



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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September 11, 2007

MEMORANDUM FOR: F/PR - James H. Lecky

FROM: F/NWC3 - John W. Ferguson *John W. Ferguson*

SUBJECT: Revised Estimation of Percentages for Listed
Pacific Salmon and Steelhead Smolts Arriving at
Various Locations in the Columbia River Basin in
2007

This Memorandum revises our earlier Memorandum to you dated August 21, 2007. An error was found in the algorithms contained in the previous Table 8, which has been corrected in the attached estimation tables.

Attachments

cc: F/NWC1 - Ford
F/NWC2 - Dickhoff
F/NWC3 - Casillas
F/NWC3 - Dey
F/NWC3 - Matthews
F/NWC3 - Frick
F/NWC3 - Ruehle
F/NWC3 - Williams
F/NWR3 - Griffin
F/NWR3 - Rule
F/NWC5 - Collier
F/NWR5 - Suzumoto
F/PR3 - Jackson

YEARLING CHINOOK SALMON ESTIMATES

Snake River ESU

The estimate of wild spring/summer Chinook salmon arriving at Lower Granite Dam is based on Idaho Department of Fish and Game and Oregon Department of Fish and Wildlife redd counts for brood year 2005. Redd counts were grouped by drainages where fecundity rates were available (Middle Fork of the Salmon River, South Fork of the Salmon River, Salmon River (excluding Middle and South Forks), Clearwater River, Imnaha River, and Grande Ronde River). The egg-to-smolt survival rate (to Lower Granite Dam) was set at 10%. We estimate that 1,185,522 wild/natural spring/summer Chinook salmon will reach Lower Granite Dam in 2007.

Under the 2005 listing guidelines, hatchery fish must now be tracked, not only by their listing status, but also by whether they have been adipose-fin clipped. We estimate that 10,628,000 hatchery spring/summer Chinook salmon smolts will be released from Idaho (9,856,500) and Oregon (771,500). Of these 10,628,000 hatchery spring/summer Chinook salmon smolts, 4,254,000 will be listed (3,833,600 with AD-clips and 420,400 without AD-clips) and 6,374,000 will be unlisted (6,284,500 with AD-clips and 89,500 without AD-clips).

In order to estimate how many hatchery smolts will reach Lower Granite Dam, we first estimated the percentage composition of Snake River spring/summer Chinook salmon arriving at the dam from listed hatcheries (Table 1). Using the mean survival estimates for the 1993-2006 outmigrations (excluding 2001, which was a record low flow year), we estimated the total number of hatchery fish that will arrive at Lower Granite Dam. The mean survival estimate for each hatchery from these years was applied to the 2007 projected release numbers for each hatchery. We estimate that 6,462,767 or 60.80887% of the 10,628,000 hatchery fish released will arrive at Lower Granite Dam. Of these 6,462,767 hatchery spring/summer Chinook salmon smolts, 2,194,301 will be listed (1,966,024 with AD-clips and 228,277 without AD-clips) and 4,268,466 will be unlisted (4,212,439 with AD-clips and 56,027 without AD-clips).

One of the June 2005 changes was the listing of Snake River hatchery fall Chinook salmon under the ESA. While most hatchery fall Chinook salmon are released as subyearlings, the Nez Perce Tribe and Washington Department of Fish and Wildlife release yearling fall Chinook salmon above Lower Granite Dam. Because these fish may not be distinguishable from yearling spring/summer Chinook salmon, they have been included in the yearling estimates detailed below.

Holdover fall Chinook salmon (wild fish that do not outmigrate as subyearlings and hatchery fish released as subyearlings that did not outmigrate as subyearlings) show extreme year-to-year variability in the numbers collected at the various dams. Also, based on PIT-tag detections of holdover fall Chinook salmon, it is known that these fish can stop migrating anywhere along their migration route and holdover to the next spring. These two characteristics of fall Chinook salmon life history make it extremely difficult to estimate how many holdover fish will outmigrate in any given year. Therefore, no estimates of holdover yearling fall Chinook salmon are included.

In 2007, 210,000 AD-clipped and 265,000 non-AD-clipped yearling listed hatchery fall Chinook salmon will be released above Lower Granite Dam. Using an average survival rate of 0.890, we estimate that 422,750 (186,900 AD-clipped and 235,850 non-AD-clipped) yearling listed hatchery fall Chinook salmon will arrive at Lower Granite Dam.

Knowing the total number of hatchery fish, the number of listed hatchery fish, and the number of wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed hatchery fish and wild fish arriving at the dam.

$$\text{total yearling smolts} = \text{total hatchery fish} + \text{wild fish} = 8,071,039 = (6,462,767 + 422,750) + 1,185,522$$

$$\% \text{ wild fish to dam} = \text{wild fish} / \text{total smolts} = 14.68859\% = 1,185,522 / 8,071,039$$

$$\% \text{ listed hatchery fish} = \text{listed hatchery fish} / \text{total smolts} =$$

AD-clip spring/summer	24.359% = 1,966,024/8,071,039
Non-AD-clip spring/summer	2.82835% = 228,277/8,071,039
AD-clip yearling fall	2.31569% = 186,900/8,071,039
Non-AD-clip yearling fall	2.92218% = 235,850/8,071,039

We set fish guidance efficiencies (FGE) at Lower Granite and Little Goose Dams to 0.430 and 0.491, respectively. Using an FGE of 0.430, the total collection at Lower Granite Dam will be 3,470,547 (8,071,039 x 0.430), based on 8,071,039 smolts arriving at the dam. The collection at Lower Granite Dam will be comprised of

Listed wild spring/summer	509,774
Listed AD-clip hatchery spring/summer	845,391
Listed Non-AD-clip hatchery spring/summer	98,158
Listed AD-clip hatchery yearling fall	80,367
Listed Non-AD-clip hatchery yearling fall	101,416
Unlisted AD-clip hatchery spring/summer	1,811,342
Unlisted Non-AD-clip hatchery spring/summer	24,099

Tucannon River fish, both hatchery and wild, are within the Snake River spring/summer Chinook salmon Evolutionarily Significant Unit (ESU) and are considered listed fish. In spring 2007, 20,429 wild and 197,000 non-AD-clipped hatchery spring/summer Chinook salmon are expected to outmigrate from the Tucannon River. The Tucannon River joins the Snake River between Little Goose and Lower Monumental Dams. Because of the short distance from the confluence to Lower Monumental Dam, we assumed no mortality of these fish prior to Lower Monumental Dam. The estimates shown in Table 2 and Tables 7-8 reflect the addition of these fish above Lower Monumental Dam.

Since 1995, some of the PIT-tagged fish bypassed at the collection dams (Lower Granite, Little Goose, Lower Monumental, and McNary Dams) have been returned to the river to continue migrating inriver. This return of fish to the river requires adjustment of our estimates of the number of listed fish that reach McNary Dam. We estimated the number of fish that will be PIT-tagged for 2007 and, as described in Appendix A, adjusted for fish diverted to transportation at each Snake River collector dam. If transportation occurs at McNary Dam, we also assumed that 100% of all PIT-tagged fish would be returned to the river. A detailed description of how we estimated the impact of returning PIT-tagged fish to the river is presented in Appendix A. We estimated that 44,851 PIT-tagged spring/summer Chinook salmon from the Snake River (including 17,489 wild and 11,529 listed hatchery fish) will be collected at McNary Dam because they were returned to the river at an upstream dam(s). These numbers represent collected fish. Dividing the collected number by the FGE at McNary Dam (0.384), we determined that 45,544 wild ($17,489/0.384$) and 30,023 listed hatchery ($11,529/0.384$) fish will arrive at McNary Dam and must be added to the number of fish that were estimated to reach McNary Dam as a result of not having been collected at an upstream dam (column "Listed fish to McNary", Table 2).

Upper Columbia River ESU

The Upper Columbia River ESU spring Chinook salmon is listed as endangered under the ESA. The ESU begins at the confluence of the Yakima and Columbia Rivers and continues upstream to Chief Joseph Dam.

Adults that returned in 2005 produced the smolts that will outmigrate in 2007. We attempted to obtain 2005 redd counts for the major Columbia River tributaries in this ESU from Washington Department of Fish and Wildlife (WDFW) and the Yakama Indian Nation; however, the only redd counts we received were from the Wenatchee River. The redd counts used for the Methow and Entiat Rivers were the average counts between 2000-06 (except

2005, for which we received no data). Fecundity estimates for this ESU range from 4,000 to 5,500 eggs per female. Estimates for egg-to-smolt survival generally range up to 19%. Using the median egg count, 4,750, and a conservative egg-to-smolt survival estimate (to the first dam encountered) of 15%, we estimated the number of smolts that each stream will produce.

We also have hatchery release estimates for this ESU from WDFW and the U.S. Fish and Wildlife Service. There are no survival estimates for these hatcheries. So, based on the distance from the hatchery to the first dam the fish will encounter, we assigned the same survival estimates for Snake River hatcheries, with similar distances to the first dam. Using this method, we assigned a survival rate of 0.788 (Dworshak Hatchery's survival estimate to Lower Granite Dam) to the fish from Winthrop, Methow, Entiat, and Leavenworth Hatcheries, a survival estimate of 0.661 (Rapid River Hatchery's estimate to Lower Granite Dam) to Cle Elum Hatchery, and a survival estimate of 100% to Eastbank and Ringold Hatcheries.

Because we have no per-project survival information for spring Chinook salmon in the Columbia River above McNary Dam, we assigned the same per-project estimate (0.9) used on the Snake and lower Columbia Rivers. Survival estimates derived from a 1 year study using yearling hatchery fall Chinook salmon support using this estimate (M. Brad Eppard, NMFS, Pers. commun., January 1999).

In 2007, 2,268,000 hatchery yearling summer Chinook salmon (all AD-clipped) will be released in the Columbia River above McNary Dam. There are no listed summer Chinook salmon in the Columbia River. Because these fish may not be distinguishable from yearling spring/summer Chinook salmon, they have been included in the yearling estimates detailed below. For the same reasons discussed under the Snake River section above, we were unable to estimate the number of holdover summer Chinook salmon outmigrating through the Columbia River.

Based on the assumptions stated above, we derived the estimates shown in Table 7. Based on projected hatchery releases and the number of wild smolts we estimate will outmigrate from the various drainages along the Columbia River above McNary Dam, we estimate that 6,526,548 spring Chinook salmon will arrive at McNary Dam. The composition of fish arriving at McNary Dam will be

Listed wild spring	961,232
Listed AD-clip hatchery spring	359,397
Listed Non-AD-clip hatchery spring	489,037
Unlisted wild spring	1,848,938
Unlisted AD-clip hatchery spring	1,706,735
Unlisted Non-AD-clip hatchery spring	0
Unlisted AD-clip hatchery yearling summer	1,161,209

Note that the numbers shown for Columbia River dams above McNary Dam are numbers arriving at the dam and not the numbers collected at the dam. The reason for this is that fish guidance efficiency (FGE) for these dams is either unknown or is currently being evaluated.

Estimate of Fish Arriving at McNary Dam

McNary Dam is the first dam on the Columbia River below the confluence of the Snake River. To obtain an estimate of the number of spring/summer Chinook salmon smolts arriving at McNary Dam, we added the estimated numbers from the Columbia River above McNary Dam (6,526,548) and the Snake River (1,459,275).

We estimate that 7,985,823 (6,526,548 + 1,459,275) spring/summer Chinook salmon smolts will arrive at McNary Dam in 2007, and that 3,066,556 fish will be collected (FGE = 0.384). The collection at McNary Dam will be comprised of

	Snake R. ESU	Upper Col. R. ESU	Total	Percent
<u>Listed groups</u>				
Wild spring/summer	76,458	369,113	445,571	14.5
AD-clip hatchery spring/summer	102,640	138,008	240,648	7.8
Non-AD-clip hatchery spring/summer	49,427	187,790	237,217	7.7
AD-clip hatchery yearling fall	53,031	0	53,031	1.7
Non-AD-clip hatchery yearling fall	65,160	0	65,160	2.1
<u>Unlisted groups</u>				
Wild spring (from Mid-Columbia)	0	0	709,992	23.2
AD-clip hatchery spring/summer	211,050	655,386	866,436	28.3
Non-AD-clip hatchery spring/summer	2,597	0	2,597	0.1
AD-clip hatchery yearling Col. R. summer	0	445,904	445,904	14.5

The ratio of Upper Columbia River ESU wild spring Chinook salmon to Snake River ESU wild spring/summer Chinook salmon at McNary, John Day, and The Dalles Dams will be 82.8%:17.2% (961,232:199,109). The ratio of Upper Columbia River ESU listed hatchery fish to Snake River ESU listed hatchery fish at McNary, John Day, The Dalles, and Bonneville Dams will be

	Ad-clipped	non-AD-clipped
Snake R spring/summers	34.9 (267,292)	16.3 (128,717)
Snake R yearling falls	18.1 (138,102)	21.5 (169,687)
Upper Columbia R springs	47.0 (359,397)	62.1 (489,037)

We received no new redd information from Oregon Department of Fish and Wildlife (ODFW) for the John Day River; therefore, we used the average redd count from 2000-06 (excluding 2005, for which we had no data). Using the same redd to smolt calculation as described above (Upper Columbia River ESU, paragraph 2), we added 709,650 wild unlisted fish between McNary and John Day Dams. Hatchery releases between McNary and John Day Dams will total 835,000 (all AD-clipped) unlisted spring and 480,000 (50,000 AD-clipped and 430,000 non-AD-clipped) unlisted yearling fall Chinook salmon. We did not receive any 2005 redd count data for the Deschutes River, so we estimated the number of redds by multiplying the 2003 redd count by the change between the 2003 and 2000-06 average redd count from the John Day River we used for this year's memo. This resulted in 426,788 wild unlisted fish being added between John Day and The Dalles Dams. Based on 2004 data from WDFW (Streamnet; no new data available), we estimate that 582,113 wild unlisted spring Chinook salmon will be added (from the Klickitat River) between The Dalles and Bonneville Dams. Hatchery releases between John Day and The Dalles Dams will total 956,250 (all AD-clipped) unlisted spring Chinook salmon. Hatchery releases between The Dalles and Bonneville Dams will total 2,898,000 (all AD-clipped) unlisted spring Chinook salmon.

Lower Columbia River ESU

The Lower Columbia River ESU extends from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls. This ESU includes wild and hatchery spring-run and fall-run Chinook salmon. The fall-run fish will be discussed below under the subyearling fall Chinook salmon section. In the past, we have received information that spawning is occurring in the Wind River, however, these spring Chinook are not considered to be part of the ESU even though they

are naturally produced. We received no new natural production data for this area. Based on the most recent available data, we estimate that 14,888 wild spring Chinook salmon will be produced above Bonneville Dam. Also, 2,898,000 unlisted AD-clipped hatchery spring Chinook salmon will be released above Bonneville Dam. This ESU will introduce 1,462,115 wild, 2,529,550 listed hatchery (2,229,550 AD-clipped and 300,000 non-AD-clipped), and 840,000 (all AD-clipped) unlisted hatchery spring Chinook salmon to the Columbia River below Bonneville Dam.

Estimate of Fish Arriving at Bonneville Dam

At Bonneville Dam, the ratio of Upper Columbia River ESU, Snake River ESU, and Lower Columbia River ESU listed wild fish will be 81.4%:16.9%:1.7% (700,738:145,150:14,888).

Fish transported from Snake River dams and McNary Dam are released below Bonneville Dam. Transportation at McNary Dam does not occur during the spring migration; therefore, all transported fish are from the Snake River ESU. The number of listed transport fish returned to the river will be 3,182,555. The composition of these fish will be

Snake River ESU (Total number = 3,182,555)

Listed wild spring/summers	917,833
Listed AD-clip hatchery spring/summers	1,509,701
Listed Non-AD-clip hatchery spring/summers	247,392
Listed AD-clip hatchery yearling falls	225,870
Listed Non-AD-clip hatchery yearling falls	281,759

A total of 6,460,290 (3,182,555 listed + 3,277,735 unlisted fish) transported yearling Chinook salmon will be released below Bonneville Dam.

Upper Willamette River ESU

The Upper Willamette River ESU contains spring Chinook salmon populations above Willamette Falls. This ESU will introduce 6,580,663 listed wild, 5,808,490 listed hatchery (5,726,990 AD-clipped and 81,500 non-AD-clipped), and no unlisted hatchery spring Chinook salmon to the Columbia River below Bonneville Dam.

The ratio of Upper Columbia River ESU, Snake River ESU, Lower Columbia River ESU, and Upper Willamette River ESU listed wild fish at Tongue Point will be 7.1%:10.8%:15.0%:67.0% (700,738:1,062,983:1,477,003:6,580,663). The ratio of Upper Columbia River ESU, Snake River ESU, Lower Columbia River ESU, and Upper Willamette River ESU listed hatchery fish at Tongue Point will be

	Ad-clipped	non-AD-clipped
Upper Columbia R spring	2.6 (262,000)	24.0 (356,508)
Snake R spring/summer	16.6 (1,704,557)	23.0 (341,227)
Lower Columbia R spring	21.8 (2,229,550)	20.2 (300,000)
Upper Willamette R spring	55.9 (5,726,990)	5.5 (81,500)
Snake R yearling fall	3.2 (326,547)	27.3 (405,460)

The per-project survival estimate remained the same (0.9) (Table 2).

