March 7, 2002

RESPONSE TO ISRP COMMENTS

COLUMBIA CASCADE PROVINCE – OKANOGAN RIVER

Project #29013 - Acquire Land Adjacent to Chiliwist Creek and Develop Summer Chinook and Summer Steelhead Acclimation Pond.

1. *Assuming supplementation is a good strategy, it seems reasonable to spread out the acclimation and planting, as the proposal suggests…The response should contain a review of the literature for the advantages and disadvantages of the two basic approaches: acclimation ponds versus point releases without acclimation.*

Review of the literature indicates Pacific salmonids differ from steelhead trout in the effectiveness of acclimation on homing fidelity, and to a lesser degree survival. Pacific salmonids in general (Lister et al. 1981; Vander Haegen and Doty 1995; Johnson et al. 1990) and chinook salmon specifically (Garcia 2000) have better homing fidelity and distribution with acclimation. Steelhead trout do not benefit significantly in overall homing fidelity, while increased survival through acclimation seems inconclusive. Those studies directed at coastal steelhead populations found no increase in homing fidelity or survival with acclimation (Tipping 1998; Kenaston et al. 2001; Tipping and Hillson, manuscript submitted), while studies conducted on more inland river systems (Whitesel et al. 1994) and with an acclimation period greater than 6 weeks (Bjornn and Ringe 1984) have demonstrated significant increases in adult survival. The rearing/acclimation pond is intended for chinook, which will over-winter in Okanogan River water for 7 months prior to their volitional migration in April. Acclimation is not intended for steelhead. The steelhead will be released in the pond immediately following chinook emigration. The ancillary benefit of the pond through the volitional migration of steelhead is the elimination of the large single point releases the natural production endures with the direct release of thousands of steelhead smolts (McMichael et al. 1997, 2000).

Table 1. Review of literature for acclimation versus point releases without acclimation

Study	Summary
Lister, D.B., D.G. Hickey, and I. Wallace. 1981. Review of the Effects of Enhancement Strategies on the Homing, Straying and Survival of Pacific Salmonids. Contract Re., Department of Fisheries and Oceans, Vancouver, B.C. 51 pp	Data from the compilation of studies reviewed suggest if the release and rearing sites are close to each other, especially if they are on the same river, the salmon are likely to return to the rearing site, rather than the release site.
Bjornn, T.C. and R. R. Ringe. 1984. Evaluation of Conditioning Steelhead Trout in Cold Water after Rearing at 15C. Idaho Cooperative Fishery Research Unit. University of Idaho. Moscow Idaho.	Transferred steelhead from hatchery with 15C water to acclimation pond on tributary of Salmon River for acclimation of 8 - 12 weeks. Study had paired releases of acclimated versus direct planted fish, and found acclimated fish had higher adult survival in all groups within years compared with direct planted steelhead.
Johnson, Steven L., Mario F. Solazzi, and Thomas	Effects of transporting yearling coho salmon to

