from this site and sent to Hagerman Fish Culture Experiment Station for mitochondrial DNA analysis to assess stock purity. Results were unavailable at the time of writing but should be completed by May of 2002. Additional samples were collected from the North fork of Hall, Barnaby, Iron, Louie, North Nanampkin and South Nanampkin creeks. If any of these populations represent a pure red-band rainbow trout stock then fish will be collected to start a captive brood stock program at the Colville Tribal Hatchery.

Hatchery Monitoring / Evaluation

Specific fishery objectives including fish condition, average size and catch per unit effort (CPUE) are critical information that allow fishery personnel to evaluate and monitor the hatchery programs contribution to Reservation fisheries. Monitoring and evaluation activities conducted during the 2001 included:

- (1) Creel census activities on Omak, Owhi, North Twin and South Twin lakes;
- (2) Development, construction, and implementation of a comprehensive fish marking program;
- (3) Development, and planning for a lake and stream monitoring program for all reservation waters;
- (4) Background research and historical data analysis, HGMP development, and project planning;
- (5) Trophic cascade and other research projects;
- (6) Report writing and administration.

Creel Census Activities

Creel Census activities conducted on Owhi, North Twin, and South Twin lakes utilized a roving creel survey with a non-uniform probability sampling (Malvestudo). Omak Lake creel data from the inception of this fishery was collected but never compiled. The Omak Lake creel census is a volunteer creel but is supported by regulation and these data compare favorably with relative abundance survey data collected in the 1990's. Creel census criteria of particular interest are species caught, angler effort, average fish length, angler catch rates (ARC), and return to creel observed in these fisheries. Survey data can be used to adjust quantity, size, timing, and species of fish stocked from the Colville Tribal Hatchery and help achieve specific fishery management goals and objectives.

Owhi Lake

Monitoring the brook trout harvest from Owhi Lake is an important task for the hatchery program. Owhi Lake provides the only brook trout brood stock source for the entire reservation, as well as the largest single subsistence fishery for the tribal membership. Owhi Lake brook trout production encompasses both annual hatchery augmentation and natural production.

During the 2001-survey period (January - March, 2001), estimated catch of brook trout totaled 2,099 fish, for a CPUE of 0.92 fish per hour (Table 7). The estimated catch for 2001 was comparable to 1999 even though it was a very mild winter and the ice was often unsafe. Usage was lower than average at 2,275 hours of use compared to an average of 3,096 hours over the last 11 years. Average lengths and weights of fish caught increased from 2000 to 2001 but were slightly lower than the 11-year average. Average lengths were well above the 309 mm average length objective identified in the hatchery Annual Operating Plan. Population condition was

Table 7: Angler catch rates (ACR), length, weight, and condition for brook trout caught at Owhi Lake from 1984-2001.

Year	Hrs. Fished	Total Catch	Avg FL (mm)	Avg Wt (gr)	ACR (Fish/Hr)	Relative Weight
1984	3542	4994	298	312	1.41	101
1985	2214	2845	285	284	1.29	105
1986	ND	ND	ND	ND	ND	#VALUE!
1987	ND	ND	ND	ND	ND	#VALUE!
1988	ND	ND	ND	ND	ND	#VALUE!
1989	2832	2556	316	416	0.90	112
1990	3046	3561	329	426	1.17	101
AVG.	2909	3489	307	356	1.17	105
1991 *	1086	932	319	433	0.86	113
1992 *	ND	ND	ND	ND	ND	#VALUE!
1993 *	4248	2974	365	612	0.70	105
1994 *	5335	4728	361	575	0.89	102
1995 *	1539	1321	383	718	0.86	106
1996 *	1978	2261	379	653	1.14	100
1997 *	4388	3351	370	628	0.76	103
1998*	1067	1197	359	573	1.12	104
1999*	2310	2133	356	533	0.92	99
2000*	2844	6739	334	427	2.37	97
2001*	2275	2099	353	513	0.92	98
AVG.	3096	2595	363	603	1.05	106

ND - No Data Available

* - Hatchery Operation Years

lower than historic and slightly below the goal of a relative weight of 100 but increased from 2000 and fewer fish will be stocked in 2002 to help improve the condition of fish at Owhi Lake (Table 7).