Summary

Tables 7a, 7b, and 8 present a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2007. This information is derived from the data shown in Tables 1-2 and Appendix Table A1. Table 11 shows the estimated number of listed spring, spring/summer, and yearling fall Chinook salmon expected to outmigrate from each ESU.

COHO SALMON ESTIMATES

Lower Columbia River coho salmon were listed under the Endangered Species Act in June 2005. The Lower Columbia River ESU extends from the mouth of the Columbia River to the Big White Salmon River on the Washington State shore and the Hood River on the Oregon shore. It includes the Willamette River to Willamette Falls, Oregon. This ESU includes both wild and hatchery-origin coho salmon.

Hatchery coho salmon are released in the Snake River and the Columbia River above the Lower Columbia River ESU. At this time we have no estimates of wild coho salmon from these areas; therefore, we have included no wild information in Table 7. As with yearling and subyearling Chinook salmon, hatchery fish must be tracked based on whether they have an adipose-fin clip.

We assigned coho salmon the same survival rates as yearling Chinook salmon in all our calculations. Enough coho have been released over the past couple years that we are able to estimate FGE at Lower Granite Dam at 0.430. Also, as with the other species discussed here, all our calculations are based on the "Transportation with Spill" scenario.

Based on hatchery outplanting records, we estimate that 828,500 hatchery coho salmon (120,000 AD-clipped and 708,500 non-AD-clipped) will be released into the Snake River drainage. We estimate that 7,439,081 hatchery coho salmon (1,985,000 AD-clipped and 5,454,081 non-AD-clipped) will be released into the Columbia River drainage above the Lower Columbia River ESU. From these releases, we estimate that 6,942,590 hatchery coho salmon (1,654,044 AD-clipped and 5,288,547 non-AD-clipped) will reach Tongue Point.

Lower Columbia River ESU

With the June 2005 change in ESU listing status, all hatchery coho in this ESU are now listed (except those released at Youngs Bay, Tongue Point, and Blind Slough in Oregon and Deep River in Washington). We attempted to obtain new wild coho salmon production estimates for 2007 from the various agencies involved in the lower Columbia River system, however, no new information was provided to us. Because of this lack of new information, we must use last year's estimate that 94,114 listed wild coho salmon will arrive at Bonneville Dam. No listed hatchery fish are released above Bonneville Dam.

Listed wild coho salmon estimates from below Bonneville Dam to Tongue Point are 1,105,190, while listed hatchery releases in

this area were 12,779,000 (8,944,000 AD-clipped and 3,835,000 non-AD-clipped) and 900,000 unlisted (all AD-clipped).

In addition, another 5,850 listed wild and 1,233,000 hatchery (8,000 listed AD-clipped and 1,225,000 unlisted AD-clipped) coho salmon will enter the Columbia River below Tongue Point.

Summary

Table 7c presents a summary of the estimated number of fish that will be collected, or will be arriving, at various locations during 2007. Table 11 shows the estimated number of listed coho salmon expected to outmigrate from the Lower Columbia River ESU.

SUBYEARLING FALL CHINOOK SALMON ESTIMATES

To estimate the 2007 collection number at Lower Granite Dam, we used the 2006 collection number and the adult returns over the dam for 2005 and 2006. In 2006, 1,200,000 unmarked hatchery subyearling fall Chinook salmon were released above Lower Granite Dam. Assuming a survival rate of 0.899 (the estimated survival rate of hatchery subyearling fall Chinook salmon released above Lower Granite Dam in 2006), 1,079,200 (1,200,000 x 0.899) of these fish would have arrived at Lower Granite Dam. Assuming an FGE of 0.181 (derived from PIT-tagged hatchery subyearling fall Chinook salmon in 2006), 195,335 (1,079,200 x 0.181) would have been collected at Lower Granite Dam. Through December 31, 2006, 204,570 unclipped (and without a coded-wire tag) subyearling Chinook salmon had been collected at Lower Granite Dam. By removing the estimated 195,335 unmarked hatchery subyearling fall Chinook salmon, we estimate that 9,235 (204,570 - 195,335) wild subyearling fall Chinook salmon were collected at Lower Granite Dam in 2006. These wild subyearling fall Chinook salmon were from the 2005 adult return. The adult count over Lower Granite Dam in 2005 was 11,170. Of these, 1,274 were hatchery fish that were returned to Lyons Ferry Hatchery and 9,896 adults were passed above Lower Granite Dam. The 2007 outmigration will be the result of the 2006 adults passed over Lower Granite Dam. Through December 31, 2006, 8,048 adults had been counted in the adult ladder. Of these, 1,096 fish were returned to Lyons Ferry Hatchery, leaving 6,952 adults that were passed above Lower Granite Dam. The 2006 count of 6,952 adults represents only 70.3% of the 2005 count (9,896). We applied this decrease (70.3%) to the 2006 subyearling collection number to arrive at the estimated 2007 collection number.

$$\left(\begin{array}{l} \text{total wild fall Chinook} \\ \text{collected at Granite} \end{array} \right) = \left(\begin{array}{l} \text{wild fall Chinook} \\ \text{collected in 2006} \end{array} \right) \times \left(\begin{array}{l} \% \text{ change between adult counts for} \\ \text{2006 and 2007 outmigrations} \end{array} \right) =$$

$$6,492 = 9,235 \times 0.703$$

We estimated the total number of wild subyearling fall Chinook salmon arriving at Lower Granite Dam by dividing the number of wild fish collected by the FGE at Lower Granite Dam. The average estimated FGE for PIT-tagged hatchery subyearling fall Chinook salmon arriving at Lower Granite Dam from 1995-2006 (excluding 2001) is 0.181.

$$\text{total wild fall Chinook} = \text{total wild fall Chinook collected} / \text{FGE} = 35,867 = 6,492 / 0.181$$

The Nez Perce Tribe along with WDFW will release 2,040,000 listed subyearling fall Chinook salmon in the Clearwater and Snake Rivers in 2007. Of these fish, 690,000 will be AD-clipped and 1,350,000 will be non-AD-clipped. Assuming a survival rate of 0.493 (the average estimated survival rate of PIT-tagged hatchery subyearling fall Chinook salmon released above Lower Granite Dam from 1995-2006 (excluding 2001)), 1,005,720 (2,040,000 x 0.493) of the 2,040,000 hatchery fish will arrive at Lower Granite Dam. Of these fish, 340,170 will be AD-clipped and 665,550 will be non-AD-clipped. In 2007, NMFS and the U.S. Fish and Wildlife Service will not be conducting research using hatchery subyearling fall Chinook salmon. Therefore, the total number of non-AD-clipped hatchery fish will be 665,550. By adding the non-AD-clipped fish to the total number of wild fall Chinook salmon (35,867), we estimate that 701,417 non-AD-clipped subyearling fall Chinook salmon will arrive at Lower Granite Dam. The percentage of non-AD-clipped subyearling fall Chinook salmon that are wild will be 5.1135% (35,867/701,417). We added the total AD-clipped hatchery fish (340,170), the total non-AD-clipped hatchery fish (665,550), and the total wild fish (35,867) to determine the total number of subyearling fall Chinook salmon arriving at Lower Granite Dam (1,041,587).

Knowing the total number of hatchery fish, the number of listed hatchery fish, and the number of wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed hatchery fish and wild fish arriving at the dam.

% listed fish = listed fish/total smolts =

Wild subyearling fall	3.4435% = 35,867/1,041,587
AD-clip subyearling fall	32.6588% = 340,170/1,041,587
Non-AD-clip subyearling fall	63.8977% = 665,550/1,041,587

We set fish guidance efficiencies (FGE) at Lower Granite and Little Goose Dams to 0.181 and 0.307, respectively. Using an FGE of 0.181, the total collection at Lower Granite Dam will be 188,527 (1,041,587 x 0.181), based on 1,041,587 smolts arriving at the dam. The collection at Lower Granite Dam will be comprised of

Listed wild subyearling fall	6,492
Listed AD-clip hatchery subyearling fall	61,571
Listed Non-AD-clip hatchery subyearling fall	120,464

NMFS has conducted subyearling fall Chinook salmon survival tests since 1995. As part of these tests, we estimated actual FGE's for McNary Dam (factoring in effects of spill). To more accurately estimate the collection number at McNary Dam, we

averaged these actual FGE's for 1995-2006 (excluding 2001). We also averaged the number of fall Chinook salmon adults crossing McNary Dam for each of the brood years (1994-2005) and the number of juvenile subyearling fall Chinook salmon collected at McNary Dam (1995-2006). The 2006 count of 90,973 adults represents 88.0% of the average for 1994-2005 count (103,429). We applied this change (88.0%) to the average 1995-2005 subyearling collection number (6,150,997) to arrive at an estimated 2007 collection number of 5,412,877 (6,150,997 x 0.880).

Based on the NMFS subyearling fall Chinook salmon survival studies conducted in 1995-2006 (excluding 2001), per-project survival was set at 75%. We set the FGEs at Little Goose, Lower Monumental, and McNary Dams, based on 1995-2006 (excluding 2001) NMFS fall Chinook salmon survival study results, to 0.307, 0.131, and 0.177, respectively.

Lower Columbia River ESU

The Lower Columbia River ESU includes both wild and hatchery tule and late-run bright fall Chinook salmon. This ESU includes fall Chinook salmon from the Clackamas River.

We received no new information on wild production from this area; therefore, our wild estimates are based on last year's data.

To determine the number of wild outmigrants from this ESU, we assumed that 50% of the adults counted in the spawning areas were female and that every female spawned successfully. We used average fecundity and set the egg-to-smolt survival rate at 15%, the same used for spring/summer Chinook salmon.

Based on these assumptions, we estimate that 1,623,609 tule fall Chinook salmon will outmigrate from above Bonneville Dam. No late-run bright fish will enter the Columbia River above Bonneville Dam. Additionally, we estimate that 16,699,877 tule fall Chinook salmon and 5,238,871 late-run bright fall Chinook salmon will enter the Columbia River below Bonneville Dam.

The ratio of Snake River ESU and Lower Columbia River ESU (tule fall Chinook salmon) listed wild fish at Bonneville Dam will be 0.1%:99.9% (1,943:1,623,609).

With the June 2005 change in ESA listing status, most hatchery fish released in this ESU are now listed. In 2007, hatchery releases above Bonneville Dam will total 15,100,000 listed tule (14,650,000 AD-clipped and 450,000 non-AD-clipped) and 6,000,000 unlisted (2,425,000 AD-clipped and 3,575,000 non-AD-clipped)

subyearling fall Chinook salmon. Below Bonneville Dam releases totaled 22,567,000 listed tule (22,350,000 AD-clipped and 217,000 non-AD-clipped) and 5,951,000 unlisted (155,000 AD-clipped and 5,796,000 non-AD-clipped) subyearling fall Chinook salmon.

The ratio of Snake River ESU and Lower Columbia River ESU (tule fall Chinook salmon) listed hatchery AD-clipped fish at Bonneville Dam will be 0.4%:99.6% (52,375:14,650,000), while the ratio for hatchery non-AD-clipped fish at Bonneville Dam will be 7.4%:92.6% (36,062:450,000).

Fish transported from Snake River dams and McNary Dam are released below Bonneville Dam. The number of listed transport fish returned to the river will be 15,747 wild, 192,846 AD-clipped, and 292,188 non-AD-clipped fish, all from the Snake River ESU. A total of 5,867,585 transported subyearling fall Chinook salmon will be released below Bonneville Dam.

The ratio of Snake River ESU, Lower Columbia River ESU (tule fall Chinook salmon), and Lower Columbia River ESU (late-run bright fall Chinook salmon) listed wild fish at Tongue Point will be 0.1%:77.7%:22.2% (17,690:18,323,486:5,238,871). The ratio for hatchery fish at Tongue Point will be

	Ad-clipped		non-AD-clipped	
Snake R. subyearling fall	0.7	(245,221)	33.0	(328,250)
Lower Columbia R. subyearling fall - Tule	99.3	(37,000,000)	67.0	(667,000)
Lower Columbia R. subyearling fall - Late run	0.0	(0)	0.0	(0)

Summary

Tables 7a and 7b present a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2007. This information is derived from the data shown in Table 2. Table 11 shows the estimated number of subyearling fall Chinook salmon expected to outmigrate from each ESU.

SOCKEYE SALMON ESTIMATES

The sockeye salmon collection count at Lower Granite Dam was based on IDFG's estimate of wild and hatchery-reared sockeye salmon smolts exiting the upper Salmon River in 2007 and their estimates of survival to Lower Granite Dam. Because no new estimates for wild sockeye salmon were provided, we averaged the IDFG wild estimates from 2000-06 (excluding 2005 for which we had no estimate). Based on this, we estimate that 4,195 wild fish and 89,096 hatchery fish that have overwintered in the lakes will survive to Lower Granite Dam in spring 2007. All of these fish are listed as endangered.

listed sockeye (wild and hatchery) to Lower Granite Dam =
IDFG's estimated wild fish + estimated hatchery fish =
93,291 = 4,195 + 89,096

To determine the percentage of wild sockeye salmon collected at Lower Granite Dam, we estimated the number of kokanee arriving at Lower Granite Dam. In 2006, WDFW staff at Lower Granite Dam estimated that 23,463 kokanee were collected. With an FGE of 0.134 (the 2006 estimate), 175,097 (23,463/0.134) kokanee reached Lower Granite Dam. Assuming the same amount of spill from Dworshak Dam in 2007 with a release of the same number of kokanee, we estimated the total number of wild *O. nerka* arriving at Lower Granite Dam to be 179,292 (175,097 + 4,195). We then estimated the percentage of wild *O. nerka* arriving at Lower Granite Dam that will be listed Snake River sockeye salmon.

% listed wild sockeye =
listed wild sockeye/total wild *O. nerka* to Lower Granite Dam =
2.3% = 4,195/179,292

A total of 268,388 (93,291 listed sockeye + 175,097 kokanee) *O. nerka* will arrive at Lower Granite Dam.

% total listed sockeye =
total listed sockeye/total *O. nerka* to Lower Granite Dam =
34.8% = 93,291/268,388

An FGE of 0.312 (average for 1998-2006 (excluding 2001)) was used to estimate the number of *O. nerka* smolts reaching Lower Granite Dam that will be collected.

O. nerka salmon collected = total *O. nerka* salmon x FGE =
83,737 = 268,388 x 0.312

Because of extreme year-to-year variability, the count used at McNary Dam for 2007 is based on the average of the counts at the dam from 1985 to 2006 (523,996). Project survival was set at the yearling Chinook salmon level (Table 2).

Summary

Table 7 presents a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2007. This information is derived from the data shown in Table 2. Table 11 shows the estimated number of sockeye salmon expected to outmigrate from the Snake River ESU.

STEELHEAD ESTIMATES

Introduction

Because of the time of year that steelhead spawn, it is very difficult to obtain redd count information. All of our steelhead estimates, not otherwise explained, are based on adult counts in the spawning areas. We assumed that 65% of the adults were females and that every female spawned successfully. To estimate the number of outmigrants, we used average fecundity estimates, and assigned an egg-to-smolt survival rate of 1%. This survival rate is conservative as all rates we calculated or found in the literature were from 0.5% to 0.75%.

Snake River Steelhead ESU

Prior to the 2001 outmigration, nearly all hatchery steelhead were fin-clipped, allowing us to use the juvenile collection numbers at Lower Granite Dam without making any adjustments for unclipped hatchery fish. Because it was known that a large number of unclipped steelhead were to be released for the 2006 outmigration, WDFW not only recorded the number of unclipped steelhead collected but also the number of unclipped steelhead that had fin erosion, a strong indicator that a fish is of hatchery origin. Based on the information provided by WDFW (Fred Mensik, WDFW, Pers. commun., January 2007), we determined that 354,950 wild steelhead were collected at Lower Granite Dam in 2006 (0.370, or 208,183, of the 563,133 unclipped steelhead collected at Lower Granite Dam in 2006 had fin erosion). We applied the 2006 estimated FGE (0.359) to the collection number to determine that 988,719 (354,950/0.359) wild steelhead arrived at Lower Granite Dam in 2006.