E. Nickelson. 1990. Effects on Survival and Homing of Trucking Hatchery Yearling Coho Salmon to Release Sites. North American Journal of Fisheries Management 10:427 - 433.	release sites in Oregon coastal river systems were determined by comparing the survival of fish transported before release to that of fish released without being transported. For yearling coho salmon trucked to another Oregon coastal river system for release, fish acclimated at the release site for 6 weeks before release showed consistently higher survival than groups released immediately upon arrival at the release site. Almost all returning adult fish released upstream from the rearing hatchery returned to the rearing site. Data suggest that much of the negative effect of transporting coho salmon can be eliminated if the fish are allowed to recover (acclimate) for a period of time. Objective was to supplement wild escapement. If data representative, it suggests transporting coho salmon to enhance natural spawning is ineffective.
Whitesel. T.A., P.T. Lofy, R.W. Carmichael. R.T. Messmer, M.W. Flesher, and D. W. Rondorf. 1994. A Comparison of the Performance of Acclimated and Direct Stream Released, Hatchery-reared Steelhead Smolts in Northeast Oregon. Pages 87-92 *in* D.D. MacKinlay, editor. High Performance Fish. American Fisheries Society, Physiology Section, Bethesda, Maryland.	Steelhead smolts acclimated for 37 - 39 days showed better survival to adult return than direct planted smolts. Study suggests size at release may have attributed to the increase in survival.
Vander Haegen, Geraldine, and Daniel Doty. 1995. Homing of Coho and Fall Chinook Salmon in Washington. Washington Department of Fish and Wildlife Report #H95-08.	Most fish reared in Washington Department of Fish and Wildlife hatcheries spend all or the majority of their freshwater life history in a single facility and are released on-station. Less than 1% of coho reared and released in a single location were recovered at locations other than the release site, which is comparable to wild coho. From 1.6 - 55% of coho released off-station were recovered at locations other than the release site. Homing patterns for fall chinook varried widely between regions, hatcheries and their release methods. However, results suggested that fish release in the location they were reared had better homing fidelity and less straying.
Tipping, Jack M. 1998. Return Rates of Transported Steelhead Smolts With and Without a Rest Period Before Release. The Progressive Fish Culturist 60: 284 - 287.	Post release smolt survival of summer steelhead that had been trucked for .75 h and released was compared with smolts that had been trucked and allowed to rest 24 h before release. Results showed no difference in return rates, suggesting that resting after transport may not improve steelhead survival.
Appleby, Andrew, Ted Anderson and Geraldine Vander Haegen. 1998. Effects of Acclimation on Survival of Spring Chinook Salmon. Final Report July 1989 - June 1998. U.S. Department of Energy Bonneville Power Administration. Project Number 89-30.	Effects of 3 week and 6 week acclimation was compared with un-acclimated fish to determine if acclimation improved survival. All ANOVA's showed that acclimation does not consistently affect survival.
Garcia, Aaron P., “Spawning Distribution of Snake River Fall Chinook Salmon”. 2002. BPA project proposal No. 199801003	Evaluation of three chinook acclimation facilities in the Snake River basin, with the objective of determining where juveniles released migrate and spawn as returning adults, and whether they distribute throughout the natural spawning area.

	Redd distribution has changed to show acclimated fish spawn in the vicinity of the release site.
Kenaston, Kenneth R., Robert B. Lindsey, and R. Kirk Schroeder. 2001. Effect of Acclimation on the Homing and Survival of Hatchery Winter Steelhead. North American Journal of Fisheries Management 21: 765-773	Evaluated the prerelease acclimation of hatchery winter steelhead as a management strategy to attract returning adults to a release site where they could be removed to eliminate commingling with wild winter steelhead. Found no significant difference in homing rate or survival between hatchery steelhead acclimated for 30 d and those trucked from the hatchery and directly released. The study shows that acclimation of juvenile steelhead is not necessary to achieve a high rate of homing of adult steelhead to a release site.
Tipping, J. M. and Todd Hillson. Manuscript submitted.	On a river with a rearing facility, trucking steelhead smolts up or downstream from the facility has little effect on adult return distribution, especially summer steelhead. The adult return distribution of fish trucked downstream from Merwin Hatchery to mid-river and lower river sites on the Lewis River showed no difference for summer steelhead while winter steelhead showed a modest (15%) level of site fidelity difference to release location.
Murdoch, Andrew. 2001. Washington Department of Fish and Wildlife unpublished data	Paired releases of two month versus seven month acclimated releases of summer chinook in the Wenatchee River for two consecutive years. Found that the seven month acclimated fish had a 200% increase in survival over the two month acclimated fish.

The over-winter rearing program at Similkameen Pond for the Washington Department of Fish and Wildlife has demonstrated considerable smolt to adult return success (e.g. 1994 BY=0.701%; 1995 BY= 0.39%) relative to other chinook propagation programs in the upper Columbia River (0.098 - 0.136% for brood years 1976 - 1989). Redd densities now exceed 400/km in the lower Similkameen River. Of those hatchery fish that spawn in the Okanogan River, a majority (76 %) spawn above the town of Riverside (rkm 65). Thus, hatchery fish underutilize a large portion of the Okanogan River and the spawning habitat is under seeded. The rearing/acclimation and release of smolts (a proportion of the Similkameen Program) in the Okanogan River would reduce spawner densities on the Similkameen River and ensure all spawning habitat in the Okanogan River is fully seeded. A reduction in spawner densities on the Similkameen River would also decrease redd superimposition, increase egg-to-emergence survival, and increase the subsequent number of wild chinook.

