PROGRAMMATIC BIOLOGICAL ASSESSMENT

OF THE

PROPOSED LSRCP PROGRAM

BY THE

LOWER SNAKE RIVER COMPENSATION

PLAN OFFICE

U.S. FISH AND WILDLIFE SERVICE

BOISE, IDAHO

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INTRODUCTION

National Marine Fisheries Service (NMFS) listed Snake River sockeye salmon as endangered in November 1991 (56 FR 58619), Snake River spring/summer and fall chinook salmon as threatened in April 1992 (57 FR 14653), upper Columbia River steelhead as endangered in August 1997 (62 FR 43937), Snake River steelhead as threatened in August 1997 (62 FR 43937), Lower Columbia River steelhead as threatened in March 1998 (63 FR 13347), lower Columbia River chinook as threatened in March 1999 (64 FR 14308), upper Willamette River chinook as threatened in March 1999 (64 FR 14308), upper Columbia Rive spring chinook as threatened in March 1999 (64 FR 14308), Columbia River chum as threatened in March 1999 (64 FR 14508), upper Willamette steelhead as threatened in March 1999 (64 FR 14517), and mid-Columbia River steelhead as threatened in March 1999 (64 FR 14517). The U.S. Fish and Wildlife Service (FWS) listed Columbia River Basin bull trout as threatened in June 1998 (62 FR 32268).

To meet the requirements of the Endangered Species Act (ESA) the Lower Snake River Compensation Plan (LSRCP) Office is required to consult with NMFS and FWS to insure that all actions authorized, funded, or carried out involving indirect take do not jeopardize the continued existence of any listed species. Previous biological assessments of the LSRCP Program were completed in 1993, 1994, and 1999 for NMFS listed species and 1998 for FWS listed bull trout. In 2002 and 2003, LSRCP cooperators prepared Hatchery Genetic Management Plans (HGMP) for indirect take, currently have Section 10 permits or applications to obtain permits for scientific research and/or enhancement programs, and 4(d) rule coverage for programs funded by the LSRCP.

There are currently a number of legal and planning processes initiated in the Columbia River Basin that may affect how the LSRCP Program addresses its mitigation, ESA, and Tribal Trust responsibilities in the future. It is difficult to speculate the extent of those changes prior to NMFS and FWS development of recovery plans that are integrated with regional planning for production, harvest, and conservation of remaining populations in the Columbia River Basin.

On December 21, 2000 NMFS issued a biological opinion on Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program and 19 Bureau of Reclamation (BOR) Projects in the Columbia River Basin (NMFS 2000b). The opinion concluded (in part) that the proposed operation and configuration of the FCRPS and the BOR projects are likely to jeopardize the continued existence of Snake River spring/summer chinook, Snake River fall chinook, Snake River steelhead, Snake River sockeye, and mid-Columbia River steelhead. The opinion identified the concept of offsite mitigation (habitat, hatcheries, and harvest), that in combination with efforts to reduce hydro mortality, improvements expected from other ongoing Federal activities, and cumulative efforts of state or private activities that are reasonably certain to occur, should be sufficient to allow the FCRPS and BOR power system operations to meet the jeopardy standard.

Reasonable and Prudent Actions (RPA) identified in the FCRPS opinion under artificial propagation included measures to “reform” existing hatchery programs to reduce negative effects of hatchery production on natural populations while retaining proven production and potential conservation benefits. The opinion states that the overarching goal of “reforms” is to reduce or eliminate adverse genetic, ecological, and management effects of artificial production on natural production while retaining and enhancing the potential of hatcheries to contribute to basin-wide

objectives for conservation and recovery. A fundamental premise of "reform" in the opinion is that artificial production programs can be operated consistent with, and complementary to the goals of ESA while achieving mitigation objectives. Given the scientific uncertainty and wide range of scientific and policy opinions, NMFS has committed to work on a method for recognizing the benefits of "reform" efforts to assess meeting basin-wide objectives.

NMFS is currently in the process of drafting a new policy for the consideration of artificially propagated salmon and steelhead in ESA listing determinations in response to the U.S. District Courts ruling in *Alsea Valley Alliance v. Evans*. The new policy is to clearly articulate how NMFS will consider artificial propagation in conducting ESA status reviews and listing determinations for Pacific salmon and steelhead. In addition, NMFS will also develop guidelines for designing and implementing artificial propagation programs for the purpose of supporting tribal treaty fisheries, recreational and commercial fisheries, species reintroduction and restoration efforts, and species conservation efforts (NMFS, July 23, 2002).

NMFS has formed an upper Columbia River Technical Recovery Team (TRT) whose primary tasks are to identify population/ESU delisting criteria, characterize habitat/fish productivity relationships, identify factors for decline and limiting factors, identify actions for recovery, identify research, monitoring, and evaluation needs, and serve as science advisors to groups charged with developing measures to achieve recovery goals (NMFS, August 2000). NMFS will use the TRT along with policy input, existing science teams, and state, local, regional, tribal, and private entities to develop a final recovery plan to provide a framework for addressing problems across each ESU (NMFS, 2/1/00).

The Northwest Power Planning Council (NWPPC) will review and adopt subbasin plans as a part of the NWPPC's 2000 Columbia River Basin Fish and Wildlife Program. Subbasin plans will help direct Bonneville Power Administration (BPA) funding of projects that protect, mitigate, and enhance fish and wildlife that have been adversely impacted by the development and operation of the Federal Columbia River Power System (FCRPS). The NWPPC, BPA, NMFS, and FWS intend to use the subbasin plans to meet the RPA's of the 2000 FCRPS biological opinion and for recovery planning at the subbasin level.(NWPPC July 1, 2002).

The LSRCP program provided project descriptions to the Independent Scientific Review Panel (ISRP) which reviews all of the NWPPC's Columbia River Basin Fish and Wildlife Programs for scientific merit. The project descriptions allowed the ISRP to provide an independent scientific review of the LSRCP programs and to place the LSRCP program in context with the NWPPC's Fish and Wildlife Program.

The Columbia River Fish Management Plan (CRFMP) under *US v Oregon* expired on July 31, 1999. The parties' are currently renegotiating a new CRFMP agreement which will include harvest and production objectives in the Columbia River Basin. Interim management agreements (spring agreement) for upriver spring chinook, summer chinook, and sockeye and (fall agreement) for upper Columbia River fall chinook, steelhead, and coho are currently in place, with the parties' intent to conclude negotiations on a new CRFMP by December 2003. Agreements made for adult outplants and production under *US v Oregon* will need to be integrated with recovery and subbasin planning efforts.
The NMFS April 2, 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999) concluded that artificial propagation programs in the Columbia River Basin

are likely to jeopardize the continued existence of listed Lower Columbia River steelhead and Snake River summer steelhead. It identified three programs that adversely affect the two listed ESU's; the NMFS 's Columbia River Fisheries Development Program, the FWS's LSRCP Program, and one IDFG hatchery program. The major effects identified included continued use of non-endemic steelhead broodstocks, release of hatchery smolts in spawning and rearing areas of listed steelhead, and the potential genetic introgression when hatchery adults return and spawn with listed steelhead.

The LSRCP submitted a consultation package to NMFS addressing HGMP's included in the mid-Columbia River (Lyons Ferry stock steelhead and Touchet River endemic steelhead programs in the Walla Walla River Basin) in December 2002. Those two programs were not included in this consultation.

The LSRCP program will continue to work closely with its cooperators: Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), Idaho Department of Fish and Game (IDFG), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Nez Perce Tribe (NPT), and Shoshone Bannock Tribe (SBT) to meet the requirements of its compensation goals, ESA and other legal mandates and court orders, and tribal trust responsibilities. The following programmatic assessment is based on current agreements among the cooperators for 2003. As the multitude of legal and regional processes discussed above are completed, some LSRCP programs will likely be modified and consultation reinitiated.

BACKGROUND

The LSRCP was authorized by the Water Resources Development Act of 1976, Public Law (P.L.) 94-587, to compensate for adult fish losses caused by the construction and operation of the four lower Snake River dams and navigation lock projects (Herrig 1990). Salmon and steelhead compensation levels were based on estimates of the total run sizes to the Snake River basin prior to construction of the four lower Snake River dams and the percent of smolts lost during outmigration. Resident trout compensation was based on lost resident trout fishing opportunities (LSRFWCP 1975). Estimates of total numbers of smolts needed for release and compensation of losses were determined by dividing the number of adult salmon and steelhead to be compensated for by estimated smolt-to-adult survival rates (Table 1).

Guidelines were developed for allocating compensation of adults by river basin and back-calculating hatchery capacity needs to rear the appropriate number of smolts needed for release to meet adult escapement goals. Based on the estimated pounds of smolts needed, eleven major hatcheries were built by the Corp of Engineers (COE) under the LSRCP Program to meet established goals. The FWS, LSRCP Office funds and administers operation and maintenance and evaluation of hatcheries and related facilities through a direct funding agreement with Bonneville Power Administration (Table 2).

Table 1. LSRCP hatchery production necessary to return the required numbers of adult chinook salmon and steelhead trout (Herrig 1990).

	Fall Chinook	Spring/Summer Chinook	Steelhead
Adult loss level for basing hatchery size	18,300	58,700	55,100
Percent survival, smolt to adults.	0.20	0.87	0.50
Number of smolts.	9,160,000	6,750,000	11,020,000
Smolts per pound.	90	15	8
Pounds of smolts.	101,800	450,000	1,377,500
Percent survival, egg to smolts.	80	70	65
Number of eggs needed.	11,450,000	9,650,000	16,950,000
Eggs per female.	5,000	4,500	5,000
Number of females needed.	2,290	2,145	3,390

Table 2. Lower Snake River Fish and Wildlife Compensation Plan hatchery facilities, estimated design capacities, and completion dates.

Hatchery/ Operating Agency	Species	Rearing Capacity Pounds	Satellite Facility	Completion Date
Lookingglass (ODFW)	Spring Chinook	69,600		Nov. 82
Big Canyon Ck. Apr. 87				
			Imnaha	Jul. 89
Irrigon (ODFW)	Steelhead	279,600		Oct. 85
			Wallowa	May 85
			Little Sheep Ck.	Aug. 87
			Big Canyon Ck.	
Lyons Ferry *				Nov. 83
Phase I (WDW)	Steelhead	116,400		
	Trout	45,000		
			Cottonwood Pd.	Feb. 85
			Dayton Pd.	Oct. 86
			Curl Lk.	Feb. 85
Phase II (WDF)	Fall Chinook	101,800		Nov. 84
	Spring Chinook	8,800	Tucannon FH	Nov. 84
COE add-on (NPT))	Fall Chinook		Pittsburg Landing	96
			Big Canyon	96
			Captain Johns	97
Tucannon (WDFW)	Trout	41,000		Nov 84
McCall (IDFG)	Summer Chinook	61,300		Sep. 81

				S.F. Salmon R.	Jul. 80
Sawtooth (IDFG)		Spring Chinook	149,000		Jan. 85
				E.F. Salmon R.	Nov. 83
Clearwater (IDFG)		Steelhead	350,000		Dec. 91
		Spring Chinook	91,300		
Red River	Nov. 86				
				Crooked R.	May 90
				Powell R.	May 89
Magic Valley (IDFG)		Steelhead	291,500		Aug. 87
Hagerman (FWS)		Steelhead	340,000		Apr. 84
Dworshak (FWS)		Spring Chinook	70,000		Nov. 82

* Phase I and II are now operated as a complex by ODFW.

The LSRCP salmon and steelhead program involves ten fish hatcheries (FH) managed by three State agencies (IDFG, ODFW, and WDFW) and the FWS. Although the original plan was to produce about 11 million steelhead smolts at 8 fish per pound (fpp) (1.4 million pounds), 6.75 million spring/summer chinook salmon smolts at 15 fpp (450,000 pounds), and 9.2 million fall chinook salmon at 90 fpp (101,800 pounds), rearing conditions at hatcheries required changes in the targeted size and number of smolts released. Generally, larger smolts were produced then originally planned resulting in fewer being released. Warmer water at several LSRCP facilities made it difficult to produce smolts at target sizes, and evaluation data showed larger smolts survived better than smaller smolts. The five steelhead rearing facilities (and associated satellite facilities) are Irrigon (Wallowa, Little Sheep Creek, and Big Canyon), Lyons Ferry (Cottonwood and Dayton ponds), Hagerman National Fish Hatchery (NFH), Magic Valley, and Clearwater FH's. The six salmon rearing facilities (and associated satellite facilities) include Lookingglass (Big Canyon and Imnaha), Lyons Ferry (Tucannon, Curl Lake, Pittsburg Landing, Big Canyon, and Captain Johns), McCall (South Fork Salmon River), Sawtooth (East Fork Salmon River), Clearwater (Red River, Powell at Lochsa River, and Crooked River), and Dworshak NFH's. Kooskia NFH located on Clear Creek, a tributary to the Middle Fork of the Clearwater River, is funded and operated by the FWS and is not a LSRCP facility and is not included in the analysis. The two resident rainbow trout rearing facilities include Lyons Ferry and Tucannon FH's. The individual programs and their releases beginning in 2003 are discussed below.

DESCRIPTION OF PROJECT AREA

The Snake River basin was one of the most important fish producing systems within the United States supporting anadromous runs of spring, summer, and fall chinook salmon, coho salmon, sockeye salmon, steelhead, sturgeon, lamprey, and a variety of other resident fish including bull trout. Water development projects within the Snake River basin have dramatically altered water quality, fish habitat, biotic assemblages, and reduced numbers of indigenous fish in the basin. Numerous projects such as Hells Canyon Dam Complex (completed in 1967) on the mainstem Snake River and Dworshak Dam (1970) on the North Fork Clearwater have eliminated access to important spawning and rearing habitat for spring and fall chinook salmon, sockeye salmon, and steelhead (46% of pre-development habitat). Construction of Ice Harbor (1961), Lower Monumental (1969), Little Goose (1970), and Lower Granite (1975) dams on the lower mainstem Snake River further altered natural flow regimes within the basin and significantly affected both upstream and downstream migration (directly and indirectly). Important spawning and rearing areas were inundated by the reservoirs, often eliminating anadromous runs in parts of the basin. High quality stream fisheries for chinook salmon, sockeye salmon, steelhead, and white sturgeon have, in many areas, been converted to reservoir fisheries or warm-water species. Predator-related mortality increased due to injuries associated with dam passage, increased migration time through reservoirs, changes in water quality and biotic assemblages, and transmission of various infectious diseases. In addition, development within the Snake River basin (agriculture, logging, grazing, and water diversions etc.) has further reduced habitat quality in local areas. Current biological, chemical, and physical conditions within large portions of the basin are much different from those in which indigenous species evolved.

Historically the Snake River was the greatest producer of spring chinook salmon in the Columbia River basin, with the Salmon River alone producing approximately 39% of the total Columbia River production (CBFWA 1991). The five major Snake River subbasins currently producing spring chinook salmon include the Tucannon River, Salmon River, Clearwater River, Grande Ronde River, and Imnaha River. Historical records from the Snake River basin indicate annual runs in excess of 100,000 fish and averaged 40,000 fish from 1954 through 1969. The smolt capacity (wild/natural production) for spring chinook salmon in the Snake River basin has recently been estimated at about 16 million smolts (CBFWA 1991).

Summer chinook salmon were historically one of the most abundant salmon stocks in the Columbia basin with annual commercial catches of up to 2 million fish in the 1880's (CBFWA 1991). Snake River summer chinook salmon production historically made up approximately 45% of the total Columbia basin production. Annual run sizes averaged 50,919 fish at the upper dams from 1954 through 1969. The two Snake River subbasins currently producing summer chinook salmon include the Salmon River and Clearwater River although recent data in the Imnaha River indicates (based on adult run timing at Lower Granite Dam) that over 90% of that run may be summer chinook salmon. The smolt capacity (wild/natural production) for summer chinook salmon in the Snake River basin has recently been estimated at about 3.95 million smolts (CBFWA 1991).

According to the CBFWA (1991) Snake River fall chinook salmon historically made up approximately 33% of the production above McNary Dam. Since 1954 run sizes have ranged from 32,700 fish to a five year average of 1,610 fish (1985-90). Current production is mainly

limited to the mainstem Snake River below Hells Canyon Dam although some production may occur in the lower Clearwater, Grande Ronde, Imnaha, and Salmon rivers. The smolt capacity (wild/natural production) for fall chinook salmon in the Snake River basin has not been estimated due to poorly documented natural spawning in the reaches above Lower Granite Dam (CBFWA 1991).

The Snake River historically produced approximately 55% of the total Columbia River basin steelhead. Annual run sizes at the upper dams averaged 80,361 wild fish from 1954 through 1969. There are two strains of steelhead produced in the Snake River basin, those that have a predominate one-ocean component ("A") and those that have a strong 2-ocean component ("B"). The major subbasins which currently produce steelhead include the Salmon River (A, B), Clearwater River (A, B), Grande Ronde River (A), Imnaha River (A), Tucannon River (A), and Snake River (A). The smolt capacity (wild/natural production) for "A" summer steelhead in the Snake River basin has recently been estimated at about 2.7 million smolts and 3.1 million for "B" summer steelhead (CBFWA 1991).

Historically sockeye salmon production occurred in three tributary lake systems within the Snake River basin, including Payette Lake, the Stanley Basin Lakes, and Wallowa Lake. Sockeye salmon runs in the Salmon River subbasin have been declining since the late 1800's with recorded run sizes over 1,000 fish during the mid-1950's. In recent years only Redfish and Alturas lakes in the Stanley Basin have had limited production; in 1992 and 1993 only one (male) and eight sockeye salmon returned to Red Fish Lake respectively. The smolt capacity (wild/natural production) for sockeye salmon in the upper Salmon River has recently been estimated at 1.3 million smolts from five lakes (Alturas, Redfish, Stanley, Pettit, and Yellowbelly) (CBFWA 1991).

