Research related to transportation of juvenile salmonids on the Columbia and Snake Rivers, 1995

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Coastal Zone and Estuarine Studies Division

Northwest Fisheries Science Center

National Marine Fisheries Service

Seattle, Washington

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Douglas M. Marsh, Jerrel R. Harmon, Kenneth W. McIntyre, Kenneth L. Thomas, Neil N. Paasch, Benjamin P. Sandford, Daniel J. Kamikawa, and Gene M. Matthews

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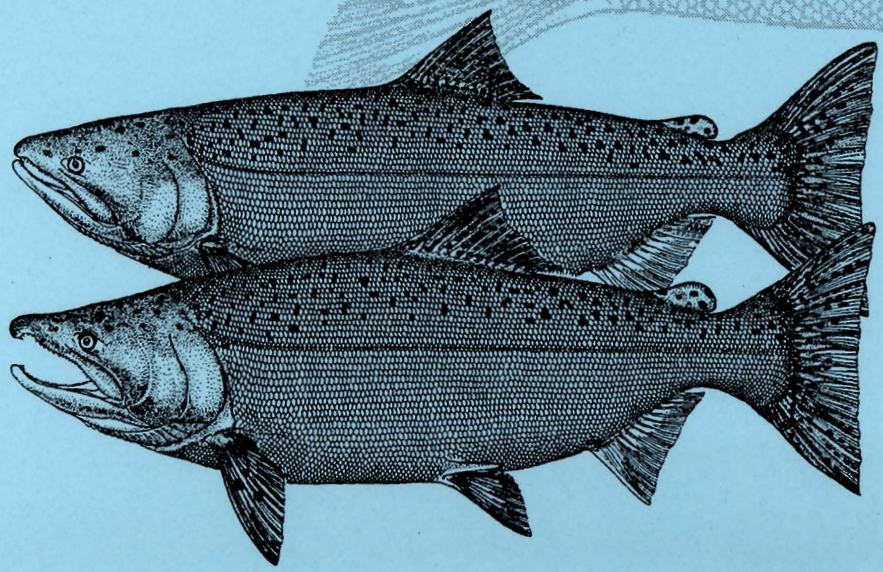

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Annual Report of Research

Funded by

U. S. Army Corps of Engineers
Walla Walla District
Contract DACW68-84-H0034

and

Coastal Zone and Estuarine Studies Division
Northwest Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

October 1996

EXECUTIVE SUMMARY

In 1995, the National Marine Fisheries Service (NMFS) researched four principal areas related to smolt transportation: 1) evaluation of barge transportation vs. inriver migration of fall chinook salmon juveniles at McNary Dam (NMFS funded); 2) assessment of survival benefits for steelhead smolts released at Tongue Point in the upper estuary vs. those released at Skamania Light, the standard release site; 3) evaluation of transportation vs. inriver migration of spring/summer chinook salmon at Lower Granite Dam; and 4) evaluation of a PIT-tag diversion system at McNary Dam. We also continued to monitor the prevalence of marine mammal abrasions on adult spring/summer chinook salmon at Lower Granite Dam.

Fall Chinook Salmon Transportation Study--McNary Dam

From 21 June through 17 August, we marked 11 release lots of approximately 12,000 fish each for transport and release below Bonneville Dam. Additionally, we marked 11 release lots of approximately 15,000 fish each for release into the McNary Dam tailrace through the new bypass outfall pipe. Overall, post-marking delayed mortality and tag loss were low, averaging 0.5 and 1.1%, respectively. Evaluation will be based upon adult recoveries in ensuing years.

Estuarine Release-Site Study

We completed the 3-year smolt marking phase of this study in spring 1994 and are now in the adult recovery phase. We recovered age-3-ocean steelhead marked as juveniles during the first year of this study in 1992, age-2-ocean steelhead from the second year of smolt marking in

1993, and age-1-ocean steelhead from the third year of smolt marking in 1994. Adult returns for all 3 study years were much lower than expected. So far, adult returns for the 1992 study year total only 82 fish from the Tongue Point release (0.15% of the juveniles released) and 98 fish from the Skamania Light release (0.16% of the juveniles released). Likewise, from the 1993 study year, adult returns total only 98 (0.16% of the juveniles released) and 128 (0.19% of the juveniles released) fish from the Tongue Point and Skamania Light releases, respectively. For the 1994 study year, age-1-ocean adult returns total 64 (0.11% of the juveniles released) fish for the Tongue Point release and 25 (0.4% of the juveniles released) fish for the Skamania Light release. When adult returns are complete, these low adult return rates may preclude any meaningful statistical analysis.

Spring/Summer Chinook Salmon Transportation Study--Lower Granite Dam

In spring 1995, we began a new 3-year marking study to evaluate transportation vs. inriver migration of spring/summer chinook salmon smolts at Lower Granite Dam. The study was designed to compare the survival to adulthood of smolts transported to below Bonneville Dam with those allowed to migrate downstream volitionally from the Lower Granite Dam tailrace under optimized inriver survival conditions called for in the NMFS Biological Opinion. From 8 April through 30 June, we PIT tagged and freeze branded 246,089 yearling smolts at Lower Granite Dam. Of this total, 107,458 were transported and released below Bonneville Dam, while 136,123 were released into the Lower Granite Dam tailrace. Post-marking delayed mortality (24 hour) averaged 1.6% for the period. Inriver migrating fish collected at downstream

dams were returned to the river using PIT-tag diversion systems (slide gates). Evaluation will be based upon adult returns detected at Lower Granite Dam in ensuing years.

McNary Dam PIT-Tag Diversion System Evaluation

We completed an evaluation of the new PIT-tag diversion system at McNary Dam in 1995. As during previous evaluations at other dams, system efficiency varied proportionally to the hourly facility fish counts. For the A flume (small-fish flume), the number of untagged fish diverted per cycle ranged from 0.70 at counts between 1,001 and 2,000 fish per hour to 1.99 at counts between 5,001 and 6,000 fish per hour. For the B flume (large-fish flume), the number of untagged fish diverted per cycle ranged from 0.70 at counts from 0 to 1,000 fish per hour to 3.23 at counts from 7,001 to 8,000 fish per hour. These results are comparable to those obtained during earlier evaluations of similar systems at Lower Granite, Little Goose, and Lower Monumental Dams, and indicate the McNary Dam PIT-tag diversion system is ready for use in monitoring or research programs.

Marine Mammal Abrasions--Lower Granite Dam

We continued to observe high abrasion levels from marine mammal teeth and claws on adult spring/summer chinook salmon sampled at Lower Granite Dam in 1995. Prevalence of abrasions was 17.8% on adults examined, with open wounds occurring on about 30.4% of the fish with abrasions.

CONTENTS

TRANSPORTATION VS. INRIVER MIGRATION OF FALL CHINOOK SALMON--MCNARY DAM

Introduction

Research to evaluate the effects of transporting juvenile salmonids around dams has been ongoing for over 25 years. From 1978 through 1983 (Park 1985) and, again from 1986 through 1988, subyearling chinook salmon were marked to evaluate transportation of this life history type from McNary Dam. During all studies, marked fish migrating inriver were returned to the McNary Dam tailrace via the bypass outfall. Results consistently demonstrated that significantly more fish transported from McNary Dam survived to adulthood than did fish allowed to migrate inriver, regardless of adult recovery area. Moreover, annual transport to inriver adult return ratios (T/Is) were consistently high, ranging from 1.8 to 10.1 (Park 1985, Harmon et al. 1993), and did not differ significantly among the adult recovery areas. Even so, some biologists within the fisheries community have expressed concern that these studies only evaluated poor migrational conditions for the inriver migrating fish released into the McNary Dam tailrace because they were released into an area known to harbor high concentrations of predators during a non-spill period. Further, inriver conditions were not always considered optimal because of low flows and no spill at downstream dams, forcing most inriver migrating fish to pass through turbines at each dam. Therefore, optimal survival conditions for inriver migrating fish were not evaluated.

The current study is designed in part to address concerns about past transport evaluations of subyearling chinook salmon from McNary Dam. Inriver conditions, spill, and release strategies were set to maximize inriver survival as much as possible. The evaluation will provide

new data on which to assess the potential benefits of inriver migration and transportation as means to increase the survival of subyearling chinook salmon.

Methods

Juvenile Marking

Much of the basic marking methodology was the same as described in previous reports (Matthews et al. 1987, Harmon et al. 1993). Fish marked in the study were randomly sampled from the population passing through the fish and debris separator within the juvenile collection facility at McNary Dam. Sufficient numbers of smolts were marked to statistically determine that the true T/I was greater than 1.0, if the minimal adult recovery rate was 0.10% and the observed T/I was 1.5.