The Scientific Review Team (1999) recommended that, "In developing hatchery technology, hatchery programs should work toward the goal of providing environments that resemble natural conditions during artificial propagation. These may include: …Acclimation ponds at release sites;…" As a conservation recommendation in its 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin, NMFS stated, "The use of acclimation facilities and volitional release strategies should be considered to reduce potential straying and minimize potential competition between hatchery fish and listed salmon and steelhead."

2. *The switch to Okanogan River water is good for flows in the Chiliwist Creek…thermal difficulties were mentioned, but the solution was not clear and should be further discussed.*

The Okanogan River experiences water temperatures above the generally tolerable levels for salmonids July through August. The summer chinook would be transferred as pre-smolts to the acclimation facility in September/October. The fish would be released as smolts the following April. Fish will be absent from the pond during the time of high temperatures. The returned flow to Chiliwist Creek may have a further cooling effect upon the mainstem Okanogan. These cool refuges are important for migrating and holding adult sockeye and chinook prior to spawning.

3. *The proposal did not say how the pond would be designed. Another proposal from the Twisp River has gone to great lengths…Could this be done to create "off-channel" habitat (including riparian) in this project?*

Project 29038 Supplement Summer Steelhead Eightmile Creek/Chewuch River improves upon currently existing dirt ponds for acclimation and release with the objective of providing a more natural environment. The sponsor of the above project, the Methow Salmon Recovery Foundation, has secured funds from other sources for a second project that reconnects a side channel in the lower Twisp River. This side channel was isolated from the Twisp River by a dike built by the Corp of Engineers following the flood of 1972. The goals and objectives for the Twisp River side channel are virtually the same as those identified for project 29038. The strength for both of these projects lies in the ability to utilize previously created or currently existing features within the riparian zone (large earthen pond or side channel). These ponds will not be used for the extended period, nor the pounds of fish advocated for in this proposal. Otherwise disease management, feeding and water availability would need to be addressed.

The Chiliwist property in this proposal is almost all agriculture land created from shrub-steppe habitat on a bench 10 feet above the Okanogan River riparian and flood plain zone. This property is best suited for shrub-steppe habitat rehabilitation with incorporation of a more formal rearing pond. The pond would be lined with large cobble and substrate similar to the Washington Department of Fish and Wildlife's Methow Hatchery off site rearing and acclimation ponds. The cobble would benefit fish by exposing them to more natural flow patterns. It would further enhance the development of cryptic qualities and the use of cobble as cover. Chinook would be reared on Okanogan River water through the entire 7 months, providing a natural thermal regime.

4. *Nothing was said about use of the rest of the land…The response needs to include a HEP analysis for value to wildlife, and identification of mitigation credit to BPA and a detailed M&E proposal.*

About 70% of the acquisition piece is managed for apple production (Figure 1 - black lines). Another five to seven acres is a historical Native American burial site (far left yellow line). The remainder of the habitat is essentially native shrub-steppe, although some cattle grazing occurs. The riparian and floodplain zone coded with blue lines is owned by Douglas County Public Utility District #1. Their ownership and maintenance was part of the original settlement agreement with the Federal Energy Regulatory Commission for inundation of habitat caused by Wells Dam. The area under red is a Native American allotment. The orchard immediately north of the Native American allotment has recently sold. The new owners plan to eliminate the orchard and replace it with livestock (horses).