Bull trout are native to the Pacific northwest and western Canada. Bull trout historically occurred in major river drainages in the Pacific northwest from about 41° N to 60° N latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in Northwest Territories, Canada. To the west, bull trout range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska. Bull trout are wide-spread throughout tributaries of the Columbia River basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (FWS 1999).

LIFE CYCLES OF SPECIES OF INTEREST

Snake River Spring/Summer Chinook Salmon

Upstream migrating Snake River adult spring and summer chinook salmon pass Bonneville Dam from March through May and June through July respectively (56 FR 29542). Spring chinook salmon generally tend to spawn in higher elevated streams than summer chinook salmon although there is considerable overlap in some basins. Most spring/summer chinook salmon enter individual subbasins from mid-May through late-September and spawn from late-August through late-September.

Spring/summer chinook salmon juveniles begin emerging from the gravel from late-February through early-June with peak emergence between April and early-May (Peery and Bjornn 1991, IDFG 1992). Their size from March to June is 30 to 40 mm in fork length (FL) (IDFG 1992). By mid-summer they are 55 to 75 mm (FL) long and 80 to 105 mm (FL) long by fall (Bugert et al. 1990, 1991; Reingold 1967; IDFG 1992). Summer (August) and fall (September-November) emigration from upper stream rearing areas to lower elevation rivers is common (Bugert et al. 1990, 1991; Kiefer and Forster 1990). Chinook salmon smolts are 90 to over 120 mm (FL) long by spring when seaward migration occurs in April and May (Bugert et al. 1990, 1991; IDFG 1992). Emigration timing past lower Granite Dam is somewhat protracted and occurs from early-April through June (56 FR 29542).

Snake River Fall Chinook Salmon

Adult Snake River fall chinook salmon enter the Columbia River in July and migrate into the Snake River from mid-August through October (56 FR 29542). Fall chinook salmon production is presently limited to the Snake River below Hells Canyon Dam although in recent years a few redds have been reported during aerial spawning ground surveys in the lower mainstem and North Fork Clearwater, lower Salmon, lower Grande Ronde, and lower Tucannon rivers (VAR-FWS-AFF-14 1992, 56 FR 29542). Fall chinook salmon spawning generally occurs from October through November with fry emergence occurring from March through April. Emigration generally begins within several weeks of emergence with juveniles rearing in backwaters and shallow areas through mid-summer prior to smolting and emigration (70-95 mm) to the ocean in the summer and fall. Peak emigration past Lower Granite Dam occurs from late-June to late-July (range, May to September) for production out of the Snake R. and in August (range July to September) for production out of the Clearwater R (B. Conner, IFRO, personal comm.). Subyearling fall chinook salmon are present in the Columbia River estuary from April through October (56 FR 29542).

Snake River Sockeye Salmon

Production of Snake River sockeye salmon is currently limited to Redfish Lake in the upper Salmon River (VAR-FWS-AFF-14 1992). Adult sockeye salmon enter the Snake River from mid-July through August and spawn from September and October. Most sockeye salmon juveniles rear in their natal lakes for 1-2 years prior to emigrating from late-April through mid-May (peak May) from 60-117 mm. Peak sockeye salmon juvenile emigration occurs at Lower Granite Dam by mid-June.

Snake River Steelhead

Snake River summer steelhead enter the Columbia River from March through October, with peak abundance from late-July through early-September (CBFWA, 1991). They are comprised of two groups, “A” run and “B” run based on adult entry into the Columbia River although there may be considerable overlap in the timing of the two runs. “A” steelhead enter the Columbia River from June through early-August while “B” steelhead enter from late-August into October. Both groups spawn from April through June with most juveniles rearing in freshwater for two years prior to ocean entry. Most “A” steelhead spend from one to two years in the ocean while most “B” steelhead spend two to three years in the ocean. “B” steelhead tend to be significantly larger on return than “A” steelhead. “A” steelhead are produced in all the major subbasins in the Snake

River while “B” steelhead are produced in the Salmon and Clearwater subbasins.

The below listed salmon and steelhead ESU’s all occur outside the Snake River Basin. Potential effects of LSRCP Program actions are limited to mainstem migration corridor, estuary and ocean effects. See NMFS status reviews for life history information.

Mid-Columbia River Steelhead
Upper Columbia River Steelhead
Lower Columbia River Steelhead
Lower Columbia River Chinook
Upper Willamette River Chinook
Upper Columbia Rive Spring Chinook
Columbia River Chum
Upper Willamette Steelhead

Bull Trout

Bull trout populations exhibit diverse life history strategies with four distinct life history types; resident, fluvial, adfluvial, and anadromous (62 FR 32268, FWS 1998). Bull trout typically spawn in low gradient streams in the late summer through fall (August-November) often associated with areas of ground water infiltration (Pratt 1992). Fry emerge in the early spring (April) and most juveniles remain near the stream bottom for two years closely associated with cover. Most juveniles migrate at the beginning of the third growing season and mature at age 5 or 6. Adult migrations begin in March or April and may extend through the summer with extensive migrations common. Migratory corridors are critical to tie seasonal habitat requirements of the various life history strategies together to maintain both among and between population variation.

Historically bull trout were widely distributed throughout the Snake River basin, perhaps similar to the historic range of spring, summer, and fall chinook salmon (Esch and Hallock). Recent studies suggest that there is a high degree of variability in habitat factors that determine bull trout distribution and abundance (Watson and Hillman 1997). Current distribution in the Snake River basin is primarily limited to tributaries in association with colder water temperatures (Rieman and McIntyre 1995) although reliable trend data are lacking for many areas.

CUMULATIVE EFFECTS

This programmatic assessment of the LSRCP Program was developed to assess proposed LSRCP-funded actions beginning in 2003; and, in consultation with NMFS and FWS, to determine if actions involving incidental take are likely to jeopardize the continued existence of the listed species. Each cooperator completed HGMP’s of their proposed actions involving incidental take (Table 3) and have provided or will provide the LSRCP Office with copies of their Section 10 applications or permits for scientific or enhancement purposes (Table 4) and 4(d) rule protective regulations for conservation of species (Table 5).

Table 3. HGMP’s completed for LSRCP Programs.

BASIN	PROGRAM (stock)	FACILITY *(non - LSRCP facilities)	ACTIONS

Clearwater	"B" steelhead (N.F. Clearwater) non-listed/part of ESU	*Dworshak NFH Clearwater FH Hagerman NFH	Receive eggs Rearing Release O&M M&E Fish health
Clearwater	Spring chinook (RR/N.F. Clearwater) non-listed	Dworshak NFH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Clearwater	Spring chinook (Powell/Red R.-Crooked R./RR) non-listed	Clearwater FH Powell facility Crooked R. facility Red R. facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Clearwater	Fall chinook (Snake) non - listed/part of ESU	Lyons Ferry FH Big Canyon facility	Rearing Release O&M M&E Fish health
Clearwater	Rainbow trout	Lyons Ferry FH	Release
Salmon	"B" steelhead (N.F. Clearwater) non-listed/part of ESU	*Dworshak NFH Magic Valley FH	Receive eggs Rearing Release O&M M&E Fish health
Salmon	Steelhead (E.F. Salmon) listed	E.F. Salmon facility Magic Valley FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Salmon	"A" steelhead (Sawtooth/Pahsimeroi) non-listed	Sawtooth FH Magic Valley FH Hagerman NFH *Pahsimeroi FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Salmon	Spring chinook (upper Salmon) Suppl. - listed Reserve - non-listed	Sawtooth FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Salmon	Rainbow trout	Lyons Ferry FH	Release

S.F. Salmon	Spring chinook (S.F. Salmon) suppl. - listed Reserve - non-listed	S.F. Salmon facility McCall FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Snake	Fall chinook (Snake) non - listed/part of ESU	Lyons Ferry FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Snake	Fall chinook (Snake) non - listed/part of ESU	Lyons Ferry FH Captain Johns facility Pittsburg Landing facility	Rearing Release O&M M&E Fish health
Snake	“A” steelhead (Lyons Ferry) non - listed	Lyons Ferry FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Imnaha	“A” steelhead (Imnaha) listed	Irrigon FH Little Sheep facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Imnaha	Spring chinook (Imnaha) listed	Lookingglass FH *Oxbow FH Irrigon FH Imnaha facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Grande Ronde	“A” steelhead (Wallowa) non - listed	Irrigon FH Wallowa FH Big Canyon facility	Adult trapping Spawning Rearing Release O&M M&E Fish health
Grande Ronde	Spring chinook (upper Grande Ronde) listed	Lookingglass FH *upper Grande Ronde facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health

Grande Ronde	Spring chinook (Catherine) listed	Lookingglass FH *Catherine facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Grande Ronde	Spring chinook (Lostine) listed	Lookingglass FH *Lostine facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Grande Ronde	"A" steelhead (Wallowa) non - listed	Lyons Ferry FH Cottonwood facility	Adult trapping Spawning Rearing Release O&M M&E Fish health
Tucannon	"A" steelhead (Lyons Ferry) non - listed	Lyons Ferry FH	Release M&E
Tucannon	"A" steelhead (Tucannon) listed	Lyons Ferry FH Tucannon FH	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
Tucannon	Spring chinook (Tucannon) listed	Lyons Ferry FH Tucannon FH Curl Lake facility	Adult trapping/releases Spawning Rearing Release O&M M&E Fish health
WA inland waters	Rainbow trout	Lyons Ferry FH Tucannon FH	Receive eggs Rearing Release O&M M&E Fish health

Table 4. Section 10 permits (or applications) for LSRCP Programs.

PROGRAM	PERMIT HOLDER	PERMIT NUMBER
Grande Ronde River chinook captive and conventional broodstock	ODFW	permit 1011
Imnaha River chinook enhancement	ODFW	permit 1128
Tucannon River chinook enhancement	WDFW	permit 1129
Lostine River chinook enhancement	CRITFC	permit application 1149

Salmon River chinook enhancement	IDFG	permit application 1179

Table 5. 4(d) rule coverage for LSRCP Programs.

PROGRAM	STATUS
Tucannon River "A" steelhead	finalized
Touchet River "A" steelhead	submitted to NMFS
Imnaha River "A" steelhead	submitted to NMFS
E.F. Salmon steelhead	submitted to NMFS

The following sections summarize major actions by basin and species, analyze how proposed actions involving indirect takes might affect the listed species, and assess whether LSRCP actions will adversely affect the survival or recovery of the listed species in the natural habitat. Where appropriate, plans for direct take for scientific and/or enhancement purposes (Section 10) and 4(d) rule coverage will be referenced and discussed.

SUMMARY OF MAJOR ACTIONS BY BASIN

Washington inland waters (rainbow trout)

Washington inland waters includes a rainbow trout program covered in one LSRCP HGMP. Spokane stock rainbow trout eggs used in the program are obtained from WDFW's Spokane FH. The program has little potential to indirectly take listed species (e.g. failure of lake/pond screens or disease transmission through water supply).

The rainbow trout program at Lyons Ferry FH and Tucannon FH involves rearing, release, operations and maintenance (O&M), monitoring and evaluation (M&E), and fish health activities of rainbow trout (Appendix 1). Catchable rainbow trout are released directly into inland lakes and ponds in SW Washington for recreational fisheries. The program is to compensate for resident fish losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include release of juveniles (predation, competition, and disease transmission). Releases in the program are currently limited to non-anadromous man-made lakes or ponds.

Snake River

The Snake River basin includes two fall chinook programs and a steelhead program covered in three LSRCP HGMP's. The two Snake River fall chinook programs use broodstock obtained from returns to Lower Granite Dam and volunteers back to Lyons Ferry FH and are a part of the listed Snake River fall chinook ESU, but not listed. The Lyons Ferry stock "A" steelhead program uses fish obtained from returns to Lyons Ferry FH, which are not part of the listed Snake River steelhead ESU, and are not listed.

The Snake River fall chinook salmon program at Lyons Ferry FH involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 2). The program has the potential to indirectly take listed Snake River steelhead, spring/summer chinook, fall chinook, sockeye and bull trout in the Snake River and the remainder of the listed

species in the Columbia River mainstem, estuary, and ocean. Broodstock are collected at Lower Granite Dam and volunteers back to Lyons Ferry FH. The program is to compensate for fall chinook losses caused by the four lower Snake River dams, conserve a listed fall chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping/releases (trap mortality and spatial and temporal distribution), O&M of Lyons Ferry FH (effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (spawning surveys and genetic monitoring), and fish health activities (treatments).

The Snake River fall chinook salmon program at Captain Johns and Pittsburg Landing facilities involves rearing, release, O&M, M&E, and fish health activities (Appendix 3). The program has the potential to indirectly take listed Snake River steelhead, spring/summer chinook, fall chinook, sockeye and bull trout in the Snake River and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Snake River fall chinook used in the program are juveniles obtained from Lyons Ferry FH (see Appendix 4). The program is to compensate for fall chinook losses caused by the four lower Snake River dams, conserve a listed fall chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Captain Johns and Pittsburg Landing facilities (reduction of stream volume between facility intake and return sites, effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Lyons Ferry stock "A" steelhead program at Lyons Ferry FH involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 4). The program has the potential to indirectly take listed Snake River steelhead, spring/summer chinook, fall chinook, sockeye and bull trout in the Snake River and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Lyons Ferry broodstock collected are also used for the Walla Walla River and Tucannon River programs. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries. In addition Lyons Ferry FH is used for spawning and early rearing of the Touchet and Tucannon river endemic programs.

Potential effects of the program include adult trapping/releases (trap mortality and spatial and temporal distribution), O&M of Lyons Ferry FH (effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (genetic monitoring), and fish health activities (treatments).

Tucannon River

The Tucannon River basin includes a spring chinook program and two steelhead programs covered by three LSRCP HGMP's. The Tucannon River spring chinook program uses fish obtained from returns to Tucannon FH which are part of the Snake River spring/summer ESU and listed. The program is covered under WDFW's section 10 enhancement permit 1129 and research permit 1126. The Lyons Ferry stock "A" steelhead program uses fish obtained from returns to Lyons Ferry FH which are not part of the listed Snake River steelhead ESU and are not listed.

The Tucannon River "A" steelhead program uses fish obtained from returns to the Tucannon River which are part of the Snake River ESU and listed. The program is permitted under a NMFS 4(d) rule.

The Tucannon River spring chinook salmon program at Tucannon FH and Curl Lake facility involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 5). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Tucannon River, Snake River sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Broodstock collected for the program are hauled to Lyons Ferry FH for spawning and early rearing. Broodstock used for the captive program are reared in tanks at Lyons Ferry. The program is to compensate for spring chinook losses caused by the four lower Snake River dams, conserve a listed spring chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping/releases (weir mortality and spatial and temporal distribution), O&M of Tucannon FH and Curl Lake facility (reduction of stream volume between facility intake and return sites, effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (electrofishing, snorkeling, rod and reel surveys, spawning surveys, smolt trapping and PIT tagging), and fish health activities (treatments).

The Lyons Ferry stock "A" steelhead program involves release and M&E activities (Appendix 6). The program has the potential to indirectly take listed Snake River steelhead, spring/summer chinook, fall chinook, and bull trout in the Tucannon River, Snake River sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Fish used in the program are obtained from Lyons Ferry FH. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries. Potential effects of the program include release of juveniles (residualism, predation, competition, behavior modifications and disease transmission) and M&E (creel surveys).

The Tucannon River "A" steelhead program involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 7). The program has the potential to indirectly take listed Snake River spring/summer chinook, fall chinook, and bull trout in the Tucannon, Snake River sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Broodstock collected for the program are transported to Lyons Ferry FH for spawning and early rearing. The program is to compensate for steelhead losses caused by the four lower Snake River dams, conserve a listed steelhead population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping/releases (weir mortality and spatial and temporal distribution), O&M of Tucannon FH (effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (electrofishing, snorkeling, rod and reel surveys, spawning surveys, smolt trapping and PIT tagging), and fish health activities (treatments).

Clearwater River

The Clearwater River basin includes a fall chinook program, two spring chinook salmon programs, three steelhead programs, and a rainbow trout program covered in six LSRCP HGMP's. The Snake River fall chinook program uses broodstock obtained from returns to Lower Granite Dam and volunteers back to Lyons Ferry FH which are part of the listed Snake River fall chinook ESU, but not listed. The N.F. Clearwater/Rapid River spring chinook program uses broodstock obtained from returns to Dworshak NFH which are not part of the Snake River spring/summer ESU and not listed. The Powell/Red River/Crooked River/Rapid River spring chinook program uses broodstock obtained from returns to Powell, Red River, and Crooked River facilities which are not part of the Snake River spring/summer chinook ESU and are not listed. The two N.F. Clearwater "B" programs use broodstock obtained from returns to Dworshak NFH which are part of the Snake River steelhead ESU but not listed. The rainbow trout program uses fish obtained from WDFW.