To our knowledge, no research has been conducted on the age-class distribution of migrating juvenile steelhead in the Snake River; however, there has been research on the mid-Columbia River (Pevan et al. 1994¹). Pevan's research showed that in the mid-Columbia River, migrating steelhead were 0.7% age-1, 43.2% age-2, 46.4% age-3, and 8.6% age-4 smolts. The age-class of the remainder of smolts (1.1%) was greater than age-4, up to age-7. Because of this age-class breakdown, we decided to base our estimates on age-classes 1 to 4. Because steelhead spawn in the spring, our annual counts were from July 1 to June 30, rather than by calendar year. Using the adult counts at Lower Granite Dam of the 4 years that comprised the 2006 wild smolt outmigration (2001-2005 brood years, July 1, 2000-June 30, 2005), and applying

¹ Pevan, C. M., R. R. Whitney, and K. R. Williams. 1994. Age and length of steelhead smolts from the Mid-Columbia River Basin, Washington. N. Am. J. Fish. Manage. 14:77-86.

the smolt age-class percentages to the adult counts for each of these 4 years, we estimated that 50,093 of the adults passing Lower Granite Dam produced the 2006 steelhead outmigration. We performed the same calculation to estimate the number of adults from the 4 years (2002-2006 brood years) producing the 2007 wild outmigration. We calculated that the 2007 wild outmigration will be based on 40,776 adults, or 81.4% of the number of fish producing the 2006 outmigration. We applied the change in the number of adults to the number of wild steelhead that arrived at Lower Granite Dam in 2006 (988,719) to determine the estimated 2007 arrival number.

$$\left(\begin{array}{c} \text{total wild steelhead} \\ \text{arriving at Lower} \\ \text{Granite} \end{array} \right) = \left(\begin{array}{c} \text{wild steelhead} \\ \text{arriving in} \\ \text{2006} \end{array} \right) \times \left(\begin{array}{c} \% \text{ change between adult counts} \\ \text{for 2006 and 2007} \\ \text{outmigrations} \end{array} \right) =$$

$$804,817 = 988,719 \times 0.814$$

For the steelhead hatchery release numbers, we used IDFG's, ODFW's, and WDFW's estimates of hatchery releases in Idaho, Oregon, and Washington. We estimate that 8,657,000 hatchery smolts (Table 4) will be released from Idaho (7,562,000), Oregon (100,000), and Washington (995,000 above Lower Granite Dam).

In order to estimate how many hatchery smolts will reach Lower Granite Dam, we attempted to use the survival estimates for the 1993-2006 outmigrations (excluding 2001) (from the NMFS survival study, Research Action #1212). Survival estimates have been made for all but two hatchery release groups, releases into the Grande Ronde Basin from Irrigon and Lyons Ferry Hatcheries. We applied the survival estimate from Dworshak National Fish Hatchery (0.786) to these hatchery release groups. Using the 2007 projected release number and survival estimate for each hatchery, we estimated how many total hatchery fish will arrive at Lower Granite Dam. We estimate that 6,526,862 or 75.3940% of the 8,657,000 hatchery fish released will arrive at the dam (Table 4).

Knowing the numbers of hatchery and wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed wild fish arriving at the dam.

$$\begin{aligned} \text{total smolts} &= \text{total hatchery fish} + \text{wild fish} = \\ 7,331,679 &= 6,526,862 + 804,817 \end{aligned}$$

$$\begin{aligned} \% \text{ wild fish to Lower Granite Dam} &= \text{wild fish} / \text{total smolts} = \\ 10.97725\% &= 804,817 / 7,331,679 \end{aligned}$$

$$\% \text{ listed hatchery fish} = \text{listed hatchery fish} / \text{total smolts} =$$

$$\begin{aligned} \text{AD-clip summer} & \quad 31.95932\% = 2,343,155 / 7,331,679 \\ \text{Non-AD-clip summer} & \quad 8.25503\% = 605,232 / 7,331,679 \end{aligned}$$

We set FGEs at Lower Granite and Little Goose Dams at 0.482 and 0.581, respectively. Using an FGE of 0.482, the total collection at Lower Granite Dam will be 3,533,869 (7,331,679 x 0.482), based on 7,331,679 smolts arriving at the dam. The collection at Lower Granite Dam will be comprised of

Listed wild	387,922
Listed hatchery AD-clip	1,129,401
Listed hatchery Non-AD-clip	291,722
Unlisted hatchery AD-clip	1,557,935
Unlisted hatchery Non-AD-clip	166,889

Wild/natural Tucannon River drainage fish are listed within the Snake River ESU. In spring 2007, 27,000 wild fish are expected to outmigrate from the Tucannon River. In addition, 43,000 (32,250 AD-clipped and 10,750 non-AD-clipped) listed hatchery fish and 69,000 (10,000 AD-clipped and 59,000 non-AD-clipped) unlisted hatchery fish will be released into the Tucannon River or released directly from Lyons Ferry Hatchery. The Tucannon River joins the Snake River between Little Goose and Lower Monumental Dams. Because of the short distance from the confluence to Lower Monumental Dam, we assumed no mortality of these fish prior to Lower Monumental Dam. The estimates shown in Table 5 and Tables 9-10 reflect the addition of these fish above Lower Monumental Dam.

Except when research studies require an alternate disposition, all PIT-tagged fish bypassed at the collection dams (Lower Granite, Little Goose, Lower Monumental, and McNary Dams) are returned to the river to continue migrating inriver. This return of fish to the river requires adjustment of our estimates of the number of listed fish that reach McNary Dam. We estimated the number of fish that will be PIT tagged for 2007 and, as described in Appendix B, adjusted for fish diverted to transportation at each Snake River collector dam. A detailed description of how we estimated the impact of returning PIT-tagged fish to the river is presented in Appendix B. We estimated that 10,464 PIT-tagged steelhead from the Snake River (including 4,122 wild fish) will be collected at McNary Dam because they were returned to the river at an upstream dam(s). These numbers represent collected fish. Dividing the collected number by the FGE at McNary Dam (0.209), we determined that 19,722 wild Snake River steelhead (4,122/0.209) will arrive at McNary Dam and must be added to the number of fish that were estimated to reach McNary Dam as a result of not having been collected at an upstream dam (column "Listed fish to McNary", Table 5).

Upper-Columbia River ESU Steelhead

Very little is known regarding wild steelhead in the Columbia River above the confluence with the Yakima River. Also, little is known regarding dam passage of smolts at the dams above McNary Dam. Because of this lack of information, the estimates of wild steelhead from the listed Upper Columbia River ESU are based on what little information is available and on broad generalizations based on this information. No FGE's have been established for the dams in this reach, so the numbers presented in this section of the memorandum (and in Tables 9 and 10) are the number of fish arriving at the dam, not collection numbers (unless otherwise noted in the text).

As mentioned above, Pevan et al. (1994) showed that migrating steelhead were 0.7% age-1, 43.2% age-2, 46.4% age-3, and 8.6% age-4 smolts. The age-class of the remainder of smolts (1.1%) was greater than age-4, up to age-7. Because of this age-class breakdown, we decided to base our estimates on age-classes 1 to 4.

We based our estimates of wild fish on counts collected at Rock Island Dam by the Fish Passage Center. During the 2006 outmigration, 11,392 wild steelhead smolts were counted in the Smolt Monitoring Program's sample. It is estimated that the sample represents 3-5% of the fish passing the dam. Using a 4% sample rate, we estimated that 284,800 wild steelhead passed Rock Island Dam in 2006.

We then examined the adult counts at Rock Island Dam. Because steelhead spawn in the spring, our annual counts were from July 1 to June 30, rather than by calendar year. Using the adult counts of the 4 years that comprised the 2006 wild smolt outmigration (2001-2005 brood years, July 1, 2000-June 30, 2005), and applying the smolt age-class percentages to the adult counts for each of these 4 years, we estimated that 12,171 of the adults passing Rock Island Dam produced the 2006 steelhead outmigration. We performed the same calculation to estimate the number of adults from the 4 years (2002-2006 brood years) producing the 2007 wild outmigration. We calculated that the 2007 wild outmigration will be based on 10,140 adults, or 0.833 of the number of fish producing the 2006 outmigration. We applied the change in the number of adults to the 2006 Rock Island Dam collection to arrive at the estimated 2007 collection number.

$$\left(\begin{array}{c} \text{total wild steelhead} \\ \text{collected at Rock Island} \end{array} \right) = \left(\begin{array}{c} \text{wild steelhead} \\ \text{collected in} \\ \text{2006} \end{array} \right) \times \left(\begin{array}{c} \% \text{ change between adult counts} \\ \text{for 2006 and 2007 outmigrations} \end{array} \right) =$$
$$9,490 = 11,392 \times 0.833$$

Since this represents 4% of the fish passing the dam, we estimate that 237,250 wild steelhead smolts will pass the dam in 2007. Using the smolt age-class percentages, we estimate that 1,661 smolts will be age-1, 102,492 will be age-2, 110,084 will be age-3, and 20,404 will be age-4.

To determine the number of wild smolts passing the two dams above Rock Island Dam (Rocky Reach and Wells Dams), we used the estimate of wild smolts passing Rock Island Dam (237,250) and the adult counts at all three dams.

By comparing the adult counts at each of the three dams for the 4 years that will produce the 2007 outmigration (2002-2006), we calculated the number of adults "lost" between each dam. We assigned this "loss" to adults migrating up rivers between the dams. The difference in adult counts between dams varied between years, so we applied the age-class percentages to each year's differences between dams to determine the number of wild smolts added from the rivers between the dams.

From Rock Island Dam to McNary Dam, the only adjustment made to the wild steelhead smolt count was for per-project survival (0.9).

To determine the number of hatchery smolts arriving at each dam in 2007, we used the outplanting data for the 3 years comprising the 2007 outmigration (2005-2007). Because hatchery fish are larger than equivalent age-class wild fish, we assigned age-2 status to hatchery fish released in 2007, age-3 to those released in 2006, and age-4 to those released in 2005. All of the hatchery outplants will be of listed hatchery stocks.

Because there are no survival data for the various hatcheries releasing fish in this section of the Columbia River, we assumed that all fish released survived to the first dam. We again applied the age-class percentages to the number of fish released each of the 3 years to determine the number of hatchery fish that would outmigrate in 2007. Beginning at Wells Dam and assuming 90% per-project survival, we determined both the number of listed hatchery and the total number of hatchery fish reaching each dam through McNary Dam (Tables 5 and 9).

Mid-Columbia River ESU Steelhead

The Mid-Columbia River wild summer-run and winter-run steelhead are listed protected species. With the January 2006 listings, some hatchery steelhead in this ESU are now listed. Only summer steelhead from the Yakima and Walla Walla Rivers enter the Columbia River above McNary Dam.

We received no new information on wild production from this area; therefore, our wild estimates are based on last year's data.

Based on our assumptions described in the steelhead introduction, 95,177 wild summer steelhead will enter above McNary Dam in 2007.

WDFW will release 59,000 (all non-AD-clipped) listed (from Mid-Columbia River ESU stock) and 88,000 (all AD-clipped) unlisted hatchery steelhead (Lyons Ferry Hatchery stock) into the Touchet River, a tributary of the Walla Walla River, and 104,000 (all AD-clipped) non-listed hatchery steelhead (from Lyons Ferry stock) into the Walla Walla River. The Walla Walla River enters the Columbia River above McNary Dam. For these fish, survival to McNary Dam was set at 100%.

An additional 228,114 wild from this ESU will be added between McNary and John Day Dams. Hatchery summer steelhead will be released between McNary and John Day Dams. Release numbers will be

Summer Steelhead

Listed hatchery AD-clip	150,000
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Between John Day and The Dalles Dams, 725,148 wild and 162,000 (all AD-clipped) listed hatchery summer steelhead will be added. Between The Dalles and Bonneville Dams, 16,557 wild winter, 119,568 (all AD-clipped) unlisted hatchery summer, and 22,500 (all AD-clipped) unlisted hatchery winter steelhead will be added.

Estimate of Fish Arriving at McNary Dam

McNary Dam is the first dam on the Columbia River below the confluence of the Snake River. To obtain an estimate of the number of steelhead smolts arriving at McNary Dam, we added the estimated numbers from the Upper Columbia River (1,215,198), Mid-Columbia (95,177) and the Snake River (647,297) ESUs.

We estimate that 1,957,672 (1,215,198 + 95,177 + 647,297) steelhead smolts will arrive at McNary Dam in 2007, and that 409,153 fish will be collected. Of the 409,153 smolts collected at McNary Dam, 74,538 (0.182) will be wild (36,148 Upper Columbia River ESU, 18,498 Snake River ESU, and 19,892 Mid-Columbia River ESU), 143,686 (0.351) will be listed hatchery AD-clipped (102,545 Upper Columbia River ESU, 41,141 Snake River ESU, and 0 Mid-Columbia River ESU), 66,293 (0.162) will be listed hatchery non-AD-clipped (43,966 Upper Columbia River ESU, 9,996 Snake River ESU, and 12,331 Mid-Columbia River ESU), and 177,097 (0.433) will be unlisted hatchery fish (145,358 AD-clipped and 31,739 non-AD-clipped). The ratio of Upper Columbia River ESU wild fish, Snake River ESU wild fish and Mid-Columbia River ESU wild fish at McNary, John Day, and The Dalles Dams will be

	McNary Dam	John Day	The Dalles
Upper Columbia	48.5 (172,955)	29.6 (155,660)	12.4 (140,094)
Snake River	24.8 (88,506)	15.1 (79,655)	6.4 (71,690)
Mid-Columbia			
Summer	26.7 (95,177)	55.3 (290,962)	81.2 (914,499)
Winter	—	—	—

The ratio of Upper Columbia River ESU, Snake River ESU, and Mid-Columbia River ESU hatchery fish at McNary, John Day, and The Dalles Dams will be

	McNary Dam	John Day	The Dalles
Upper Columbia			
AD-clipped	71.4 (490,648)	57.4 (441,583)	46.5 (397,425)
non-AD-clipped	66.3 (210,362)	66.3 (189,326)	66.3 (170,393)
Snake River			
AD-clipped	28.6 (196,847)	23.0 (177,162)	18.7 (159,446)
non-AD-clipped	15.1 (47,826)	15.1 (43,043)	15.1 (38,739)
Mid-Columbia			
Summer			
AD-clipped	0.0 (0)	19.5 (150,000)	34.8 (297,000)
non-AD-clipped	18.6 (59,000)	18.6 (53,100)	18.6 (47,790)
Winter			
AD-clipped	0.0 (0)	0.0 (0)	0.0 (0)
non-AD-clipped	0.0 (0)	0.0 (0)	0.0 (0)

Lower Columbia River ESU

We received no new information on wild production from this area; therefore, our wild estimates are based on last year's data.

We estimate that 49,160 (21,704 summer and 27,456 winter) wild steelhead from this ESU will arrive at Bonneville Dam. With the January 2006 listings, some hatchery steelhead in this ESU are now listed. Because the hatchery steelhead are denoted as of summer or winter stock, we have decided to track each run individually. At Bonneville Dam, the ratio of wild fish in the various ESUs will be

Upper Columbia	11.7 (126,085)
Snake River	6.0 (64,521)
Mid-Columbia	
summer	76.3 (823,049)
winter	1.5 (16,557)
Lower Columbia	
summer	2.0 (21,704)
winter	2.5 (27,456)

Between The Dalles and Bonneville Dams, 60,000 (all AD clipped) unlisted hatchery summer will be added. There will be 50,000 AD-clipped listed winter steelhead released above Bonneville Dam from this ESU. At Bonneville Dam, the ratio of hatchery fish in the various ESUs will be

	Bonneville Dam	
Upper Columbia		
AD-clipped	43.7	(357,683)
non-AD-clipped	66.3	(153,354)
Snake River		
AD-clipped	17.5	(143,501)
non-AD-clipped	15.1	(34,865)
Mid-Columbia		
Summer		
AD-clipped	32.7	(267,300)
non-AD-clipped	18.6	(43,011)
Winter		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)
Lower Columbia		
Summer		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)
Winter		
AD-clipped	6.1	(50,000)
non-AD-clipped	0.0	(0)

Another 552,698 (41,714 summer and 510,984 winter) wild steelhead are expected to enter the Columbia River from Washington and Oregon downstream from Bonneville Dam.

Fish transported from Snake River dams are released below Bonneville Dam. The number of listed transport fish returned to the river will be 3,246,813 (703,864 wild, 2,022,288 AD-clipped hatchery, and 520,661 non-AD-clipped hatchery), all from the Snake River ESU. A total of 6,228,002 transported steelhead will be released below Bonneville Dam.

Upper Willamette River ESU

The Upper Willamette River wild winter-run steelhead are listed protected species. There are no listed hatchery steelhead from this ESU.

We received no new information on wild production from this area; therefore, our wild estimates are based on last year's data.

Based on our assumptions described in the steelhead introduction, 289,114 winter steelhead will enter the Columbia River in 2007, 220,642 of which will be from listed stocks.

At Tongue Point the ratios of wild fish from the various ESUs will be

	Tongue Point	
Upper Columbia	4.9	(126,085)
Snake River	30.1	(768,385)
Mid-Columbia		
summer	32.2	(823,049)
winter	0.7	(16,557)
Lower Columbia		
summer	2.5	(63,418)
winter	21.1	(538,440)
Upper Willamette		
summer	0	(0)
winter	8.6	(220,642)

There will be no listed hatchery releases from this ESU for either summer or winter steelhead. At Tongue Point the ratios of listed hatchery fish from the various ESUs will be

Tongue Point		
Upper Columbia		
AD-clipped	9.6	(357,683)
non-AD-clipped	20.4	(153,354)
Snake River		
AD-clipped	58.2	(2,165,789)
non-AD-clipped	73.9	(555,526)
Mid-Columbia		
Summer		
AD-clipped	7.2	(267,300)
non-AD-clipped	5.7	(43,011)
Winter		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)
Lower Columbia		
Summer		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)
Winter		
AD-clipped	25.0	(930,000)
non-AD-clipped	0.0	(0)
Upper Willamette		
Summer		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)
Winter		
AD-clipped	0.0	(0)
non-AD-clipped	0.0	(0)

Summary

Tables 9 and 10 summarize the estimated number of steelhead that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the collection dams during 2007. This information is derived from the data shown in Tables 4-5 and Appendix Table B1. Table 11 shows the estimated number of steelhead expected to outmigrate from each ESU.