From 21 June through 17 August 1995, we marked eleven replicates of fall chinook salmon with coded-wire tags (CWT) and adipose fin clips (Appendix Table 1.0). Each replicate consisted of an inriver migrating group of approximately 15,000 fish and a transport group of approximately 12,000 fish. In total, 166,226 inriver migrating and 133,673 transported fish were marked. Both study groups were marked simultaneously, using preanesthetic techniques, and returned to raceways where they were held for approximately 24 hours before release into either the tailrace through the new outfall pipe at McNary Dam (inriver) or into a barge or truck for transport and release below Bonneville Dam. Inriver releases were made near midday, with release times varying between 1000 and 1400 hours. This release scenario was coordinated with the work of researchers from the National Biological Survey, and was designed to minimize the

probability of predation loss. Periodically, samples of both groups were held 24 hours to measure post-marking delayed mortality and tag loss.

Adult Recoveries and Data Analysis

Adults will be recovered for up to 6 years after release as juveniles. Ocean and river commercial fisheries, hatcheries, and spawning grounds will serve as the primary adult recovery sites. Tag recovery data will be retrieved from the Regional Mark Information System, a database operated by the Pacific States Marine Fisheries Commission. We will tabulate observed and estimated tag recoveries of study fish in the various fisheries and terminal recovery locations. We will also sample the sports fishery in the Hanford Reach of the Columbia River.

Evaluation will be based upon adult return T/Is from fish marked as juveniles. As described by Harmon et al. (1996), a 95% confidence interval (CI) will be used to test the null hypothesis that the true T/I was equal to 1.0. If the 95% CI does not include a ratio equal to 1.0, then the null hypothesis will be rejected.

Results and Discussion

Juvenile Marking

Post-marking delayed mortality and tag loss were low (Appendix Table 2.0). Delayed mortality averaged 0.5% and 1.8% for transports and inriver fish, respectively. Tag loss averaged 1.4% for transports and 0.8% for inriver fish. We believe the 1.8% delayed mortality of inriver fish was artificially high because of errors: hoses were removed from holding tanks or supply water was inadvertently reduced or completely turned off. Throughout the marking period, 24-hour mortality counts from the raceways where tagged inriver fish were held before release

averaged 0.5%, the same as for the delayed mortality tests of transported fish. We could not compare similar 24-hour mortality counts from raceways where tagged transported fish were held because they were held with other fish collected for transport, and we could not reliably differentiate between our marked fish and other previously marked fish in those raceways.

Adult Recoveries and Data Analysis

To date, we have not received any adult return information for juveniles marked during the first year of this study. We expect initial tag returns in 1997.

ESTUARINE RELEASE-SITE STUDY

Introduction

There is a growing body of evidence suggesting that survival of juvenile salmonids can be enhanced by releasing them into upper areas of estuaries rather than farther upstream in freshwater areas. In Scandinavian countries, releases of hatchery-reared Atlantic salmon (*Salmo salar*) smolts directly into estuarine waters have resulted in increased survival compared to similar releases in fresh water (Gunnerod et al. 1988). Macdonald et al. (1988) and Levings et al. (1989) speculated that increased survival of salmonid juveniles released into estuarine areas was related to decreased predation and stress, increased food availability, and ease of osmoregulation in the estuary. In a 5-year study, Solazzi et al. (1991) released hatchery-reared coho salmon (*O. kisutch*) immediately below Bonneville Dam (control), at Tongue Point (upper intrusion of salt water in the estuary), and at several locations offshore in the Columbia River plume. They

reported a smolt-to-adult survival rate 1.6 times higher for fish released at Tongue Point than for the control group.

After release at the site immediately below Bonneville Dam, smolts transported from the Snake River must migrate approximately 150 km through the lower Columbia River before arriving at the estuary. Although the river is free-flowing in this reach, the area is known to harbor large numbers of predators, primarily northern squawfish (*Ptychocheilus oregonensis*) and various avian species. The studies mentioned above suggest that mortality from predation alone may be of sufficient magnitude to warrant the additional transport distance.

In spring 1992, we began a 3-year study to determine if marked hatchery and wild steelhead smolts, transported by barge and released in the upper estuary at Tongue Point, would return as adults to Lower Granite Dam in significantly greater numbers than those transported by barge and released at the traditional site near Skamania Light (just downstream from Bonneville Dam). In spring 1993, we marked steelhead smolts for the second year of this study, and in spring 1994, we marked steelhead smolts for the third and final year of study. Spring/summer chinook salmon were not included in the present study, because it was not feasible to mark the tremendously large numbers of smolts required to detect small differences in survival for this species. Depending upon the results of the study for steelhead, spring/summer chinook salmon may be tested in the future.

In 1995, we recovered age-3-ocean adult steelhead from the 1992 study year, age-2-ocean adult steelhead from the 1993 study year, and age-1-ocean adult steelhead from the 1994 study year. Results of these efforts are reported here.

Methods

We will recover adults in each of 3 years following each juvenile release year, with Lower Granite Dam as the primary evaluation point. Statistical analysis of the results will be the same as described by Harmon et al. (1996).

Results and Discussion

Adult Recoveries and Data Analysis

Preliminary adult returns to Lower Granite Dam from steelhead smolts marked for the release-site study in 1992, 1993, and 1994 are presented in Table 1 (Appendix Tables 3.0 through 8.6). Although age-1- and age-2-ocean adult returns are complete from the 1992 study year, a few age-3-ocean returns are still expected in spring 1996. A total of 82 fish from Tongue Point releases (0.15% of the release) and 98 fish from the Skamania Light releases (0.16% of the release) were recovered. Age-1 and age-2-ocean adult returns from the 1993 study year total 98 fish from the Tongue Point releases (0.16% of the release) and 128 fish from the Skamania Light releases (0.19% of the release). Age-1-ocean adult returns from the 1994 study year total 64 fish from the Tongue Point releases (0.11% of the release) and only 25 fish from the Skamania Light releases (0.04% of the release).

These adult returns rates were much lower than expected for all study years, but were consistent with the overall poor adult returns observed for both steelhead and spring/summer chinook salmon from the same smolt migration years. Low river flows and warmer-than-normal water temperatures during spring 1992 may have contributed to the abysmal adult returns for that

Table 1. Preliminary summary of recovered adult steelhead marked at Lower Granite Dam in 1992, 1993, and 1994 and transported to either Tongue Point or below Bonneville Dam (recoveries through January 1996). Numbers in parentheses represent fish that were jaw-tagged at the dams and subsequently recovered upstream.

Group	Number released	Observed adult returns								
		Ocean-age	River fishery	Indian fishery	Lower Granite Dam N		Lower Granite Dam %	Hatcheries	Total N*	Total %
1992 Tongue Point	55,366	1	14	2	32	(11)	0.06	2	39	0.07
		2	7	4	46	(4)	0.08	0	53	0.10
		3	1	0	4	(1)	0.01	0	4	0.01
		Total	22	6	82	(16)	0.15	2	96	0.18
1992 Bonneville	60,577	1	8	1	32	(6)	0.05	0	35	0.06
		2	24	3	62	(12)	0.10	2	79	0.13
		3	0	0	4		0.01	0	4	0.01
		Total	32	4	98	(18)	0.16	2	118	0.20
1993 Tongue Point	62,348	1	9	1	35	(6)	0.06	6	45	0.07
		2	3	0	63	(3)	0.10	0	63	0.10
		Total	12	1	98	(9)	0.16	6	108*	0.17
1993 Bonneville	65,987	1	8	2	47	(8)	0.07	5	54	0.08
		2	4	2	81	(4)	0.12	0	83	0.13
		Total	12	4	128	(12)	0.19	5	137*	0.21
1994 Tongue Point	60,016	1	2	0	64	(2)	0.11	0	64*	0.11
1994 Bonneville	68,314	1	1	1	25	(1)	0.04	0	26*	0.04

* Fish captured more than once were only counted once in totals.

study year. However, we believe that periodic, exceptionally unfavorable estuary and/or early-ocean conditions (Ware and Thomson 1991, Beamish and Bouillon 1993, Lawson 1993, Hsieh et al. 1995, Roemmich and McGowan 1995) continued as the primary causative factors of poor adult returns, as posited by Achord et al. (1992) and Harmon et al. (1996).

To complete the release-site study, we will continue recovering adult steelhead at Lower Granite Dam. Complete adult returns for the 3-year smolt marking study will be available in spring 1998. Unfortunately, the extremely depressed adult steelhead returns reported above may not allow us to make any statistically meaningful statements about differences in adult returns from juveniles released at the two different release sites.