The Snake River fall chinook salmon program at Big Canyon facility involves rearing, release, O&M, M&E, and fish health activities (Appendix 3). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River, spring/summer chinook and sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Snake River fall chinook used in the program are juveniles obtained from Lyons Ferry FH. The program is to compensate for fall chinook losses caused by the four lower Snake River dams, conserve a listed fall chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Big Canyon facility (reduction of stream volume between facility intake and return sites, effluent, and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The N.F. Clearwater River "B" steelhead program at Clearwater FH involves receiving eggs, rearing, release, O&M, M&E, and fish health activities (Appendix 8). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River, spring/summer chinook and sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. N.F. Clearwater River "B" steelhead used in the program are obtained from Dworshak NFH. The program is to compensate for steelhead losses caused by the four lower Snake River dams, conserve a listed steelhead population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Clearwater FH (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (creel surveys), and fish health activities (treatments).

The N.F. Clearwater River "B" steelhead program at Hagerman NFH involves receiving eggs, rearing, release, O&M, M&E, and fish health activities (Appendix 9). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River, spring/summer chinook and sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. N.F. Clearwater River "B" steelhead used in the program are obtained from Dworshak NFH. The program is to compensate for steelhead losses caused by the four lower Snake River dams, conserve a listed steelhead population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Hagerman NFH (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E (creel surveys), and fish health activities (treatments).

The Rapid River/N.F.Clearwater stock spring chinook program at Dworshak NFH involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 10). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River, spring/summer chinook and sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for spring chinook losses caused by the four lower Snake River dams,

and provide fisheries.

Potential effects of the program include O&M of Dworshak NFH (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Powell/Red R./Crooked R./Rapid River stock spring chinook program at Clearwater FH, Powell facility, Red River facility, and Crooked River facility involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 11). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River, spring/summer chinook and sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for spring chinook losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include O&M of Clearwater FH, Powell facility, Red River facility, and Crooked River facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The rainbow trout program involves release of juveniles obtained from Lyons Ferry FH (Appendix 12). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Clearwater River and spring/summer chinook and sockeye in the Snake River. The program is to compensate for resident fish losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), and M&E.

Grande Ronde River

The Grande Ronde River basin includes a spring chinook salmon program and two steelhead programs covered in three LSRCP HGMP's. The Grande Ronde spring chinook program includes three separate broodstocks (upper Grande Ronde River, Lostine River, and Catherine Creek) obtained from returns to the respective tributaries which are all part of the Snake River spring/summer chinook ESU and are listed. All three broodstocks include both a captive and conventional component. A reintroduction program in Lookingglass Ck. will be initiated using Catherine Ck. broodstock when co-managers have developed the plan. One Wallowa stock "A" steelhead program uses broodstock obtained from returns to Wallowa FH and Big Canyon facility which are not part of the Snake River steelhead ESU and not listed. The other Wallowa stock "A" steelhead program uses broodstock obtained from returns to Cottonwood facility which are not part of the Snake River ESU and not listed.

The upper Grande Ronde River spring chinook part of the program at Lookingglass FH and upper Grande Ronde facility (BPA funded facility) involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 13). Upper Grande Ronde spring chinook are permitted under ODFW's section 10 enhancement permit 1011. The Catherine Creek

spring chinook part of the program at Lookingglass FH and Catherine Creek facility (BPA funded facility) involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities Catherine Creek spring chinook are covered under ODFW's section 10 enhancement permit 1011. The Lostine River spring chinook part of the program at Lookingglass FH and Lostine River facility (BPA funded facility) involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities. Lostine River spring chinook are covered under CRITFC's section 10 enhancement permit 1149 (proposed). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Grande Ronde River, sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for spring chinook losses caused by the four lower Snake River dams, conserve a listed spring chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Lookingglass FH (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Wallowa stock "A" steelhead program at Irrigon FH, Wallowa FH, and Big Canyon facility involves adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 14). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, and bull trout in the Grande Ronde River, sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of Wallowa FH and Big Canyon facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Wallowa stock "A" steelhead program at Cottonwood facility (and Lyons Ferry FH) involving adult trapping, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 15). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, and bull trout in the Grande Ronde River, sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of Cottonwood facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

Imnaha River

The Imnaha River basin includes a spring chinook salmon program and a steelhead program covered in two LSRCP HGMP's. The Imnaha spring chinook program uses broodstock obtained from returns to the Imnaha facility which are pert of the Snake River spring/summer ESU and are listed. Imnaha River spring chinook are permitted under ODFW's section 10 enhancement permit 1128. The Imnaha "A" steelhead program uses broodstock obtained from returns to Little Sheep facility which are part of the Snake River ESU and are listed. The Imnaha "A" steelhead are permitted under a NMFS 4(d) rule (proposed).

The Imnaha River spring chinook program at Lookingglass FH, Irrigon FH, Imnaha facility, and Oxbow FH involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 16). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, and bull trout in the Imnaha River, sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for spring chinook losses caused by the four lower Snake River dams, conserve a listed spring chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Imnaha facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Imnaha River "A" steelhead program at Irrigon FH and Little Sheep facility involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 17). The program has the potential to indirectly take listed Snake River fall chinook, spring/summer chinook, and bull trout in the Grande Ronde River, sockeye in the Snake River, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. Imnaha River steelhead are permitted under the NMFS 4(d) rule. The program is to compensate for steelhead losses caused by the four lower Snake River dams, conserve a listed steelhead population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include O&M of Little Sheep facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

Salmon River

The Salmon River basin includes a spring chinook salmon program, a summer chinook salmon program, three steelhead programs, and a rainbow trout program covered in six LSRCP HGMP's. The N.F. Clearwater "B" steelhead program uses broodstock obtained from Dworshak NFH which are part of the Snake River steelhead ESU but are non-listed. The E.F. Salmon steelhead program uses broodstock obtained from the E.F. Salmon River which are part of the Snake River ESU and listed. The E.F. Salmon steelhead program is permitted under a NMFS 4(d) rule (proposed). The Sawtooth/Pahsimeroi "A" steelhead program uses broodstock obtained from returns to Sawtooth FH and Pahsimeroi FH which are not part of the Snake River ESU and are

not listed. The Salmon River spring chinook program uses returns to Sawtooth FH which are part of the Snake River ESU, with the reserve (H x H) component not listed and the supplementation (H x N and N x N) component listed. Salmon River spring chinook are permitted under IDFG's section 10 enhancement permit 1179 (proposed) The S.F. Salmon River summer chinook program uses broodstock obtained from returns to the S.F. Salmon facility which are part of the Snake River spring/summer chinook ESU, with the reserve (H x H) component not listed and the supplementation (H x N and N x N) component listed. S.F. Salmon River summer chinook are permitted under ODFW's section 10 enhancement permit 1179 (proposed).

The N.F. Clearwater "B" stock steelhead program at Magic Valley FH involves receiving eggs, rearing, release, O&M, M&E, and fish health activities (Appendix 18). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include O&M of Magic Valley FH (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The E.F. Salmon steelhead program at Magic Valley FH and the East Fork Salmon facility involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 19). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for steelhead losses caused by the four lower Snake River dams, conserve a listed steelhead population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of Magic Valley FH and East Fork Salmon facility (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Sawtooth/Pahsimeroi "A" stock steelhead steelhead program at Sawtooth FH, Magic Valley FH, Pahsimeroi FH, and Hagerman NFH involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 20). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for steelhead losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of Sawtooth FH, Magic Valley FH, and Hagerman NFH (effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The Salmon River spring chinook program at Sawtooth FH involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 21). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for spring chinook losses caused by the four lower Snake River dams, conserve a listed spring chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of Sawtooth FH (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

IDFG manages a S.F. Salmon River summer chinook program at McCall FH and S.F. Salmon facility involving adult trapping/releases, spawning, rearing, release, O&M, M&E, and fish health activities (Appendix 22). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean. The program is to compensate for summer chinook losses caused by the four lower Snake River dams, conserve a listed summer chinook population at risk of extinction, and provide fishery opportunities.

Potential effects of the program include adult trapping (weir mortality and spatial and temporal distribution), O&M of McCall FH and South Fork Salmon facility (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments).

The rainbow trout program involving release of juveniles obtained from Lyons Ferry FH (Appendix 12). The program has the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers. The program is to compensate for resident fish losses caused by the four lower Snake River dams and provide fisheries.

Potential effects of the program include release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), and M&E.

SUMMARY OF MAJOR ACTIONS BY SPECIES

STEELHEAD PROGRAMS

The LSRCP program currently funds ten steelhead programs in the Snake River Basin. Three listed steelhead programs are located in the Tucannon (WDFW), Imnaha (ODFW), and East Fork Salmon (IDFG) rivers. HGMP's for these Three programs were submitted to NMFS to apply for a limit as defined in the final 4(d) rule for salmon and steelhead (Table 5). Two HGMP's were developed for N. F. Clearwater "B" steelhead (from Dworshak NFH) in the Salmon (FWS and IDFG) and Clearwater (IDFG) rivers that are not listed but are a part of the Snake River steelhead

ESU. NMFS is currently reviewing how they will consider the hatchery component of the N.F. Clearwater steelhead when conducting their latest status reviews and listing determinations for the Snake River steelhead ESU. The remaining five HGMP's, all use non-listed steelhead broodstocks which are not a part of the Snake River steelhead ESU, were developed for the Salmon (FWS and IDFG), Snake (WDFW), and Grande Ronde (WDFW and ODFW) rivers.

Potential effects of the steelhead programs include straying or wandering of adult returns, adult trapping (weir mortality and spatial and temporal distribution), O&M of steelhead facilities (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E, and fish health activities (treatments). These programs have the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean.

RAINBOW TROUT PROGRAMS

The LSRCP program currently funds three rainbow trout programs in the lower Salmon (IDFG) and Clearwater (IDFG) rivers and in inland Washington lakes (WDFW). HGMP's for these three programs were developed by WDFW and IDFG.

Potential effects of the rainbow trout programs include release of juveniles (residualism, predation, competition, behavior modifications and disease transmission). The programs have the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers.

CHINOOK PROGRAMS

The LSRCP program currently funds twelve chinook programs. Seven listed chinook programs are located in the upper Salmon (IDFG), S.F. Salmon (IDFG), Imnaha (ODFW), upper Grande Ronde(ODFW and CTUIR), Catherine (ODFW and CTUIR), Lostine (ODFW and NPT), and Tucannon (WDFW) rivers. All seven chinook programs operate under NMFS section 10 permits (Table 4). Three programs (WDFW and NPT) use Snake River fall chinook which are non-listed but part of the listed Snake River fall chinook ESU. IDFG maintains a non-listed reserve component (H x H) in both the S.F. Salmon summer chinook and upper Salmon spring chinook programs. NMFS is currently reviewing how they will consider the hatchery components of Snake River fall chinook and the hatchery reserve components of both the S.F. Salmon River summer chinook and upper Salmon River spring chinook programs when conducting their latest status reviews and listing determinations for the Snake River fall chinook and spring/summer chinook ESU's. The remaining two chinook programs in the Clearwater River (FWS and IDFG) use non-listed spring/summer chinook broodstocks which are not a part of the Snake River spring/summer ESU. The Clearwater Basin was not included as critical habitat for Snake River spring/summer chinook.

Potential effects of the chinook programs include adult trapping (weir mortality and spatial and temporal distribution), O&M of steelhead facilities (reduction of stream volume between facility intake and return sites, effluent and routine operations and maintenance), release of juveniles (residualism, predation, competition, behavior modifications and disease transmission), M&E,

and fish health activities (treatments). These programs have the potential to indirectly take listed Snake River steelhead, fall chinook, spring/summer chinook, sockeye, and bull trout in the Salmon and Snake rivers, and the remainder of the listed species in the Columbia River mainstem, estuary, and ocean.

ANALYSES OF EFFECTS

Our analysis of the potential effects of the LSRCP relies on HGMP's provided by our cooperators, published and unpublished literature, personal communication, agency knowledge, and local studies now underway. Although local studies for many of the potential effects listed in the assessment are limited, considerable literature was available describing various interactions among salmonids. The lack of basin specific data to analyze many of the effects made it necessary to apply study results from outside the basin. While in most cases evidence is not conclusive for many of the LSRCP programs, we believe the potential for adverse effects exists in some areas and the LSRCP staff is working with the cooperators to develop and fund additional studies in Oregon, Washington, and Idaho. The effects of many actions, such as those which might cause interspecific competition and behavior modification, are unknown at this time and are not easily measured. We will need to rely heavily on the scientific community in future years to assess these and other unknowns, such as the genetic, biological, and environmental effects of our actions.

Many actions with varying potential to affect listed species are the result of interim agreements reached (including NMFS) under *US v Oregon.* Some of these may be reconsidered after NMFS has developed criteria for conservation and recovery of listed species and subbasin plans are completed with basin specific objectives and priorities identified.

The following sections analyze the potential effects of our proposed actions on the survival and recovery of listed species. Although we estimate indirect take whenever possible, rarely are empirical data available to make calculations. As we have noted above, removal (direct take) and subsequent use of listed adults or juveniles for scientific or enhancement purposes are proposed in several basins and described in Section 10 permit applications and 4(d) rules. These actions will only occur when the NMFS approves the applications, assesses the effects of their granting these and other permits (i.e. conducts a Section 7 consultations), and issues the permits. Therefore, the only actions analyzed below are those which <u>may affect</u> the listed species and, if adversely, require approval for <u>indirect take</u>. Because many basins have proposed actions involving both un-permitted (indirect) and permitted (direct) takes, actions waiting Section 10 permits may be briefly discussed, but only to clarify programs which might involve indirect takes.

Program Analyses

Each of the LSRCP programs were described and potential effects to listed populations assessed in the following sections covering juvenile rearing and releases, fish health, adult returns, facility operations, and monitoring and evaluations. Potential effects of programs permitted under section 10 (Table 4) and the 4(d) rule (Table 5) were not assessed in this analyses.

Washington Inland Waters

Rainbow Trout Program (WDFW)

Both Lyons Ferry FH and Tucannon FH receive Spokane stock rainbow trout eggs for the program from Spokane FH (Appendix 1). Releases of 237,500 rainbow trout into Washington inland waters (Table 12) occur in areas outside the natural habitat or in lakes and ponds that have been screened to prevent access to all listed salmon, steelhead, and bull trout populations in the Columbia River Basin.

Hatchery releases of rainbow trout are examined prior to release following fish health protocols established for the region. There is very little potential for effects to listed salmon and steelhead species from releases in this program (e.g. failure of screens or horizontal transmission of pathogens).

Lyons Ferry FH uses well water and Tucannon FH uses a combination of spring, well, and Tucannon River water for rearing rainbow trout (Table 8). All screens are inspected and maintained on an annual basis. Effluents from the facilities comply with state and Federal NPDES permit standards. Routine O&M at the facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

M&E activities include routine monitoring at the facilities and creel surveys. Monitoring and evaluation of production (routine culture monitoring at the facilities and creel surveys) will not affect listed species.

There is no evidence to date that the program will affect other FWS listed species.

Table 6. Proposed 2003 LSRCP steelhead broodstock collection sites and collection dates.

SUBBASIN	COLLECTION SITE	DATES COLLECTED
Snake R.	Lyons Ferry FH trap	September - November
Tucannon R.	Tucannon FH weir/trap	September - April
	lower Tucannon R. weir/trap[1]	September - March
Grande Ronde R.	B. Canyon weir/trap	February - June
	Wallowa FH weir/trap	February - June
	Cottonwood Ck.weir/trap	March - May
Imnaha R.	L. Sheep Ck. weir/trap[1]	March - June
Clearwater R.	Crooked R. weir/trap	April - May
	Red R. Weir/trap	April-May
Salmon R.	E. F. Salmon R. weir/trap[1]	March - May
	Sawtooth FH weir/trap	March - May

[1] Projects proposing direct takes.

Table 7. Proposed 2003 LSRCP chinook salmon broodstock collection sites and collection dates.

SUBBASIN	COLLECTION SITE	DATES COLLECTED
Snake R.	Lyons Ferry FH trap	September - November
Tucannon R.	Tucannon FH weir[1]	May - September
Clearwater R.	Dworshak NFH trap	May - September
Kooskia NFH weir		May - October
	Red River weir	June - October
	Powell R. weir	June - October
Crooked R. weir		June - October
Grande Ronde R.	Lookingglass Ck.FH weir	*
Imnaha R.	Imnaha R. weir[1]	May - September
Salmon R.	S. F. Salmon R. weir[1]	May - October
	Sawtooth FH weir[1]	June - September

[1] Projects proposing direct takes.
* No broodstock collection in 2003.

Snake River

Snake River Fall Chinook Program (WDFW)

The proposed release of 450,000 yearling and 200,000 subyearling Snake River fall chinook from Lyons Ferry FH into the Snake River (Table 11) has the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. The release site is located well below primary production areas of listed fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. Hatchery fall chinook are released as smolts in April and subyearlings in June and are unlikely to prey on listed fall chinook. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River and timing differences between yearling releases and natural out-migration. Size differences should also result in selection of different habitats with the potential for competition reduced as the smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery fall chinook.

Hatchery releases of fall chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Snake River fall chinook releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of Lyons Ferry fall chinook may escape into spawning areas within the mainstem Snake, Clearwater, Grande Ronde, Imnaha, and Salmon rivers (Appendix 4). Hatchery origin fall chinook are intended to spawn upstream of Lower Granite Dam in mainstem and tributary natural production areas. Proportions of hatchery-origin fall chinook spawners is unknown at this time due to difficulty in determining productivity or survival data by life stage in the mainstem Snake River and releases of unmarked hatchery groups. It is currently unknown if hatchery origin adults

successfully spawn with natural fish and whether they affect the reproductive success of natural spawners. While there are likely more than 30% hatchery-origin spawners in some natural production areas in the Snake Basin, the current *US v Oregon* agreement stipulates releases of unmarked fall chinook. There is currently a sub-group under *US v Oregon* working on a Snake River fall chinook management plan which includes marking strategies to address this issue. Currently 100% of juveniles released are adipose clipped with CWT groups in both subyearling and yearling releases. In addition all yearling releases will have a red VI elastomer tag behind the left eye for external identification.