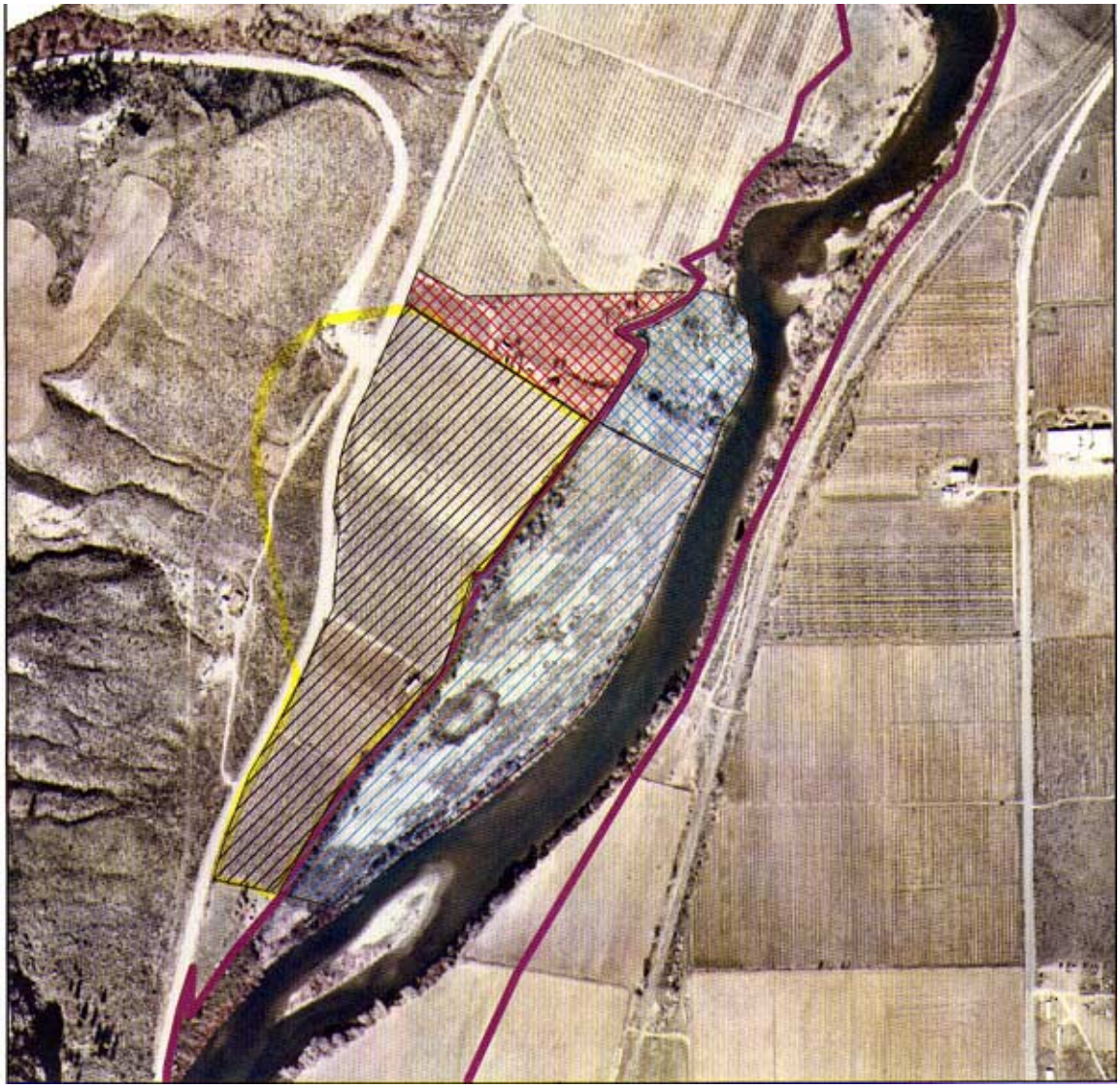

Figure 1. Proposed Chiliwist Acquisition parcel outlined in yellow (map provided courtesy of Douglas County PUD).

Mule deer pass through this property as they travel from the Chiliwist Wildlife Area (left of the yellow line) to the Okanogan River, while meadowlark use to a small degree the existing shrub-steppe habitat. These shrub-steppe indicator species probably use the parcel very little in its current condition. An ocular estimation plugged into a HEP model provides a current habitat value of essentially zero.