Observed values for average fish length, weight and condition factor of fish harvested during the hatchery operation years of 1991 to 2001 exceed those observed during the pre-hatchery operation years of 1984 to 1990. However, average CPUE was 90 percent of that observed in the 1984-1990 period (Table 7). Tribal fisheries management practices using our hatchery program as a tool have positively influenced the average fish length and weight with a corresponding decrease in CPUE. The decrease in CPUE would be considered a normal biological response to increased average fish size. At Owhi Lake, anglers prefer and biologically this fishery is more balanced with fewer large brook trout as opposed to many small brook trout. Owhi Lake continues to be the Colville Tribes most important Tribal fishery and remains robust.

Twin Lakes (North and South)

Monitoring and evaluating fishery data collected from North and South Twin Lakes is important because in some year up to 65% of all hatchery production is collectively stocked into these waters. Twin Lakes is the most prominent fishery and most important non-member sport fishery on the Colville Reservation (Figure 1).



Figure 1: The tranquil beauty of North Twin Lake, not shown are the improved facilities that are available at the lake including, cabins, 2-resorts, campgrounds, and boat ramps.

Rainbow Trout

An estimated 18,442 rainbow trout were harvested during the 2000 creel survey period from April to October (Table 8). Twenty-three years of creel, data collected from Twin Lakes has indicated a very stable fishery with little change in fish size or catch rates. During 2001, no data was collected and existing data was analyzed to determine if management changes were needed (Table 9). Return to creel analysis indicated that in years when stocking was reduced to between 10 and 14 pounds of fish per acre that return to creel increased dramatically. However, in 1997, this was not the case so, in 2002 stocking will be reduced to 10 pounds per acre and creel data will be collected to see if the return to creel increases. Creel data protocols were redefined in 2001 for Twin Lakes so that data are collected for both North Twin and South Twin lakes independently. Largemouth bass populations have been a concern for the last 10 years and in 2002, we will assess this population. Predation and competition between largemouth bass and trout could be masking results from past management decisions. Trophic Cascade data designed to determine zooplankton fish interactions has been halted due to the poor health and latter death

(November of 2001) of the primary researcher Dr. Edmond Broch. A slight change in scope of the zooplankton work proposed will be conducted but will be limited to zooplankton size ratios and peak emergence timing but will be expanded to include all Colville Reservation lakes and conducted by the Colville tribes Fish and Wildlife Department staff. Wild fires raged across the Colville Reservation in 2001 and Dr. Brochs student were only able to conduct one sampling attempt at Buffalo Lake and none at Twin Lakes as a result. Fire restrictions also canceled the gill netting surveys schedules for Twin Lakes. Reducing the amount of data collected from Twin Lakes when compared to past years has allowed biologist to catch up on data analysis and

Table 8: Rainbow trout creel data collected from Twin Lakes over the period from 1978 to 2000.

Year	Hrs. Fished	RBT Catch	AVG. FI (mm)	AVG. Wt (gr)	ACR Fish/Hr.	Relative Weight
1978	55,653	26,526	274	278	0.48	129
1979	81,124	24,094	279	277	0.30	122
1980	64,323	48,158	269	297	0.75	146
1981	55,528	35,617	296	384	0.64	141
1982	57,659	28,338	303	388	0.49	133
1983	45,173	28,655	287	343	0.63	138
1984	51,614	22,916	305	415	0.44	139
1985	44,760	14,766	308	427	0.33	139
1986	42,893	11,873	304	479	0.28	162
1987	47,676	38,812	274	297	0.81	138
1988	52,571	39,072	293	369	0.74	140
1989	39,019	25,520	299	387	0.65	138
1990	47,929	19,316	320	444	0.40	129
AVG.	52,763	27,974	293	368	0.533	139
1991*	40,411	18,967	300	374	0.47	132
1992*	40,452	29,896	286	319	0.66	130
1993*	60,110	26,077	300	352	0.43	124
1994*	91,928	32,912	304	391	0.36	132
1995*	74,411	28,996	283	295	0.39	124
1996*	29,611	10,940	317	412	0.37	123
1997 *	20,930	9,094	308	358	0.44	116
1998*	13,187	29,252	310	381	0.45	122
1999*	34,825	17,411	325	436	0.50	121
2000*	32,470	18,442	310	390	0.57	124
AVG.	43,834	22,199	304	371	0.452	125

*Denotes years when Colville Tribal Hatchery produced fish were stocked.