Trapping for the fall chinook program occurs at Lower Granite Dam from August through November and at Lyons Ferry FH from September through November (Table 7). Trapping at both facilities are timed to avoid most of the spring/summer chinook run, although some incidental take of listed Snake River spring/summer chinook occurs. An average of five CWT spring/summer chinook are incidentally caught annually during the trapping period. No bull trout have been captured to date during fall chinook trapping. Listed summer steelhead that are trapped are held in fall chinook holding ponds until sorting and then passed to steelhead raceways for a 21 day chemical withdrawl period, then passed upstream to spawn naturally.

Lyons Ferry FH uses well water for rearing Snake River fall chinook (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile fall chinook is conducted on an annual basis using spawning ground surveys conducted in the Snake River (FWS and NPT) and Tucannon River (covered under Tucannon River endemic steelhead and spring/summer chinook programs).

There is no evidence to date that the program will affect other FWS listed species.

Snake River Fall Chinook Program (NPT)

Proposed release of 300,000 yearling and 1,200,000 subyearling Snake River fall chinook from Captain Johns and Pittsburg Landing into the Snake River (Table 11) has the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. The release sites are located near primary production areas of listed fall chinook and well below primary production areas for Snake River spring/summer chinook, steelhead, sockeye salmon, and bull trout. Hatchery fall chinook are released as smolts in April and subyearlings in June. Smolts are expected to actively migrate from release sites.

Releases from the two sites have the potential for competition with listed Snake River fall chinook, however, potential for competition with listed Snake River spring/summer chinook, steelhead, sockeye salmon, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River. Size differences should result in selection of different habitats and the potential for competition reduced as the smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery fall chinook.

Hatchery releases of fall chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Snake River fall chinook releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of Lyons Ferry fall chinook may escape into spawning areas within the mainstem Snake, Clearwater, Grande Ronde, Imnaha, and Salmon rivers (Appendix 3). Proportions of hatchery-origin fall chinook spawners is unknown at this time due to difficulty in determining productivity or survival data by life stage in the mainstem Snake River and releases of unmarked hatchery groups. It is currently unknown if hatchery origin adults successfully spawn with natural fish and whether they reduce the reproductive success of natural spawners. While there are likely more than 30% hatchery-origin spawners in some natural production areas in the Snake Basin, the current *US v Oregon* agreement stipulates releases of unmarked fall chinook. There is currently a sub-group under *US v Oregon* working on a Snake River fall chinook management plan which includes marking strategies to address this issue. Releases will contain a CWT group for evaluation purposes, along with unmarked / untagged yearling and subyearling juveniles.

Captain Johns and Pittsburg Landing facilities use Snake River water for rearing Snake River fall chinook (Table 8). Effluent from the facilities comply with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile fall chinook is conducted on an annual basis using spawning ground surveys conducted in the Snake River (FWS).

There is no evidence to date that the program will affect other FWS listed species.

Lyons Ferry Stock "A" Steelhead Program (WDFW)

Proposed releases of 60,000 Lyons Ferry stock steelhead from Lyons Ferry FH into the Snake River (Table 10) have the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. Size at release of Lyons Ferry stock steelhead (210 mm @ 4.5 fpp) should preclude substantial predator/prey interactions with listed steelhead (130 mm-200 mm) at and below the release site (Appendix 6). Release site is located well below primary production areas of listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. Hatchery steelhead are released as smolts in mid-April and are expected to actively migrate from release sites. Residualism rates in the Snake River are unknown although it is assumed that higher densities generally remain close to release sites and decline steadily throughout the summer. Predation rates on other salmonids by residual steelhead appears to be low. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

The potential for competition with listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River. Size differences between hatchery and listed fish should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced

by hydro-system operations covered outside this analysis. All LSRCP non-listed hatchery releases remain within the NMFS production cap and size at release criteria intended to address those potential effects.

Hatchery steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Lyons Ferry stock steelhead releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of Lyons Ferry stock steelhead released into the Snake River likely escape into spawning areas within tributaries to the Snake River, although it appears to be a low level based on available data (Appendix 4). Estimated proportions of hatchery-origin steelhead spawners in the Tucannon River typically is < 1% based on CWT recoveries. It is currently unknown if hatchery fish are spawning with naturally produced fish. WDFW collects genetic samples from both listed and Lyons Ferry stock steelhead that are being analyzed in the future. Preliminary analysis by WDFW indicates that Lyons Ferry stock releases into the Snake River stray from 1% -2.5% into the Deschutes River. Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Walla Walla River and Snake River Basin. Currently 100% of smolts released are adipose clipped with CWT and/or ventral fin clipped groups for evaluations.

Adult returns of Lyons Ferry "A" steelhead have been harvested at very high rates in the Columbia River net and sport fisheries, and in the mainstem Snake. WDFW harvest regulations have been focused on minimizing escapement of Lyons Ferry stock steelhead into the Snake River and tributaries and impacts to listed steelhead. WDFW has also recently initiated endemic Touchet and Tucannon river steelhead programs (Appendix 3 and Appendix 9).

Operation of the adult trap from July through mid-November may incidentally take listed Snake River steelhead. Annual take of listed steelhead has averaged less than100 fish with one mortality in each of the last two years. The trap is not operated every day and listed steelhead are returned to the Snake River.

Lyons Ferry FH uses well water for rearing Lyons Ferry stock steelhead (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will affect other FWS listed species.

Tucannon River

Tucannon River "A" Steelhead Program (WDFW)

The HGMP for the endemic Tucannon River steelhead program (part of the listed Snake River steelhead ESU) was submitted to NMFS under the 4(d) rule (Appendix 5). Potential effects to listed Snake River steelhead were not addressed in this assessment.

Proposed release of 50,000 Tucannon River steelhead into the Tucannon River above Tucannon FH (Table 10) has the potential to take listed Snake River spring/summer chinook, fall chinook, and bull trout. Release sites are located near primary production areas of Snake River spring/summer chinook and bull trout. Hatchery steelhead are released as smolts in mid-April to May and are expected to actively migrate from release sites. Residualism rates for endemic releases in the Touchet River are currently unknown. WDFW plans to monitor releases to determine residualism rates. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

The potential for competition with spring/summer chinook and bull trout exists, while the potential for fall chinook should remain low due to the distance between releases and primary production areas in the Tucannon River, and the short period of spatial overlap would coincide with steelhead out-migration. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis.

Hatchery steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Tucannon River steelhead releases negatively affect listed spring/summer chinook, fall chinook, steelhead and bull trout in the Tucannon River or other listed species outside the basin.

Adult returns of Tucannon River steelhead are not expected to affect listed Snake River spring/summer and bull trout or other listed species outside the basin. Operation of the lower Tucannon River weir and Tucannon FH trap occurs from October through April (Table 6) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River spring/summer chinook and bull trout. Operation of the adult traps has resulted in minimal take of listed fish. All bull trout captured at the weir are sampled and passed with minimal delay. Sampling is conducted under a FWS, Section 7 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program in Washington. Stress and/or mortality on bull trout associated with operation of the weir and trap appears to be minimal to date. Currently 100% of smolts released are coded wire tagged with a VI elastomer tag in the adipose eye tissue.

Tucannon FH diverts approximately < 5 % of the Tucannon River for rearing Tucannon River steelhead from March through May (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile steelhead is conducted on an annual basis using spawning ground surveys, electrofishing, snorkel surveys, smolt trapping and PIT tagging. Potential take associated with spawning ground surveys is expected to be temporary displacement and not expected to result in mortality to listed spring/summer chinook, fall chinook, and bull trout. Snorkel surveys normally

occur from July through September and may result in displacement of listed spring/summer chinook, fall chinook, and bull trout. While there is no estimate of the level of take associated with snorkel surveys, it is assumed to be very low. Most fish displaced during snorkel surveys appear to quickly re-establish their original locations.

Electrofishing surveys are conducted from July through September and may result in displacement, injury, and/or mortality of listed spring/summer chinook, fall chinook, and bull trout. Surveys are conducted with modified Smith-Root backpack electroshockers with state of the art electronic components designed to minimize potential effects to fish. Surveys are conducted using NMFS electrofishing criteria. Mortalities associated with electrofishing have been low and surveys are terminated when higher than usual recovery times and/or mortalities occur.

Smolt trapping will be conducted on the Tucannon River from October through June to enumerate natural smolt production from the primary steelhead and chinook production area in the Tucannon River. Trapping may result in delayed migration for listed spring/summer chinook, fall chinook, and bull tout and could result in mortality. However, smolt trapping mortalities are expected to be low (< 0.5% based on steelhead trapping in Tucannon R., 1997-present) and trap protocols are in place to remove fish on a daily basis.

There is no evidence to date that the program will affect other FWS listed species.

Tucannon River Spring Chinook Program (WDFW)

The endemic Tucannon River spring chinook program (part of the listed Snake River ESU) is covered under a Section 10 permit submitted to NMFS by WDFW (Table 2). The program includes both a conventional and captive component (Appendix 8). Potential effects to listed Snake River spring/summer chinook were not addressed in this assessment.

Proposed release of 132,000 conventional and 150,000 captive Tucannon River spring chinook smolts into the Tucannon River from Curl Lake facility (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook released as smolts in March through April are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in the lower Tucannon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Tucannon River spring chinook releases negatively affect listed steelhead, fall chinook, and bull trout in the Tucannon River or other listed species outside the basin.

Adult returns of Tucannon River spring chinook are not expected to affect listed Snake River steelhead, fall chinook, and bull trout or other listed species outside the basin. Operation of the Tucannon FH weir and trap occurs from April through October (Table 7) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River steelhead and bull trout. Operation of the adult traps may result in take of listed Snake River steelhead and bull trout. All listed bull trout and steelhead captured at the weir are sampled and passed with minimal delay. Bull trout sampling is conducted under a FWS, Section 7 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program in Washington. Stress and/or mortality on listed bull trout and steelhead associated with operation of the weir and trap appears to be minimal to date. Currently 100% of the conventional smolts are externally marked with an elastomer tag and coded wire tag while the captive smolts are marked with a coded wire tag only.

Adults are transferred to Lyons Ferry FH, spawned and reared through October before transfer to Tucannon FH. Tucannon FH diverts approximately 5 % of the Tucannon River for rearing Tucannon River spring chinook from October through mid-February (Table 9). In mid-February, juveniles are transferred to Curl Lake facility for final rearing to release. Curl Lake facility diverts approximately 6 % - 10 % of the Tucannon River for rearing Tucannon River spring chinook from mid-February through April (Table 9).

Effluent from both facilities comply with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile spring chinook is conducted on an annual basis using spawning ground surveys, electrofishing, snorkel surveys, smolt trapping and PIT tagging. Potential take associated with spawning ground surveys is expected to be temporary displacement and not expected to result in mortality to listed steelhead, fall chinook, and bull trout. Snorkel surveys normally occur from July through September and may result in displacement of listed steelhead, fall chinook, and bull trout. While there is no estimate of the level of take associated with snorkel surveys, it is assumed to be very low. Most fish displaced during snorkel surveys appear to quickly re-establish their original locations.

Smolt trapping will be conducted on the Tucannon River from October through July to enumerate natural smolt production from the primary steelhead and chinook production area in the Tucannon River. Trapping may result in delayed migration for listed steelhead, fall chinook, and bull tout and could result in mortality. However, smolt trapping mortalities are expected to be low (< 0.5% based on steelhead trapping in Tucannon R., 1997-present) and trap protocols are in place to remove fish on a daily basis.

There is no evidence to date that the program will affect other FWS listed species.

Lyons Ferry Stock "A" Steelhead Program (WDFW)

The proposed release of 135,000 Lyons Ferry stock steelhead into the lower Tucannon River (Table 10) has the potential to take listed Snake River steelhead, spring/summer chinook, fall

chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and spring/summer chinook and bull trout and above fall chinook primary production areas. Steelhead are released as smolts in April and are expected to actively migrate from release sites. Predation by residuals on listed spring/summer chinook, steelhead, fall chinook, and bull trout is assumed to be low.

The potential for competition with listed fall chinook exists, while steelhead, spring/summer chinook, and bull trout should remain low due to the distance between release and primary production areas in the lower Tucannon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be of similar or larger size and predation by hatchery steelhead unlikely.

Hatchery steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Lyons Ferry stock steelhead releases negatively affect listed spring/summer chinook, steelhead, fall chinook, and bull trout in the Tucannon River or other listed species outside the basin.

Adult returns of Lyons Ferry stock steelhead released into the basin likely escape into spawning areas within the Tucannon River and tributaries (Appendix 7). Estimated proportions of hatchery-origin steelhead spawner escapement in the Tucannon River in 2000 and 2001, was 98.6% and 68.5%. However, the limited ability to efficiently trap adults and conduct spawning ground surveys may reduce the accuracy of the existing data. It is currently unknown if hatchery fish are spawning with naturally produced fish. WDFW collects genetic samples from both listed and Lyons Ferry stock steelhead that could be analyzed in the future. Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Walla Walla River and Snake River Basin. Currently 100% of the smolts released are marked with an adipose fin clip and a group marked with a coded wire tag and left ventral fin clip for evaluation.

Adult returns of Lyons Ferry "A" steelhead have been harvested at very high rates in the Columbia River net and sport fisheries, and in the mainstem Snake and Tucannon rivers. WDFW harvest regulations have been focused on minimizing escapement of Lyons Ferry stock steelhead into the Tucannon River and impacts to listed steelhead. WDFW is currently assessing further reductions in Lyons Ferry steelhead release numbers in 2004 to address potential impacts to listed steelhead in the basin. WDFW has also recently initiated an endemic Tucannon River steelhead program (Appendix 7).

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will affect other FWS listed species.

Clearwater River

Snake River Fall Chinook Program (NPT)

Proposed release of 150,000 yearling and 500,000 subyearling Snake River fall chinook from Big Canyon facility into the Clearwater River (Table 11) has the potential to take listed Snake River

fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. The release site is located near primary production areas of listed fall chinook and below primary production sites for spring/summer chinook, steelhead, sockeye salmon, and bull trout. Hatchery fall chinook are released as smolts in April and subyearlings in June. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River spring/summer chinook, steelhead, sockeye salmon, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery fall chinook.

Hatchery releases of fall chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Snake River fall chinook releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of Snake River fall chinook may escape into spawning areas within the mainstem Snake, Clearwater, Grande Ronde, Imnaha, and Salmon rivers (Appendix 3). Proportions of hatchery-origin fall chinook spawners is unknown at this time due to difficulty in determining productivity or survival data by life stage in the mainstem Clearwater River and releases of unmarked hatchery groups. While there are likely more than 30% hatchery-origin spawners in natural production areas in the Snake Basin, the current *US v Oregon* agreement stipulates releases of unmarked fall chinook. There is currently a sub-group under *US v Oregon* working on a Snake River fall chinook management plan which includes marking strategies to address this issue. Releases will contain a CWT group for evaluation purposes.

Big Canyon facility uses Clearwater R. water for rearing Snake River fall chinook (Table 9). Effluent from the facility complies with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

North Fork Clearwater "B" Steelhead Program (IDFG)

The proposed releases of 1,040,000 N.F. "B" steelhead smolts from Clearwater FH (direct releases into S.F. Clearwater R., Clear Ck., and Lolo Ck.) and acclimated releases from Red River facility and Crooked River facility into the Clearwater River (Table 10) have the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. The release sites are located below primary production areas of listed steelhead and bull trout and above primary production sites for fall chinook. Steelhead are released as smolts from April through May. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River steelhead , fall chinook, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that N.F. Clearwater "B" steelhead releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of N.F. Clearwater "B" steelhead may escape into spawning areas within the Clearwater River (Appendix 8). Proportions of hatchery-origin steelhead spawners is unknown at this time due to releases of unmarked hatchery groups and adults. Mean exploitation rates for adult returns from release years 1994 through 1996 ranged from 46% to 66%. While there are likely more than 30% hatchery-origin spawners in some natural production areas in the Clearwater Basin, the current *US v Oregon* agreement stipulates releases of unmarked steelhead adults and juveniles. There is currently a sub-group under *US v Oregon* working on a Columbia Basin marking strategy for steelhead which would includes marking strategies to address this issue. Currently 100% of smolts released for mitigation are marked with an adipose fin clip with groups marked with coded wire tags and/or ventral fin clips for evaluation. Production targeted for NPT supplementation (*US v Oregon* agreement) may be released unmarked.

Operation of the adult traps at Red River and Crooked River facilities occurs from April through *May (Table 6) and may incidentally take listed Snake River steelhead and bull trout. All* unmarked steelhead and bull trout are released immediately above the weirs with a minimum of handling Broodstock used for the program are obtained from Dworshak NFH and hatchery origin adults collected at the Red River and Crooked River facilities.