TRANSPORTATION VS. INRIVER MIGRATION OF PIT-TAGGED SPRING/SUMMER CHINOOK SALMON SMOLTS--LOWER GRANITE DAM

Introduction

Research to evaluate the effects of transporting juvenile salmonids around dams began over 25 years ago. Evaluation of transportation of spring/summer chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) was conducted from various Snake River Dams from 1968 through 1980. In addition, transportation of summer/fall chinook salmon and steelhead was evaluated at McNary Dam on the Columbia River from 1978 through 1983.

Based upon adult returns, results of the transportation studies varied by species. For summer/fall chinook salmon (subyearlings) and steelhead, results consistently showed that significantly more marked/transported fish returned to the point of release than did marked fish released to migrate inriver. However, for spring/summer chinook salmon (yearling smolts),

study results were less consistent. Results from the earliest studies, during 1968-73, demonstrated conclusively that significantly more marked fish that were transported returned to the point of marking than did marked fish released to migrate inriver (Ebel et al. 1973, Slatick et al. 1975, Ebel 1980). However, most studies conducted during 1975-80 yielded inconclusive results because very low numbers of marked adults returned from either group (Park 1985).

Matthews (1992) postulated that severe physical traumas suffered by many smolts during collection and marking were a primary cause of low returns of spring/summer chinook salmon adults during the 1975-80 studies. From 1981 through 1984, the COE and fisheries agencies addressed this problem by modifying or otherwise improving many features of the smolt collection and bypass systems at dams, particularly at Lower Granite Dam. Moreover, the preanesthetic system of handling and marking smolts (Matthews et al. 1986) was introduced at Lower Granite Dam in 1983. This system virtually eliminated the major physical traumas associated with the handling and marking process. All indications suggest that the modifications and improvements increased survival substantially.

A study to reevaluate smolt transportation of yearling chinook salmon migrants from the Snake River, after the subtantial modifications to collection and bypass facilities were made, was initiated at Lower Granite Dam in 1986. Spring/summer chinook salmon smolts were marked with CWTs and freeze brands in 1986 and 1989 at Lower Granite Dam. Approximately one-half of the smolts were placed in barges at Lower Granite Dam. The remainder were trucked to a release site downstream from Little Goose Dam to continue their inriver migration. Although significantly more marked adults returned from those fish barged compared to marked fish that migrated inriver, concern has been expressed by some biologists within the fisheries community

that the studies were compromised by transporting the inriver fish to below Little Goose Dam. The studies were further criticized because a small fraction of inriver migrating fish were inadvertantly transported from McNary Dam and inriver migration conditions were not considered optimal. Thus, inriver migrating fish were not afforded the full opportunity to remain inriver and survive at the highest rates possible.

Since 1989, a succession of low-flow years and the construction and operation of a new bypass and collection system at Lower Monumental Dam have impeded further attempts to conduct conventional transportation research (using CWTs and freeze brands) from Lower Granite Dam. However, a major fish-marking technology advance, the passive integrated transponder (PIT) tag (Prentice et al. 1990), along with recently-developed PIT-tag diversion systems (Matthews et al. 1990, 1992; Achord et al. 1992; Harmon et al. 1995) installed at collector dams downstream from Lower Granite Dam, have provided the opportunity to conduct contemporary transportation studies directly from Lower Granite Dam. This combination of technologies allows release of inriver-migrating study fish directly into the Lower Granite Dam tailrace because a high percentage of the fish collected inadvertently at any downstream dam can now be returned to the river rather than transported to below Bonneville Dam. Furthermore, the collection history and final disposition of each inriver migrating fish will be recorded, and the small fraction inadvertently transported from any downstream dam can then be eliminated from the analysis.

The primary objective of this study is to compare adult returns to Lower Granite Dam of PIT-tagged spring/summer chinook salmon smolts transported from Lower Granite Dam to below Bonneville Dam and PIT-tagged spring/summer chinook salmon smolts allowed to

migrate inriver from the tailrace of the dam under optimal conditions for inriver survival. In addition, the number of PIT-tagged fish released in-river will allow smolt-survival estimations between the Lower Granite and McNary Dam tailraces using the Single-Release Model (Iwamoto et al. 1994). The study requires tagging spring/summer chinook salmon smolts for 3 years, not necessarily in succession. Here we report tagging results and other data derived from inriver-migrating study fish during the initial study year of 1995. Adult return data will be reported as acquired in ensuing years.

Methods

Smolt Sampling and Tagging

During spring 1995, we tagged spring/summer chinook salmon smolts at Lower Granite Dam for the first year of the 3-year transportation study. We marked fish externally with freeze brands and internally with modified PIT tags (see below). We loaded some fish onto barges or trucks for transport and release below Bonneville Dam and released others directly into the Lower Granite Dam tailrace to continue their seaward migration.

We designed the study to test a minimum 1.3 T/I for adults returning to Lower Granite Dam from the two groups of fish. We calculated the numbers of fish to be marked in both study groups using the following notation:

N_i = number of tagged inriver migrants

N_t = number of tagged transported fish

n_i = number of inriver migrants recovered as adults

n_t = number of transported fish recovered as adults

$p_i = n_i/N_i$ = proportion of inriver migrants returning as adults

$p_t = n_t/N_t$ = proportion of transported fish returning as adults

The T/I ratio was estimated by

$$R = p_t / p_i ,$$

the variance of R was given by

$$V(R) \approx R^2 \left(\frac{1}{n_i} + \frac{1}{n_t}\right) ,$$

and the relative variance by

$$RV = \frac{V(R)}{R^2} \approx \frac{1}{n_i} + \frac{1}{n_t} .$$

The value for RV is the square of the coefficient of variation (CV). The sample sizes were then calculated by inserting the desired CV into this equation. The CV specifies the standard error as a percent of the ratio itself.

To maximize precision for a given total sample size, we allocated numbers to provide about equal numbers of expected adults returning in the transport and inriver migrant groups (i.e., $n_i = n_t$). By specifying the value of RV, the required number of returning adults was obtained from

$$RV \approx 1/n_i + 1/n_t = 2/n,$$

where $n = n_i = n_t$ and n was estimated from $n \approx 2/RV$. For spring chinook salmon, we desired a CV of 10.0% (S.E. = 0.13) , and the number required in each returning group was

$$n \approx 2/RV - 2/(0.1)^2 = 2/0.01 = 200.$$

We estimated a minimum adult return of transported fish to Lower Granite Dam of 0.2% for the 1995 smolt outmigration, thus the required number of releases in this group was given as

$$N_t \approx n_t/p_t = 200/0.002 = 100{,}000.$$

If R is 1.3, then the number of inriver migrants (N_i) was given as

$$N_i \approx N_t(1.3) = 100{,}000(1.3) = 130{,}000.$$

Thus, the total numbers of PIT-tagged spring chinook salmon required were 100,000 transports and 130,000 inriver migrants. In addition to the PIT tag, we also marked the transport and inriver migrants with freeze brands in 10,000- and 13,000-fish release lots, respectively, to assure identification of adult returns, even if PIT tags were not reliably detected.

To mark the required numbers of fish over the entire season, we set our initial daily sample rate at approximately 9.2%. We based this sample rate on an expected total collection of 2,500,000 spring/summer chinook salmon at Lower Granite Dam over the course of the smolt migration. We obtained daily samples of fish for marking by periodically diverting all fish passing through the collection facility into an east-bank raceway at Lower Granite Dam (Fig. 1). To assure that our marked fish were proportionally representative of the entire smolt outmigration, we attempted to sample the collected population at the same rate each day. However, we recognized in advance that inherent logistical constraints would require decreased sample rates during peak collection days. To compensate and assure we achieved our overall tagging goal, we sampled at a slightly higher rate during the early part of the