Table 9: Results from the Twin Lakes return to creel analysis from 1991-2001.

Year	Species	Acres	lbs		Harvest	Avg. Size	lbs.Harvested/ac.	% return
			stocked	lbs/ac.				
1991	RBT	1937	23871	12.3	18967	0.82	8.1	66
1992	RBT	1937	31857	16.4	29896	0.70	10.9	66
1993	RBT	1937	15606	8.1	26077	0.78	10.4	130
1994	RBT	1937	17516	9.0	32912	0.86	14.6	162
1995	RBT	1937	18590	9.6	28996	0.65	9.7	101
1996	RBT	1937	22527	11.6	10940	0.91	5.1	44
1997	RBT	1937	16431	8.5	9094	0.79	3.7	44
1998	RBT	1937	25703	13.3	29252	0.84	12.7	96
1999	RBT	1937	30029	15.5	17411	0.96	8.6	56
2000	RBT	1937	30029	15.5	18442	0.86	8.2	53
Annual return to creel averages			22459	11.6	22616	0.81	9.3	85

planning for future years. Good baseline data has been collected for twin lakes so future efforts will focus on trend analysis and not require annual data collection, instead more time will be spent collecting data on other lakes where less data has been collected.

Brook Trout

During the 2000 survey period (April 13 - October 14) an estimated 2,907 brook trout were harvested for a catch rate of .09 fish per hour. The average fish length (339mm) exceeded the 304 mm length objective identified for the program (Table 10). Average length, weight, and catch rates have increased since the Colville Tribal Hatchery has been producing fish stocked into Twin Lakes. However, condition of brook trout has been on a steady decline and in 2000, the population exhibited a condition below the stated goal of 100 across all lengths. Increases in the size and number of fish in Twin Lakes has reached a point of diminishing return and as a result future stockings will be reduced in an attempt to avoid a crash of this population. Return to creel data was analyzed in 2001 (Table 11). Results of the brook trout return to creel analysis compared favorably with those from the rainbow trout analysis and showed that lower stocking rates increased return to creel. Reducing stocking rates to between 10 and 14 pounds per acre in future years for these lakes should result in higher returns to creel. To test this theory, 2002 stocking at both North and South Twin Lakes will be reduced to 10 lbs/acre.

Creel data protocols were redefined in 2001 for Twin Lakes so that data are collected for both North Twin and South Twin lakes independently. When creel data was compared to, gill net survey data (Table 12) a bias toward low catch rates for brook trout was identified. New creel protocols will distinguish between hours-expended fishing for brook trout and those expended fishing for rainbow trout. The brook trout angler effort is concentrated in early spring and late in the fall, rather than throughout the entire survey period. The rainbow trout fishery occurs throughout the lake from April to September, therefore the creel census program has historically over-estimated total hours expended fishing for brook trout, which negatively influences the catch rate. Gill net data indicated that brook trout averaged approximately 40 percent relative abundance in North and South Twin Lake (Table 12). Creel data indicated that brook trout averaged approximately 18 percent of the angler harvest in the Twin Lakes Fishery during the same time-period. The 1998 and 1999 data shows rainbow trout as more dominant than brook

trout but 1995 and 1996 data show that the dominance is reversed (Tables 11 and 12). Data are inconsistent but the introduction of large triploid rainbow trout in 1998 and 1999 provided additional fish from outside funds that increased angler catch rates of rainbow trout and also likely increased gill net catch rates in 1998 and 1999. The additional stockings of large rainbow trout in 1998 and 1999 would account for some of the inconsistencies in these data. New creel protocols developed in 2001 will ensure that appropriate strata are being sampled and that data can be used to accurately evaluate fishery trends.

Table 10: Brook trout creel data collected from Twin Lakes over the period from 1978 to 2000.