N.F. Clearwater "B" steelhead are reared at Clearwater FH, Red River facility, and Crooked River facility. Clearwater FH uses water from Dworshak reservoir, Red River facility uses river water from Red River, and Crooked River facility uses river water from Crooked River for rearing N.F. "B" steelhead (Table 8). Effluent from the facilities complies with state and Federal NPDES permit standards. Routine O&M at the facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

North Fork Clearwater "B" Steelhead Program (FWS)

The proposed releases of 200,000 N.F. "B" steelhead smolts from Dworshak NFH (direct releases into S.F. Clearwater R. (Table 10) have the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout. The release sites are located

below primary production areas of listed steelhead and bull trout and above primary production sites for fall chinook. Steelhead are released as smolts from April through May. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River steelhead , fall chinook, and bull trout should remain low due to the distance between releases and primary production areas in the Snake River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that N.F. Clearwater "B" steelhead releases negatively affect listed Snake River fall chinook, spring/summer chinook, steelhead, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of N.F. Clearwater "B" steelhead may escape into spawning areas within the Clearwater River (Appendix 9). Proportions of hatchery-origin steelhead spawners is unknown at this time due to releases of unmarked hatchery groups and adults. While there are likely more than 30% hatchery-origin spawners in production areas in the Clearwater Basin, the current *US v Oregon* agreement stipulates releases of unmarked steelhead adults and juveniles. There is currently a sub-group under *US v Oregon* working on a Columbia Basin marking strategy for steelhead which would includes marking strategies to address this issue. Currently 100% of smolts released are unmarked based on existing *US v Oregon* agreement.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

N.F. Clearwater/Rapid River Spring Chinook Program (FWS)

The proposed release of 1,050,000 spring chinook smolts from Dworshak NFH into the N.F. Clearwater River (Table 11) has the potential to take listed Snake River fall chinook, steelhead, and bull trout. The release site is located near primary production areas of listed fall chinook and below primary production sites for steelhead and bull trout. Hatchery spring chinook are released as smolts from March through April. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River steelhead and bull trout should remain low due to the distance between releases and primary production areas in the Clearwater River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that spring chinook releases negatively affect listed Snake River fall chinook, steelhead, spring/summer, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of N.F. Clearwater/Rapid River stock spring chinook may escape into spawning areas within the Clearwater River, however, there are no listed spring chinook in the Clearwater Basin (Appendix 10). Currently 100% of smolts released are adipose fin clipped with groups coded wire tagged for evaluation.

Dworshak NFH uses N.F. Clearwater R. water for rearing spring chinook (Table 9). Effluent from the facility complies with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Powell/Red R.-Crooked R./Rapid River Spring Chinook Program (IDFG)

The proposed release of 325,000 parr, 623,000 presmolt and 1,370,000 smolt spring chinook from Powell, Red River, and Crooked River facilities into the Clearwater River Basin (Table 11) has the potential to take listed Snake River fall chinook, steelhead, and bull trout. The release sites are located above primary production areas of listed fall chinook and below primary production sites for steelhead and bull trout. Hatchery spring chinook are released as fingerlings in October, July and as smolts from March through April. Smolts are expected to actively migrate from release sites.

The potential for competition with listed Snake River steelhead and bull trout should remain low due to the distance between releases and primary production areas in the Clearwater River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that spring chinook releases negatively affect listed Snake River fall chinook, steelhead, spring/summer, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Adult returns of Powell/Red R.-Crooked R./Rapid River stock spring chinook may escape into spawning areas within the Clearwater River, however, there are no listed spring chinook in the Clearwater Basin (Appendix 11). Currently 100% of all smolts released for mitigation are adipose fin clipped with groups coded wire tagged for evaluation. Smolts released for NPT supplementation may be unmarked based on existing *US v Oregon* agreement.

Clearwater FH uses Dworshak reservoir water for rearing spring chinook (Table 9). Effluent from the facility complies with state and Federal NPDES permit standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Rainbow Trout Program (IDFG)

The proposed release of 25,000 rainbow trout obtained from WDFW into the lower Clearwater River (Table 12) has the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, and bull trout Release occurs in areas outside the primary production areas of all listed salmon (except fall chinook), steelhead, and bull trout populations in the Snake River Basin (Appendix 12).

The potential for predation on and competition with listed Snake River steelhead, spring/summer chinook, and bull trout should remain low due to the harvest and loss of trout through the summer in the lower Clearwater River.

Hatchery releases of rainbow trout are examined prior to release following fish health protocols established for the region. There is no evidence that rainbow trout releases negatively affect listed Snake River fall chinook, steelhead, spring/summer, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Grande Ronde River

Upper Grande Ronde Spring Chinook Program (ODFW/CTUIR)

The endemic upper Grande Ronde River spring chinook program (part of the listed Snake River ESU) is covered under a Section 10 permit submitted to NMFS by ODFW (Table 2). The program includes both a conventional and captive component. Potential effects to listed Snake River spring/summer chinook were not addressed in this assessment (Appendix 13). Marking through the BY2004 production will be as follows; captive evaluation group - ADCWT, conventional - CWT, and captive non-evaluation - AD. Co-managers will revise marking strategy after the captive evaluation program is completed.

The proposed release of upper Grande Ronde River spring chinook into the upper Grande Ronde River from the upper Grande Ronde facility (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook are released as smolts in March through April are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in

the lower Grande Ronde River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that upper Grande Ronde River spring chinook releases negatively affect listed steelhead, fall chinook, and bull trout in the Grande Ronde River or other listed species outside the basin.

Adult returns of upper Grande Ronde River spring chinook are not expected to effect listed Snake River steelhead, fall chinook, and bull trout or other listed species outside the basin. Operation of the upper Grande Ronde River weir and trap is funded through BPA and covered in another HGMP. Juveniles are reared in part at Lookingglass FH before transfer to the upper Grande Ronde facility for final rearing to release.

Effluent from Lookingglass FH complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Catherine Creek Spring Chinook Program (ODFW/CTUIR)

The endemic Catherine Creek spring chinook program (part of the listed Snake River ESU) is covered under a Section 10 permit submitted to NMFS by ODFW (Table 2). The program includes both a conventional and captive component. Potential effects to listed Snake River spring/summer chinook were not addressed in this assessment (Appendix 13). Marking through the BY2004 production will be as follows; captive evaluation group - ADCWT, conventional - ADCWT+VIE, and captive non-evaluation - AD. Co-managers will revise marking strategy after the captive evaluation program is completed. The long term goal for the program is to reduce releases of Catherine Creek spring chinook in Catherine Creek and to initiate a reintroduction program in Lookingglass Creek using Catherine Creek stock.

The proposed release of Catherine Creek spring chinook into Catherine Creek from the Catherine Creek facility (Table 11) and in Lookingglass Creek has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook are released as smolts in March through April are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in Catherine Creek. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Catherine Creek spring chinook releases negatively affect listed steelhead, fall chinook, and bull trout in the Grande Ronde River or other listed species outside the basin.

Adult returns of Catherine Creek spring chinook are not expected to effect listed Snake River steelhead, fall chinook, and bull trout or other listed species outside the basin. Operation of the Catherine Creek weir and trap is funded through BPA and covered in another HGMP. Juveniles are reared in part at Lookingglass FH before transfer to the Catherine Creek facility for final rearing to release.

Effluent from Lookingglass FH complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Lostine River Spring Chinook Program (ODFW/NPT)

The endemic Lostine River spring chinook program (part of the listed Snake River ESU) is covered under a Section 10 permit submitted to NMFS by CRITFC (Table 2). The program includes both a conventional and captive component. Potential effects to listed Snake River spring/summer chinook were not addressed in this assessment (Appendix 13). Marking through the BY2004 production will be as follows; captive evaluation group - ADCWT, conventional - ADCWT+VIE, and captive non-evaluation - AD. Co-managers will revise marking strategy after the captive evaluation program is completed.

The proposed release of Lostine River spring chinook into the Lostine River from the Lostine facility (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook are released as smolts in March through April are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in

the Lostine River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Lostine River spring chinook releases negatively affect listed steelhead, fall chinook, and bull trout in the Grande Ronde River or other listed species outside the basin.

Adult returns of Lostine River spring chinook are not expected to effect listed Snake River steelhead, fall chinook, and bull trout or other listed species outside the basin. Operation of the Lostine River weir and trap is funded through BPA and covered in another HGMP. Juveniles are reared in part at Lookingglass FH before transfer to the Lostine facility for final rearing to release.

Effluent from Lookingglass FH complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Wallowa Stock "A" Steelhead Program (ODFW)

The proposed release of 870,000 Wallowa stock steelhead smolts into the Wallowa River from the Wallowa FH and Big Canyon facility (Table 10) has the potential to take listed Snake River steelhead, fall chinook, spring chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead, spring chinook, and bull trout and above fall chinook primary production areas. Hatchery steelhead are released as smolts from April through May are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead, spring chinook, fall chinook, and bull trout exists, the potential should remain low due to the distance between release and primary production areas in the Grande Ronde River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Wallowa stock steelhead releases negatively affect listed steelhead, spring chinook, fall chinook, and bull trout in the Grande Ronde River or other listed species outside the basin.

Adult returns of Wallowa stock steelhead released into the basin likely escape into spawning areas within the Grande Ronde rivers and tributaries (Appendix 14). Estimated proportions of hatchery-origin steelhead spawners in natural spawning areas was one quarter of available spawners in some Grande Ronde Basin streams in the past. However, ODFW believes that the high proportion may have been related to adult returns from smolts released into adjacent stream reaches without acclimated and/or adult collection facilities. ODFW has eliminated all direct stream releases and currently acclimates and releases smolts at two locations with adult collection facilities. ODFW will continue to monitor the natural spawning areas to assess the change as well as natural/hatchery ratios in other spawning locations within the Grande Ronde Basin. It is currently unknown if hatchery fish are spawning with naturally produced fish. ODFW collects genetic samples from both listed and Wallowa stock steelhead that could be analyzed in the future. Preliminary analysis by ODFW indicates that Wallowa stock releases from Wallowa FH into the Grande Ronde River appear to stray into the Deschutes River at a higher rate (3-20% for the 1985-95 broodyears) than other Snake River stocks (Carmichael 2002). Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Grande Ronde River and Snake River Basin. Currently 100% of smolts released are marked with an adipose fin clip with groups marked with a coded wire tag and ventral fin clip.

Adult returns of Wallowa steelhead have been harvested at high rates in the Columbia River net and sport fisheries, in the mainstem Snake, and Grande Ronde rivers (Appendix 15). ODFW harvest regulations have been focused on minimizing escapement of Wallowa stock steelhead into the Grande Ronde River and impacts to listed steelhead.

Operation of the adult traps at Wallowa FH and Big Canyon facility occurs from mid-February through early-June (Table 6) and may incidentally take listed Snake River steelhead and bull trout. All unmarked steelhead and bull trout are released immediately above the weirs with a minimum of handling.

Wallowa FH and Big Canyon facility divert approximately 0-100% and 50-80% of Spring Creek and Deer Creek respectively for rearing Wallowa stock steelhead from March through May (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Wallowa Stock "A" Steelhead Program (WDFW)

The proposed release of 200,000 Wallowa stock steelhead smolts into the Wallowa River from the Cottonwood facility (Table 10) has the potential to take listed Snake River steelhead, fall chinook, spring chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead, spring chinook, and bull trout and above fall chinook primary production areas. Hatchery steelhead are released as smolts from April through May are expected

to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead, spring chinook, fall chinook, and bull trout exists, the potential should remain low due to the distance between release and primary production areas in the Grande Ronde River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Wallowa stock steelhead releases negatively affect listed steelhead, spring chinook, fall chinook, and bull trout in the Grande Ronde River or other listed species outside the basin.

Adult returns of Wallowa stock steelhead smolts released into the basin likely escape into spawning areas within the lower Grande Ronde River and tributaries (Appendix 15). Estimated proportions of hatchery-origin steelhead spawners in natural spawning areas in the lower Grande Ronde River Basin is unknown. It is currently unknown if hatchery fish are spawning with naturally produced fish. WDFW collects genetic samples from both listed and Wallowa stock steelhead that could be analyzed in the future. Preliminary analysis by WDFW indicates that Wallowa stock releases into the Grande Ronde River do not stray at a high rate into the Deschutes River (5% - 7% from 1986 -1989 run years). Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Grande Ronde River and Snake River Basin. Currently 100% of smolts released are marked with an adipose fin clip with groups marked with a coded wire tag, a left ventral fin clip, and freeze brand.

Adult returns of Wallowa steelhead have been harvested at high rates in the Columbia River net and sport fisheries, in the mainstem Snake, and Grande Ronde rivers (Appendix 15). WDFW harvest regulations have been focused on minimizing escapement of Wallowa stock steelhead into the Grande Ronde River and impacts to listed steelhead.

Operation of the adult trap at Cottonwood facility occurs from March through late-April (Table 6) and may incidentally take listed Snake River steelhead and bull trout. All unmarked steelhead (average < 20 natural origin steelhead per year) trapped are released immediately above the weirs with a minimum of handling. Listed bull trout, spring chinook, and fall chinook have not been trapped to date at the facility.

Cottonwood facility diverts approximately 20% - 90% of Cottonwood Creek for rearing Wallowa stock steelhead from February through mid-May (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Imnaha River

Imnaha Spring Chinook Program (ODFW)

The endemic Imnaha River spring chinook program (part of the listed Snake River ESU) is covered under a Section 10 permit submitted to NMFS by ODFW (Table 2). Potential effects to listed Snake River spring/summer chinook were not addressed in this assessment (Appendix 16). Currently 100% of smolts released are marked with an adipose fin clip and coded wire tag.

The proposed release of 490,000 (reduced to 360,000 for 2003 due to facility constraints) Imnaha River spring chinook into the Imnaha River from Imnaha facility (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook are released as smolts in March through April are expected to actively migrate from release sites.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in the lower Imnaha River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery releases of spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Imnaha River spring chinook releases negatively affect listed steelhead, fall chinook, and bull trout in the Imnaha River or other listed species outside the basin.

Adult returns of Imnaha River spring chinook are not expected to effect listed Snake River steelhead, fall chinook, and bull trout or other listed species outside the basin. Operation of the Imnaha facility weir and trap occurs from June through September (Table 7) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River steelhead and bull trout. All listed bull trout and steelhead captured at the weir are sampled and passed with minimal delay. Stress and/or mortality on listed bull trout and steelhead associated with operation of the weir and trap appears to be minimal to date.

Adults are transferred to Lookingglass FH for holding and spawning and then reared at Lookingglass FH or transfered to Oxbow FH or Irrigon FH for early rearing. Fingerlings will be transferred to Imnaha facility for acclimation and release in mid-April to early-May Lookingglass FH diverts approximately 50 % to 90 % of Lookingglass Creek for rearing Imnaha River spring chinook from October through March (Table 9). Oxbow FH receives water from wells and Oxbow FH from springs.

Effluent from all facilities comply with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both

facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile spring chinook is conducted on an annual basis using spawning ground surveys, smolt trapping, and PIT tagging. Potential take associated with spawning ground surveys from March through October is expected to be temporary displacement and not expected to result in mortality to listed steelhead, fall chinook, and bull trout.

Smolt trapping will be conducted on the Imanha River to enumerate natural smolt production from the primary steelhead and chinook production area in the Imnaha River. Trapping may result in delayed migration for listed steelhead, fall chinook, and bull tout and could result in mortality. However, smolt trapping mortalities are expected to be low and trap protocols are in place to remove fish on a daily basis.

There is no evidence to date that the program will effect other FWS listed species.

Imnaha "A" Steelhead Program (ODFW)

The HGMP for the endemic Imnaha River steelhead program (part of the listed Snake River steelhead ESU) was submitted to NMFS under the 4(d) rule (Appendix 17). Potential effects to listed Snake River steelhead were not addressed in this assessment.

The proposed release of 330,000 Imnaha River steelhead smolts into the Imnaha River from Little Sheep Creek facility (Table 10) has the potential to take listed Snake River spring/summer chinook, fall chinook, and bull trout. Release sites are located near primary production areas of Snake River spring/summer chinook and bull trout. Hatchery steelhead are released as smolts in March and April and are expected to actively migrate from release sites. Residualism rates for endemic releases in the Imnaha River are currently unknown. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with spring/summer chinook and bull trout exists, while the potential for fall chinook should remain low due to the distance between releases and primary production areas in the Imnaha River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Imnaha River steelhead releases negatively affect listed spring/summer chinook, fall chinook, steelhead and bull trout in the Imnaha River or other listed species outside the basin.

Adult returns of Imnaha River steelhead are not expected to effect listed Snake River spring/summer and bull trout or other listed species outside the basin. Operation of the Little

Sheep Creek weir and trap occurs from March through June (Table 6) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River spring/summer chinook and bull trout. Operation of the adult traps has resulted in minimal take of listed fish. All bull trout captured at the weir are sampled and passed with minimal delay. Stress and/or mortality on bull trout associated with operation of the weir and trap appears to be minimal to date. Currently 100% of smolts released for mitigation are marked with an adipose fin clip with groups marked with coded wire tags for evaluation. Supplementation groups are released with blank coded wire tags (Little Sheep Ck.) and no marks (Big Sheep Ck.).

Adults trapped at Little Sheep Creek facility are held and spawned at the facility with green eggs hatched and reared at Irrigon FH. Fingerlings are transported back to Little Sheep Creek facility in March and April for acclimation and release. Smolts are also direct released into Big Sheep Creek in April.

Little Sheep Creek facility diverts approximately 5% to 50% of Little Sheep Creek for rearing Imnaha River steelhead from March through May (Table 8). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. Monitoring and evaluation of distribution of hatchery-origin and listed natural juvenile steelhead is conducted on an annual basis using spawning ground surveys, electrofishing, smolt trapping and PIT tagging. Potential take associated with spawning ground surveys is expected to be temporary displacement and not expected to result in mortality to listed spring/summer chinook, fall chinook, and bull trout.