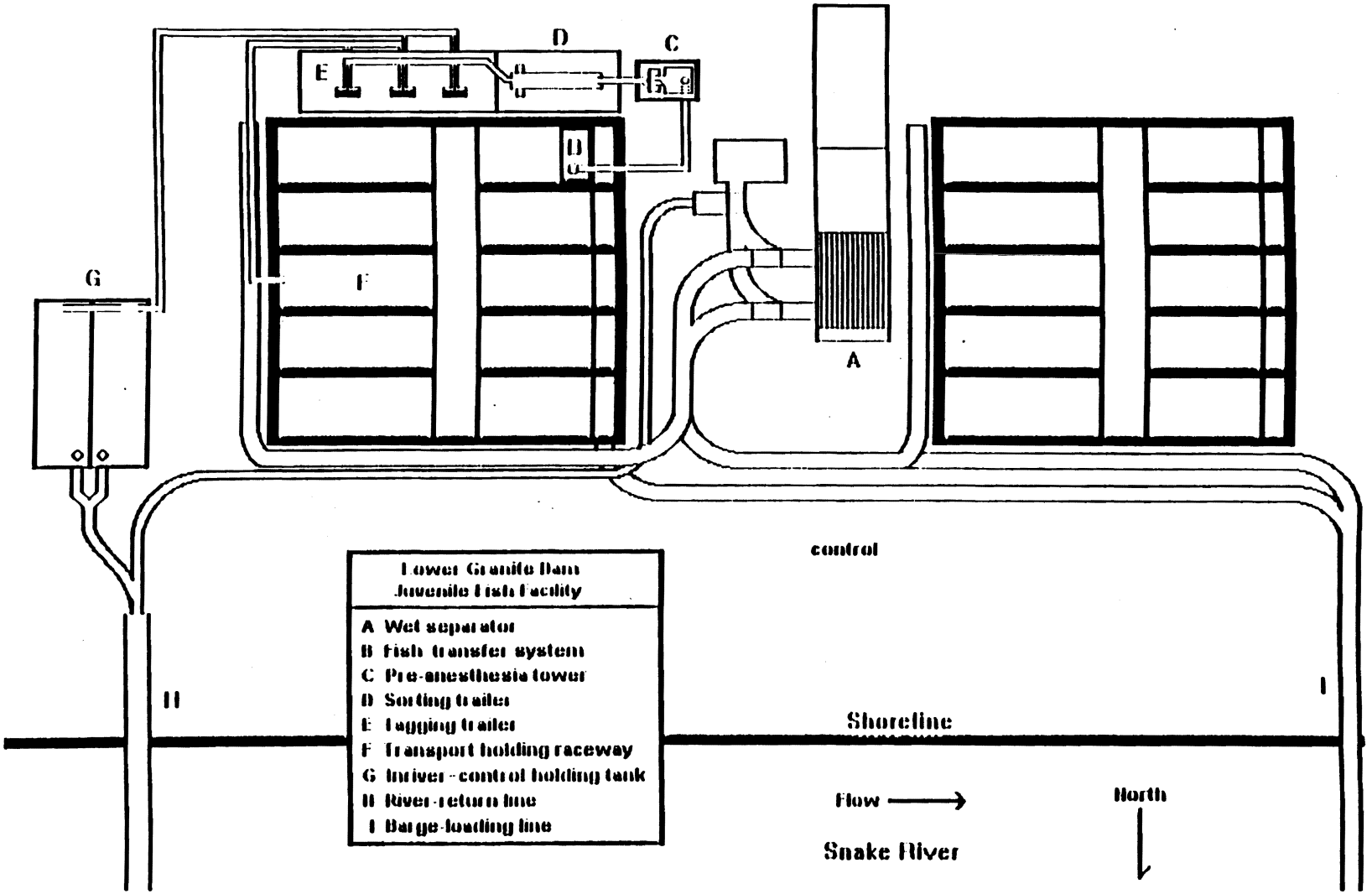

Figure 1. Schematic of the Lower Granite Dam juvenile fish facility showing the NMFS fish-handling/marking facilities layout in 1995.

outmigration (Fig. 2). This small adjustment guaranteed that we would be on schedule to fulfill our overall tagging goal after the peak smolt-collection period, when any deficiency in overall tagging numbers would be difficult to make up.

We handled and marked all fish using preanesthesia techniques. However, we utilized a new, state-of-the-art method for transferring fish from the sample raceway into the preanesthesia chambers. The new method incorporated an Aqua-Life[1] fish transfer system to move fish in water from the sample raceway to the preanesthesia system. The Aqua-Life fish transfer system was specifically designed to move fish and other organisms in water without harm. This system has undergone extensive testing on many different aquatic organisms, and is widely used in anadromous salmonid hatcheries in the Pacific Northwest and in resident trout hatcheries throughout the United States. We incorporated the system into our handling/marking process to reduce the need for intensive crowding, to gain much greater control over the numbers of fish transferred at any given time, and to eliminate dipnetting of anesthetized fish. During the season, we conducted several tests to determine the effects of the system on sampled fish. We sampled one group from a raceway with a sanctuary liftnet (Matthews et al. 1986) before they passed through the transfer system, and another group from the sorting trough immediately after they had passed through the fish transfer and preanesthesia systems. We examined both groups for descaling and injury using standard protocols.

We began the marking process by gently crowding fish toward the fish transfer system located at one end of a raceway. To eliminate fish contact with the crowder screen, we installed an air-bubbler system along the screen's lower edge. The air-bubbler system, constructed of a

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[1] Use of trade names does not imply endorsement by the National Marine Fisheries Service.

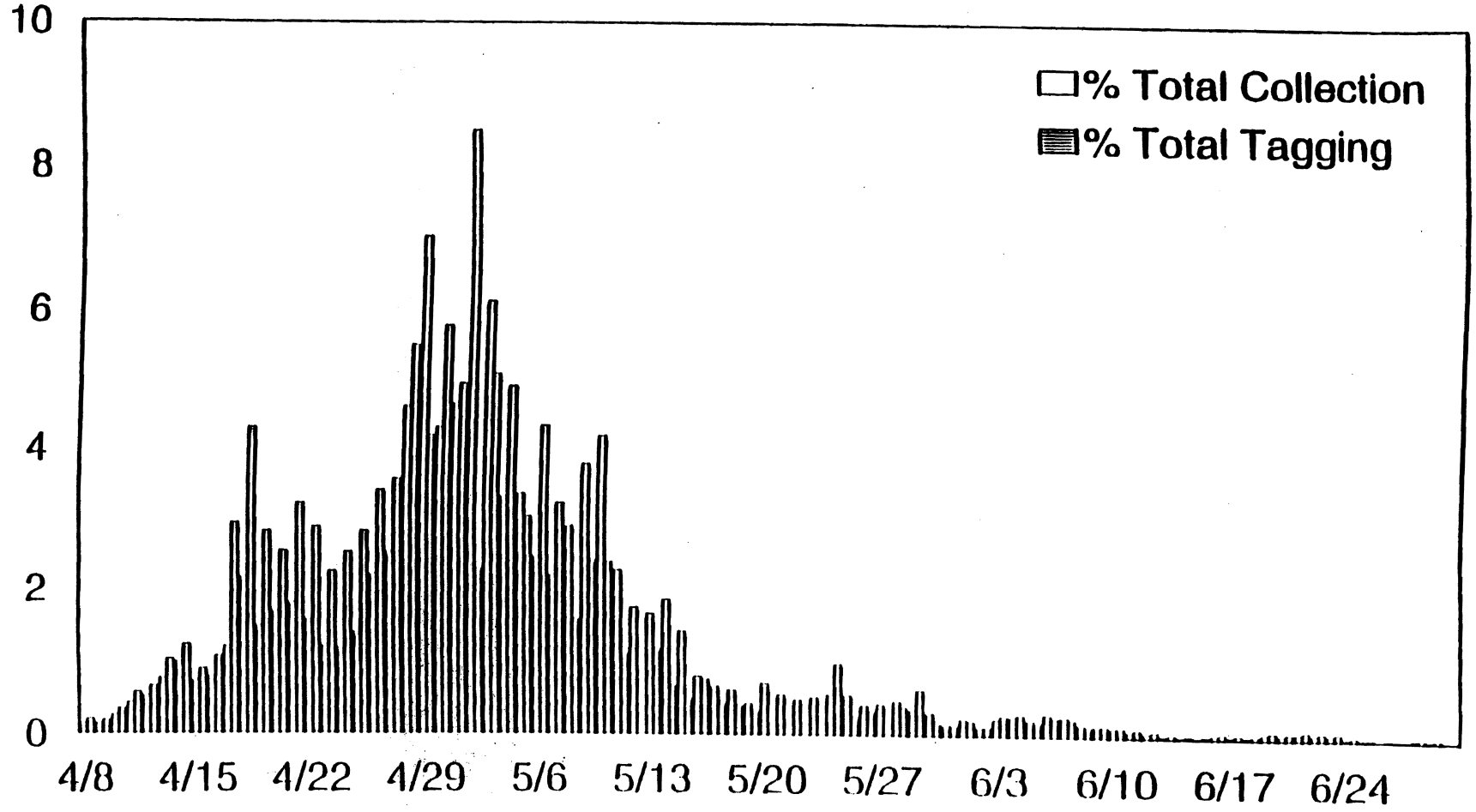

Figure 2. Daily spring/summer chinook salmon collection and tagging at Lower Granite Dam expressed as percentages of the total collection and tagging in 1995.

perforated plastic pipe with a plug at one end, was connected to a high-pressure air supply line. When turned on, the system produced a thick curtain of air bubbles between the crowding screen and the fish. Use of the air-bubbler facilitated the movement of fish into the fish transfer system with minimal crowding.