Year	Hrs. Fished	EBT Catch	AVG. FI (mm)	AVG. Wt (gr)	ACR Fish/hr	Relative Weight
1978	55,653	2,414	295	342	0.04	114
1979	81,124	2,677	302	360	0.03	111
1980	64,323	8,453	268	304	0.13	136
1981	55,528	9,361	303	379	0.17	116
1982	57,659	5,681	314	415	0.20	114
1983	45,173	4,321	303	389	0.10	119
1984	51,614	7,020	310	419	0.14	120
1985	44,760	6,793	311	434	0.15	123
1986	42,893	2,646	340	593	0.06	127
1987	47,676	600	336	531	0.01	118
1988	52,571	966	309	421	0.02	121
1989	39,019	1,167	302	396	0.03	123
1990	47,929	794	358	656	0.02	120
AVG.	52,763	4,069	312	434	0.08	122
1991*	40,411	1,045	336	536	0.03	119
1992*	40,452	2,681	330	457	0.07	107
1993*	60,110	2,709	337	468	0.05	103
1994*	91,928	5,670	307	403	0.06	118
1995*	74,411	13,141	321	410	0.18	105
1996*	29,611	5,215	329	454	0.18	108
1997*	20,930	3,842	346	500	0.18	101
1998*	29,252	2,766	351	557	0.09	108
1999*	34,825	2,528	344	508	0.07	105
2000*	32,470	2,907	339	455	0.09	98
AVG.	51,122	4,900	329	461	0.11	109

*Denotes years when Colville Tribal Hatchery produced fish were stocked.

Table 11: Results from the Twin Lakes return to creel analysis from 1991-2000.

Year	Species	Acres	lbs stocked	lbs/ac.	Harvest	Avg. Size	lbs.Harvested/ac.	% return
1991	EBT	1937	17517	9.0	1045	1.18	0.6	7
1992	EBT	1937	8053	4.2	2681	1.01	1.4	34
1993	EBT	1937	8548	4.4	2709	1.03	1.4	33
1994	EBT	1937	9826	5.1	5670	0.89	2.6	51
1995	EBT	1937	6405	3.3	13141	0.90	6.1	185
1996	EBT	1937	7639	3.9	5215	1.00	2.7	68
1997	EBT	1937	9270	4.8	3842	1.10	2.2	46
1998	EBT	1937	13818	7.1	2766	1.23	1.8	25
1999	EBT	1937	10589	5.5	2528	1.12	1.5	27
2000	EBT	1937	10589	5.5	2907	1.00	1.5	28
Annual return to creel averages			10185	5.3	4400	1.05	2.3	53

Table 12: Gill netting data from Twin Lakes collected in June of 1994 to 2000.

Date	Total fish Caught	# BKT	Percent of Catch	# RBT	Percent of Catch	# LMB	Percent of Catch
Jun-94	150	141	94%	9	6%	ND	ND
Jun-95	363	187	52%	176	48%	ND	ND
Jun-96	114	79	69%	35	31%	ND	ND
Jun-97	0	0	ND	0	ND	ND	ND
Jun-98	373	179	48%	166	45%	28	8%
Jun-99	179	73	41%	90	50%	16	9%
Jun-00	195	63	32%	115	59%	17	9%
Avg.	196	103	56%	84	40%	20	8%

Gillnetting Surveys

Gillnetting surveys have been conducted on Buffalo Lake, South Twin and North Twin Lakes since 1994, in an effort to define the status of the free ranging fish population in reservation lakes that receive fish from the Colville Tribal Hatchery. Gillnetting activities during the 1994-2000 period only assessed the fish populations present in the month of June rather than seasonally throughout the year, this one-time sampling schedule only gives a “snapshot” of the potential population status during this period. A more ambitious sampling protocol was developed in 2001 to better assess true population parameters for all lakes on the Colville Reservation. New sampling protocols parallel the Washington Department of Fish and Wildlife protocols for standard sampling guidelines for ponds and lakes due to the large number of small inland lakes scattered across the reservation. Gill nets, trap nets, and electrofishing will all be utilized so that both warm and coldwater species can be surveyed. New protocols needed to be developed in an effort to increase precision and confidence in predicting fish population status in specific reservation waters, including hatchery and natural production contribution to fisheries across the Reservation. New sampling protocols will also allow for a more through analysis of data

collected including but not limited to relative weight analysis across all sizes of fish, length at age/capture, length frequency histograms and multivariate statistics.