Electrofishing surveys may result in displacement and/or mortality of listed spring/summer chinook, fall chinook, and bull trout. Surveys are conducted with modified Smith-Root backpack eletroshockers with state of the art electronic components designed to minimize potential effects to fish. Surveys are conducted using NMFS electrofishing criteria. Mortalities associated with electrofishing have been low and surveys are terminated when higher than usual recovery times and/or mortalities occur.

Smolt trapping will be conducted on the Imnaha River to enumerate natural smolt production from the primary steelhead and chinook production area in the Imnaha River. Trapping may result in delayed migration for listed spring/summer chinook, fall chinook, and bull tout and could result in mortality. However, smolt trapping mortalities are expected to be low and trap protocols are in place to remove fish on a daily basis.

There is no evidence to date that the program will effect other FWS listed species.

Salmon River

N.F. Clearwater "B" Steelhead Program (IDFG)

The proposed release of 840,000 N.F. Clearwater "B" stock steelhead smolts into the Salmon River (Table 10) has the potential to take listed Snake River steelhead, fall chinook, spring

chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead, spring chinook, and bull trout and above fall chinook primary production areas. Hatchery steelhead are released as smolts from April through May are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead, spring chinook, fall chinook, and bull trout exists, the potential should remain low due to the distance between release and primary production areas in the Salmon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that N.F. Clearwater "B" stock steelhead releases negatively affect listed steelhead, spring chinook, fall chinook, and bull trout in the Salmon River or other listed species outside the basin.

Adult returns of N.F. Clearwater "B" stock steelhead released into the basin likely escape into spawning areas within the Salmon River and tributaries (Appendix 18). Estimated proportions of hatchery-origin steelhead spawners in natural spawning areas in the Salmon River Basin is currently unknown. It is currently unknown if hatchery fish are spawning with naturally produced fish. IDFG collects genetic samples from both listed and N.F. Clearwater "B" stock steelhead that could be analyzed in the future. There is currently no analysis of N.F. Clearwater "B" stock releases into the Salmon River for straying into the Deschutes River. Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Salmon River and Snake River Basin. Currently 100% of smolts released for mitigation are marked with an adipose fin clip with groups marked with coded wire tags and/or ventral fin clips for evaluation.

Adult returns of N.F. Clearwater "B" stock steelhead have been harvested at high rates in the Columbia River net and sport fisheries, in the mainstem Snake, and Salmon rivers (Appendix 15). IDFG harvest regulations have been focused on minimizing escapement of N.F. Clearwater "B" stock steelhead into the Salmon River and impacts to listed steelhead.

Operation of the adult traps at Sawtooth FH, E.F. Salmon facility, and Squaw Creek Pond occurs from March through May (Table 6) and may incidentally take listed Snake River steelhead and bull trout. All unmarked steelhead trapped are released immediately above the weirs with a minimum of handling. Listed bull trout may be trapped at the facilities.

All steelhead are held, spawned and incubated at Sawtooth FH and then shipped to Magic Valley FH for rearing. Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

E.F. Salmon Steelhead Program (IDFG)

The HGMP for the naturally produced East Fork Salmon River steelhead program (part of the listed Snake River steelhead ESU) will be submitted to NMFS under the 4(d) rule (Appendix 19). Potential effects to listed Snake River steelhead were not addressed in this assessment.

The proposed release of 50,000 East Fork Salmon stock steelhead into the Salmon River (Table 10) has the potential to take listed Snake River spring/summer chinook, sockeye, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead, spring chinook, and bull trout and above fall chinook primary production areas. Hatchery steelhead are released as smolts from April through May are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead, spring chinook, fall chinook, and bull trout exists, the potential should remain low due to the distance between release and primary production areas in the Salmon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that E.F. Salmon stock steelhead releases negatively affect listed spring chinook, fall chinook, and bull trout in the Salmon River or other listed species outside the basin.

Operation of the adult trap at E.F. Salmon facility occurs from March through May (Table 6) and may incidentally take listed Snake River steelhead and bull trout. Unmarked steelhead (range from 6 to 27 fish from 2000 to 2002) trapped are retained for broodstock or released immediately above the weir with a minimum of handling (currently all males are released after partial milt harvest, if enough males return, 50% will be released without milt harvest). Current protocols include retaining up to 50% of unmarked adults trapped for broodstock. Listed bull trout may be trapped at the facility.

All steelhead are held and spawned at the E.F. Salmon facility, incubated at Sawtooth FH, and then shipped to Magic Valley FH for rearing. Effluent from the facilities comply with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Sawtooth/Pahsimeroi "A" Steelhead Program (IDFG)

The proposed release of 2,220,000 Sawtooth/Pahsimeroi stock steelhead smolts into the Salmon River (Table 10) has the potential to take listed Snake River steelhead, fall chinook, spring chinook, and bull trout. Release sites are located below primary production areas of Snake River steelhead, spring chinook, and bull trout and above fall chinook primary production areas. Hatchery steelhead are released as smolts from April through May are expected to actively migrate from release sites. Predation rates on spring/summer chinook and bull trout by residual endemic hatchery steelhead is assumed to be low.

The potential for competition with listed steelhead, spring chinook, fall chinook, and bull trout exists, the potential should remain low due to the distance between release and primary production areas in the Salmon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery steelhead.

Hatchery releases of steelhead are examined prior to release following fish health protocols established for the region. There is no evidence that Sawtooth/Pahsimeroi stock steelhead releases negatively affect listed steelhead, spring chinook, fall chinook, and bull trout in the Salmon River or other listed species outside the basin.

Adult returns of Sawtooth/Pahsimeroi stock steelhead released into the basin likely escape into spawning areas within the Salmon River and tributaries (Appendix 20). Estimated proportions of hatchery-origin steelhead spawners in natural spawning areas in the Salmon River Basin is currently unknown. It is currently unknown if hatchery fish are spawning with naturally produced fish. IDFG collects genetic samples from both listed and Sawtooth/Pahsimeroi stock steelhead that could be analyzed in the future (Jennifer Nielsen assessment in progress). There is currently no analysis of Sawtooth/Pahsimeroi stock releases into the Salmon River for straying into the Deschutes River. Existing data on straying into the Deschutes River is currently being developed by ODFW to further assess hatchery steelhead release groups from the Salmon River and Snake River Basin. Currently 100% of smolts released for mitigation are marked with an adipose fin clip with groups marked with coded wire tags and/or ventral fin clips for evaluation. Production targeted for NPT supplementation (*US v Oregon* agreement) may be released unmarked.

Adult returns of Sawtooth/Pahsimeroi stock steelhead have been harvested at high rates in the Columbia River net and sport fisheries, in the mainstem Snake, and Salmon rivers (Appendix 15). IDFG harvest regulations have been focused on minimizing escapement of Sawtooth/Pahsimeroi stock steelhead into the Salmon River and impacts to listed steelhead.

Operation of the adult trap at Sawtooth FH occurs from March through May (Table 6) and may incidentally take listed Snake River steelhead and bull trout. All unmarked steelhead (range from 6 to 44 fish from 1992 to 2000) trapped are released immediately above the weir with a minimum

of handling. Listed bull trout may be trapped at the facility.

All steelhead are held, spawned and incubated at Sawtooth FH and then shipped to Magic Valley FH and Hagerman NFH for rearing. Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at the facility follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Salmon R. Spring Chinook Program (IDFG)

The endemic upper Salmon River spring chinook program includes two groups; a supplementation group which is part of the listed Snake River ESU and covered under a Section 10 permit submitted to NMFS by IDFG (Table 2) and a reserve group (H x H) which is not listed (Appendix 21). Potential effects to listed Snake River spring/summer chinook for the supplementation group were not addressed in this assessment.

Proposed release of 1,600,000 upper Salmon River spring chinook smolts into the Salmon River (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located below primary production areas of Snake River spring chinook, steelhead and bull trout and above fall chinook primary production areas. Hatchery spring chinook released as smolts in March through April are expected to actively migrate from release sites.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in the lower Salmon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery spring chinook.

Hatchery spring chinook are examined prior to release following fish health protocols established for the region. There is no evidence that Salmon River spring chinook releases negatively affect listed steelhead, fall chinook, spring chinook, and bull trout in the Salmon River or other listed species outside the basin.

Adult returns of upper Salmon River spring chinook are not expected to affect listed Snake River steelhead, spring chinook, fall chinook, and bull trout or other listed species outside the basin. Operation of the Sawtooth FH weir and trap occurs from June through September (Table 7) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River steelhead and bull trout. Operation of the adult traps may result in take of listed Snake River steelhead and bull trout. All listed bull trout and steelhead captured at the weir are sampled and passed with minimal delay. Stress and/or mortality on listed bull trout and steelhead associated with operation of the weir and trap appears to be minimal to date. Currently 100% of the

production smolts are adipose fin-clipped with evaluation groups marked with CWT's and PIT tags. Fish released as part of the ISS are not adipose fin-clipped but contain CWT's and PIT tag groups.

Sawtooth FH diverts approximately 20-50 % of the Salmon River for rearing upper Salmon River spring chinook (Table 9). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. There is no evidence to date that the program will affect other FWS listed species.

S.F. Salmon Summer Chinook Program (IDFG)

The endemic S.F. Salmon River summer chinook program includes two groups; a supplementation group which is part of the listed Snake River ESU and covered under a Section 10 permit submitted to NMFS by IDFG (Table 2) and a reserve group which is not listed (Appendix 22). Potential effects to listed Snake River spring/summer chinook for the supplementation group were not addressed in this assessment.

Proposed release of 1,017,000 S.F. Salmon River summer chinook smolts and 50,000 parr into the S.F. Salmon River (Table 11) has the potential to take listed Snake River steelhead, fall chinook, and bull trout. Release sites are located near primary production areas of Snake River summer chinook, steelhead and bull trout and above fall chinook primary production areas. Hatchery summer chinook released as smolts in March through April are expected to actively migrate from release sites.

The potential for competition with listed steelhead and bull trout exists, while the potential for fall chinook should remain low due to the distance between release and primary production areas in the lower Salmon River. Size differences should result in selection of different habitats and the potential reduced as smolts migrate seaward. Potential effects in the mainstem migration corridor are largely unknown and influenced by hydro-system operations covered outside this analysis. Bull trout found in release areas are likely to be larger and prey on hatchery summer chinook.

Hatchery summer chinook are examined prior to release following fish health protocols established for the region. There is no evidence that S.F. Salmon River summer chinook releases negatively affect listed steelhead, fall chinook, spring chinook, and bull trout in the S.F. Salmon River or other listed species outside the basin.

Adult returns of S.F. Salmon River spring chinook are not expected to affect listed Snake River steelhead, spring chinook, fall chinook, and bull trout or other listed species outside the basin. Operation of the S.F. Salmon weir and trap occurs from May through October (Table 7) and may delay, disrupt, and/or prevent normal temporal and spatial distribution of listed Snake River steelhead and bull trout. Percent of hatchery origin adult S.F. Salmon River summer chinook has averaged 73% (range 37-89%) in the 11 km reach below the S.F. Salmon weir, averaged 27% (range 6-36%) in the Poverty Flat/Lodgepole Camp reach (7.8 km), ranged from 0-17.6% in

Johnson Creek, and ranged from 0-12% in the Secesh River from 1992 to 2001 (Paul Kucera, NPT - personal communication).

Operation of the adult traps may result in take of listed Snake River steelhead and bull trout. All listed bull trout and steelhead captured at the weir are sampled and passed with minimal delay. Stress and/or mortality on listed bull trout and steelhead associated with operation of the weir and trap appears to be minimal to date. Currently 100% of the production smolts are adipose fin-clipped with evaluation groups marked with CWT's and PIT tags. Fish released as part of the ISS are not adipose fin-clipped but contain CWT's and PIT tag groups.

S.F. Salmon facility diverts approximately <15 % of the S.F. Salmon River for rearing S.F. Salmon River summer chinook (Table 9). Effluent from the facility complies with state and Federal NPDES permit standards. All intakes are screened and inspected on an annual basis to meet NMFS standards. Routine O&M at both facilities follow IHOT protocols established to minimize potential impacts to listed species. All non-routine O&M that may affect listed species will be assessed and consulted on prior to initiation.

Monitoring and evaluation of production (routine culture monitoring at the facilities) will not affect listed species. There is no evidence to date that the program will affect other FWS listed species.

Rainbow Trout Program (IDFG)

The proposed release of 25,000 rainbow trout obtained from WDFW into the lower Salmon River (Table 12 has the potential to take listed Snake River fall chinook, spring/summer chinook, steelhead, and bull trout (Appendix 12). Release occurs in areas outside the primary production areas of all listed salmon (except fall chinook), steelhead, and bull trout populations in the Snake River Basin.

The potential for predation on and competition with listed Snake River steelhead, spring/summer chinook, and bull trout should remain low due to the harvest and loss of trout through the summer in the lower Salmon River.

Hatchery releases of rainbow trout are examined prior to release following fish health protocols established for the region. There is no evidence that rainbow trout releases negatively affect listed Snake River fall chinook, steelhead, spring/summer, sockeye salmon, and bull trout in the Snake River or other listed species outside the basin. Monitoring and evaluation of production (creel surveys) will not affect listed species.

There is no evidence to date that the program will effect other FWS listed species.

Programmatic Analyses

Adult returns

In most years an unknown percentage of returning adult hatchery steelhead and chinook are unaccounted for and may stray/wander into natural production areas. Hatchery produced adults that are not harvested or collected may result in genetic risks to listed populations (loss of fitness, reduction in genetic variability or diversity, genetic drift, selection, and domestication). While there is currently very limited empirical data to support that genetic changes are occurring, NMFS

established criteria in 1995 which addressed how much gene flow can occur above natural levels and still remain compatible with long-term conservation of local adaptation and diversity among populations. NMFS criteria for releases or straying of non-listed hatchery adults is currently targeted at less than 5% of listed populations on an annual basis while releases or straying of within-ESU hatchery adults is targeted from 5% to 30% of the listed population on an annual basis. In addition, NMFS established a production cap on non-listed hatchery fish releases in the Columbia River Basin.

While many areas within the Columbia River and Snake River basins lack data on actual numbers of hatchery fish escaping to natural production areas, there is evidence in some areas that proportions of hatchery produced fish exceed existing criteria. In many areas, current *US v Oregon* agreements, NMFS section 10 permits, and 4(d) rules allow escapement of hatchery adults in excess of established criteria. Numerous studies and assessments of existing data are currently being conducted to assess whether certain hatchery populations escape into natural production areas at greater rates and to determine the spatial and temporal overlap of hatchery and natural spawners.

ODFW is completing an assessment of Snake River hatchery steelhead stocks (Wallowa, Imnaha, Pahsimeroi, and Dworshak "B") straying into the Deschutes River basin. Preliminary analyses indicate that Wallowa stock steelhead released from Wallowa FH appear to stray into the Deschutes River at a higher rate than the other three Snake River hatchery stocks (e.g. Wallowa stock ranged from 3-20% for 1985-95 broodyears compared to less than 5% for all Dworshak "B" broodyears).

Comparisons of hatchery and wild adult returns to Lower Granite Dam seem to indicate that factors affecting population abundance (i.e. outmigration and ocean conditions) are generally working on both wild and hatchery fish. There appears to be little evidence in the trends that increases in the abundance of hatchery fish is affecting the response of wild population abundance. The majority of the affects on abundance of wild fish occurred prior to the initiation of large scale hatchery programs in the Snake River Basin.

Identification of spatial and temporal overlap of hatchery and natural production in primary spawning areas along with identification of listed (ESU) population structure and recovery criteria (recovery plan) is critical for determining the appropriate LSRCP hatchery strategies for meeting mitigation, ESA, tribal trust, and harvest objectives. LSRCP programs have and will continue to modify their programs to meet existing criteria as the assessments are completed and as recovery criteria (recovery plan) and other legal agreements are established.

Adult steelhead and chinook collected (Tables 6 & 7) are used for broodstock, released upstream of weirs, transported to under-seeded areas for natural spawning, recycled through fisheries, and/or killed. Potential effects of adult steelhead and chinook trapping may include injury, mortality, increased stress, disruption, delay, or prevention of natural spatial and temporal distribution to holding and spawning areas, mining of natural spawning populations and reductions in nutrients.

While adult steelhead and chinook weir and traps may increase stress, injury and mortality, there have been few incidences in recent years that have resulted in significant mortality to listed species. The few incidences that have occurred were usually the result of mechanical or human

error. All LSRCP facilities have protocols in place to monitor trapping facilities and take appropriate actions to minimize trapping effects when listed species are known to be present. Properly designed, installed, and operated weirs and traps can reduce many of the potential effects on listed species.

Adult steelhead and chinook weirs and traps may disrupt, delay, or prevent natural spatial and temporal distribution of listed fish. While there is evidence that this may occur, the design, installation, and operation of weirs and traps are based on the conditions specific to each site, presence of listed species, and the local environmental conditions to reduce the potential effects of their operations. In most years we estimate indirect takes at most facilities will be a small percentage of the anticipated Snake River runs of listed salmon and steelhead and will have minimal effect on the survival or recovery of the listed species. In general, listed returns to LSRCP weirs are held a minimum amount of time before their release upstream. Distribution of listed populations are monitored to assess long term changes in natural patterns that may be a result of weir operations.

There are currently no LSRCP programs that remove listed fish without a section 10 permit or coverage under NMFS 4(d) rule. Any genetic and unintentional selection risks to listed populations are addressed in those processes.