CHUM ESTIMATES

Columbia River ESU

Wild and all hatchery chum salmon in the Columbia River are listed protected species.

Because of the lack of data, we cannot make an estimate of listed chum salmon. We expect the hatchery (all non-AD-clipped) chum salmon outmigration to be 80,000 from the Columbia River, 5,000 from Chinook River, and 180,000 from Grays River.

Full Transportation Scenario

The estimates shown in Table 3 were derived using the same methodology utilized under the Transportation with Spill Scenario, with one major difference. The number of fish removed at each dam under the Transportation with Spill Scenario was based on an FGE value that adjusted for spill. For our estimates under the Full Transportation Scenario, we used the FGE values developed during developmental testing of the diversion screens installed in each of the turbine intakes. Using the results from these tests, the FGEs for spring/summer Chinook salmon and sockeye salmon were changed from the values in Table 2 to 60.0%, 65.0%, 50.0%, and 80.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Subyearling fall Chinook salmon FGEs were changed from the values in Table 2 to 55.0%, 60.0%, 40.0%, and 65.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Steelhead FGEs (in Table 6) were changed from the values in Table 5 to 80.0%, 90.0%, 65.0%, and 90.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Using the same formulas as under the Transportation with Spill Scenario, we derived the values found in Tables 3 and 6-10.

Because the adjusted FGE at Lower Granite Dam was changed from 43.0% to 60.0% for yearling spring/summer Chinook and sockeye salmon, the total number of fish collected at Lower Granite Dam will be 4,842,623 (8,071,039 x 0.60) spring/summer Chinook salmon and 161,033 (268,388 x 0.60) *O. nerka* salmon.

Because more PIT-tagged fish will be collected at the upstream dams, the number of PIT-tagged fish that are returned to the river and subsequently collected at McNary Dam will be different under this scenario. The effects of this are shown in Appendices A and B.

As under the Transportation with Spill Scenario, to estimate the number of spring/summer Chinook salmon smolts arriving at McNary Dam, we added the estimated numbers from the Columbia River above McNary (6,526,548) and the Snake River (794,659).

$$6,526,548 + 794,659 = 7,321,207$$

Tables 7-10 show the changes in percentages of listed fish at each dam.

Table 1. Estimated percentage composition of Snake River spring/summer Chinook salmon arriving at Lower Granite Dam from listed hatcheries compared with total hatchery releases projected for spring 2007.

Hatchery	2007 Total hatchery releases ^a		Survival to <u>Lower Granite Dam</u>	Fish to Lower Granite Dam	
	AD-clipped	Non-AD-clipped	Mean ^b	AD-clipped	Non-AD-clipped
Dworshak ^c	950,000	0	0.788	748,600	0
Kooskia ^c	391,500	0	0.677	265,046	0
Lookingglass					
Imnaha ^d	360,000	0	0.637	229,320	0
Grande Ronde ^d	411,500	0	0.598	246,077	0
Clearwater ^c	1,778,500	0	0.626	1,113,341	0
Rapid River ^c	2,985,000	0	0.661	1,973,085	0
Sawtooth ^d	990,000	0	0.406	401,940	0
McCall ^d	1,086,600	420,400	0.543	590,024	228,277
Pahsimeroi ^d	985,500	0	0.506	498,663	0
Nez Perce ^c	179,500	89,500	0.626	112,367	56,027
Totals					
All stocks	10,118,100	509,900		6,178,463	284,304
Listed stocks	3,833,600	420,400		1,966,024	228,277
Percent of listed stocks	40.02635%			33.95296%	

- a Data from USFWS, NPT, IDFG and ODFW.
- b Mean survival estimate made from PIT-tag detections of marked hatchery fish releases as part of the NMFS survival studies (Research Action #1212) for 1993-2006 (excluding 2001).
- c Non-listed stocks in 2007.
- d Listed stocks in 2007.

Table 2. Estimate of listed threatened and endangered species arriving at various locations during outmigration year 2007 under past transportation and spill conditions.

Yearling spring/summer Chinook salmon

Snake River ESU

Rearing type	Total Collection*		Of Granite % Listed Fish	Total Listed Fish to Granite ^a	Granite	FGE ¹		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon**				Listed Fish	% Listed Fish
Wild	3,470,547	3,066,556	14.689	1,185,522	0.430	0.491	0.366	0.384	0.9	199,109	76,458	2.49
Listed Hatchery***												
AD-clipped	3,470,547	3,066,556	24.359	1,966,024	0.430	0.491	0.366	0.384	0.9	267,292	102,640	3.35
Non-AD-clipped	3,470,547	3,066,556	2.828	228,277	0.430	0.491	0.366	0.384	0.9	128,717	49,427	1.61

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam			Of dam total, % listed fish			FGE McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Wells	Rocky Reach	Rock Island	Wells	Rocky Reach	Rock Island				Listed Fish	% Listed Fish
Wild****	741,713	764,442	1,318,561	31.4	25.7	24.9	0.384	0.9	961,232	369,113	12.04
Listed Hatchery											
AD-clipped	0	0	493,000	0.0	0.0	9.3	0.384	0.9	359,397	138,008	4.50
Non-AD-clipped	828,188	745,369	670,832	35.1	25.0	12.7	0.384	0.9	489,037	187,790	6.12

Fall Chinook salmon

Rearing type	Total Collection*		Of Granite % Listed Fish	Total Listed Fish to Granite ^a	Granite	FGE ¹		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon				Listed Fish	% Listed Fish
Wild****	188,528	5,412,877	3.444	35,869	0.181	0.307	0.131	0.177	0.75	5,598	991	0.02
Listed Subyearling Hatchery												
AD-clipped	188,528	5,412,877	32.659	340,170	0.181	0.307	0.131	0.177	0.75	150,848	26,700	0.49
Non-AD-clipped	188,528	5,412,877	63.898	665,550	0.181	0.307	0.131	0.177	0.75	103,863	18,384	0.34
Listed Yearling Hatchery												
AD-clipped	3,470,547	3,066,556	2.31569	186,900	0.430	0.491	0.366	0.384	0.9	138,102	53,031	1.73
Non-AD-clipped	3,470,547	3,066,556	2.92218	235,850	0.430	0.491	0.366	0.384	0.9	169,687	65,160	2.12

Sockeye salmon

Rearing type	Total Collection*		Of Granite % Listed Fish	Total Listed Fish to Granite ^a	Granite	FGE ¹		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon				Listed Fish	% Listed Fish
Wild and listed hatchery*****	83,737	523,996	34.8	93,291	0.312	0.438	0.385	0.259	0.9	14,555	3,770	0.72

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Listed wild and hatchery spring Chinook salmon enter the Snake River above Lower Monumental Dam. We estimate that 20,429 wild and 197,000 listed hatchery (all non-AD-clipped) fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2007.

***Note: Based on 2007 hatchery releases, it was estimated that 31.8206% and 80.29328% of the AD-clipped and non-AD-clipped, respectively, hatchery fish arriving at Lower Granite Dam are products of a listed hatchery (Table 1). Because Table 2 is based on the total collection at Lower Granite Dam, which includes both wild and hatchery (listed and unlisted) fish, these estimates of 31.8206% and 80.29328% of all hatchery fish were adjusted to 24.359% and 2.82835% of the total collection at Lower Granite Dam.

****Note: Estimated values based on the average collection numbers from 1995-2006 (excluding 2001) (Fish Passage Center Weekly Reports), and on the average number of adult returns from 1994-2006 (excluding 2001) and the 2006 adult returns (FPC Weekly Reports 1994-2006).

*****Note: The Lower Granite Dam estimate is based on our estimate of 4,195 wild sockeye salmon smolts and 89,096 hatchery fish that overwintered in the lakes arriving at Lower Granite Dam in 2007. The McNary Dam estimate is the average collection count at McNary Dam from 1985-2006 (Annual Fish Passage Reports 1985-2006, and WDFW's 2006 fish counts).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2006 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2007).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}})) \times (\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite}) \times (1 - \text{FGE}_{\text{Granite}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Goose}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{listed Tucannon fish}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 20,429 wild and 197,000 hatchery (all non-AD-clipped)

PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table A1.

Table 3. Estimate of listed threatened and endangered species arriving at various locations during outmigration year 2007 under full transportation conditions (no spill).

Yearling spring/summer Chinook salmon

Snake River ESU

Rearing type	Total Collection*		Of Granite Total % Listed Fish	Listed Fish to Granite ^a	Granite	FGE		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon**				Listed Fish	% Listed Fish
Wild	4,842,623	5,856,966	14.689	1,185,522	0.60	0.65	0.50	0.80	0.9	115,699	92,559	1.58
Listed Hatchery***												
AD-clipped	4,842,623	5,856,966	24.359	1,966,024	0.60	0.65	0.50	0.80	0.9	123,728	98,982	1.69
Non-AD-clipped	4,842,623	5,856,966	2.828	228,277	0.60	0.65	0.50	0.80	0.9	90,269	72,215	1.23

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam			Of dam total, % listed fish			FGE McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Wells	Rocky Reach	Rock Island	Wells	Rocky Reach	Rock Island				Listed Fish	% Listed Fish
Wild****	741,713	764,442	1,318,561	31.4	25.7	24.9	0.80	0.9	961,232	768,986	13.13
Listed Hatchery											
AD-clipped	0	0	493,000	0.0	0.0	9.3	0.80	0.9	359,397	287,518	4.91
Non-AD-clipped	828,188	745,369	670,832	35.1	25.0	12.7	0.80	0.9	489,037	391,230	6.68

Subyearling fall Chinook salmon

Rearing type	Total Collection*		Of Granite Total % Listed Fish	Listed Fish to Granite ^a	Granite	FGE		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon				Listed Fish	% Listed Fish
Wild****	572,874	19,876,972	3.444	35,869	0.55	0.60	0.40	0.65	0.75	1,226	797	0.00
Listed Subyearling Hatchery												
AD-clipped	572,874	19,876,972	32.659	340,170	0.55	0.60	0.40	0.65	0.75	79,124	51,431	0.26
Non-AD-clipped	572,874	19,876,972	63.898	665,550	0.55	0.60	0.40	0.65	0.75	22,743	14,783	0.07
Listed Yearling Hatchery												
AD-clipped	4,842,623	5,856,966	2.31569	186,900	0.60	0.65	0.50	0.80	0.9	99,709	79,767	1.36
Non-AD-clipped	4,842,623	5,856,966	2.92218	235,850	0.60	0.65	0.50	0.80	0.9	122,207	97,766	1.67

Sockeye salmon

Rearing type	Total Collection*		Of Granite Total % Listed Fish	Listed Fish to Granite ^a	Granite	FGE		McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Low	Mon				Listed Fish	% Listed Fish
Wild and listed hatchery*****	161,033	523,996	34.8	93,291	0.60	0.65	0.50	0.80	0.9	4,285	3,428	0.65

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Listed wild and hatchery spring Chinook salmon enter the Snake River above Lower Monumental Dam. We estimate that 20,429 wild and 197,000 listed hatchery (all non-AD-clipped) fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2007.

***Note: Based on 2007 hatchery releases, it was estimated that 31.8206% and 80.29328% of the AD-clipped and non-AD-clipped, respectively, hatchery fish arriving at Lower Granite Dam are products of a listed hatchery (Table 1). Because Table 2 is based on the total collection at Lower Granite Dam, which includes both wild and hatchery (listed and unlisted) fish, these estimates of 31.8206% and 80.29328% of all hatchery fish were adjusted to 24.359% and 2.82835% of the total collection at Lower Granite Dam.

****Note: Estimated values based on the average collection numbers from 1995-2006 (excluding 2001) (Fish Passage Center Weekly Reports), and on the average number of adult returns from 1994-2006 (excluding 2001) and the 2006 adult returns (FPC Weekly Reports 1994-2006).

*****Note: The Lower Granite Dam estimate is based on our estimate of 4,195 wild sockeye salmon smolts and 89,096 hatchery fish that overwintered in the lakes arriving at Lower Granite Dam in 2007. The McNary Dam estimate is the average collection count at McNary Dam from 1985-2006 (Annual Fish Passage Reports 1985-2006, and WDFW's 2006 fish counts).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2006 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2007).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}})) \times (\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite}) \times (1 - \text{FGE}_{\text{Granite}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Goose}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{listed Tucannon fish}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 20,429 wild and 197,000 hatchery (all non-AD-clipped)

PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table A1.

Table 4. Estimated percentage composition of Snake River steelhead arriving at Lower Granite Dam from total hatchery releases projected for spring 2007.

Hatchery	2007 Total hatchery releases ^a		Survival to <u>Lower Granite Dam</u>	Fish to Lower Granite Dam	
	AD-clipped	Non-AD-clipped	Mean ^b	AD-clipped	Non-AD-clipped
Dworshak ^c	262,000	161,500	0.786	205,932	126,939
Clearwater ^c	1,955,000	332,500	0.718	1,403,690	238,735
Hagerman ^{c,d}	1,117,000	324,000	0.726	810,942	235,224
Magic Valley ^{c,d}	1,270,000	340,000	0.793	1,007,110	269,620
Niagara Springs ^d	1,800,000	0	0.760	1,368,000	0
Irrigon (released above Lower Granite Dam) ^{c,d}	0	100,000	0.786	0	78,600
Lyons Ferry (released into Grande Ronde) ^d	992,000	3,000	0.786	779,712	2,358
Totals					
All stocks	7,396,000	1,261,000		5,575,386	951,476
Listed stocks	3,160,000	797,000		2,343,155	605,232
Percent of listed stocks	45.70868%			45.17312%	

- a Data from USFWS, IDFG, ODFW, and WDFW.
- b Mean survival estimate made from PIT-tag detections of marked hatchery fish releases as part of the NMFS survival studies (Research Action #1212) for 1993-2006 (excluding 2001).
- c Listed stocks in 2007.
- d Un-listed stocks in 2007.

Table 5. Estimates of listed threatened and endangered steelhead arriving at various locations during outmigration year 2007 under past transportation and spill conditions.

Snake River ESU

Rearing type	<u>Total Collection*</u>		Of Granite Total % Listed Fish	Listed Fish to Granite ^a	Granite	<u>FGE¹</u>			Project Survival	Listed fish to McNary ^b	<u>Of Fish Collected at McNary</u>	
	Granite	McNary				Goose	Low	Mon**			McNary	Listed Fish
Wild	3,533,869	366,734	10.9773	804,817	0.482	0.581	0.496	0.209	0.9	88,506	18,498	5.04
Listed Hatchery***												
AD-clipped	3,533,869	366,734	31.9593	2,343,155	0.482	0.581	0.496	0.209	0.9	196,847	41,141	11.22
Non-AD-clipped	3,533,869	366,734	8.2550	605,232	0.482	0.581	0.496	0.209	0.9	47,826	9,996	2.73

Upper Columbia River ESU

Rearing type	<u>Number of listed fish passing dam</u>			<u>Of dam total, % listed fish</u>			<u>FGE¹</u> McNary	Project Survival	Listed fish to McNary ^b	<u>Of Fish Collected at McNary</u>	
	Wells	Rocky Reach	Rock Island	Wells	Rocky Reach	Rock Island				Listed Fish	% Listed Fish
Wild***	185,130	204,912	237,250	27.9	32.3	26.4	0.209	0.9	172,955	36,148	9.86
Listed Hatchery***											
AD-clipped	470,566	423,509	655,328	65.7	62.0	60.1	0.209	0.9	490,648	102,545	27.96
Non-AD-clipped	53,031	47,728	192,850	7.4	7.0	17.7	0.209	0.9	210,362	43,966	11.99

Mid-Columbia River ESU

Rearing type	<u>Total Collection*</u>		Of Granite Total % Listed Fish	Listed Fish to Granite ^a	Granite	<u>FGE¹</u>			Project Survival	Listed fish to McNary ^b	<u>Of Fish Collected at McNary</u>		
	Granite	McNary				Goose	Low	Mon**			McNary	Listed Fish	% Listed Fish
Summer-run(First dam reached is McNary Dam)													
Wild									0.209	0.9	95,177	19,892	5.42
Listed Hatchery***													
AD-clipped									0.209	0.9	0	0	0.00
Non-AD-clipped									0.209	0.9	59,000	12,331	3.36
Winter-run(First dam reached is Bonneville Dam)													
Wild									0.209	0.9	0	0	0.00
Listed Hatchery***													
AD-clipped									0.209	0.9	0	0	0.00
Non-AD-clipped									0.209	0.9	0	0	0.00

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Hatchery steelhead and listed wild steelhead enter the Snake River above Lower Monumental Dam. We estimate that 27,000 wild fish and 43,000 (32,250 AD clipped and 10,750 Non AD clipped) listed hatchery fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2007. An additional 59,000 (all non-AD-clipped) listed Mid-Columbia hatchery summer steelhead will outmigrate from the Touchet and Walla Walla Rivers above McNary Dam.