Restoration of the shrub-steppe habitat, a priority habitat type for the Washington Department of Fish and Wildlife, will be an intensive long-term endeavor. Removal of the orchard (included in the purchase agreement), followed by a concerted effort of weed control will be essential. Weed control would occur in concert with prescribed plantings of perennial grasses and forbs adapted to the site and beneficial for wildlife. The Washington Department of Fish and Wildlife has succeeded in rehabilitating agriculture land to its original shrub-steppe ecotype on the McCabe Ranch - Wenas Wildlife Area and the Scotch Creek Wildlife Area.

The Scotch Creek Wildlife Area also resides within the Okanogan Valley. In Okanogan County, a fall planting prescription is preferred over a spring planting prescription, and the prescription followed in both the Wenas and Scotch Creek Wildlife areas will be employed for the proposed acquisition piece.

Following completion of rehabilitation, the minimum expected HEP values for mule deer and meadowlark would be 0.5 for each, but the values will likely approach 1.0 per acre for both (J. Olson, WDFW, personal communication).

5. *Even if the M&E is to be conducted by another project, details that apply to monitoring and evaluation of the proposed project should be given in this proposal. The specific sample areas, methods, and sampling frequency and intensity…need to be specified. How will one know if this project is a success or failure?*

The Washington Department of Fish and Wildlife conducts weekly surveys by foot, raft, or fixed wing aircraft of all available summer chinook spawning habitat in the Okanogan (124.5 km) and Similkameen (14.2 km) rivers to determine the temporal and spatial spawning distribution. Surveyors remain the same during the sampling period. Historical chinook survey reaches are used during the surveys to maintain consistency with previous surveys (Table 2.)

Weekly aerial redd surveys are conducted on the Okanogan and Similkmaneen rivers to identify areas that require ground surveys to confirm spawning activity. Two observers record the number of redds and locations on USGS Quadrangle Topographic maps (scale 1:24,000). Spawning locations identified during aerial surveys are confirmed by ground survey. Weekly ground redd surveys on the Okanogan River are conducted by foot. Areas of spawning activity identified during aerial redd surveys are surveyed from the ground the same week. The date, redd number, and exact location of the redd are recorded on flagging and in field notes. In localized areas of mass spawning, maps were drawn to identify the exact location of redds. New redds are color coded on the maps to distinguish them from old redds. Limited surveys are conducted on the Columbia River by fixed wing and rafts. Towards the end of the spawning season redds below Wells Dam and near the confluence of the Chelan River are counted on a weekly basis. Redds below Wells Dam are counted during aerial surveys. Spawning ground surveys in or near the confluence of the Chelan River are conducted by raft.

Information concerning the spawning populations is derived from biological data collected from carcasses recovered during the surveys. The location, origin, sex, fork length, post orbital-to-hypural plate (POH) length, and the number of eggs retained by females are recorded. Scale samples are collected from every fish encountered. John Sneva (WDFW) analyzes all scale samples. Snouts are collected from all adipose fin-clipped fish and sent to WDFW-Olympia for coded wire tag (CWT) extraction and decoding.

Table 2. Historical spawning ground survey reaches on the Okanogan and Similkameen rivers.

Reach designation	Reach description	Reach location (rkm)	Length (km)
	Okanogan River		
O1	Mouth to Malott Bridge	0.0 - 27.2	27.2
O2	Malott Bridge to Okanogan Bridge	27.2 - 41.9	14.7
O3	Okanogan Bridge to Omak Bridge	41.9 - 49.4	7.5
O4	Omak Bridge to Riverside Bridge	49.4 - 65.4	16.0

O5	Riverside Bridge to Tonasket Bridge	65.4 - 91.4	26.0
O6	Tonasket Bridge to Zosel Dam	91.4 - 124.5	33.1
	Similkameen River		
S1	Mouth to Oroville Bridge	0.0 - 8.0	8.0
S2	Oroville Bridge to Enloe Dam	8.0 - 14.2	6.2

Redd distribution is determined by the number of redds found within each historical reach. The total number of redds found during ground surveys are compared to aerial survey counts and historical data (Tables 3 and 4).