Buffalo Lake

In 2001, gill net survey data for Buffalo Lake was reanalyzed to determine the value of this data. Considerable variability within and between years made this data difficult to interpret. Data was collected from four bottom set, variable mesh gill nets, 225 feet long, and one mid-water horizontal gill net 160 feet long, ($1\frac{1}{2}$ " x $1\frac{3}{4}$ " variable mesh) fished during mid – June of 1994 to 2000. Overnight sets were used with the average net being fished for 18 hours.

Sixty fish were captured in the gillnet survey during 2000. One net accounted for 40 kokanee and this likely biased the survey. However, kokanee salmon were also the most abundant salmonid recovered during 1999 (54% of the total catch; Table 13) indicating that the kokanee salmon population in Buffalo Lake appears may be increasing in abundance. In 2001, data collected for largemouth bass was also included in the analysis and game fish composition was determined for Buffalo Lake (Table 13).

Gill net data was analyzed for relative abundance, relative weight, and average length. However, variable data made it difficult to determine specific trends. However, some general observations were possible: 1. The rainbow trout population appears stable in regard to abundance, size, and condition, 2. The largemouth bass population appears to be stable in abundance but is increasing in size, 3. The kokanee salmon population appears to be increasing in abundance, size, and condition, 4. No brook trout were collected during 1999 or 2000. Although a general idea of trend was possible to establish, new lake survey protocols were developed in 2001 that should allow future data analysis to yield improved precision and accuracy.

Future management on Buffalo Lake will focus on the development of a redband rainbow trout population. The first step was to eliminate all brook trout stocking in 2001 or 2002 and stock exclusively triploid rainbow trout in 2002, 2003, and 2004 while a captive redband rainbow trout brood stock is developed at the Colville Tribal Hatchery. Once redband rainbow trout begin being produced at the hatchery they will be exclusively stocked into Buffalo Lake in hopes of developing a wild brood stock. To improve the chances of success of a wild brood stock at Buffalo Lake restoration of the largest inflow is being pursued.

Illegal introductions of largemouth bass in the early 1990's, is likely contributing to a shift in the ecological balance at Buffalo Lake. To improve information available for this lake creel data will be collected in 2002 and the largemouth bass population will be surveyed using nighttime electrofishing, a more efficient gear for collecting bass than gill nets. Many Colville Reservation waters have had similar introductions and the trout populations are able to persist although catch rates are reduced. Stocking larger fish appears to improve return to creel. Brook trout were essentially non-existent in the gill net catches from 1994 to 2000 with the exception of 1997. The poor recruitment of brook trout into the Buffalo Lake fishery is most likely do to ecological conditions existing in the lake rather than general fish condition/health of the hatchery fish planted annually in the lake. Brook trout fisheries in other reservation waters performed well

throughout this period, and were augmented with the same brood years and stock of brook trout utilized to augment the Buffalo Lake brook trout fishery. Therefore, brook trout stocking was discontinued in the fall of 2001.

Table 13: Species composition of game fish in Buffalo Lake collected from gill net surveys during summer of 1994 to 2000.

Date	Brook Trout			Rainbow Trout		Kokanee Salmon		Largemouth Bass		Pumpkinseed		Total Caught
	# Caught	Relative Abundance	Percent of Population	# Caught	Percent of Population	# Caught	Percent of Population	# Caught	Percent of Population	# Caught	Percent of Population	
Jun-94	6	18%	17%	15	43%	13	37%			1		35
Jun-95	1	5%	5%	7	35%	11	55%			1		20
Jun-96	2	7%	6%	15	47%	14	44%			1		32
Jul-97	9		36%	6	24%	8	32%	1	4%	1	4%	25
Jul-98	3		8%	15	41%	9	24%	7	19%	3	8%	37
Jul-99	0		0%	7	27%	14	54%	4	15%	1	4%	26
Jul-00	0		0%	8	13%	48	80%	4	7%	0	0%	60
AVG.	4	11%	12%	11	36%	12	41%	4	13%	1	5%	29

Table 14: Buffalo Lake gill net survey data for game fish collected from 1994 to 2000.