The fish transfer system moved fish up to one of two preanesthesia chambers located on a platform above the level of the marking building. We filled one anesthesia chamber until the desired number of fish was attained; we then diverted the flow of fish to the second empty chamber and anesthetized fish in the first chamber. After anesthesia, we tripped an air gate that allowed anesthetized fish in the first chamber to pass through water lines into a sorting trough inside the marking facility. By this time, the second chamber had filled with fish, and we diverted the flow of fish back into the first empty chamber while we anesthetized the fish in the second chamber. When fully anesthetized, we again tripped an air gate on the second chamber to pass these fish into the sorting trough. This procedure was continuously repeated while the fish transfer system was operating.

In the sorting trailer, we sorted out non-target species (e.g., steelhead, sockeye) and returned them to a holding raceway to await transport. We also returned any previously PIT-tagged, severely injured, or moribund spring/summer chinook salmon to the holding raceway. The remaining spring/summer chinook salmon were then randomly distributed into the two treatment groups for branding. After branding, they were gravity-transferred in water lines into the PIT-tagging building where both treatment groups were PIT-tagged simultaneously.

We set up six PIT-tagging stations in the marking building--three each for the transport and inriver study groups. At each station, individual fish were PIT tagged and scanned to record

the tag code onto a computer. We recorded each fish's origin as hatchery, wild, or unknown based primarily on the presence (wild) or absence (hatchery) of an adipose fin. We also recorded the physical condition (descaling, various injuries, etc.) of each fish, and measured fork lengths on 20% of the marked fish. We tagged each fish with a sterile, hand-held syringe and disinfected all syringes and needles after each use in accordance with standard disinfection protocols (immersion in ethyl alcohol for 10 minutes). Once every 2 hours, we rotated fish marking personnel among the marking stations.

After marking, transport fish were gravity-transferred in water lines to a holding raceway (Fig. 1) and loaded onto barges or trucks as available. Simultaneously, inriver migrants were gravity-tranferred in water lines into a separate holding tank, but were held an average of 24 hours before release. We released the inriver fish into the Lower Granite Dam tailrace through the bypass river-return line. We made all inriver releases near midday, with release times varying between 1000 and 1400 hours. This release scenario was coordinated with the work of researchers from the National Biological Survey, and was designed to minimize the probability of predation loss.

We collected all mortalities from the holding tank as the inriver fish were released. Also, whenever possible, we attempted to collect mortalities from the transport holding raceways. However, the size and depth of the transport raceways made mortality collection inefficient. We removed, scanned, and recorded PIT tags from all mortalities.

At the end of each day, we validated the computer files containing the PIT-tag codes and comments for all fish tagged that day to ensure all standards established for PIT tagging in the Columbia River Basin were met. At this time, we also deleted the mortality tag codes from the

tagging files. We then uploaded the files to the PIT-Tag Information System (PTAGIS), a database which is the central repository for all data from PIT-tagging operations in the Columbia River Basin. The PTAGIS is overseen by the PIT Tag Operations Center of the Pacific States Marine Fisheries Commission.

Inriver Migration

After release, PIT-tagged inriver fish migrated volitionally downstream through seven Snake and Columbia River reservoirs and dams (Fig. 3). If spill were occurring, two major passage routes, turbine intakes or spillways, were possible at each dam. If fish entered a turbine intake, they were either guided into a bypass system by a submerged guidance device, or they passed through the turbine below the guidance device. Fish guided into bypass systems were collected for transportation at some dams or returned to the river at others. At Little Goose and Lower Monumental Dams, most PIT-tagged fish were detected and routed back to the tailraces, thus avoiding transport from these dams. The small percentage of PIT-tagged inriver migrant fish that were not diverted, and thus were transported, were deleted from the inriver migrant data files. Prior to 20 June, all fish (tagged and nontagged) collected at McNary Dam were bypassed to the river after passing through PIT-tag detectors; no fish were transported from McNary Dam during this time. On 20 June, collection and transport operations began at McNary Dam, and the PIT-tag diversion system was used thereafter to return PIT-tagged fish back to the river.

In addition to the three collector dams listed above, a small fraction of fish bypassed at John Day Dam and at the Bonneville Dam First Powerhouse passed through PIT-tag-detectors. However, unlike the transport-collector dams, where all collected fish passed through PIT-tag

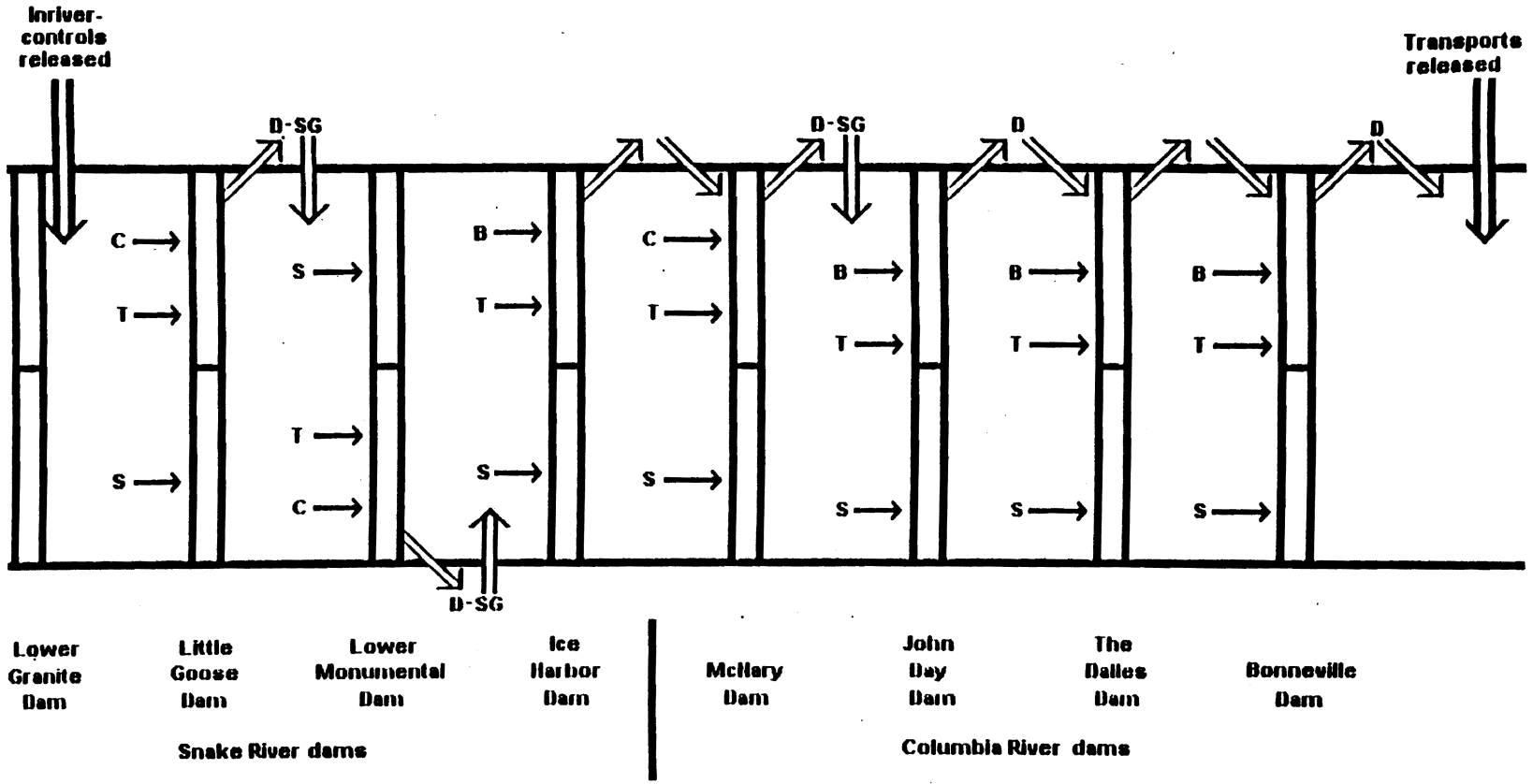

Figure 3. Schematic of the lower Snake and Columbia River hydropower system showing all possible passage routes at each dam for smolts PIT tagged and released inriver at Lower Granite Dam in 1995. Abbreviations used are: C = bypassed and collected for transportation; B = bypassed to river only, not collected for transportation; T = passed through turbines; S = passed through spillbays; D = passed through a PIT-tag detection system after being bypassed only; D-SG = passed through a PIT-tag detection and diversion system and diverted back to the river after being bypassed for collection (occurs only at transport collector dams--Little Goose, Lower Monumental, and McNary Dams).

detectors, only a small fraction of fish bypassed at these two dams were subjected to detection. Additionally, all bypassed fish were returned to the river because neither dam was equipped to collect fish for transportation.

At all dams, PIT-tag detection data were stored redundantly in computer systems and uploaded to PTAGIS daily. Whenever desired, we obtained data on inriver-migrating study fish through PTAGIS.