***Note: Estimated values based on 2006 collection numbers (Fish Passage Center Weekly Reports), and on the number of adult returns from 1995-2006 (FPC Weekly Reports 1995-2006).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2006 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2007).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}}) / (\text{FGE}_{\text{Granite}})) \times (\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite}) \times (1 - \text{FGE}_{\text{Granite}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Goose}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{listed Tucannon fish}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{Rock Island listed fish}) \times (\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 27,000 wild and 43,000 (32,250 AD clipped and 10,750 Non AD clipped) hatchery fish
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table B1.

Table 6. Estimates of listed threatened and endangered steelhead arriving at various locations during outmigration year 2007 under full transportation conditions (no spill).

Snake River ESU

Rearing type	<u>Total Collection*</u>		Of Granite % Listed Fish	Total Listed Fish to Granite ^a	Granite	<u>FGE</u>			Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Granite	McNary				Goose	Low	Mon**			McNary	Listed Fish
Wild	5,865,343	1,133,912	10.9773	804,817	0.80	0.90	0.65	0.90	0.90	35,060	31,554	2.78
Listed Hatchery***												
AD-clipped	5,865,343	1,133,912	31.9593	2,343,155	0.80	0.90	0.65	0.90	0.90	37,787	34,008	3.00
Non-AD-clipped	5,865,343	1,133,912	8.2550	605,232	0.80	0.90	0.65	0.90	0.90	5,827	5,244	0.46

Upper Columbia River ESU

Rearing type	<u>Number of listed fish passing dam</u>			<u>Of dam total, % listed fish</u>			FGE McNary	Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary	
	Wells	Rocky Reach	Rock Island	Wells	Rocky Reach	Rock Island				Listed Fish	% Listed Fish
Wild***	185,130	204,912	237,250	27.9	32.3	26.4	0.90	0.90	172,955	155,660	13.73
Listed Hatchery***											
AD-clipped	470,566	423,509	655,328	65.7	62.0	60.1	0.90	0.90	490,648	441,583	38.94
Non-AD-clipped	53,031	47,728	192,850	7.4	7.0	17.7	0.90	0.90	210,362	189,326	16.70

Mid-Columbia River ESU

Rearing type	<u>Total Collection*</u>		Of Granite % Listed Fish	Total Listed Fish to Granite ^a	Granite	<u>FGE</u>			Project Survival	Listed fish to McNary ^b	Of Fish Collected at McNary		
	Granite	McNary				Goose	Low	Mon**			McNary	Listed Fish	% Listed Fish
Summer-run(First dam reached is McNary Dam)													
Wild									0.90	0.90	95,177	85,659	7.55
Listed Hatchery***													
AD-clipped									0.90	0.90	0	0	0.00
Non-AD-clipped									0.90	0.90	59,000	53,100	4.68
Winter-run(First dam reached is Bonneville Dam)													
Wild									0.90	0.90	0	0	0.00
Listed Hatchery***													
AD-clipped									0.90	0.90	0	0	0.00
Non-AD-clipped									0.90	0.90	0	0	0.00

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Hatchery steelhead and listed wild steelhead enter the Snake River above Lower Monumental Dam. We estimate that 27,000 wild fish and 43,000 (32,250 AD clipped and 10,750 Non AD clipped) listed hatchery fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2007. An additional 59,000 (all non-AD-clipped) listed Mid-Columbia hatchery summer steelhead will outmigrate from the Touchet and Walla Walla Rivers above McNary Dam.

***Note: Estimated values based on 2006 collection numbers (Fish Passage Center Weekly Reports), and on the number of adult returns from 1995-2006 (FPC Weekly Reports 1995-2006).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}}) / (\text{FGE}_{\text{Granite}})) \times (\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite}) \times (1 - \text{FGE}_{\text{Granite}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Goose}}) \times (\text{Project Survival}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{listed Tucannon fish}) \times (1 - \text{FGE}_{\text{Low Mon}}) \times (\text{Project Survival})^2 + (\text{Rock Island listed fish}) \times (\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 27,000 wild and 43,000 (32,250 AD clipped and 10,750 Non AD clipped) hatchery fish
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table B1.

Table 7a. Juvenile Chinook salmon collection at each of eight mainstem collection facilities in 2007 under a full transportation scenario.

	Full Transportation Scenario							
	Chinook salmon							
	Yearlings			Subyearlings				
Total fish collected at:*								
Lower Granite	4,842,623						572,874	
Little Goose	1,934,553						210,922	
Lower Monumental	888,959						122,184	
Ice Harbor**	529,773						61,856	
<u>Columbia River</u>								
Wells***	2,359,477						NA	
Rocky Reach***	2,978,485						NA	
Rock Island***	5,288,004						NA	
Wanapum***	4,759,204						NA	
Priest Rapids***	4,283,284						NA	
McNary****	5,856,966						19,876,972	
John Day** *****	5,168,242						3,019,534	
The Dalles** *****	3,654,160						1,617,608	
Bonneville (I & II combined)** *****	4,453,899						8,272,930	
---To the tailrace of Bonneville	11,134,748						27,576,433	
---To Tongue Point*****	29,322,491						98,816,133	
	Spring/Summer Chinook Hatchery			Fall Chinook - Yearlings Hatchery		Fall Chinook - Subyearlings Hatchery		
	Wild	Ad-clip	No Ad-clip	Ad-clip	No Ad-clip	Wild	Ad-clip	No Ad-clip
Total listed fish at:								
Lower Granite	711,313	1,179,615	136,965	112,140	141,510	19,727	187,094	366,053
Little Goose	298,453	474,245	53,416	43,735	55,189	7,263	68,885	134,774
Lower Monumental	106,211	129,873	111,443	123,097	150,873	1,453	93,777	26,955
Ice Harbor**	77,132	82,485	60,179	66,472	81,471	736	47,475	13,646
<u>Columbia River</u>								
Wells***	741,713	0	828,188	0	0	NA	NA	NA
Rocky Reach***	764,442	0	745,369	0	0	NA	NA	NA
Rock Island***	1,318,561	493,000	670,832	0	0	NA	NA	NA
Wanapum***	1,186,705	443,700	603,749	0	0	NA	NA	NA
Priest Rapids***	1,068,035	399,330	543,374	0	0	NA	NA	NA
McNary****	861,545	386,500	463,444	79,767	97,766	797	51,431	14,783
John Day** *****	581,543	260,888	312,825	53,843	65,992	113	7,270	2,090
The Dalles** *****	348,926	156,533	187,695	32,306	39,595	61	3,895	1,120
Bonneville (I & II combined)** *****	319,988	140,880	168,926	29,075	35,636	487,138	4,398,506	136,008
---To the tailrace of Bonneville	799,970	352,200	422,315	72,688	89,090	1,623,793	14,661,687	453,360
---To Tongue Point*****	3,328,244	2,103,339	724,139	351,660	436,662	23,591,781	37,412,874	1,212,925
Percent listed fish at:								
Lower Granite	14.69%	24.36%	2.83%	2.32%	2.92%	3.44%	32.66%	63.90%
Little Goose	15.43%	24.51%	2.76%	2.26%	2.85%	3.44%	32.66%	63.90%
Lower Monumental	11.95%	14.61%	12.54%	13.85%	16.97%	1.19%	76.75%	22.06%
Ice Harbor**	14.56%	15.57%	11.36%	12.55%	15.38%	1.19%	76.75%	22.06%
<u>Columbia River</u>								
Wells***	31.44%	0.00%	35.10%	0.00%	0.00%	NA	NA	NA
Rocky Reach***	25.67%	0.00%	25.03%	0.00%	0.00%	NA	NA	NA
Rock Island***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
Wanapum***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
Priest Rapids***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
McNary****	14.71%	6.60%	7.91%	1.36%	1.67%	0.00%	0.26%	0.07%
John Day** *****	11.25%	5.05%	6.05%	1.04%	1.28%	0.00%	0.24%	0.07%
The Dalles** *****	9.55%	4.28%	5.14%	0.88%	1.08%	0.00%	0.24%	0.07%
Bonneville (I & II combined)** *****	7.18%	3.16%	3.79%	0.65%	0.80%	5.89%	53.17%	1.64%
---To the tailrace of Bonneville	7.18%	3.16%	3.79%	0.65%	0.80%	5.89%	53.17%	1.64%
---To Tongue Point*****	11.35%	7.17%	2.47%	1.20%	1.49%	23.87%	37.86%	1.23%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

**** Note: (See next page)

***** Note: (See next page)

For example, If you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation scenario (above), 11.35% of them will be listed wild fish, or 114 fish. To these 114 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 114 x 0.1161 = 13; UCR, 114 x 0.0707 = 8; etc).

Yearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Spr/Sum	10.74	21.20	12.90
SR - Fall (Yrlg)	0.00	17.10	17.40
UCR	89.26	61.70	69.70
LCR - Spring	0.00	0.00	0.00
UWR	0.00	0.00	0.00

Subyearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Fall (Subyrlg)	100.00	100.00	100.00
LCR - Tule fall	0.00	0.00	0.00
LCR - Late run fall	0.00	0.00	0.00

***** Note: Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at 100% to Tongue Point.

The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:

Bonneville Dam Yearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Spr/Sum	10.54	21.20	12.90
SR - Fall (Yrlg)	0.00	17.10	17.40
UCR	87.60	61.70	69.70
LCR - Spring	1.86	0.00	0.00
UWR	0.00	0.00	0.00

Subyearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Fall (Subyrlg)	0.01	0.08	0.74
LCR - Tule fall	99.99	99.92	99.26
LCR - Late run fall	0.00	0.00	0.00

Tongue Point Yearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Spr/Sum	11.61	17.70	23.80
SR - Fall (Yrlg)	0.00	3.40	28.30
UCR	7.07	2.50	23.10
LCR - Spring	14.91	21.40	19.50
UWR	66.41	55.00	5.30

Subyearling Chinook salmon	Full Transportation		
	Wild	Ad-clip	Hatchery No Ad-clip
SR - Fall (Subyrlg)	0.12	1.10	45.01
LCR - Tule fall	77.67	98.90	54.99
LCR - Late run fall	22.21	0.00	0.00

SR - Spr/Sum = Snake River ESU - Spring/Summer Chinook salmon
 SR - Fall (Yrlg) = Snake River ESU - Yearling Fall Chinook salmon
 SR - Fall (Subyrlg) = Snake River ESU - Subyearling Fall Chinook salmon
 UCR = Upper Columbia River ESU
 LCR - Spring = Lower Columbia River ESU - Spring Chinook salmon
 UWR = Upper Willamette River ESU

LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon
 LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon

Table 7b. Juvenile Chinook salmon collection at each of eight mainstem collection facilities in 2007 under a transportation with spill scenario.

	Transportation with Spill Scenario							
	Chinook salmon							
	Yearlings			Subyearlings				
Total fish collected at:*								
Lower Granite	3,470,547			188,528				
Little Goose	2,057,822			196,418				
Lower Monumental	1,000,036			69,762				
Ice Harbor**	972,852			156,186				
<u>Columbia River</u>								
Wells***	2,359,477			NA				
Rocky Reach***	2,978,485			NA				
Rock Island***	5,288,004			NA				
Wanapum***	4,759,204			NA				
Priest Rapids***	4,283,284			NA				
McNary****	3,066,556			5,412,877				
John Day** *****	1,354,148			5,862,355				
The Dalles** *****	3,869,496			3,651,799				
Bonneville (I & II combined)** *****	2,044,989			8,183,998				
---To the tailrace of Bonneville	11,619,256			33,679,004				
---To Tongue Point*****	28,719,701			90,003,337				
	Spring/Summer Hatchery		Fall Chinook - Yearlings Hatchery			Fall Chinook - Subyearlings Hatchery		
	Wild	Ad-clip	No Ad-clip	Ad-clip	No Ad-clip	Wild	Ad-clip	No Ad-clip
Total listed fish at:								
Lower Granite	509,774	845,391	98,158	80,367	101,416	6,492	61,571	120,464
Little Goose	310,003	502,893	57,498	47,077	59,407	6,764	64,148	125,505
Lower Monumental	126,428	180,345	91,736	98,426	120,936	1,500	40,427	27,835
Ice Harbor**	132,740	178,196	85,811	92,069	113,125	3,358	90,509	62,318
<u>Columbia River</u>								
Wells***	741,713	0	828,188	0	0	NA	NA	NA
Rocky Reach***	764,442	0	745,369	0	0	NA	NA	NA
Rock Island***	1,318,561	493,000	670,832	0	0	NA	NA	NA
Wanapum***	1,186,705	443,700	603,749	0	0	NA	NA	NA
Priest Rapids***	1,068,035	399,330	543,374	0	0	NA	NA	NA
McNary****	445,571	240,648	237,217	53,031	65,160	991	26,700	18,384
John Day** *****	153,513	82,911	81,729	18,270	22,450	1,040	28,026	19,297
The Dalles** *****	375,950	203,047	200,153	44,743	54,980	648	17,458	12,021
Bonneville (I & II combined)** *****	151,496	80,407	79,261	17,718	21,772	395,009	3,572,677	118,113
---To the tailrace of Bonneville	860,773	456,858	450,347	100,670	123,705	1,625,551	14,702,374	486,062
---To Tongue Point*****	3,240,721	1,966,559	697,739	326,540	405,464	23,580,046	37,245,220	995,250
Percent listed fish at:								
Lower Granite	14.69%	24.36%	2.83%	2.32%	2.92%	3.44%	32.66%	63.90%
Little Goose	15.06%	24.44%	2.79%	2.29%	2.89%	3.44%	32.66%	63.90%
Lower Monumental	12.64%	18.03%	9.17%	9.84%	12.09%	2.15%	57.95%	39.90%
Ice Harbor**	13.64%	18.32%	8.82%	9.46%	11.63%	2.15%	57.95%	39.90%
<u>Columbia River</u>								
Wells***	31.44%	0.00%	35.10%	0.00%	0.00%	NA	NA	NA
Rocky Reach***	25.67%	0.00%	25.03%	0.00%	0.00%	NA	NA	NA
Rock Island***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
Wanapum***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
Priest Rapids***	24.93%	9.32%	12.69%	0.00%	0.00%	NA	NA	NA
McNary****	14.53%	7.85%	7.74%	1.73%	2.12%	0.02%	0.49%	0.34%
John Day** *****	11.34%	6.12%	6.04%	1.35%	1.66%	0.02%	0.48%	0.33%
The Dalles** *****	9.72%	5.25%	5.17%	1.16%	1.42%	0.02%	0.48%	0.33%
Bonneville (I & II combined)** *****	7.41%	3.93%	3.88%	0.87%	1.06%	4.83%	43.65%	1.44%
---To the tailrace of Bonneville	7.41%	3.93%	3.88%	0.87%	1.06%	4.83%	43.65%	1.44%
---To Tongue Point*****	11.28%	6.85%	2.43%	1.14%	1.41%	26.20%	41.38%	1.11%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
 ** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
 *** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.
 **** Note: (See next page)
 ***** Note: (See next page)

**** Note: The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:
For example, if you handle 1,000 yearling Chinook salmon at Tongue Point, under the Transportation with spill scenario (above),
 11.28% of them will be listed wild fish, or 113 fish. To these 113 fish, apply the percentages
 listed below under the Tongue Point section to determine how many are from each ESU
 (SR, $113 \times 0.1082 = 12$; UCR, $113 \times 0.0713 = 8$; etc).

Yearling Chinook salmon	Transportation with spill		
	Wild	Ad-clip	No Ad-clip
SR - Spr/Sum	17.16	34.90	16.30
SR - Fall (Yrlg)	0.00	18.10	21.50
UCR	82.84	47.00	62.10
LCR - Spring	0.00	0.00	0.00
UWR	0.00	0.00	0.00

Subyearling Chinook salmon	Hatchery		
	Wild	Ad-clip	No Ad-clip
SR - Fall (Subyrlg)	100.00	100.00	100.00
LCR - Tule fall	0.00	0.00	0.00
LCR - Late run fall	0.00	0.00	0.00

***** Note: Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at 100% to Tongue Point.
 The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:

Bonneville Dam Yearling Chinook salmon	Transportation with spill		
	Wild	Ad-clip	No Ad-clip
SR - Spr/Sum	16.86	34.90	16.30
SR - Fall (Yrlg)	0.00	18.10	21.50
UCR	81.41	47.00	62.10
LCR - Spring	1.73	0.00	0.00
UWR	0.00	0.00	0.00

Subyearling Chinook salmon	Hatchery		
	Wild	Ad-clip	No Ad-clip
SR - Fall (Subyrlg)	0.12	0.36	7.42
LCR - Tule fall	99.88	99.64	92.58
LCR - Late run fall	0.00	0.00	0.00

Tongue Point Yearling Chinook salmon	Transportation with spill		
	Wild	Ad-clip	No Ad-clip
SR - Spr/Sum	10.82	16.60	23.00
SR - Fall (Yrlg)	0.00	3.20	27.30
UCR	7.13	2.60	24.00
LCR - Spring	15.04	21.80	20.20
UWR	67.00	55.90	5.50

Subyearling Chinook salmon	Hatchery		
	Wild	Ad-clip	No Ad-clip
SR - Fall (Subyrlg)	0.08	0.66	32.98
LCR - Tule fall	77.71	99.34	67.02
LCR - Late run fall	22.22	0.00	0.00

SR - Spr/Sum = Snake River ESU - Spring/Summer Chinook salmon
 SR - Fall (Yrlg) = Snake River ESU - Yearling Fall Chinook salmon
 SR - Fall (Subyrlg) = Snake River ESU - Subyearling Fall Chinook salmon
 UCR = Upper Columbia River ESU
 LCR - Spring = Lower Columbia River ESU - Spring Chinook
 UWR = Upper Willamette River ESU

LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon
 LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon

Table 7c. Juvenile sockeye, coho, and chum salmon collection at each of eight mainstem collection facilities in 2007 under full transportation and transportation with spill scenarios.