Rainbow Trout

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight by size		
						Population all fish	S to P (30 to 50cm)	P to M (50 to 65cm)
1994*	15	9	1.67	329	597	159	N/D	N/D
1995*	7	9	0.78	338	642	157	N/D	N/D
1996	15	9	1.67	275	294	135	N/D	N/D
1997	6	9	0.67	339	631	135	130	93
1998	15	5	3.00	304	533	123	128	157
1999	8	5	1.60	311	453	108	104	105
2000	8	5	1.60	374	753	126	126	N/D
AVG.	10.57	7	1.57	324	558	135	122	118

Eastern Brook Trout

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight by size		
						Population all fish	S to P (26 to 33cm)	P to T (>33 cm)
1994*	15	9	1.67	329	597	142	N/D	N/D
1995*	7	9	0.78	338	642	140	N/D	N/D
1996	15	9	1.67	275	294	122	N/D	N/D
1997	9	9	1	296	376	119	111	110
1998	3	5	0.60	260	420	117	N/D	125
1999	0	5	0.00	N/D	N/D	N/D	N/D	N/D
2000	0	5	0.00	N/D	N/D	N/D	N/D	N/D
AVG.	7	7	0.82	300	466	128	111	118

Table: 14 Continued

Largemouth Bass

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight by size			
						Population all fish	S to P (20 to 30cm)	P to M (30 to 38cm)	M to Q (38 to 51cm)
1997	1	9	0.11	114	30	170	N/D	N/D	N/D
1998	7	5	1.40	273	593	128	N/D	145	120
1999	7	5	1.40	273	593	148	N/D	135	142
2000	4	5	0.80	336	1003	132	131	115	150
AVG.	5	6	0.93	249	555	144	131	132	137

Kokanee Salmon

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight
						Population all fish**
1997	8	9	0.89	179	79	83
1998	12	5	2.40	219	146	93
1999	14	5	2.80	214	123	95
2000	48	5	9.60	227	181	100
AVG.	21	6	3.92	210	132	93

* 1994 and 1995 data taken from 1999 annual production report but could not be verified.

** Standard weight equation determined from 2000 data regression analysis.

Twin Lakes

Because of the high variability of the gill net data collected since 1994, no data was collected in 2001. Biologist instead developed new sampling protocols to allow high quality data to be collected in the future. Equipment was purchased and new employees capable of carrying out these new protocols were hired. In 2002 new data, using electrofishing, gill nets and trap nets will be collected from Twin Lakes. Additionally new tagging procedures for 100 % of the Colville Tribal Hatchery's production will be in place and using net pens to increase rearing space and allow large average fish sizes to be stocked will be pursued. Results of the 2000 data collected, has already been described (Table 12). Relative abundance, size, and condition of game fish populations at Twin Lakes appear to be stable.

Fish marking

A major accomplishment in 2001 was the design, purchase, and construction of a mass-marking trailer (Figure 2). Upon completing the construction of this marking trailer, it was immediately pressed into service so that all sub-catchable and catchable rainbow, brook, and cutthroat trout on station could be marked before being stocked into reservation waters.

Beginning on October 2nd after completion of construction at the Colville Hatchery and hiring of personnel, 269,806 trout were adipose clipped. Adipose clips are a secondary mark designed to make creel clerks aware of the possible presence of the primary mark. Elastomer marks are the primary marking and allows differentiation of different stocks, sizes at stocking, and year classes

of fish. Elastomer marks began being applied on November 7th, 2001. Due to a lack of time sub-catchable stocking in the fall of 2001 occurred with fish that had only an adipose clip. Fish remaining in the hatchery over winter were white Elastomer marked behind the right eye. A total of 97,609-rainbow trout that will be planted in the spring of 2002 as catchable fish were marked. One thousand of these fish were placed in circular tanks at the Colville Tribal Hatchery for mark retention studies. Samples taken during the marking process showed only slight reduction in growth rates when compared to unmarked fish. Workers averaged 287 marked fish per hour with continued training 300 fish per hour should be easily obtained. So, if 1,000,000 fish are to be marked next year then 5 people working 4 months each will be needed.



Figure 2: Fish marking trailer was designed, constructed, and began marking fish in 2001.