Adult Recoveries and Data Analysis

We will recover adults in each of 3 years following tagging as juveniles. The inladder adult PIT-tag detection system at Lower Granite Dam will function as the primary adult recovery site for this study. We will jaw tag all study fish recorded at Lower Granite Dam to preclude multiple counts of adults that fall back downstream through the dam and reascend the ladder. These tags will also provide ancillary data on fish subsequently recovered from hatcheries and natal spawning areas.

Some recent adult return data suggest that either the adult PIT-tag detector at Lower Granite Dam is less efficient than thought or some fraction of PIT tags are undetectable after fish have spent 2-3 years at sea. To test the efficacy of adult PIT-tag detection, we marked smolts with PIT tags that contained blank CWTs attached internally during manufacture and also marked each smolt with an external freeze brand. This tagging combination allowed us to minimize handling during smolt marking. The hybridized PIT tags will serve the same function as CWTs in past transportation studies. When returning tagged adults pass through the inladder PIT-tag and CWT detectors at Lower Granite Dam, the hybridized PIT tags will divert these fish

into the adult trap. To measure the efficiency of the inladder PIT-tag detector, we will interrogate each fish by hand with a highly sensitive PIT-tag detector and record freeze brands. If inladder detection efficiency is low, this mark combination will allow us to further isolate the problem between the PIT-tag detection system and PIT-tag failure.

When adult returns for a given study year are complete; we will calculate 95% confidence intervals for T/Is as described by Harmon et al. (1996). We will regress T/Is against inriver variables such as flow and spill, and compare T/Is to inriver survival estimates. Finally, we will provide a statistically bound detection efficiency estimate for the inladder adult PIT-tag detector at Lower Granite Dam.

Results and Discussion

Smolt Sampling and Tagging

The temporary sampling and tagging facility that we installed at Lower Granite Dam in 1991 operated very effectively again this year. During this study, we used the Aqua-Life fish transfer system for the first time to move fish from a raceway into the preanesthesia chambers. In previous marking studies, we had preanesthetized fish in a raceway chamber, then dipnetted them into the sorting building. This old system required rather intensive raceway crowding, and it was difficult to control the abundance of fish moving through the sorting/marking process. However, with the new transfer system, we were able to control the pace of fish passing through the system with remarkable ease. Table 2 shows the results of the descaling and injury tests that we conducted over the course of the tagging season. Passage through the fish transfer system did not

Table 2. Descaling prior to and after transfer from a collection raceway to the sorting/marking building during handling/PIT tagging operations at Lower Granite Dam, 1995.

Sample area	Number of fish	Descaling (percent)
Spring/summer chinook salmon smolts		
Collection raceway	988	3.5
Sorting trough	929	3.2
Steelhead smolts		
Collection raceway	299	3.2
Sorting trough	681	3.2

increase descaling and injury. Moreover, we found that even adult steelhead kelts passed through the transfer system safely.

We PIT tagged and freeze branded fish from 8 April through 30 June. During this period, we tagged 246,089 yearling spring/summer chinook salmon (Table 3 and Appendix Tables 9.0-11.0), or 6.5% of the total yearling spring/summer chinook salmon collection at Lower Granite Dam in 1995. The number of fish tagged daily ranged from 57 to 14,187. Of the total tagged, 136,123 were released into the Lower Granite Dam tailrace, and 107,458 were transported to below Bonneville Dam. Hatchery and wild fish proportions were virtually identical in the two treatment groups, indicating a random distribution of fish between treatments.

Based upon mortality counts from the inriver holding tank, post-marking delayed mortality (24 hour) averaged 1.6% over the entire tagging season. This value is exceptionally low, considering that we tagged virtually every fish sampled. We rejected for tagging only a few fish that were either very severely injured or exhibited obvious symptoms of gross bacterial kidney disease. By tracking each fish's unique PIT-tag code, we determined the condition of each mortality as recorded when the fish was still alive during tagging. Descaling appeared to have the largest impact on post-marking delayed mortality. When tagged, only 3.7% of all fish were recorded as descaled; however, 20.0% of the delayed mortalities were recorded as descaled during tagging.

Our inability to efficiently recover post-marking mortalities from the transport holding raceways introduced a small bias into the study. We collected and removed from the inriver data set virtually all mortalities of fish marked for the inriver releases, but only an unknown fraction of mortalities of fish marked for transport. Assuming that marked transport fish experienced the

Table 3. Numbers of wild and hatchery spring/summer chinook salmon smolts PIT tagged and released inriver at Lower Granite Dam or transported below Bonneville Dam, 1995.

	Hatchery		Wild		
	number	percent	number	percent	Totals
Released inriver					
tagged	106,077	76.7	32,310	23.3	138,387
released	104,350	76.7	31,773	23.3	136,123
Transported					
tagged	83,560	77.6	24,142	22.4	107,702
released	83,354	77.6	24,104	22.4	107,458

same delayed mortality rate prior to release as marked inriver fish, over 1,500 (1.6%) marked transport fish that we recorded as released alive were actually released postmortem. This bias will slightly skew the adult return T/I downward.

We recorded fork lengths on 20% of the fish during tagging. Wild and hatchery fish lengths were identical in the two treatments (Table 4), providing another indication of the degree of randomization attained by the sample procedure.

Inriver Migration

As inriver study fish continued their seaward migration, some were recollected at dams downstream from Lower Granite Dam. Of the 136,123 inriver fish released, 87,094 (64.0%) were detected at least once at a downstream collector dam (Table 5 and Appendix Table 12.0). As expected, the largest number of first-time detections occurred at Little Goose Dam.

Table 6 (Appendix Tables 13.0-15.0) shows total numbers and ultimate dispositions of inriver fish detected at each dam. We removed from the inriver data set fish that were detected at a dam but not later detected on a return-to-the-river detector coil at that dam. At the end of the smolt migration, we obtained information from COE project biologists at each collector dam regarding periods when all detected fish were returned to the river from raceways. During these periods, we added back to the inriver data set fish whose final detections were on coils leading to raceways at each dam. At each dam, any fish detected exiting the fish and debris separator but not detected elsewhere was removed from the inriver data set. Fish whose final detections were on coils leading to sampling rooms were also removed from the inriver data set.

Table 4. Mean fork lengths (fl.)(mm) by brand groups of spring/summer chinook salmon PIT tagged at Lower Granite Dam, 1995. Inriver and transport brand groups are paired chronologically.

Inriver brand	Hatchery fl.	Hatchery number	Wild fl.	Wild number	Transport brand	Hatchery fl.	Hatchery number	Wild fl.	Wild number
LAP1	137	1,047	116	1,572	RAV1	138	854	117	1,061
LAP2	136	1,629	115	978	RAV2	138	1,505	122	667
LAP3	135	1,855	111	637	RAV3	136	1,442	110	460
LAP4	137	1,802	116	331	RAV4	136	1,549	112	378
LA31	137	2,499	114	394	RAU1	135	1,749	115	318
LA32	137	2,870	117	497	RAU2	134	1,296	112	201
LA34	137	2,902	115	476	RAU3	135	1,565	114	290
LA33	136	2,152	115	433	RAU4	135	1,823	113	254
LAZ1	136	2,354	113	319	RAS1	139	1,857	121	282
LAZ2	138	1,914	117	458	RAS2*	137	1,462	115	321
					RAF1*	136	66	108	12
LA41	136	846	117	851	RAF2	136	673	114	662
Totals or Averages	137	21,869	116	6,946		137	15,842	116	4,906

* Transport brand groups RAS2 and RAF1 were paired with inriver brand group LAZ2.

Table 5. Numbers and percentages of spring/summer chinook salmon smolts PIT tagged and released at Lower Granite Dam in spring 1995 and subsequently detected at Little Goose, Lower Monumental, and McNary Dams. Percentages are based on the total numbers of inriver fish released.

Dam	First detections	Second detections	Third detections
Little Goose Dam			
Number detected	43,920		
% of release	32.3		
Lower Monumental Dam			
Numbers detected	30,015	15,983	
% of release	22.0	11.7	
McNary Dam			
Numbers detected	13,159	13,542	4,730
% of release	9.7	9.9	3.5
Totals			
Numbers detected	87,094	29,525	4,730
% of release	64.0	21.7	3.5

Table 6. Final disposition of PIT-tagged spring/summer chinook salmon smolts released at Lower Granite Dam in spring 1995 and subsequently detected at Little Goose, Lower Monumental, and McNary Dams (includes definitions for final dispositions).