Removal of adults at the weirs may reduce nutrients from stream reaches. Efforts to use adult returns to hatcheries to supplement nutrients in streams is an ongoing effort requiring permits, coordination with local landowners, and addressing fish health concerns.

Existing LSRCP marking strategies (under existing *US v Oregon* agreements) may not allow adequate evaluation of spatial and temporal overlap between hatchery produced fish and natural production in many areas. A Columbia Basin wide marking and evaluation strategy is urgently needed to fully address this issue. In the interim, continued assessments of existing data, monitoring and evaluation to assess spatial and temporal overlap between hatchery and natural production in key spawning areas, and genetic sampling is being conducted.

Harvest strategies employed by state and tribal managers (not under LSRCP control) are conducted to target non-listed returns and minimize impacts on listed species. Assessments of existing harvest strategies (from both a mainstem mix stock and terminal perspective) continue to identify actions to better meet mitigation, ESA, harvest, and tribal trust responsibilities. Harvest assessments are being conducted by those agencies responsible for setting regulations and will not be addressed in this assessment.

Rearing

Of the fourteen LSRCP facilities that rear steelhead, nine divert water from rivers/tributaries which may contain listed species (Table 8). Water diversions are all screened to meet NMFS screening criteria and are inspected on an annual basis. Potential effects of water diversions may include de-watering of habitat, impingment, and/or migration delay or barriers.

Of the seventeen LSRCP facilities that rear salmon, twelve divert water from rivers of which may contain listed species (Table 9). Water diversions are all screened to meet NMFS screening criteria and are inspected on an annual basis. Potential effects of water diversions may include de-watering of habitat and/or migration delay or barriers between intakes and return sites.

Table 8. Proposed 2003 LSRCP steelhead rearing sites and percent of river water diverted into the facilities.

SUBBASIN	FACILITY	WATER SOURCE	PERCENT DIVERTED
Columbia R.	Irrigon FH	well	-
Snake R.	Lyons Ferry FH	well	-
	Hagerman NFH	spring	-
	Magic Valley FH	spring	-
Tucannon R.	Tucannon FH	river/spring/well	<5
Curl Lake facility	river	6-10	
Grande Ronde R.	Cottonwood facility	river	20-90
	Wallowa FH	river	0-100
	Big Canyon facility	river	50-80
Imnaha R.	L. Sheep Ck. Facility	river	5-50
Salmon R.	Sawtooth FH	river	20-50
	E.F. Salmon facility	river	-
Clearwater R.	Clearwater FH	reservoir	-

Table 9. Proposed 2003 LSRCP chinook salmon rearing sites and percent of river water diverted at facilities.

Subbasin	Facility	Water Source	Percent Diverted
Columbia R.	Irrigon FH	well	-
Snake R.	Lyons Ferry FH	well	-
	Captain Johns facility	river	< 1
	Pittsburg Landing facility	river	< 1
Tucannon R.	Tucannon FH	river/spring	5
	Curl Lake facility	river	6-10
Grande Ronde R.	Lookingglass FH	river/well	50-90
Imnaha R.	Imnaha facility	river	<10
Salmon R.	S.F. Salmon Trap	river	<15
	Sawtooth FH	river	20-50
Clearwater R.	Clearwater FH	reservoir	-
	Red R. facility	river	5-50
	Crooked R. facility	river	5-50
	Powell facility	river	5-50
	Big Canyon facility	river	< 1
	Dworshak NFH	reservoir	-
Payette R.	McCall FH	reservoir	-

The operation of facilities for rearing/acclimating steelhead and salmon have the potential to affect listed species by reducing stream volume between hatchery intakes and return sites and through impingement or removing fish from the river**.** Most facilities divert a small percentage of the total stream volume for a short distance resulting in very limited potential for effects to listed species in the stream channel below intakes. There is the potential at some sites for increased effects of water diversions during extreme drought years and protocols are in place to reduce

impacts by reducing/eliminating water diverted or pumping water back to intakes to meet established or natural flows. All LSRCP facilities that divert water from sources that may contain listed species are required to meet NMFS screen criteria and inspect screens on an annual basis to assure compliance.

The operation of all LSRCP facilities for rearing/acclimating discharge effluent into rivers. Each rearing facility is required to meet State Water Quality Guidelines and Federal National Pollution Discharge Elimination Standards (NPDES) for hatchery discharge and operate under guidelines developed through IHOT. NMFS, FWS, and EPA are currently reviewing existing EPA water quality standards for compliance with ESA for issuance of aquaculture permits. Potential effects of effluent may include mortality, reduction in river water quality below the discharge point (water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand) spatial and temporal redistribution of listed species, and disease transmission. There has been no data to date indicating that hatchery effluent (meeting existing NPDES standards) results in the take of listed species.

Standard operations and maintenance occurs at all LSRCP facilities on an annual basis. Each facility has protocols established to minimize potential for effects to listed species for routine O&M. Standard operations and maintenance have the potential to affect listed species by facility power failure, loss of water, reductions in water quality due to landscaping practices (chemicals), vehicle operations (spills), etc.. Each facility has protocols established to minimize potential for effects to listed species for routine O&M. Any O&M that is not routine and has the potential to take listed species will be assessed and consultation initiated with NMFS and FWS prior to initiating the action. There has been no data to date indicating that standard O&M results in the take of listed species.

Releases

Approximately 5,795,000 juvenile steelhead are proposed to be released from LSRCP facilities between March and May 2003 (Table 10). The proposed numbers represent targets for the programs and will vary depending upon returns to the facilities, and other factors. Most releases of non-listed fish will not be into or above primary production areas for listed salmon, steelhead, and bull trout although they may occupy water used at some time of the year by those species. All releases will traverse the emigration corridor of all listed species in the Columbia River mainstem, estuary, and ocean. The potential effects of releases are discussed below and may include residualism, predation, competition, behavior modifications, and disease transmission.

Approximately 11,140,000 juvenile chinook are proposed to be released from LSRCP facilities between March and May 2003 (Table 11). The proposed numbers represent targets for the programs and will vary depending upon returns to the facilities, and other factors. Many of the releases are listed and will be into or above primary production areas for listed salmon, steelhead, and bull trout and they may occupy water used at some time of the year by those species. All releases will traverse the emigration corridor of all listed species in the Columbia River mainstem, estuary, and ocean. The potential effects of releases are discussed below and may include residualism, predation, competition, behavior modifications, and disease transmission.

Approximately 287,000 rainbow trout will be annually released from LSRCP facilities between March and October 2003 (Table 12). The LSRCP releases most rainbow trout into waters (lakes and ponds) with no effects on listed species and are not assessed in this BA. Most of the potential

effects of the rainbow trout programs on listed species are similar to steelhead effects.

Table 10. Proposed 2003 LSRCP steelhead releases.

SUBBASIN	NUMBER	FPP	DATE	RELEASE SITE
Snake R.	60,000	4	4/03	Snake R. (Lyons Ferry FH)
Tucannon R.	135,000	4	4/03	Below RM 17.4
	50,000 *	5	4-5/03	Above Tucannon FH
Grande Ronde R.	565,500	5	4-5/03	Grande Ronde R. (Spring Ck.)
	304,500	5	4-5/03	Deer Ck. (Big Canyon)
	200,000	5	3-4/03	Grande Ronde R.(Cottonwood P.)
Imnaha R.	230,000 *	5	4-5/03	Imnaha R. (L. Sheep Ck.)
	100,000 *	5	4/03	Imnaha R. (Big Sheep Ck.)
Clearwater R.	1,040,000	4.5	4-5/03	Mainstem Clearwater R. and tribs.
Salmon R.	3,100,000	4.5	4/03	Salmon R.(including L. Salmon R.)

GRAND TOTAL 5,795,000

* listed releases

Table 11. Proposed 2003 LSRCP chinook salmon releases.

Subbasin		Number	FPP	Date	BY	Release Site
Snake R.	(fach)	450,000	10	4/03	01	Lyons Ferry FH
		200,000	50	6/03	02	Lyons Ferry FH
		150,000			01	Pittsburg Landing
		400,000			02	Pittsburg Landing
		150,000			01	Captain Johns
		800,000			02	Captain Johns
Clearwater R.	(fach)	150,000			01	Big Canyon
		500,000			02	Big Canyon
	(spch)	1,050,000			01	Dworshak NFH
		335,000			01	Powell
		335,000			02	Powell
		325,000			02	Lochsa R.
		700,000			01	Crooked River
		158,000			02	Crooked River
		335,000			01	Red River
		80,000			02	Red River
		50,000			02	Papoose Ck.
Grande Ronde R.	(spch)	240,000*	20	4/03	01	Catherine Ck.
		240,000*	20	4/03	01	Lostine R.
		240,000 *	20	4/03	01	Upper Grande Ronde
		150,000*	20	4/03	01	Lookingglass Ck.
Tucannon R.	(spch)	132,000*	15	3-4/94	01	Tucannon R.
		150,000*	15	3-4/03	01	Tucannon R.

Imnaha R.	(spch) 360,000*	20	3-4/03	01	Imnaha R.
Salmon R.	sp/such) 1,100,000*	20	4/95 93	01	S.F. Salmon R.
	60,000			02	Stolle Pond
	2,300,000*			01	Sawtooth FH

GRAND TOTAL 11,140,000

* listed releases (portion of the S.F. Salmon and Sawtooth releases non-listed)

.Table 12. Proposed 2003 LSRCP rainbow trout releases.

SUBBASIN	NUMBER	FPP	DATE	RELEASE SITE
Salmon R.	25,000	3.5	10/03	Lower Salmon R.
Clearwater R.	25,000	3.5	10/03	Lower Clearwater R.
Washington (inland lakes)	237,500	3.5	3-4/03	Inland lakes

Residualism. Released steelhead smolts generally fall into two categories: those that emigrate in a few weeks and those that fail to emigrate and residualize near their release area. Partridge (1986) suggested that steelhead remaining one month after release (i.e. late May in the upper Salmon River) should be considered residuals. Others have suggested emigration occurs well into June (Chrisp and Bjornn 1978). Although most residual rates vary from a few percent (Viola and Schuck 1991, Martin et al. 1993, IDFG 1993) to 10 percent (Partridge 1985, 1986), some estimates have been higher than 25 percent (Viola and Schuck 1991, Chrisp and Bjornn 1978).

Residualism rates are believed to vary with the size and sex of fish released. Partridge (1985, 1986) found that larger smolts generally seemed to residualize at a higher rate than smaller smolts, with some minimum size necessary for emigration (Chrisp and Bjornn 1978). Sampling conducted in 1992 by ODFW (Whitesel et al. 1994, Johnnason et al. 1994 and 1995) found that the majority of residual steelhead from hatchery releases that year originated from the smallest fish, while IDFG (IDFG 1993) and WDW (Martin et al. 1993) found no conclusive evidence of a relationship between length and residualism in hatchery steelhead smolts. Generally, male steelhead appear more likely to residualize than females. Samples collected in late summer/fall by ODFW and WDW show a much higher proportion of males than females.

Steelhead and rainbow residuals normally remain near their release point (IDFG 1992). Partridge (1986) noted that most residual steelhead were within about 8 kilometers (km) of the upper Salmon River release site. M. Schuck (WDW, personal comm.) found steelhead about 20 km below and 10 km above release sites in the Tucannon River, Washington. Whitesel et al. (1994) reported that the primary dispersal pattern of residuals in N.E. Oregon appeared to be downstream from release sites however, they also reported residuals dispersed 39 miles upstream. Most studies conducted to assess residualism of hatchery steelhead smolt releases in the Snake River basin have been limited to areas near the release sites. The spatial and temporal distribution of residuals into areas outside of the study sites is largely unknown. ODFW has documented the contribution of residual steelhead in the Lower Granite reservoir fishery throughout the summer and the catch of substantial numbers in the mainstem Grande Ronde River near Troy, Oregon. We assume rainbow and steelhead residual densities are highest at the release sites and decrease with distance both above and below the sites.

Martin et al. (1993) estimated that on average up to 8.6% of the total steelhead smolts released in 1992 residualized and remained through the summer and into fall, behaving much like hatchery rainbow plants. In 1992, 96% of the hatchery steelhead in the upper Salmon River emigrated from sample sites by the end of May with few residualizing into the late summer and fall (IDFG 1993). Martin et al. (1993) saw a total residualism rate of 8.6% for steelhead smolts released (all groups combined) into the Tucannon River in June 1992, declining to 4.5% by October. Schuck (1993) reported average residualism rates of 12.65% for direct stream releases in 1993 compared to 7.8% for acclimated fish released in 1992. In 1993 and 1994 WDFW began a study at the Curl Lake steelhead acclimation pond to examine the potential for reducing residualism rates in the Tucannon R. Based on the active pond management only 4.0% and 6.1% of the steelhead released residualized in 1993 and 1994 respectively. Residual steelhead in the Touchet River have been estimated between 3% - 31% (Bumgarner et al. 2002, Martin et al. 2000, Schuck et al.1995, Schuck et al.1994) while estimates in the Tucannon River ranged between 1% and 4.8% in 2000 and 2001 (WDFW - unpublished data from Snake River Lab, 2002).

Most residual hatchery steelhead/trout populations appear to decrease rapidly through the summer until few remain in the fall. However, ODFW found hatchery steelhead residuals persisting in the Grande Ronde River for more than 12 months after release (Whitesel et al. 1994). The gradual decline of residualized steelhead throughout the summer in most Snake River release areas may be due to harvest, other factors resulting in mortality, and emigration. Partridge (1986) noted that, in areas of heavy harvest, virtually no steelhead were available for harvest after 10 weeks in the upper Salmon River. In the East Fork Salmon River, where harvest pressure was light, he found residuals in the harvest 16 weeks after the late-May "residualized" date. Viola and Schuck (1991) noted that residual populations declined at a rate of about 50% per month from June to October (declining from 4.3 to 0.8% of the total released).

Most of the LSRCP steelhead releases do not occur in or above the primary production areas for natural chinook salmon. Emerging fry or juveniles may be present in release areas (passive or active migration and rearing) during some portion of the year. However, we are unable to estimate the number of chinook salmon fry/fingerlings that may be present or could be affected by migrating and residual steelhead during any given year.

In summary, we assume steelhead densities at the release sites may be very high immediately after release until smolting fish emigrate. After one to two months less than 13 percent of the total releases may remain in an area near the release site, most within 10 to 20 km. Throughout the summer most of the residuals and hatchery trout will disappear due to harvest, mortality, or emigration (relative distribution shift upstream and downstream during the fall and winter months). We believe the potential effects of residualism diminishes shortly after release and is minimal after more than a month.

Predation. The potential of predation by hatchery-released spring/summer and fall chinook salmon on natural chinook salmon is currently unknown. Hatchery releases of chinook salmon range in size from approximately 110 to 155 mm at release in late March to early April. Peak emergence of wild chinook salmon occurs from March through May with sizes ranging from 30 to 40 mm. Hatchery chinook salmon smolts generally emigrate from release areas within a few days of release. The ability of hatchery-reared chinook salmon to convert from a hatchery diet to a piscivorous diet probably does not occur within this time frame. Although there was no

evidence in the literature of hatchery chinook salmon predation on naturally-produced chinook salmon, the potential may exist in areas where large concentrations of hatchery chinook salmon smolts are released over emerging natural chinook salmon, especially when the hatchery smolts fail to emigrate quickly. Due to the size of hatchery migrants, their rapid migration time, and short time to convert to natural diet, we do not believe releases of hatchery juveniles will adversely affect listed populations from predation.

IDFG (1992) thoroughly discusses the potential of various sizes of steelhead to feed on juvenile salmonids. Although small steelhead/trout may feed on fish (Horner 1978, IDFG 1992, Hillman and Mullan 1989), 250 mm (total length) appears to be the lower threshold size that has the greatest propensity to be piscivorous (Beauchamp 1990, IDFG 1992). Parkinson et al. (1989) noted that predatory fish normally feed on prey one-third or less their own length. Due to their time of emergence, newly emerged spring and summer chinook salmon fry are perhaps most vulnerable to hatchery-released steelhead. Their vulnerability is greatest as they emerge in high densities and decreases greatly once they have dispersed and moved into shallow, shoreline areas not typically used by larger fish (IDFG 1992).

Data are available to indicate predation rates on chinook salmon fry/fingerling or the percent chinook salmon fry/fingerling in a steelhead smolt's diet. Partridge (1986) examined stomach contents of 222 steelhead smolts and residuals collected in April, June, July, and August and found one unidentified salmonid (0.45%). Viola and Schuck (1991) found no salmonids in 52 stomachs of residualized steelhead and unidentified salmonid remains in three of 24 rainbow stomachs (12.5%) from fish captured from the Tucannon in August and October 1991. Bugert et al. (1991) examined 36 steelhead, all naturally-produced and less than 127 mm (FL), and found no fish in their stomachs. Ed Schriever (IDFG, personal comm.) found no salmonids in trout stomachs from recaptures of Lower Clearwater River trout releases. IDFG (1993) found three of the 6,762 hatchery steelhead smolt stomachs examined (0.04%) contained a total of ten chinook salmon fry in the upper Salmon River in 1992. Martin et al. (1993) found three of the 1,713 hatchery steelhead smolt stomachs (0.18%) and one of the 429 hatchery rainbow trout stomachs (0.23%) examined contained salmon fry in the Tucannon River in 1992. Jonasson et al. (ODFW, personal comm.) sampled 406 residual steelhead stomachs from summer samples and 143 residual steelhead stomachs from fall samples collected in NE Oregon during 1992. No chinook salmon were observed in any of the stomachs in either season although 10% of the summer stomach samples and 5% of the fall stomach samples contained other fish as prey items (mainly sculpins). Conclusions about the rates at which residual steelhead prey on chinook salmon must be made cautiously, however, since only 14-15% of the summer-sampled residuals existed sympatrically with juvenile chinook salmon in NE Oregon.