Table 3. Peak number of summer chinook salmon redds counted during aerial surveys in historical Okanogan River sampling reaches (rkm). Total ground counts are in italics when available.

Year	O1	O2	O3	O4	O5	O6	Total aerial survey	Total ground survey
1956							37	
1957							53	
1958							4	
1959							50	
1960							29	
1961								
1962								
1963	2	*	2	0	5	0	9	
1964	3	*	38	21	46	4	112	
1965	18	8	37	9	35	2	109	
1966	32	24	88	37	146	62	389	
1967	1	8	41	11	63	25	149	
1968	2	24	41	14	126	25	232	
1969	0	9	40	0	40	14	103	
1970	6	162	138	27	267	55	656	
1971	2	14	74	3	205	12	310	
1972	0	8	36	17	84	37	182	
1973	3	0	67	0	38	30	138	
1974	3	0	43	0	46	21	113	
1975	0	8	67	4	160	34	273	
1976	0	0	17	0	71	19	107	
1977	5	18	63	14	153	23	276	
1978	1	19	81	15	73	6	195	
1979	0	1	43	7	94	28	173	
1980	0	3	31	0	75	9	118	
1981	1	0	15	3	30	6	55	
1982	0	0	5	0	18	0	23	
1983	0	1	11	0	11	13	36	
1984	0	1	26	26	112	70	235	
1985	0	4	20	4	80	30	138	
1986	0	3	31	0	116	47	197	
1987	3	19	33	0	101	45	201	
1988	2	6	34	9	46	16	113	
1989	0	9	27	3	55	40	134	
1990	0	2	17	0	48	21	88	
1990	*0*	*0*	*8*	*0*	*20*	*19*		*47*
1991	0	3	11	1	26	14	55	
1991	*0*	*4*	*12*	*1*	*32*	*15*		*64*
1992	0	0	13	2	9	11	35	
1992	*0*	*0*	*18*	*3*	*14*	*18*		*53*
1993	1	20	27	3	54	39	144	

1993	*1*	*20*	*31*	*3*	*59*	*48*		*162*
1994	5	34	60	23	160	90	372	
1994	*5*	*37*	*49*	*23*	*165*	*96*		*375*
1995	1	9	43	7	149	51	260	
1995	*1*	*9*	*45*	*5*	*148*	*59*		*267*
1996	1	2	12	10	50	27	102	
1996	*1*	*2*	*12*	*16*	*54*	*31*		*116*
1997	0	1	18	4	52	74	149	
1997	*0*	*1*	*20*	*4*	*61*	*72*		*158*
1998	0	8	22	4	17	24	75	
1998	*0*	*10*	*22*	*6*	*21*	*29*		*88*
1999	0	5	55	6	76	80	222	
1999	*0*	*11*	*69*	*17*	*136*	*136*		*369*
2000	0	44	72	38	131	99	384	
2000	*0*	*59*	*114*	*45*	*202*	*129*		*549*

* - checkpoint skipped. Count included in next upstream section.

Table 4. Peak number of summer chinook salmon redds counted during aerial surveys in historical Similkameen River sampling reaches (rkm). Total ground counts are in italics when available.

Year	S1	S2	Total aerial survey	Total ground survey
1957			30	
1957			30	
1959			31	
1960			23	
1961				
1962				
1963	*	17	17	
1964	*	51	51	
1965	*	67	67	
1966	*	154	154	
1967	*	77	77	
1968	*	107	107	
1969	*	83	83	
1970	*	357	357	
1971	*	210	210	
1972	*	55	55	
1973	*	64	64	
1974	*	130	130	
1975	*	201	201	
1976	*	184	184	
1977	*	139	139	
1978	*	268	268	
1979	*	138	138	
1980	*	172	172	
1981	*	121	121	
1982	*	56	56	
1983	*	57	57	
1984	*	301	301	
1985	*	309	309	
1986	*	300	300	
1987	137	27	164	
1988	175	16	191	
1989	200	21	221	370
1990	88	6	94	
	143	*4*		*147*
1991	57	10	68	

	76	*15*		*91*
1992	48	0	48	
	57	*0*		*57*
1993	138	14	152	
	272	*16*		*288*
1994	369	94	462	
	606	*171*		*777*
1995	272	65	337	
	499	*117*		*616*
1996	231	21	252	
	290	*29*		*419*
1997	277	20	297	
	456	*30*		*486*
1998	228	10	238	
	267	*9*		*276*
1999	773	130	903	
	1,071	*204*		*1275*
2000	484	65	549	
2000	*803*	*190*		*993*

* - checkpoint skipped. Count included in next upstream section.