Final disposition*	Number of smolts		
	Little Goose Dam	Lower Monumental Dam	McNary Dam
River	34,935	43,108	31,284
Bypassed	1,794	53	0
Sample	978	1,114	28
Transported	5,204	1,408	18
Unknown	867	154	2
Totals			
Observed	43,778	45,837	31,332
Removed from study	7,049	2,676	48
% removed from study	16.1	5.8	0.2
To river	36,729	43,161	31,284

* Definitions:

Disposition	Last coil observation	Special circumstances	Ultimate destination	Study status
River	Diversion or river return		River	Retained
Bypassed	Raceway	Raceway emptied to river	River	Retained
Sample	Sample		Unknown	Removed
Transported	Raceway		Barge/Truck	Removed
Unknown	Separator		Unknown	Removed

The PIT-tag diversion system at Little Goose Dam returned PIT-tagged fish to the river with the lowest efficiency of the three diversion systems located at collector dams downstream from Lower Granite Dam. By comparing total facility detections with post-diversion detections on coils leading to the river, we determined that 20% of the fish collected at Little Goose Dam were not diverted back to the river, and we removed them from the inriver data set. In contrast, using the same method at Lower Monumental Dam, we determined that only 6% of the collected fish fell into this category. We added back to the inriver data set those fish detected on coils leading to raceways during periods when all fish were returned to the river at both dams, and this resulted in a subtraction from the inriver data set of 16.1% of all inriver study fish collected at Little Goose Dam. However, with these same additions at Lower Monumental Dam, the loss of tagged fish to the inriver data set did not change. Since all fish were returned to the river at McNary Dam prior to 20 June, very few of the inriver study fish collected at this dam required removal from the inriver data set.

From 9 April through 13 May, we released 122,880 PIT-tagged spring/summer chinook salmon smolts into the Lower Granite Dam tailrace. Based upon detections at John Day and Bonneville Dams, Muir et al. (1996) estimated that approximately 70% of these fish survived to the McNary Dam tailrace. The adult return T/I should approximate the inverse of inriver survival (1/S). Assuming proportional survival through the remaining three dams and reservoirs, the adult return T/I for the above period should approximate 1.8.

Matthews et al. (1992) reported a 1.6 T/I for spring/summer chinook salmon marked to evaluate transportation from Lower Granite Dam in 1986, a year with Snake and Columbia River spill and flow volumes similar to those in 1995. In this study, inriver migrants were trucked for

release below Little Goose Dam, leaving six dams and reservoirs in the migration path of these fish. If inriver survival were proportionally the same through the six hydroprojects in 1986 as measured through the four hydroprojects in 1995, then the expected T/I for 1986 would have been approximately 1.6, the same value observed and reported.

Adult Recoveries and Data Analysis

As of this writing, no adults have returned from fish marked for this study. We expect initial jack returns in spring 1996.

MCNARY DAM PIT-TAG DIVERSION SYSTEM EVALUATION

Introduction

In spring 1994, a PIT-tag diversion system was installed within the new fish collection facility at McNary Dam. The system was modeled after the original one at Lower Granite Dam, and incorporated design and operational modifications developed at that dam during evaluations from 1989 through 1991 (Matthews et al. 1990, 1992; Achord et al. 1992). In 1995, we were scheduled to begin testing and evaluation of the McNary Dam system on 1 May; however, mechanical and technical difficulties forced a delay of testing until 8 May. Figure 4 shows the layout of the PIT-tag diversion system within the juvenile fish collection and transportation facility at McNary Dam. It is important to note that, unlike the fish and debris separator at Lower Granite Dam, the separator at McNary Dam is designed to sort fish by size. Once sorted, fish exit the separator via small- and large-fish flumes (flumes A and B, respectively), and are thus

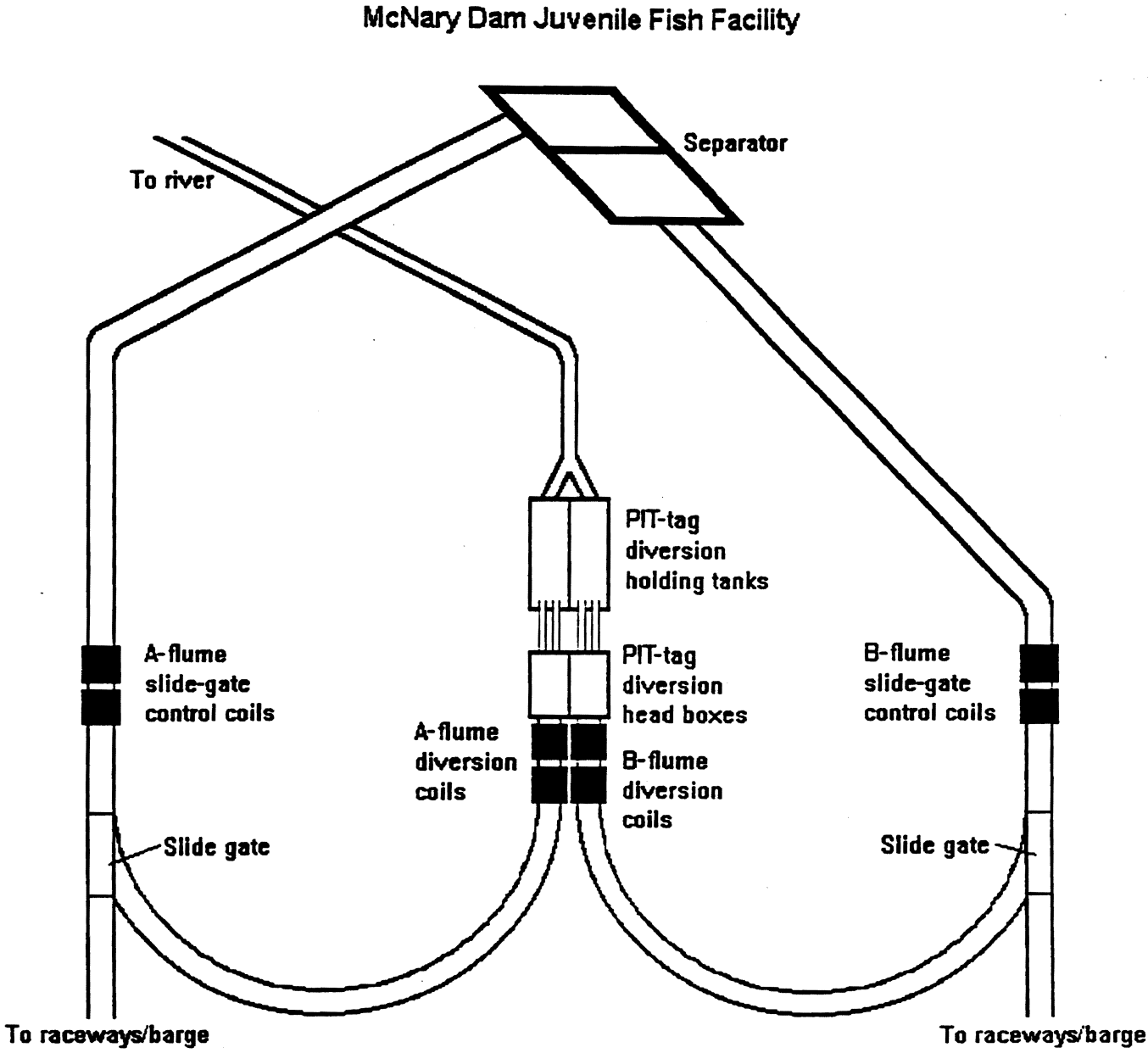

Figure 4. Schematic of the PIT-tag diversion system within the juvenile fish facility at McNary Dam.

kept separate throughout further handling, sorting, holding for transportation, and/or bypass to the river. It is this difference that necessitated individual evaluations of each flume.

The principal feature of the PIT-tag diversion system at McNary Dam is a sliding gate (slide gate) in the bottom of each flume exiting the fish and debris separator. The slide gates open to divert PIT-tagged fish from the general population passing through the flumes to the collection raceways, river, or barge.

The primary objectives of the 1995 tests were to evaluate the reliability and efficiency of the system and to determine if modifications were needed to retain high efficiency while maintaining minimal levels of injury and/or mortality.

Methods

As during previous studies at Lower Granite, Little Goose, and Lower Monumental Dams, the efficiency of the McNary Dam PIT-tag diversion system was defined as the ratio of untagged fish diverted per slide-gate diversion cycle. Since this ratio is a function of cycle time and rate of fish movement past the system, an expected value for this ratio can be estimated. Also, since there is mechanical separation of fish passing through the separator, a different estimate was made for each flume. The formulas used to estimate the expected values were:

$$\text{Expected Value flume A} = \sum_{i=1}^{n} \frac{H_i(T_{ai})}{3600n}$$

$$\text{Expected Value flume B} = \sum_{i=1}^{n} \frac{H_i(T_{bi})}{3600n}$$

where: n = the number of tests in each grouping

I = 1,...,n

H_i = the expanded hourly facility count for test I

T_{ai} = the cycle time for flume A

T_{bi} = the cycle time for flume B

These formulas assume a linear relationship between the facility count and the expected value. As the facility count increases, the expected values increase proportionally (Achord et al. 1992).