	Full Transportation Scenario				Transportation with Spill Scenario					
	Sockeye salmon	Coho salmon			Chum salmon	Sockeye salmon	Coho salmon			Chum salmon
Total fish collected at:*										
Lower Granite	161,033	311,185			0	83,737	223,016			0
Little Goose	62,803	121,362			0	72,789	130,637			0
Lower Monumental	15,218	29,407			0	32,362	44,609			0
Ice Harbor**	8,218	15,880			0	27,915	41,728			0
<u>Columbia River</u>										
Wells***	NA	338,430			0	NA	338,430			0
Rocky Reach***	NA	304,587			0	NA	304,587			0
Rock Island***	NA	1,152,354			0	NA	1,152,354			0
Wanapum***	NA	1,037,119			0	NA	1,037,119			0
Priest Rapids***	NA	933,407			0	NA	933,407			0
McNary****	523,996	1,161,519			0	523,996	572,418			0
John Day** *****	1,092,501	1,684,025			0	222,142	417,716			0
The Dalles** *****	655,501	1,010,415			0	655,501	1,022,978			0
Bonneville (I & II combined)** *****	589,951	2,563,019			12,000	262,528	1,132,703			12,000
---To the tailrace of Bonneville	1,474,878	6,407,548			30,000	1,474,876	6,435,813			30,000
---To Tongue Point*****	1,713,932	17,818,692			1,452,982	1,663,764	16,883,265			1,452,982
		Coho salmon					Coho salmon			
Total listed fish at:	Sockeye salmon	Wild	Hatchery		Chum salmon	Sockeye salmon	Wild	Hatchery		Chum salmon
			Ad-clip	No Ad-clip				Ad-clip	No Ad-clip	
Lower Granite	55,975	0	0	0	0	29,107	0	0	0	0
Little Goose	21,830	0	0	0	0	25,302	0	0	0	0
Lower Monumental	5,290	0	0	0	0	11,249	0	0	0	0
Ice Harbor**	2,857	0	0	0	0	9,703	0	0	0	0
<u>Columbia River</u>										
Wells***	NA	0	0	0	0	NA	0	0	0	0
Rocky Reach***	NA	0	0	0	0	NA	0	0	0	0
Rock Island***	NA	0	0	0	0	NA	0	0	0	0
Wanapum***	NA	0	0	0	0	NA	0	0	0	0
Priest Rapids***	NA	0	0	0	0	NA	0	0	0	0
McNary****	3,428	0	0	0	0	3,770	0	0	0	0
John Day** *****	2,314	0	0	0	0	1,598	0	0	0	0
The Dalles** *****	1,388	0	0	0	0	4,715	0	0	0	0
Bonneville (I & II combined)** *****	1,249	37,646	0	0	12,000	1,888	16,564	0	0	12,000
---To the tailrace of Bonneville	3,123	94,115	0	0	30,000	10,607	94,114	0	0	30,000
---To Tongue Point*****	89,646	1,199,305	8,944,000	3,835,000	1,452,982	76,265	1,199,304	8,944,000	3,835,000	1,452,982
Percent listed fish at:										
Lower Granite	34.76%	0.00%	0.00%	0.00%	---	34.76%	0.00%	0.00%	0.00%	---
Little Goose	34.76%	0.00%	0.00%	0.00%	---	34.76%	0.00%	0.00%	0.00%	---
Lower Monumental	34.76%	0.00%	0.00%	0.00%	---	34.76%	0.00%	0.00%	0.00%	---
Ice Harbor**	34.77%	0.00%	0.00%	0.00%	---	34.76%	0.00%	0.00%	0.00%	---
<u>Columbia River</u>										
Wells***	NA	0.00%	0.00%	0.00%	---	NA	0.00%	0.00%	0.00%	---
Rocky Reach***	NA	0.00%	0.00%	0.00%	---	NA	0.00%	0.00%	0.00%	---
Rock Island***	NA	0.00%	0.00%	0.00%	---	NA	0.00%	0.00%	0.00%	---
Wanapum***	NA	0.00%	0.00%	0.00%	---	NA	0.00%	0.00%	0.00%	---
Priest Rapids***	NA	0.00%	0.00%	0.00%	---	NA	0.00%	0.00%	0.00%	---
McNary****	0.65%	0.00%	0.00%	0.00%	---	0.72%	0.00%	0.00%	0.00%	---
John Day** *****	0.21%	0.00%	0.00%	0.00%	---	0.72%	0.00%	0.00%	0.00%	---
The Dalles** *****	0.21%	0.00%	0.00%	0.00%	---	0.72%	0.00%	0.00%	0.00%	---
Bonneville (I & II combined)** *****	0.21%	1.47%	0.00%	0.00%	---	0.72%	1.46%	0.00%	0.00%	---
---To the tailrace of Bonneville	0.21%	1.47%	0.00%	0.00%	100.00%	0.72%	1.46%	0.00%	0.00%	100.00%
---To Tongue Point*****	5.23%	6.73%	50.19%	21.52%	100.00%	4.58%	7.10%	52.98%	22.71%	100.00%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
 ** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
 *** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

Table 8a. Juvenile salmon collection at each of the mainstem collection facilities in 2007 under a full transportation scenario. Percentage of listed fish at each facility.

****Use this table only if the reartype and/or clip/no-clip status of all handled fish is known****

	Full Transportation Scenario										
	Yearling Chinook salmon					Coho salmon			Subyearling Chinook salmon		
	Unclipped		Clipped			Unclipped		Clipped	Unclipped	Clipped	
Total fish collected at:											
Lower Granite	1,023,405		3,819,218			266,113		45,072	385,780	187,094	
Little Goose	420,169		1,514,384			86,487		14,648	142,037	68,885	
Lower Monumental	371,703		517,256			17,464		2,958	28,407	93,777	
Ice Harbor**	220,498		309,275			7,859		1,331	14,381	47,475	
<u>Columbia River</u>											
Wells***	1,569,901		789,576			338,430		0	NA	NA	
Rocky Reach***	1,509,811		1,468,674			304,587		0	NA	NA	
Rock Island***	1,989,393		3,298,611			1,152,354		0	NA	NA	
Wanapum***	1,790,454		2,968,750			1,037,119		0	NA	NA	
Priest Rapids***	1,611,409		2,671,875			933,407		0	NA	NA	
McNary****	2,903,963		2,953,002			698,642		450,438	18,929,366	947,606	
John Day** ****	2,643,965		2,524,276			1,326,583		349,046	2,675,593	343,940	
The Dalles** ****	1,757,094		1,897,066			795,950		209,428	1,433,353	184,254	
Bonneville (I & II combined)** *****	1,587,340		2,866,559			1,946,001		612,485	2,984,600	5,288,329	
---To the tailrace of Bonneville	3,968,350		7,166,398			4,865,003		1,531,213	9,948,667	17,627,763	
---To Tongue Point*****	10,439,005		24,633,713			10,873,899		11,888,329	57,386,005	41,430,125	
	Spring/Summer Chinook Hatchery		Fall Chinook Hatchery		Spring/Summer Chinook Hatchery		Fall Chinook Hatchery	Coho salmon Hatchery		Coho salmon Hatchery	
	Wild	No Ad-clip	No Ad-clip	Ad-clip	Ad-clip	Wild	No Ad-clip	Ad-clip	Wild	No Ad-clip	
Total listed fish at:											
Lower Granite	711,313	136,965	141,510	1,179,615	112,140	0	0	0	19,727	366,053	
Little Goose	298,453	53,416	55,189	474,245	43,735	0	0	0	7,263	134,774	
Lower Monumental	106,211	111,443	150,873	129,873	123,097	0	0	0	1,453	26,955	
Ice Harbor**	77,132	60,179	81,471	82,485	66,472	0	0	0	736	13,646	
<u>Columbia River</u>											
Wells***	741,713	828,188	0	0	0	0	0	0	NA	NA	
Rocky Reach***	764,442	745,369	0	0	0	0	0	0	NA	NA	
Rock Island***	1,318,561	670,832	0	493,000	0	0	0	0	NA	NA	
Wanapum***	1,186,705	603,749	0	443,700	0	0	0	0	NA	NA	
Priest Rapids***	1,068,035	543,374	0	399,330	0	0	0	0	NA	NA	
McNary****	861,545	463,444	97,766	386,500	79,767	0	0	0	797	14,783	
John Day** ****	581,543	312,825	65,992	260,888	53,843	0	0	0	113	2,090	
The Dalles** ****	348,926	187,695	39,595	156,533	32,306	0	0	0	61	1,120	
Bonneville (I & II combined)** *****	319,988	168,926	35,636	140,880	29,075	37,646	0	0	487,138	136,008	
---To the tailrace of Bonneville	799,970	422,315	89,090	352,200	72,688	94,115	0	0	1,623,793	453,360	
---To Tongue Point*****	3,328,244	724,139	436,662	2,103,339	351,660	1,199,305	3,835,000	8,944,000	23,591,781	1,212,925	
Percent listed fish at:											
Lower Granite	69.50%	13.38%	13.83%	30.886%	2.936%	0.00%	0.00%	0.00%	5.11%	94.89%	
Little Goose	71.03%	12.71%	13.13%	31.316%	2.888%	0.00%	0.00%	0.00%	5.11%	94.89%	
Lower Monumental	28.57%	29.98%	40.59%	25.108%	23.798%	0.00%	0.00%	0.00%	5.11%	94.89%	
Ice Harbor**	34.98%	27.29%	36.95%	26.670%	21.493%	0.00%	0.00%	0.00%	5.12%	94.89%	
<u>Columbia River</u>											
Wells***	47.25%	52.75%	0.00%	0.00%	0.00%	NA	NA	NA	NA	NA	
Rocky Reach***	50.63%	49.37%	0.00%	0.00%	0.00%	NA	NA	NA	NA	NA	
Rock Island***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	
Wanapum***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	
Priest Rapids***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	
McNary****	29.67%	15.96%	3.37%	13.09%	2.70%	0.00%	0.00%	0.00%	0.00%	0.08%	
John Day** ****	22.00%	11.83%	2.50%	10.34%	2.13%	0.00%	0.00%	0.00%	0.00%	0.08%	
The Dalles** ****	19.86%	10.68%	2.25%	8.25%	1.70%	0.00%	0.00%	0.00%	0.00%	0.08%	
Bonneville (I & II combined)** *****	20.16%	10.64%	2.25%	4.91%	1.01%	1.93%	0.00%	0.00%	16.32%	4.56%	
---To the tailrace of Bonneville	20.16%	10.64%	2.25%	4.91%	1.01%	1.93%	0.00%	0.00%	16.32%	4.56%	
---To Tongue Point*****	31.88%	6.94%	4.18%	8.54%	1.43%	11.03%	35.27%	75.23%	41.11%	2.11%	

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

**** Note: (See next page)

***** Note: (See next page)

**** Note: The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:
For example, if you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation scenario (above),
 31.88% of them will be listed wild fish, or 319 fish. To these 319 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 319 x 0.1161 = 37; UCR, 319 x 0.0707 = 23; etc).

Spring/Summer Chinook salmon	Full Transportation		
	Wild	Hatchery	
		Ad-clip	No Ad-clip
SR	10.74	21.20	12.90
UCR	89.26	61.70	69.70
LCR - Spring	0.00	0.00	0.00
UWR	0.00	0.00	0.00

Fall			
Chinook salmon			
	Wild	Ad-clip	No Ad-clip
SR	100.00	100.00	100.00
LCR - Tule fall	0.00	0.00	0.00
LCR - Late run fall	0.00	0.00	0.00

***** Note: Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at 100% to Tongue Point.
 The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:

Bonneville Dam Spring/Summer Chinook salmon	Full Transportation		
	Wild	Hatchery	
		Ad-clip	No Ad-clip
SR	10.54	21.20	12.90
UCR	87.60	61.70	69.70
LCR - Spring	1.86	0.00	0.00
UWR	0.00	0.00	0.00

Fall			
Chinook salmon			
	Wild	Ad-clip	No Ad-clip
SR	0.01	0.08	0.74
LCR - Tule fall	99.99	99.92	99.26
LCR - Late run fall	0.00	0.00	0.00

Tongue Point Spring/Summer Chinook salmon	Full Transportation		
	Wild	Hatchery	
		Ad-clip	No Ad-clip
SR	11.61	17.70	23.80
UCR	7.07	2.50	23.10
LCR - Spring	14.91	21.40	19.50
UWR	66.41	55.00	5.30

Fall			
Chinook salmon			
	Wild	Ad-clip	No Ad-clip
SR	0.12	1.10	45.01
LCR - Tule fall	77.67	98.90	54.99
LCR - Late run fall	22.21	0.00	0.00

SR = Snake River ESU
 UCR = Upper Columbia River ESU
 LCR - Spring = Lower Columbia River ESU - Spring Chinook
 UWR = Upper Willamette River ESU

LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon
 LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon

Table 8b. Juvenile salmon collection at each of the mainstem collection facilities in 2007 under a transportation with spill scenario. Percentage of listed fish at each facility.

****Use this table only if the reartype and/or clip/no-clip status of all handled fish is known****

	Transportation with Spill Scenario															
	Yearling Chinook salmon					Coho salmon				Subyearling Chinook salmon						
	Unclipped		Clipped			Unclipped		Clipped		Unclipped	Clipped					
Total fish collected at:*																
Lower Granite	733,441		2,737,106			190,714		32,302		126,957	61,571					
Little Goose	441,021		1,616,801			93,096		15,768		132,270	64,148					
Lower Monumental	343,920		656,116			26,492		4,487		29,335	40,427					
Ice Harbor**	336,184		636,668			20,651		3,498		65,676	90,509					
<u>Columbia River</u>																
Wells***	1,569,901		789,576			342,780		0		NA	NA					
Rocky Reach***	1,509,811		1,468,674			308,502		0		NA	NA					
Rock Island***	1,989,393		3,298,611			1,155,878		0		NA	NA					
Wanapum***	1,790,454		2,968,750			1,040,290		0		NA	NA					
Priest Rapids***	1,611,409		2,671,875			936,261		0		NA	NA					
McNary****	1,460,537		1,606,020			340,755		216,959		5,154,826	258,051					
John Day** *****	670,729		683,419			326,876		85,774		5,410,885	451,469					
The Dalles** *****	1,813,317		2,056,179			800,513		210,059		3,370,568	281,231					
Bonneville (I & II combined)** *****	720,694		1,324,295			858,047		269,743		3,829,756	4,354,242					
---To the tailrace of Bonneville	4,094,852		7,524,403			4,875,267		1,532,631		15,760,313	17,918,691					
---To Tongue Point*****	8,871,525		22,869,881			10,466,514		11,646,147		49,155,449	40,847,888					
	Spring/Summer Chinook		Fall Chinook		Spring/Summer Chinook		Fall Chinook		Coho salmon		Coho salmon		Fall Chinook		Fall Chinook	
	Wild	Hatchery	Hatchery	Hatchery	Hatchery	Hatchery	Wild	Hatchery	Hatchery	Hatchery	Wild	Hatchery	Hatchery	Hatchery	Hatchery	Hatchery
	No Ad-clip	No Ad-clip	No Ad-clip	Ad-clip	Ad-clip	Ad-clip	No Ad-clip	No Ad-clip	Ad-clip	Ad-clip	No Ad-clip	No Ad-clip	No Ad-clip	No Ad-clip	No Ad-clip	No Ad-clip
Total listed fish at:																
Lower Granite	509,774	98,158	101,416	845,391	80,367	0	0	0	0	0	6,492	120,464	61,571			
Little Goose	310,003	57,498	59,407	502,893	47,077	0	0	0	0	0	6,764	125,505	64,148			
Lower Monumental	126,428	91,736	120,936	180,345	98,426	0	0	0	0	0	1,500	27,835	40,427			
Ice Harbor**	132,740	85,811	113,125	178,196	92,069	0	0	0	0	0	3,358	62,318	90,509			
<u>Columbia River</u>																
Wells***	741,713	828,188	0	0	0	0	0	0	0	0	NA	NA	NA			
Rocky Reach***	764,442	745,369	0	0	0	0	0	0	0	0	NA	NA	NA			
Rock Island***	1,318,561	670,832	0	493,000	0	0	0	0	0	0	NA	NA	NA			
Wanapum***	1,186,705	603,749	0	443,700	0	0	0	0	0	0	NA	NA	NA			
Priest Rapids***	1,068,035	543,374	0	399,330	0	0	0	0	0	0	NA	NA	NA			
McNary****	445,571	237,217	65,160	240,648	53,031	0	0	0	0	0	991	18,384	26,700			
John Day** *****	153,513	81,729	22,450	82,911	18,270	0	0	0	0	0	1,040	19,297	28,026			
The Dalles** *****	375,950	200,153	54,980	203,047	44,743	0	0	0	0	0	648	12,021	17,458			
Bonneville (I & II combined)** *****	151,496	79,261	21,772	80,407	17,718	16,564	0	0	0	0	395,009	118,113	3,572,677			
---To the tailrace of Bonneville	860,773	450,347	123,705	456,858	100,670	94,114	0	0	0	0	1,625,551	486,062	14,702,374			
---To Tongue Point*****	3,240,721	697,739	405,464	1,966,559	326,540	1,199,304	3,835,000	8,944,000	0	0	23,580,046	995,250	37,245,220			
Percent listed fish at:																
Lower Granite	69.50%	13.38%	13.83%	30.89%	2.94%	0.00%	0.00%	0.00%	0.00%	0.00%	5.11%	94.89%	100.00%			
Little Goose	70.29%	13.04%	13.47%	31.10%	2.91%	0.00%	0.00%	0.00%	0.00%	0.00%	5.11%	94.89%	100.00%			
Lower Monumental	36.76%	26.67%	35.16%	27.49%	15.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.11%	94.89%	100.00%			
Ice Harbor**	39.48%	25.53%	33.65%	27.99%	14.46%	0.00%	0.00%	0.00%	0.00%	0.00%	5.11%	94.89%	100.00%			
<u>Columbia River</u>																
Wells***	47.25%	52.75%	0.00%	0.00%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA			
Rocky Reach***	50.63%	49.37%	0.00%	0.00%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA			
Rock Island***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA			
Wanapum***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA			
Priest Rapids***	66.28%	33.72%	0.00%	14.95%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA			
McNary****	30.51%	16.24%	4.46%	14.98%	3.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.36%	10.35%			
John Day** *****	22.89%	12.19%	3.35%	12.13%	2.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.36%	6.21%			
The Dalles** *****	20.73%	11.04%	3.03%	9.87%	2.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.36%	6.21%			
Bonneville (I & II combined)** *****	21.02%	11.00%	3.02%	6.07%	1.34%	1.93%	0.00%	0.00%	0.00%	0.00%	10.31%	3.08%	82.05%			
---To the tailrace of Bonneville	21.02%	11.00%	3.02%	6.07%	1.34%	1.93%	0.00%	0.00%	0.00%	0.00%	10.31%	3.08%	82.05%			
---To Tongue Point*****	36.53%	7.86%	4.57%	8.60%	1.43%	11.46%	36.64%	76.80%	0.00%	0.00%	47.97%	2.02%	91.18%			