The projects success or failure will be seen in the changes to redd distribution and carcass recoveries from the above tables. Reaches O2 and O3 are anticipated to have an increase for annual redds encountered and carcasses recovered, while reaches O6 and S1 will have decreases in redds encountered. Differential CWT marks for the fish released in the lower Okanogan will also assist in determining if better distribution results from dispersement of the hatchery released summer chinook through carcass recoveries. In addition, improvement of the brood to brood replacement ratio is expected, especially for the Similkameen River, where superimposition of redds decreases natural production.

In addition to the comprehensive adult monitoring and evaluation, the Washington Department of Fish and Wildlife has an outlined M&E program for hatchery juveniles that includes monitoring of growth rate, health, smoltification and volitional migration timing and pattern from the rearing/acclimation pond.

6. An M&E proposal for monitoring of wildlife habitat is also needed…The proponents are also referred to the programmatic section of this report on Monitoring, the specific comments on Aquatic Monitoring and Evaluation, and the specific comments on Terrestrial Monitoring and Evaluation.

An M&E specific to the 89 acres proposed for the Chiliwist acquisition may not be informative because of the small sample size. However, the proximity of the 89 acre piece to the Washington Department of Fish and Wildlife's Chiliwist Wildlife Area makes incorporation logical. The approved M&E for the Chiliwist Wildlife Area would be expanded to include the 89 acre acquisition.

A management plan, written for the Methow Wildlife Area and including the Chiliwist Wildlife Area, was written in the mid-1990's. Regional Wildlife Managers for the Washington Department of Fish and Wildlife are revamping all Wildlife Management Area M&E plans for use across the region. A primary reason for modifications is the need to incorporate the management, maintenance and enhancement of listed salmonid species within the Wildlife Management Areas. As soon as the enhanced M&E plans are completed, the Chiliwist Wildlife Area plan will be adopted for the proposed acquisition piece.

At the time of purchase, the Chiliwist Wildlife Area was described as excellent for wildlife because of the wide diversity of habitats and wildlife species. It was operated as a working ranch with farming and cattle grazing activity that enhanced wildlife values. At the time of purchase, it was agreed that the area would continue to be operated as a working ranch with some modifications such as reduced grazing. Shortly after purchase, some of the more remote grain fields were put into CRP (approx. 140 acres). The lessee on the area continues to do most of the major maintenance--fencing, legally required weed control, etc. Land was managed primarily for mule deer winter range, white-tailed deer, doves, turkeys, blue grouse and other upland birds (quail, chukars, Hungarians).

Presently, the management plan for WDFW's Chiliwist Wildlife Area includes several activities, divided into four categories.

1. Legally Required Activities: Taxes, DNR lease payments, etc.

2. Funded Maintenance Activities: Administration, signing, some weed control, yearly grazing evaluation, etc.

3. Unfunded Maintenance Activities: maintenance of water structures, cattleguards, fences, weed control (not legally required), litter control, etc.

4. Unfunded Enhancement Activities:

    a. Timber inventory (sensitive species--pileated woodpecker).

    b. Cliff habitat zone inventory.

    c. Riparian habitat zone --rehab riparian areas along Chiliwist Creek.

    d. Mule deer management—Re-vegetation on abandoned agriculture lands, maintain food plots, prune, fertilize and plant shrubs.

    e. Additional weed control.

Reference:

McMichael, G.A., C.S. Sharpe, and T.N. Pearsons. 1997. Effects of Residual Hatchery-reared Steelhead on Growth of Wild Rainbow Trout and Spring Chinook. Transactions of the American Fisheries Society 126:230-239.

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