A study to determine long-term Elastomer retention rates and differences in retention from various marking locations was initiated in 2001. Four groups of 250 fingerling rainbow trout were marked. Group 1 was marked in the dorsal fin, group 2 in the lower jaw, group 3 in the anal fish, and group 4 in the right eye/cheek. Retention data is collected weekly into 2003 along with weight and length samples and data analysis will begin in 2002.

With the planning, design and construction of the tagging trailer behind us looking forward the training and retention of tagging personnel is critical to the success of this project. Mass marking our hatchery production will allow biologist to determine population estimated on waters of the Colville reservation stocked with marked fish and allow the amount of natural

reproduction to be determined. If timing issues can be worked out and because the CHMT is mobile it is possible that other BPA projects that have tagging needs could benefit from this project. If we are successful at providing permanent employment for marking employees then production increases could occur and employee retention would be enhanced.

Native fish assessment

To assess the native salmonids present on the Colville Reservation will require the surveying of hundreds of miles of streams. In 2001, planning on where to start and determining needed data was completed. Stream prioritization was based upon elevation, temperature, and a review of the literature for perennial streams. The highest priority went to perennial streams over 3000 feet in elevation with summer maximum temperatures below 18 degrees Celsius. The list of streams follows: Anderson Creek, Armstrong Creek, Bear Creek, Buckhorn Creek, Cache Creek, Camp Seven Creek, Clark Creek, Deerhorn Creek, Empire Creek, Haley Creek, Johnson Mountain Creek, Kartar Creek, King Creek, Klondyke Creek, Lime Creek, Loony Creek, Mill Creek, Nason Creek, North Nanamkin Creek, Omak Creek, Owhi Creek, Sleepy Hollow Creek, South Nanamkin Creek, Stall Creek, Stapaloop Creek, Strawberry Creek, Swimpkin Creek, Thirteen Mille Creek, Thirty Mile Creek, Tunk Creek, Twentyfive Mile Creek, Twentyone Mile Creek, Twentythree mile Creek, and Wells Creek.

To facilitate data collection in 2001, BPA project # 1990001800, Lake Roosevelt Habitat Improvement Project collected data on North and South Namamkin Creeks, Twentyfive Mile Creek, and Bear Creek as part of their passage improvement duties, BPA project # 200000100, Improvements of Anadromous Fish Habitat and Passage in Omak Creek has collected a wealth of data for Omak Creek. Unfortunately, wildfires in the Omak Creek drainage burned out of control most of the summer and resulting from retardant spills in and around the creek, most resident fish were killed in a large area. Research into recolonization by resident fish is currently being studied. To date no native resident salmonid populations have been identified in these creeks but data collection is not complete.

Genetic samples of rainbow trout collected from Bridge Creek, Barnaby Creek, and the west fork of Hall Creek were sent for analysis at the University of Idaho results should be available in May of 2002. These Creeks were selected based upon our literature review and were identified as possible populations of native redband rainbow trout. Four miles of Kartar Creek were surveyed and 53 brook trout ranging in size from 50 to 140mm were collected but no resident fish were identified. In 2002, at least 5 streams will be surveyed.

Summary

The year of 2001 marked a distinct shift in management philosophy and personnel. In May, the old project biologist left the Colville Tribes for a new opportunity after 13 years. A replacement was not found until late August and then wildfires closed access to many areas well into October. However, with new enthusiastic people on board, time to plan, strategize, and modify the management of resident fisheries on the reservation was welcome. Planning is in place and we look forward to providing improved recreational and subsistence fisheries of all the people of the

region and the Colville Tribal membership in years to come. The 2002 statement of work reflects many changes that will help us achieve our long-term goals.