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
 ** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
 *** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.
 **** Note: (See next page)
 ***** Note: (See next page)

**** Note: The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:
For example, if you handle 1,000 yearling Chinook salmon at Tongue Point, under the Transportation with spill scenario (above),
 36.57% of them will be listed wild fish, or 366 fish. To these 366 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 366 x 0.1082 = 40; UCR, 366 x 0.0713 = 26; etc).

Spring/Summer Chinook salmon	Transportation with spill Hatchery		
	Wild	Ad-clip	No Ad-clip
SR	17.16	34.90	16.30
UCR	82.84	47.00	62.10
LCR - Spring	0.00	0.00	0.00
UWR	0.00	0.00	0.00

Fall Chinook salmon	Wild	Ad-clip	No Ad-clip
SR	100.00	100.00	100.00
LCR - Tule fall	0.00	0.00	0.00
LCR - Late run fall	0.00	0.00	0.00

***** Note: Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at 100% to Tongue Point.
 The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:

Bonneville Dam Spring/Summer Chinook salmon	Transportation with spill Hatchery		
	Wild	Ad-clip	No Ad-clip
SR	16.86	34.90	16.30
UCR	81.41	47.00	62.10
LCR - Spring	1.73	0.00	0.00
UWR	0.00	0.00	0.00

Fall Chinook salmon	Wild	Ad-clip	No Ad-clip
SR	0.12	0.36	7.42
LCR - Tule fall	99.88	99.64	92.58
LCR - Late run fall	0.00	0.00	0.00

Tongue Point Spring/Summer Chinook salmon	Transportation with spill Hatchery		
	Wild	Ad-clip	No Ad-clip
SR	10.82	16.60	23.00
UCR	7.13	2.60	24.00
LCR - Spring	15.04	21.80	20.20
UWR	67.00	55.90	5.50

Fall Chinook salmon	Wild	Ad-clip	No Ad-clip
SR	0.08	0.66	32.98
LCR - Tule fall	77.71	99.34	67.02
LCR - Late run fall	22.22	0.00	0.00

SR = Snake River ESU
 UCR = Upper Columbia River ESU
 LCR - Spring = Lower Columbia River ESU - Spring Chinook
 UWR = Upper Willamette River ESU

LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon
 LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon

Table 9. Juvenile steelhead trout collection at each of the mainstem collection facilities in 2007 under full transportation and transportation with spill scenarios.

	Full Transportation Scenario			Transportation with Spill Scenario		
	Steelhead trout			Steelhead trout		
Total fish collected at:*						
<u>Snake River</u>						
Lower Granite	5,865,343			3,533,869		
Little Goose	1,214,040			1,996,040		
Lower Monumental	212,850			732,615		
Ice Harbor**	110,682			527,507		
<u>Columbia River</u>						
Wells***	715,960			715,960		
Rocky Reach***	682,659			682,659		
Rock Island***	1,091,287			1,091,287		
Wanapum***	982,158			982,158		
Priest Rapids***	883,942			883,942		
McNary****	1,525,403			458,626		
John Day** ****	1,332,462			597,677		
The Dalles** ****	1,300,157			1,502,451		
Bonneville (I & II combined)** *****	1,461,937			574,217		
---To the tailrace of Bonneville	2,658,067			3,022,195		
---To Tongue Point****	14,550,775			13,922,277		
Total listed fish at:						
<u>Snake River</u>						
	Wild	Hatchery Ad-clip	No Ad-clip	Wild	Hatchery Ad-clip	No Ad-clip
Lower Granite	643,854	1,874,524	484,186	387,922	1,129,401	291,722
Little Goose	134,808	391,139	98,048	219,718	639,163	163,935
Lower Monumental	43,766	59,112	13,361	92,724	228,030	58,108
Ice Harbor**	29,217	31,490	4,856	73,754	164,038	39,856
<u>Columbia River</u>						
Wells***	185,130	470,566	53,031	185,130	470,566	53,031
Rocky Reach***	204,912	423,509	47,728	204,912	423,509	47,728
Rock Island***	237,250	655,328	192,850	237,250	655,328	192,850
Wanapum***	213,525	589,795	173,565	213,525	589,795	173,565
Priest Rapids***	192,173	530,816	156,209	192,173	530,816	156,209
McNary****	272,873	475,591	247,670	74,538	143,686	66,293
John Day** ****	350,691	437,914	173,369	139,469	195,261	72,510
The Dalles** ****	588,018	362,516	111,452	609,665	426,935	128,463
Bonneville (I & II combined)** *****	618,282	358,891	110,337	220,992	146,012	43,934
---To the tailrace of Bonneville	1,124,149	652,529	200,613	1,163,116	768,484	231,232
---To Tongue Point****	2,697,748	2,952,280	796,208	2,625,944	2,752,873	744,997
Percent listed fish at:						
<u>Snake River</u>						
Lower Granite	10.98%	31.96%	8.26%	10.98%	31.96%	8.26%
Little Goose	11.10%	32.22%	8.08%	11.01%	32.02%	8.21%
Lower Monumental	20.56%	27.77%	6.28%	12.66%	31.13%	7.93%
Ice Harbor**	26.40%	28.45%	4.39%	13.98%	31.10%	7.56%
<u>Columbia River</u>						
Wells***	25.86%	65.73%	7.41%	25.86%	65.73%	7.41%
Rocky Reach***	30.02%	62.04%	6.99%	30.02%	62.04%	6.99%
Rock Island***	21.74%	60.05%	17.67%	21.74%	60.05%	17.67%
Wanapum***	21.74%	60.05%	17.67%	21.74%	60.05%	17.67%
Priest Rapids***	21.74%	60.05%	17.67%	21.74%	60.05%	17.67%
McNary****	17.89%	31.18%	16.24%	16.25%	31.33%	14.46%
John Day** ****	26.32%	32.87%	13.01%	23.34%	32.67%	12.13%
The Dalles** ****	45.23%	27.88%	8.57%	40.58%	28.42%	8.55%
Bonneville (I & II combined)** *****	42.29%	24.55%	7.55%	38.49%	25.43%	7.65%
---To the tailrace of Bonneville	42.29%	24.55%	7.55%	38.49%	25.43%	7.65%
---To Tongue Point****	18.54%	20.29%	5.47%	18.86%	19.77%	5.35%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established at this time. Also, there is no transportation from these dams.

**** Note: (See next page)

**** Note: The percentage of listed wild and hatchery fish from each ESU at each Columbia River dam from McNary Dam to Bonneville Dam and at Tongue Point.

For example, If you handle 1,000 steelhead at Tongue Point, under the Full Transportation with spill scenario (above), 18.51% of them will be listed wild fish, or 185 fish. To these 185 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 185 x 0.3186 = 59; UCR, 185 x 0.0480 = 9; etc).

Dam	Full Transportation			Transportation with spill		
	Wild	AD-clipped	No AD-clip	Wild	AD-clipped	No AD-clip
McNary Dam						
SR	11.56	7.15	2.12	24.82	28.63	15.08
UCR	57.04	92.85	76.44	48.50	71.37	66.32
MCR - Summer	31.39	0.00	21.44	26.69	0.00	18.60
MCR - Winter	---	---	---	---	---	---
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
John Day Dam						
SR	6.60	5.44	2.12	15.14	23.05	15.08
UCR	32.55	70.59	76.44	29.58	57.44	66.32
MCR - Summer	60.85	23.98	21.44	55.29	19.51	18.60
MCR - Winter	---	0.00	0.00	---	0.00	0.00
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
The Dalles Dam						
SR	2.62	4.22	2.12	6.37	18.67	15.08
UCR	12.94	54.81	76.44	12.44	46.54	66.32
MCR - Summer	84.44	40.96	21.44	81.20	34.78	18.60
MCR - Winter	---	0.00	0.00	---	0.00	0.00
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
Bonneville Dam						
SR	2.46	3.92	2.12	5.98	17.53	15.08
UCR	12.12	50.91	76.44	11.68	43.70	66.32
MCR - Summer	79.11	38.05	21.44	76.25	32.66	18.60
MCR - Winter	1.59	0.00	0.00	1.53	0.00	0.00
LCR - Summer	2.09	0.00	0.00	2.01	0.00	0.00
LCR - Winter	2.64	7.12	0.00	2.54	6.11	0.00
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
Tongue Point						
SR	31.86	60.29	75.50	30.06	58.21	73.88
UCR	4.80	9.13	19.13	4.93	9.61	20.40
MCR - Summer	31.36	6.83	5.37	32.19	7.18	5.72
MCR - Winter	0.63	0.00	0.00	0.65	0.00	0.00
LCR - Summer	2.42	0.00	0.00	2.48	0.00	0.00
LCR - Winter	20.52	23.75	0.00	21.06	24.99	0.00
UWR - Summer	---	0.00	0.00	---	0.00	0.00
UWR - Winter	8.41	0.00	0.00	8.63	0.00	0.00

SR = Snake River ESU
 UCR = Upper Columbia River ESU
 MCR - Summer = Mid Columbia River ESU summer steelhead
 MCR - Winter = Mid Columbia River ESU winter steelhead
 LCR - Summer = Lower Columbia River ESU summer steelhead
 LCR - Winter = Lower Columbia River ESU winter steelhead
 UWR - Summer = Upper Willamette River ESU summer steelhead
 UWR - Winter = Upper Willamette River ESU winter steelhead

Table 10. Juvenile steelhead trout collection at each of the mainstem collection facilities in 2007 under full transportation and transportation with spill scenarios. Percentage of listed fish by rearing type (wild or hatchery) at each facility.

****Use this table only if the reartype and/or clip/no-clip status of all handled fish is known****

	Full Transportation Scenario Steelhead trout			Transportation with Spill Scenario Steelhead trout		
	Unclipped	Clipped		Unclipped	Clipped	
Total fish collected at:*						
<i>Snake River</i>						
Lower Granite	1,405,034	4,460,309		846,533	2,687,336	
Little Goose	288,947	914,761		477,436	1,514,652	
Lower Monumental	99,122	99,647		210,288	514,837	
Ice Harbor**	49,337	46,223		154,390	360,755	
<i>Columbia River</i>						
Wells***	238,161	477,799		238,161	477,799	
Rocky Reach***	252,640	430,019		252,640	430,019	
Rock Island***	430,100	661,187		430,100	661,187	
Wanapum***	387,090	595,068		387,090	595,068	
Priest Rapids***	348,381	535,561		348,381	535,561	
McNary****	651,336	857,105		177,602	277,924	
John Day** ****	615,615	704,974		252,198	342,088	
The Dalles** ****	758,327	534,198		809,381	687,061	
Bonneville (I & II combined)** *****	786,888	667,493		289,295	282,868	
---To the tailrace of Bonneville	1,430,705	1,213,624		1,522,605	1,488,779	
---To Tongue Point*****	4,043,451	10,493,585		3,887,798	10,023,667	
Total listed fish at:						
<i>Snake River</i>						
	Wild	Hatchery No Ad-clip	Hatchery Ad-clip	Wild	Hatchery No Ad-clip	Hatchery Ad-clip
Lower Granite	643,854	484,186	1,874,524	387,922	291,722	1,129,401
Little Goose	134,808	98,048	391,139	219,718	163,935	639,163
Lower Monumental	43,766	13,361	59,112	92,724	58,108	228,030
Ice Harbor**	29,217	4,856	31,490	73,754	39,856	164,038
<i>Columbia River</i>						
Wells***	185,130	53,031	470,566	185,130	53,031	470,566
Rocky Reach***	204,912	47,728	423,509	204,912	47,728	423,509
Rock Island***	237,250	192,850	655,328	237,250	192,850	655,328
Wanapum***	213,525	173,565	589,795	213,525	173,565	589,795
Priest Rapids***	192,173	156,209	530,816	192,173	156,209	530,816
McNary****	272,873	247,670	475,591	74,538	66,293	143,686
John Day** ****	350,691	173,369	437,914	139,469	72,510	195,261
The Dalles** ****	588,018	111,452	362,516	609,665	128,463	426,935
Bonneville (I & II combined)** *****	618,282	110,337	358,891	220,992	43,934	146,012
---To the tailrace of Bonneville	1,124,149	200,613	652,529	1,163,116	231,232	768,484
---To Tongue Point*****	2,697,748	796,208	2,952,280	2,625,944	744,997	2,752,873
Percent listed fish at:						
<i>Snake River</i>						
Lower Granite	45.82%	34.46%	42.03%	45.82%	34.46%	42.03%
Little Goose	46.65%	33.93%	42.76%	46.02%	34.34%	42.20%
Lower Monumental	44.15%	13.48%	59.32%	44.09%	27.63%	44.29%
Ice Harbor**	59.22%	9.84%	68.13%	47.77%	25.82%	45.47%
<i>Columbia River</i>						
Wells***	77.73%	22.27%	98.49%	77.73%	22.27%	98.49%
Rocky Reach***	81.11%	18.89%	98.49%	81.11%	18.89%	98.49%
Rock Island***	55.16%	44.84%	99.11%	55.16%	44.84%	99.11%
Wanapum***	55.16%	44.84%	99.11%	55.16%	44.84%	99.11%
Priest Rapids***	55.16%	44.84%	99.11%	55.16%	44.84%	99.11%
McNary****	41.89%	38.03%	55.49%	41.97%	37.33%	51.70%
John Day** ****	56.97%	28.16%	62.12%	55.30%	28.75%	57.08%
The Dalles** ****	77.54%	14.70%	67.86%	75.32%	15.87%	62.14%
Bonneville (I & II combined)** *****	78.57%	14.02%	53.77%	76.39%	15.19%	51.62%
---To the tailrace of Bonneville	78.57%	14.02%	53.77%	76.39%	15.19%	51.62%
---To Tongue Point****	66.72%	19.69%	28.13%	67.54%	19.16%	27.46%

* Note: "Total fish collected at:" is the total number of fish collected of that species, run and rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

**** Note: (See next page)

**** Note: The percentage of listed wild and hatchery fish from each ESU at each Columbia River dam from McNary Dam to Bonneville Dam and at Tongue Point.