We believe some listed spring/summer chinook salmon fry and fingerlings may be consumed by steelhead released in the Salmon, Tucannon, Grande Ronde, and Imnaha river basin. The limited empirical data suggests the number of fry/fingerlings eaten by steelhead is low or negligible, either because of low rates of predation, the lack of coexistence, or both; and too many assumptions would have to be made to confidently estimate the actual number of chinook salmon fry and fingerlings consumed (or to calculate their resulting adult equivalents).

Steelhead emigrating from release sites in the Grande Ronde, Imnaha, and Salmon river basins could potentially interact with fall chinook salmon juveniles in the Snake River. Actively migrating steelhead smolts should be well distributed as they migrate in the Snake River, and we believe they are not likely, either as smolts or residuals, to use the same habitat niches as the smaller chinook salmon. Therefore, we have concluded that predation by steelhead is likely to be a minor and insignificant mortality factor for fall chinook salmon fry or fingerlings.

The size of spring/summer and fall chinook salmon smolts should greatly reduce their vulnerability as prey for steelhead smolts or residuals. Using Parkinson et al. (1989) guide that predators are usually three times longer than their prey, 90 to 100 mm spring/summer chinook salmon smolts would likely be prey only for 270 mm or larger steelhead/rainbow trout. Few of the steelhead released are that large and, therefore, spring/summer chinook salmon smolt consumption by steelhead migrants is unlikely. Fall chinook salmon smolts are migrating after most steelhead migrants have left the Snake River basin and are not likely to be affected by LSRCP hatchery steelhead releases.

Sockeye salmon smolts range from about 90 to over 110 mm in length at time of emigration from natal lakes (Bowler 1990, IDFG 1992). As noted above for chinook salmon smolts, released steelhead would not be of sufficient size to effectively prey on sockeye salmon smolts. Therefore, there is a very limited potential for steelhead to adversely affect sockeye salmon outmigrants.

Releases of salmon and steelhead have the potential to prey on bull trout. Most release sites are located well below primary production areas for bull trout. It is assumed that most bull trout found near release sites are larger (generally fluvial adults) than fish released and more likely to out compete and prey on hatchery releases due to a size advantage.

Competition

Hatchery releases may compete with naturally produced fish in the natural environment. There is currently little data available in the literature to document the level of potential effects. We believe competition for food, space, and habitat will be minimal and is not measurable between hatchery-reared salmon migrants and listed species from release sites through free-flowing sections of the Snake River. Most non-listed hatchery releases are well below primary production and rearing areas of listed species, are released as smolts, and migrate rapidly down through the system. In addition, spatial segregation due to size (hatchery-reared smolts are larger), rapid emigration by hatchery-reared smolts from release through free-flowing reaches, foraging inefficiency of newly released hatchery-reared smolts, and differences in migration timing should reduce the potential for effects. If competition does occur, it should be localized where large groups are released; and, even then, it would be for only the short time before smolts begin to migrate and disperse. We do not believe the combined hatchery and natural smolt populations exceed the historical carrying capacity of the free-flowing tributaries or main stem of the Snake River during outmigration. Parr and presmolt releases will only occur where natural fish populations are documented and are well below carrying capacities. These releases will be carefully monitored by LSRCP cooperators to identify effects on natural fish.

Studies to date indicate that yearling chinook salmon do feed as they migrate through the Columbia River system (Giorgi 1991), although the relationship between chinook salmon that reside for extended periods of time and those that actively migrate have not been conducted. Increased emigration time due to mainstem Snake and Columbia River reservoir passage and

effects from barging and system operations could increase competition and potentially exceed the ability of the current system to support them. Because the LSRCP Program has no authority over system operations or barging, effects associated with these actions/conditions are not addressed in this analysis. These effects are the responsibility of the funding Federal agency and should be covered in their Section 7 BA's.

Behavior

Little data exists to describe adverse behavioral effects of hatchery chinook salmon releases on natural/wild chinook salmon populations. Hillman and Mullan (1989) reported that larger, hatchery-released fingerling chinook salmon apparently "pulled" smaller wild/natural chinook salmon with them as they drifted downstream, resulting in predation on the smaller fish by other salmonids. While the effects of emigrating hatchery smolts (yearlings) on wild/natural chinook salmon are unknown at this time, the potential for similar effects exists, especially within the large mainstem reservoirs.

Competition and behavioral effects of hatchery-released steelhead on naturally-produced chinook salmon and sockeye salmon should be localized near steelhead release areas until steelhead smolts have actively emigrated from the area or distributed themselves to suitable habitat (residuals). In both cases spatial segregation of the species based on the size differences (IDFG 1992, Hampton 1988) should minimize potential for impacts on listed species. The most likely potential adverse effects would be on similar size naturally-produced steelhead in the area.

Hatchery steelhead smolts and residuals have the potential to compete for food, space, and habitat types and to modify the behavior of chinook salmon. IDFG (1992) concluded that effects of behavioral and competitive interactions would be difficult to evaluate or quantify. If interactions do occur, they are likely to be restricted to the vicinity of the release site because of limited dispersal of residual and catchable trout. In addition, we believe the size differences of steelhead smolts residuals and fry will probably result in utilization of different habitat and further reduce the likelihood of interactions.

The large concentration of steelhead at and near release sites could have behavioral impacts on chinook salmon. Their mere presence may restrict normal movement and feeding responses of juvenile chinook salmon (Dill 1983, Johnson and Abrahams 1991). Hillman and Mullan (1989) found no evidence that April releases of steelhead altered normal movement and habitat use of age-0 chinook salmon.

Although competition for food and space between steelhead smolts and residuals and chinook salmon fry and fingerlings should be minimal because of their differences in habitat selection, high densities of steelhead near release sites, which last up to a few weeks, could reduce chinook salmon food availability in that area (IDFG 1992). We believe this effect would be restricted to a small stream reach for a short time.

The greatest potential for adverse competitive effects to the listed species would occur when large releases of hatchery steelhead were placed into areas with large concentrations of naturally rearing chinook salmon. It may be possible in the short term that competition for space and food, behavioral modification, or "pulling" or "pied piper" effects would affect listed species (IDFG 1992). These effects should be of limited duration as steelhead emigrate out of the area.

Residual steelhead provide a popular fishery where they are available and there is access to streams. IDFG's (1992) survey of the literature indicated that chinook salmon fingerlings are normally not vulnerable to anglers until they reach sizes of 75 mm or more. That size would not be reached until late summer, however, when residual steelhead numbers are dropping rapidly and angler use is decreasing. We believe effects of angling on juvenile chinook salmon populations should be minimal. Vulnerability of natural chinook salmon and sockeye salmon to angling on steelhead is extremely low (IDFG 1992). Juvenile chinook salmon have comprised less than 1% of game fish sampled in the Middle Fork and South Fork Salmon rivers in recent years.

Monitoring & evaluations

Monitoring and evaluation of production (routine culture monitoring at the facilities) is conducted at all LSRCP facilities and will not affect listed species. Chinook and steelhead M&E studies are conducted in Oregon, Washington, and Idaho to evaluate spatial and temporal distributions (local release areas) of hatchery and natural chinook, describe characteristics of juvenile chinook, examine genetic characteristics of hatchery and natural populations, and assess hatchery adult distribution into natural production areas. Potential effects of M&E studies (spawning ground surveys, snorkel surveys, seining, emigrant trapping, and electrofishing) include mortality and displacement. All chinook salmon and steelhead evaluations involving listed species require direct takes and are included in several Section 10 permit applications and 4(d) rules.

All evaluation studies (other than routine culture monitoring) have the potential to take listed species in a number of ways including direct or indirect mortality and as a result of physiological or behavioral responses. Electrofishing, seining, snorkeling, spawning surveys, emigrant trapping, and other types of sampling all have the potential to affect listed species through direct and indirect mortality. Sharber and Carothers (1988) found 50% of adult rainbow trout captured electrofishing in the Colorado River suffered spinal injuries and recommended that electrofishing in water containing threatened or endangered species be cautiously considered. Field observations indicated that spinal injuries could only be determined by X-ray or autopsy and that severely injured fish may be overlooked. Hudy (1985) found that the mean immediate, delayed, and total mortality was less than 2% of juvenile hatchery rainbow and brook trout electroshocked in hatchery raceways and that less than 3% of surviving fish had dislocated or fractured vertebrae. Viola and Schuck (1991) found while estimating hatchery steelhead residualism rates in Southeast Washington streams that approximately 10% of chinook salmon shocked while electrofishing sustained some injury. WDF (1992) found that annual direct electrofishing mortality is 9.3% of the juvenile chinook salmon captured. Tim Whitesel (ODFW, personal comm.) estimated 0%-5% direct mortality and Dave Cannamela (IDFG, personal comm.) estimated up to 10% direct mortality for juvenile chinook salmon while electrofishing in Oregon and Idaho during evaluation studies.

Mesa and Schreck (1989) examined physiological and behavioral responses of cutthroat trout juveniles (>100 mm) to a variety of electrofishing mark-recapture and depletion methodologies. They concluded that electrofishing and procedures used to estimate fish populations elicited a general stress response that was manifested both physiologically and behaviorally. These responses lasted for several hours and included general lethargy and cryptic behavior (i.e. cover seeking responses, digging into substrate, wedging between rocks, etc..). Recovery times for wild cutthroat trout (24 h.) were generally longer than for hatchery fish (1-2 h.). Aggressive behavior was also markedly reduced in juvenile wild fish affecting the integrity of the dominance hierarchy. Other studies (Gatz et al. 1986) suggest that tissues damaged by shocking rainbow and

brown trout juveniles may require substantial portions of their energy budget to repair. IDFG (1992) concluded that physiological and behavioral effects would be difficult to evaluate or quantify. If effects do occur, they are restricted to the vicinity of the sampling sites because of limited dispersal of residual and catchable trout.

Very limited literature and local data exists defining the effects of seining, snorkeling, and spawning surveys on chinook salmon. While some direct and indirect mortality may occur during seining, there is no evidence of more than minimal mortality associated with seining under normal sampling procedures. Other sampling methods such as snorkeling and spawning surveys have the potential for minor (spatial and temporal) displacement of chinook salmon, although literature is lacking to describe those effects.

Emigrant trapping may result in both indirect and direct mortality, although direct mortality rates to date have been minimal. There is very little literature that addresses levels of indirect mortality associated with emigrant trapping. All emigrant traps are monitored on a regular basis with fish sampled and removed to minimize time in the traps.

Fish health

Steward and Bjornn (1990) in review of the literature found very little evidence to suggest that horizontal transmission of disease from hatchery fish to wild/natural fish is widespread. Current hatchery practices include measures to control pathogens at all life stages in the hatchery. In spite of this, some diseases such as IHN persist. Although little evidence exists to suggest that the horizontal transmission of disease from hatchery steelhead to wild chinook salmon in the natural environment is wide-spread (Steward and Bjornn 1990) or even occurs, the potential for disease transmission has not been adequately assessed and may be underestimated. At this time we have no evidence that horizontal transmission of disease from hatchery releases to listed species in the free-flowing river occurs or has a measurable adverse effect. The potential effects of horizontal disease transmission in reservoirs or during barging should be assessed by the Federal agency which funds those actions (i.e. operation of the hydropower system or barging), and is not assessed in this document.

Standard fish health protocols are used in all LSRCP steelhead programs. Existing regional fish health policies (IHOT and PNFHPC) are used to manage diseases in LSRCP facilities. Current hatchery practices include measures to control pathogens at all life stages in the hatchery. In spite of this, some diseases such as BKD persist. Although little evidence exists to suggest that the horizontal transmission of disease from hatchery chinook salmon to wild fish in the natural environment is wide-spread or even occurs, the potential for disease transmission has not been adequately assessed and may be underestimated. At this time we have no evidence that horizontal transmission of disease from hatchery effluent or releases to listed species in the free-flowing river occurs or has a measurable adverse effect. The potential effects of horizontal disease transmission in reservoirs or during barging should be determined by the Federal agency which funds those actions (i.e. operation of the hydropower system or barging) and, therefore, was not addressed in this assessment.

ASSESSMENT OF EFFECTS

Under the ESA, Federal agencies are required to ensure that their programs do not jeopardize the continued existence or result in the destruction or adverse modification of critical habitat. The purpose of this analysis is to determine if the indirect takes associated with the LSRCP Program will adversely affect endangered Snake River sockeye salmon, threatened Snake River spring/summer chinook, threatened Snake River fall chinook, endangered upper Columbia River steelhead, threatened Snake River steelhead, threatened Lower Columbia River steelhead, threatened lower Columbia River chinook, threatened upper Willamette River chinook, threatened upper Columbia Rive spring chinook, threatened Columbia River chum, threatened upper Willamette steelhead, threatened mid-Columbia River steelhead and threatened Columbia River Basin bull trout.

Snake River spring/summer chinook
We have concluded that LSRCP Program may affect listed Snake River spring/summer chinook salmon. However, the effects will not threaten the survival and recovery of Snake River spring/summer chinook salmon. Actions funded by the LSRCP Program beginning in 2003 may result in incidental take of listed spring/summer chinook salmon. The effects of releasing nonlisted stocks into the basin, are largely unquantified to date. Although we believe the effects are not sufficient to meet jeopardy criteria, we will continue to cautiously monitor and modify our actions to minimize potential effects on the low wild/natural spring/summer chinook salmon spawning populations in the basin.

Snake River Fall Chinook Salmon
We have concluded that the LSRCP Program may affect listed Snake River fall chinook salmon. However, the effects will not threaten the survival and recovery of Snake River fall chinook salmon. Actions funded by the LSRCP Program beginning in 2003 may incidentally take listed fall chinook salmon. The effects of releasing nonlisted stocks into the basin, are largely unquantified to date. Although we believe the effect is not sufficient to meet jeopardy criteria, we will continue to cautiously monitor and modify our actions to minimize potential effects on the low wild/natural chinook salmon spawning populations in the basin.

Snake River Sockeye Salmon
We have concluded that LSRCP Program may affect listed Snake River sockeye salmon. However, there is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed sockeye salmon. However, we will continue to cautiously monitor and assess potential effects on the low wild/natural sockeye salmon spawning populations in the basin.

Snake River steelhead
We have concluded that the LSRCP Program may affect listed Snake River steelhead. However, the effects will not threaten the survival and recovery of listed Snake River steelhead. The effects of releasing nonlisted steelhead into the basin, straying of LSRCP Program releases, predation, competition, and behavioral effects of LSRCP Program releases are largely unquantified to date. While there is evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed steelhead, actions have been taken since the previous opinion to reduce those potential effects. Assessments are currently being conducted to assess those actions and to further define hatchery population distributions into listed spawning and production areas. A number of

regional processes are in place to assess potential impacts of hatchery programs and to identify additional actions to reduce potential effects. Although we believe the effect is not sufficient to meet jeopardy criteria, we will continue to cautiously monitor and modify our actions to minimize potential effects on the listed populations in the basin.

mid-Columbia River steelhead
We have concluded that LSRCP Program may affect listed mid-Columbia River steelhead. However, the effects will not threaten the survival and recovery of listed mid-Columbia River steelhead. The effects straying of LSRCP Program releases into the Deschutes River are currently being assessed. While there is evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed steelhead, actions have been taken since the previous opinion to reduce those potential effects. Assessments are currently being conducted to further define hatchery population distributions into listed spawning areas and actions have been taken to reduce those distributions. A number of regional processes are in place to assess potential impacts of hatchery programs and to identify additional actions to reduce potential effects. Although we believe the effect is not sufficient to meet jeopardy criteria, we will continue to cautiously monitor and modify our actions to minimize potential effects on the listed populations in the basin.

upper-Columbia River steelhead
We have concluded that LSRCP Program is not likely to adversely affect upper-Columbia River steelhead. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed upper-Columbia River steelhead.

lower-Columbia River steelhead
We have concluded that LSRCP Program is not likely to adversely affect lower-Columbia River steelhead. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed lower-Columbia River steelhead.

lower Columbia River chinook
We have concluded that LSRCP Program is not likely to adversely affect lower-Columbia River chinook. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed lower-Columbia River chinook.

upper-Willamette River chinook
We have concluded that LSRCP Program is not likely to adversely affect upper-Willamette River chinook. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed upper-Willamette River chinook.

upper-Columbia River spring chinook
We have concluded that LSRCP Program is not likely to adversely affect upper-Columbia River spring chinook. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed upper-Columbia River spring chinook.

Columbia River chum
We have concluded that LSRCP Program is not likely to adversely affect Columbia River chum**.** There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed Columbia River chum.

Willamette steelhead
We have concluded that LSRCP Program is not likely to adversely affect Willamette steelhead. There is no evidence to date that LSRCP Programs beginning in 2003 may incidentally take listed Willamette steelhead.

Columbia River Basin bull trout
We have concluded that the LSRCP Program may affect proposed listed Columbia River bull trout, however, the effects will not threaten the survival and recovery of the species. Actions funded by the LSRCP beginning in 2003 have the potential to incidentally take a small number of Columbia River DPS bull trout. Although we believe the effects are not sufficient to meet jeopardy criteria, we will continue to evaluate and modify our actions in the future to minimize potential effects on low naturally reproducing populations of listed bull trout in the basin.

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