The Colville Tribal Fish hatchery distributed 20,065 kilograms (976,984 fish) during 2001, representing 88 percent of the annual production goal of 22,679 kilograms (Table 15). North and South Twin Lakes received approximately 78 percent of the total hatchery production by number, followed by Buffalo Lake, Owhi Lake, and Omak Lake with 6%, 6% and 5% respectively. Average fish size at distribution for legal rainbow trout, sub-yearling rainbow and brook trout, fingerling rainbow and sub-yearling lahontan cutthroat trout were 2.65 fish/lb, 24 fish/lb, 28 fish/lb, 155 fish/lb and 17 fish/lb respectively. All production, with the exception of fingerling rainbow trout sub-yearling brook trout components were larger than specified in the production plan. The increased size was primarily due to reduced numbers of sub-yearling rainbow trout and the extended rearing period for rainbow trout yearlings that were destined for stream stocking late into the summer period. Generally, rearing densities were within acceptable levels once the fish reached approximately 3- grams per fish in size, however the rearing densities during the inside rearing period for legal rainbow trout were maximized. Several problem events occurred during the 2001 rearing period involving rainbow and brook trout. High mortality due to bacterial coldwater disease and extensive fungal growth during incubation resulted in higher than normal losses of larval fish.

Continued monitoring of potential reservation rainbow brood stocks identified Barnaby, Bridge, and the west fork of Hall Creeks as potential sources for redband rainbow trout and genetics work is underway to determine the purity of these stocks. Hatchery space will be the limiting factor in developing a captive brood stock program if these stocks are identified as pure redband rainbow trout.

The fisheries within the boundaries of the Colville Reservation were determined to be stable both in regard to populations of trout or other game fish and angler usage. Most of the fisheries monitored meet or exceed established goals for catch rates, mean size of fish, and fish condition. However, illegally introduced predators and poor spawning habitat resulting in little natural recruitment continue to be limiting factors for many reservation waters. To reduce predation impacts we hope to develop net pen sites at Buffalo, North, and South Twin lakes in 2002, where sub-catchable size rainbow trout and brook trout at twin lakes, can be grown out to larger sizes before being released to increase return to creel. Additionally, surveys of predatory game fish will be initiated in 2002. The 2001 brook trout fishery at Owhi Lake continued to be a robust fishery. This lake will serve as a model of establishment of a wild redband rainbow brood stock to be developed in the future. Gillnet surveys on Buffalo Lake during 2000 indicated that kokanee salmon trout are the dominant salmonid present. The rainbow trout population is most likely at minimal levels as indicated by gillnet catches so this lake has been identified as a candidate for redband rainbow trout once a captive brood stock program can be developed and starts to produce fish. Redband rainbow trout are native to this area and have been shown to obtain impressive size in waters with kokanee salmon populations.

It appears as if the operation of the Colville Tribal Hatchery is having a positive affect or at least maintaining the existing recreational and subsistence fisheries on the reservation. Some lakes and species have responded better to the hatchery program than others. Brook trout fisheries in

all waters monitored with the exception of Buffalo Lake have shown substantial improvement since the inception of the hatchery program, it is apparent that ecological interactions in Buffalo Lake specifically may be limiting the hatcheries contribution to that fishery. The hatchery effect upon the monitored rainbow fisheries doesn't appear as conclusive as the brook trout fisheries. With the new marking program in place, an expanded creel census, and increased lake surveying efforts will help determine the hatcheries current contribution to the reservation fishery and help define it's role in fisheries management on the Colville reservation.

Table 15: The number of trout by species and size, stocked into waters of the Colville Reservation during 2001.

Location	Lahontan	Fingerling	Legal	Subcatchable	Fingerling	Subcatchable	Total
	Cutthroat	Rainbow	Rainbow	Rainbow	Brook	Brook	
North Twin Lake		107,406	14,523	141,916		115,131	378,976
South Twin Lake		119,533	10,609	136,761		113,680	380,583
Bourgeau Lake			1,006	3,750			4,756
Buffalo Lake				25,340		35,033	60,373
Gold Lake						5,037	5,037
Hall Creek			2,664				2,664
LaFleur Lake			998	6,006			7,004
Little Goose Lake			1,998	4,995		1,001	7,994
Lost Creek			747				747
McGinnis Lake						5,021	5,021
Nicholas Lake			1,487				1,487
Omak Lake	47,933						47,933
Owhi Lake					28,062	30,948	59,010
Round Lake			1,505				1,505
Simpson Lake						8,602	8,602
Stanger Creek			523				523
Sugar Lake			1,003				1,003
Summit Lake						3,014	3,014
Wilmont Creek			752				752
Total:	47,933	226,939	37,815	318,768	28,062	317,467	976,984