For example, If you handle 1,000 steelhead at Tongue Point, under the Full Transportation with spill scenario (above), 64.50% of them will be listed wild fish, or 645 fish. To these 645 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 645 x 0.3186 = 206; UCR, 645 x 0.0480 = 31; etc).

Dam	Full Transportation			Transportation with spill		
	Wild	AD-clipped	No AD-clip	Wild	AD-clipped	No AD-clip
McNary Dam						
SR	11.56	7.15	2.12	24.82	28.63	15.08
UCR	57.04	92.85	76.44	48.50	71.37	66.32
MCR - Summer	31.39	0.00	21.44	26.69	0.00	18.60
MCR - Winter	---	---	---	---	---	---
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
John Day Dam						
SR	6.60	5.44	2.12	15.14	23.05	15.08
UCR	32.55	70.59	76.44	29.58	57.44	66.32
MCR - Summer	60.85	23.98	21.44	55.29	19.51	18.60
MCR - Winter	---	0.00	0.00	---	0.00	0.00
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
The Dalles Dam						
SR	2.62	4.22	2.12	6.37	18.67	15.08
UCR	12.94	54.81	76.44	12.44	46.54	66.32
MCR - Summer	84.44	40.96	21.44	81.20	34.78	18.60
MCR - Winter	---	0.00	0.00	---	0.00	0.00
LCR - Summer	---	---	---	---	---	---
LCR - Winter	---	---	---	---	---	---
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
Bonneville Dam						
SR	2.46	3.92	2.12	5.98	17.53	15.08
UCR	12.12	50.91	76.44	11.68	43.70	66.32
MCR - Summer	79.11	38.05	21.44	76.25	32.66	18.60
MCR - Winter	1.59	0.00	0.00	1.53	0.00	0.00
LCR - Summer	2.09	0.00	0.00	2.01	0.00	0.00
LCR - Winter	2.64	7.12	0.00	2.54	6.11	0.00
UWR - Summer	---	---	---	---	---	---
UWR - Winter	---	---	---	---	---	---
Tongue Point						
SR	31.86	60.29	75.50	30.06	58.21	73.88
UCR	4.80	9.13	19.13	4.93	9.61	20.40
MCR - Summer	31.36	6.83	5.37	32.19	7.18	5.72
MCR - Winter	0.63	0.00	0.00	0.65	0.00	0.00
LCR - Summer	2.42	0.00	0.00	2.48	0.00	0.00
LCR - Winter	20.52	23.75	0.00	21.06	24.99	0.00
UWR - Summer	---	0.00	0.00	---	0.00	0.00
UWR - Winter	8.41	0.00	0.00	8.63	0.00	0.00

SR = Snake River ESU
 UCR = Upper Columbia River ESU
 MCR - Summer = Mid Columbia River ESU summer steelhead
 MCR - Winter = Mid Columbia River ESU winter steelhead
 LCR - Summer = Lower Columbia River ESU summer steelhead
 LCR - Winter = Lower Columbia River ESU winter steelhead
 UWR - Summer = Upper Willamette River ESU summer steelhead
 UWR - Winter = Upper Willamette River ESU winter steelhead

Table 11. Estimated number of listed fish outmigrating from each ESU, 2007.

ESU	Run	Number of listed fish		
		Wild	AD-clipped	Hatchery ^e Non-AD-clipped
<u>Snake River</u>				
Chinook	Spring/summer	1,185,522	3,833,600	617,400
	Fall			
	- subyearlings	35,869	890,000	1,350,000
	- yearlings		435,000	540,000
Steelhead	Summer	831,817	3,192,250	807,750
Sockeye		4,195	89,096	0
<u>Upper Columbia</u>				
Chinook	Spring	1,469,176	493,000	1,051,000
Steelhead	Summer	276,254	846,650	219,000
<u>Mid-Columbia</u>				
Steelhead	Summer	1,048,439	312,000	59,000
	Winter	16,557	0	0
<u>Lower Columbia</u>				
Chinook	Spring	1,477,003	2,229,550	300,000
	Fall (tule)	18,323,486	37,000,000	667,000
	Fall (late run)	5,238,871	0	0
Steelhead	Summer	63,418	0	0
	Winter	538,440	930,000	0
Coho		1,205,154	8,952,000	3,835,000
<u>Upper Willamette</u>				
Chinook	Spring	3,847,700	5,726,990	81,500
Steelhead	Summer		0	0
	Winter	220,642	0	0
<u>Columbia River</u>				
Chum		No estimate	0	265,000

a Listed hatchery numbers are release numbers.

Appendix A.

Determination of the effects of returning all PIT-tagged
spring/summer Chinook salmon to the river at each collection dam
on the number of fish that arrive at each subsequent dam

We surveyed researchers regarding the number of outmigrating PIT-tagged spring/summer Chinook salmon in the Snake River we could expect in 2007. We found that 227,000 hatchery fish will be PIT tagged and released above Lower Granite Dam as part of the Comparative Survival Study (CSS). We applied the hatchery survival estimates found in Table 1 to the fish released from hatcheries to determine the number of CSS hatchery fish that will arrive at Lower Granite Dam (146,355). The CSS requires that 70% of the fish collected at each of the Snake River collector dams be transported.

Another 27,002 hatchery spring/summer Chinook salmon (PIT tagged at hatcheries (not part of the CSS) and traps) will arrive at Lower Granite Dam. Of the 173,357 (146,355 + 27,002) hatchery fish reaching Lower Granite Dam, 87,104 will be listed hatchery fish. It is unknown whether the PIT-tagged hatchery fish will be ad-clipped or not, so, because ad-clipped hatchery fish constitute the vast majority of hatchery fish, all PIT-tagged fish are assumed to be ad-clipped for the following calculations.

Because tagging for the 2007 outmigration year began in July 2006 and continues throughout the outmigration year, we cannot accurately estimate survival from tagging of natural and migrating fish to the head of the Lower Granite Reservoir. We assumed that all of these fish would survive to the head of the reservoir, realizing that this is an overestimation. We chose the head of the reservoir because that is where the last of the tagging occurs, and because we have survival estimates from the head of the reservoir to the tailrace of Lower Granite Dam. It is expected that 66,606 wild spring/summer Chinook salmon will be PIT tagged above Lower Granite Dam. Using 90% survival from tagging location through the Lower Granite Dam pool, 59,945 (66,606 x 0.9) will arrive at Lower Granite Dam.

National Marine Fisheries Service will be PIT-tagging fish at Lower Granite Dam during the 2007 outmigration. As part of this marking, 30,000 PIT-tagged wild and 91,154 PIT-tagged hatchery spring/summer Chinook salmon will be released into the Lower Granite Dam tailrace. As these fish move downstream, all of those collected at Little Goose and Lower Monumental Dams will be diverted back to the river. Another 28,846 PIT-tagged hatchery spring/summer Chinook salmon will be released below Ice Harbor Dam.

Approximately 4,400 fish (400 wild and 4,000 hatchery) will be released in the Tucannon River. These fish are assumed to arrive at Lower Monumental Dam with no mortality.

We performed two calculations to determine the expected number of PIT-tagged fish collected at each collector dam. The first calculation made use of the same formulas used under the "Transportation with Spill" and "Full Transportation" scenarios which assume that every fish collected is transported (except the CSS fish). This calculation provided the number of fish

collected at each dam if no PIT-tagged fish were returned to the river. In other words, this calculation is based solely on the number of fish that are not collected and transported at upstream dam(s).

In the second calculation we assumed that the only fish transported at each Snake River collector dam are the CSS fish. This calculation provided the number of fish collected at each dam if the remaining PIT-tagged fish were returned to the river. This calculation includes both the fish that were returned to the river at upstream dam(s) and the fish that were not collected at upstream dam(s). Because the number derived from the second calculation includes the number from the first calculation, the difference between the numbers from these two calculations is the number of PIT-tagged fish that were collected at each dam that were not accounted for because they were returned to the river at each dam (the number for each dam was added to the appropriate "... fish collected ..." columns in Tables 7-8). This difference in the number of fish collected was then expanded to the number of fish that arrived at the dam by dividing by the FGE of that dam, and was added to the number of fish that arrived at McNary Dam because they had not been collected and transported at upstream dams under both the "Transportation with Spill" and "Full Transportation" scenarios (column "Listed fish to McNary" in Tables 2 and 3, respectively).

Calculation 1 (Transportation)

Transportation with Spill Scenario--The numbers presented below assume that 57.0% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 43.0%), and that 30% of the CSS fish are returned to the river. In addition, 30,000 wild and 91,154 hatchery fish will be released into the tailrace of Lower Granite Dam from marking at the dam, and 28,846 will be released into the tailrace of Ice Harbor Dam.

Using the FGEs in Table 2, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	28,356	32,891	51,056	112,303
Lower Monumental	9,829	12,695	17,434	39,958
McNary	5,296	9,550	16,652	31,498

Full Transportation Scenario--The numbers presented below assume that 40.0% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 60.0%), and that 30% of the CSS fish are returned to the river. In addition, 30,000 wild and 91,154 hatchery fish will be released into the tailrace of Lower Granite

Dam from marking at the dam, and 28,846 will be released into the tailrace of Ice Harbor Dam.

Using the FGEs in Table 3, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	31,577	34,880	59,011	125,468
Lower Monumental	7,851	10,452	14,299	32,602
McNary	5,088	12,419	24,388	41,895

Calculation 2 (Only CSS fish transported)

This calculation assumes that all collected PIT-tagged fish (except the CSS fish) are returned to the river at each Snake River collector dam.

For the PIT-tagged fish returned to the river at each collection dam, the only loss of fish as they migrate downstream is the mortality through each reservoir and dam. Based on the NMFS survival studies, survival through each reservoir and dam was estimated to be 90%. The estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	39,746	40,576	56,845	137,167
Lower Monumental	26,811	23,938	32,460	83,209
McNary	22,785	21,079	32,485	76,349

Full Transportation Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	52,618	49,075	69,705	171,398
Lower Monumental	36,628	28,851	39,740	105,219
McNary	47,470	39,166	61,997	148,633

Subtracting collection numbers estimated by Calculation 1 from Calculation 2 provides the number of unaccounted for PIT-tagged fish that were collected at each dam (Appendix Table A1).

Appendix Table A1. Estimates of the number of unaccounted for PIT-tagged spring/summer Chinook salmon that will be collected at each of the collection dams, and estimates of how many of these fish will arrive at McNary Dam, 2007.

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	11,390	7,685	5,789	24,864
Lower Monumental	16,982	11,243	15,026	43,251
McNary	17,489	11,529	15,833	44,851
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.384):				
McNary	45,544	30,023	41,232	116,799

Full Transportation Scenario (No Spill)

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	21,041	14,195	10,694	45,930
Lower Monumental	28,777	18,399	25,441	72,617
McNary	42,382	26,747	37,609	106,738
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.80):				
McNary	52,978	33,434	47,011	133,423

Appendix B.

Determination of the effects of returning all PIT-tagged steelhead to the river at each collection dam on the number of fish that arrive at each subsequent dam

We surveyed researchers regarding the number of outmigrating PIT-tagged steelhead in the Snake River we could expect in 2007. We found that 27,400 (16,100 of which will be listed) hatchery fish will be PIT tagged prior to release above Lower Granite Dam. Based on the survival rates of the various hatcheries releasing fish, we estimate that 20,759 (11,894 of which will be listed) will arrive at Lower Granite Dam. Another 12,735 (5,926 of which will be listed) hatchery steelhead (PIT tagged at traps) will arrive at Lower Granite Dam, bringing the total to 33,494 hatchery fish (which includes 17,820 listed fish) arriving at Lower Granite Dam. In addition, 6,836 wild steelhead PIT tagged at traps will arrive at Lower Granite Dam.

National Marine Fisheries Service will be PIT-tagging steelhead at Lower Granite Dam during the 2007 outmigration. As part of this marking, 50,000 PIT-tagged fish will be released into the Lower Granite Dam tailrace. Of these, approximately 30,000 will be wild fish, 9,035 will be listed hatchery fish, and 10,965 will be unlisted hatchery fish. All of the fish collected at Little Goose and Lower Monumental Dams will be diverted back to the river. WDFW plans to release 1,550 PIT-tagged fish into the Tucannon River. Of these, 500 will be wild and 1,050 will be listed hatchery fish.

We performed two calculations to determine the expected number of PIT-tagged fish collected at each collector dam. The first calculation made use of the same formulas used under the "Transportation with Spill" and "Full Transportation" scenarios which assume that every fish collected is transported. This calculation provided the number of fish collected at each dam if no PIT-tagged fish were returned to the river. In other words, this calculation is based solely on the number of fish that are not collected and transported at upstream dam(s).

In the second calculation we assumed that no fish are transported. This calculation provided the number of fish collected at each dam if all PIT-tagged fish were returned to the river. This calculation includes both the fish that were returned to the river at upstream dam(s) and the fish that were not collected at upstream dam(s). Because the number derived from the second calculation includes the number from the first calculation, the difference between the numbers from these two calculations is the number of PIT-tagged fish that were collected at each dam that were not accounted for because they were returned to the river at each dam (the number for each dam was added to the appropriate "... fish collected ..." columns in Tables 9-10). This difference in the number of fish collected was then expanded to the number of fish that arrived at the dam by dividing by the FGE of that dam, and was added to the number of fish that arrived at McNary Dam because they had not been collected and transported at upstream dams under both the "Transportation with Spill" and "Full Transportation" scenarios (column "Listed fish to McNary" in Tables 5 and 6, respectively).

Calculation 1 (Transportation)

Transportation with Spill Scenario--Assuming that 51.8% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 48.2%), 3,541 (6,836 x 0.518) wild, 9,231 (17,820 x 0.518) listed hatchery, and 8,119 (15,674 x 0.518) unlisted hatchery fish will reach the Lower Granite Dam tailrace. In addition, 30,000 wild, 9,035 listed hatchery, and 10,965 unlisted hatchery fish will be released into the tailrace from marking at the dam. Therefore, the total numbers of PIT-tagged fish in the Lower Granite Dam tailrace will be 33,541 (3,541 + 30,000) wild, 18,266 (9,231 + 9,035) listed hatchery, and 19,084 (8,119 + 10,965) unlisted hatchery fish.

Using the FGEs in Table 5, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Dam	Wild	Listed hatchery	Un-listed hatchery	Total
Little Goose	17,538	9,551	9,979	37,068
Lower Monumental	5,894	3,596	3,213	12,703
McNary	1,014	765	553	2,332

Full Transportation Scenario--Assuming that 20.0% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 80.0%), 1,367 (6,836 x 0.20) wild, 3,564 (17,820 x 0.20) listed hatchery, and 3,135 (15,674 x 0.20) unlisted hatchery fish will reach the Lower Granite Dam tailrace. In addition, 30,000 wild, 9,035 listed hatchery, and 10,965 unlisted hatchery fish will be released into the tailrace from marking at the dam. Therefore, the total numbers of PIT-tagged fish in the Lower Granite Dam tailrace will be 31,367 (1,367 + 30,000) wild, 12,599 (3,564 + 9,035) listed hatchery, and 14,100 (3,135 + 10,965) unlisted hatchery fish.

Using the FGEs in Table 6, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Dam	Wild	Listed hatchery	Un-listed hatchery	Total
Little Goose	25,408	10,205	11,421	47,034
Lower Monumental	1,977	1,346	742	4,065
McNary	777	1,158	292	2,227

Calculation 2 (No Transportation)

Assuming that 100% of the collected PIT-tagged fish are returned to the river at Lower Granite Dam, 36,836 (6,836 + 30,000) wild, 26,855 (17,820 + 9,035) listed hatchery, and 26,639 (15,674 + 10,965) unlisted hatchery fish will reach the tailrace.

Because 100% of the PIT-tagged fish were assumed to be returned to the river at each collection dam, the only loss of fish as they migrate downstream is the mortality through each reservoir and dam. Based on the NMFS survival studies, survival through each reservoir and dam was estimated to be 90%. The estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2007 will be

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Un-listed hatchery	Total
Little Goose	19,261	14,042	13,930	47,233
Lower Monumental	15,047	11,310	10,703	37,060
McNary	5,136	4,007	3,653	12,796

Full Transportation Scenario

Dam	Wild	Listed hatchery	Un-listed hatchery	Total
Little Goose	29,836	21,753	21,578	73,167
Lower Monumental	19,718	14,822	14,026	48,566
McNary	22,115	17,253	15,730	55,098

Subtracting collection numbers estimated by Calculation 1 from Calculation 2 provides the number of unaccounted for PIT-tagged fish that were collected at each dam (Appendix Table B1).

Appendix Table B1. Estimates of the number of unaccounted for PIT-tagged steelhead that will be collected at each of the collection dams, and estimates of how many of these fish will arrive at McNary Dam, 2007.

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	1,723	4,491	3,951	10,165
Lower Monumental	9,153	7,714	7,490	24,357
McNary	4,122	3,242	3,100	10,464
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.209):				
McNary	19,722	15,512	14,833	50,067

Full Transportation Scenario (No Spill)

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	4,428	11,548	10,332	26,308
Lower Monumental	17,741	13,476	14,080	45,297
McNary	21,338	16,095	16,961	54,394
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.90):				
McNary	23,709	17,883	18,846	60,438