We determined the efficiency of the PIT-tag diversion system by conducting hourly tests during the 1995 smolt outmigration. The tests were timed to correspond with daily peaks of outmigrating smolts passing through the fish and debris separator. However, since the hourly fish counts and the number of PIT-tag cycles were not known in advance, peak passage periods were estimated by examining facility counts from the previous day.

Prior to testing, we observed that water from the slide-gate head boxes entered each sample tank at a high velocity through twin 10.2 cm (4 inch) water lines. Therefore, to allow dissipation of the water and limit any injury and/or descaling that might result from the fish being impinged or rolled into the collection net, we sealed off one of the lines to each sample tank. We modified the remaining line by shortening it and adding a 90 degree sweeping elbow on the end. The water level in the head boxes was lowered and maintained by manipulating valves on the makeup water line. Due to the operational design of the sample tank, we determined that the water level in the tank could not be maintained at a height that would allow volitional egress of diverted fish. Prior to 17 May, fish collected in the sample required manual release prior to testing. After 17 May, the slide gate was only turned on during the daily testing period. After the

testing season when collection for transport began, the slide gate operated 24 hours a day. Fish diverted during this period again required manual release. To prevent exceeding the carrying capacities of the sample tanks, the electronic fish counters installed in the lines leading from the head boxes were monitored periodically. The sample tank was also adapted to accept a tailscreen that sectioned off 1 meter of the tank for use as a recovery area. We also designed a distinctive system for collecting the diverted fish at this dam. We constructed net-pens that were supported externally by plastic pipe frames extending the width and depth of the sample tank. The net-pens included removable internal supports to keep the nets stretched tight during sampling.

Once each hourly sample was complete, we stopped the water flow from the head box, moved the net-pen to the end of the sample tank, removed the internal support, and placed it into the next pen, which was set in place to receive the next sample. We then resumed the water flow from the head box to begin the next test. We removed the sampled fish from the net-pen using a sanctuary dip-net and anesthetized them. We next scanned for PIT tags, identified and counted the fish by species, and recorded any injuries or descaling. We measured all PIT-tagged fish to fork length (mm) and weighed (g) all wild PIT-tagged fish. Finally, we allowed all fish to recover in the section of the sample tank behind the tailscreen prior to releasing them into the flumes leading back to the river.

Results and Discussion

During the testing season, we performed 146 successful tests on both the A and B flumes. Several tests were aborted due to mechanical, electrical, procedural and debris-flow problems.

We also conducted tests early on those days with heavy, water-borne debris loads to limit injury and/or descaling that occurred when heavy debris loads accumulated in the net-pens.

The highest hourly facility counts tested were 5,700 and 7,300 for the A and B flumes, respectively (Table 7 and Appendix Tables 16-23). For the A flume, the number of untagged fish diverted per slide-gate cycle ranged from 0.70 at counts between 1,001 and 2,000 fish per hour to 1.99 when counts were between 5,001 and 6,000 fish per hour. For the B flume, the number of untagged fish diverted per slide-gate cycle ranged from 0.70 at counts from 0 to 1,000 fish per hour to 3.23 at counts from 7,001 to 8,000 fish per hour.

The overall injury/descaling rates of 17.2% for spring/summer/fall chinook salmon juveniles, 12.8% for steelhead smolts, 30.0% for sockeye salmon smolts, and 10.6% for coho salmon smolts were higher than those measured in the collection facility's daily sample and higher than those observed during previous evaluations of similar systems at three upstream collector dams on the Snake River. The higher rates observed at McNary Dam were likely due to fish having passed several previous dams, handling necessitated by the slide-gate study, and continuously high debris loads throughout the facility and diversion system. Of the 83 mortalities observed during testing, only 1 was attributable to the slide-gate; the remainder were dead prior to passing through it.

We encountered several mechanical, electronic, and procedural problems during testing. Of those that did occur, we corrected all but two prior to the end of testing. The two problems we could not correct were unstable flows in both flumes and the inability to provide volitional egress of diverted fish from the sample tanks. Fluctuating flows in the flumes allowed some fish to swim more easily against the flows in the area of the diversion systems, thus diminishing the

Table 7. Summary of the PIT-tag diversion system test results at McNary Dam in 1995.

Hourly fish counts	Number of tests	Untagged fish per cycle	Standard error	Expected value
		Flume A		
0-1,000	81	1.03	0.06	0.13
1,001-2,000	42	0.70	0.06	0.33
2,001-3,000	13	0.79	0.06	0.56
3,001-4,000	7	0.97	0.06	0.76
4,001-5,000	2	1.79	0.05	0.97
5,001-6,000	1	1.99	0.00	1.27
Totals and Averages	146	0.88	0.22	0.28
		Flume B		
0-1,000	67	0.70	0.05	0.15
1,001-2,000	53	0.77	0.06	0.33
2,001-3,000	20	1.07	0.07	0.56
3,001-4,000	3	1.05	0.04	0.72
4,001-5,000	0	----	----	----
5,001-6,000	1	1.47	0.00	1.16
6,001-7,000	1	2.17	0.00	1.51
7,001-8,000	1	3.23	0.00	1.62
Totals and Averages	146	0.80	0.23	0.31

effectiveness of diverting PIT-tagged fish. However, we covered the majority of the flumes to eliminate light and this lessened the fishes rheotactic responses to flow and improved slide-gate efficiency. Volitional egress, however, will not be possible until the sample tanks are modified.

Overall, the results of the PIT-tag diversion system tests indicated that the system operated well and at a high level of efficiency. Test results were comparable to those obtained during testing of similar systems at Lower Granite Dam in 1991, Little Goose Dam in 1993, and Lower Monumental Dam in 1994. The McNary Dam system is operational and ready for use in research and/or monitoring programs. It is easy to operate and fine-tune, and will be an important component of future research projects.

MARINE MAMMAL ABRASIONS-LOWER GRANITE DAM

We continued to monitor the prevalence of marine mammal tooth and claw abrasions on adult spring/summer chinook salmon at Lower Granite Dam during 1995. Prevalence averaged 17.8% on adults examined, with 30.4% of the abrasions consisting of open wounds of varying severity (Table 8). As in the past, abrasion prevalence was generally higher during the early portion of the run (Matthews et al. 1992; Achord et al. 1992; Harmon et al. 1993, 1995, 1996). With the levels of abrasions observed, it is quite likely that marine mammals continue to negatively affect depressed runs of Snake River spring/summer chinook salmon.

Table 8. Weekly prevalence (27 April to 8 August) of marine mammal abrasions on adult spring/summer chinook salmon at Lower Granite Dam in 1995.

Date	Sample size	Incidence (%)
27-30 April	7	28.6
1-7 May	21	14.3
8-14 May	40	20.0
15-21 May	46	23.9
22-28 May	82	23.2
29 May-4 June	94	17.0
5-11 June	43	16.3
12-18 June	38	10.5
19-25 June	29	13.8
26 June-2 July	43	14.0
3-9 July	39	17.9
10-16 July	24	16.7
17-23 July	8	12.5
24-30 July	1	0.0
31 July-6 August	3	0.0
Total	518	Average 17.8*

* Open wounds were associated with 30.4% of the abrasions.

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Appendix

Data Tables

Appendix Table 1.0. Summary of fall chinook salmon marked at McNary Dam in 1995 for transportation studies.

Replicate number	Marking period	Wire-tag code	Number released
		Inriver (McNary Dam tailrace)	
1	21-25 June	23-29-06	15,001
2	25-27 June	23-29-07	14,728
3	27-28 June	23-29-08	15,026
4	29 June-1 July	23-29-09	15,028
5	1-3 July	23-29-10	14,953
6	3-7 July	23-29-11	15,045
7	7-12 July	23-29-12	14,997
8	12-19 July	23-29-13	15,125
9	19-22 July	23-27-16	15,178
10	22-24 July	23-27-17	15,008
11	24 July-17 August	23-27-18	16,137
		Total	166,226
		Transport (below Bonneville Dam)	
1	21-25 June	23-28-06	12,017
2	25-27 June	23-28-34	11,862
3	27-28 June	23-28-63	12,023
4	29 June-1 July	23-29-01	12,000
5	1-3 July	23-29-02	12,007
6	4-7 July	23-29-03	12,047
7	7-12 July	23-29-04	11,999
8	12-19 July	23-29-05	12,019
9	19-22 July	23-27-14	12,102
10	22-24 July	23-27-15	12,417
11	24 July-17 August	23-27-19	13,180
		Total	133,673

Appendix Table 2.0. Tag loss and mortality of tagged fall chinook salmon that were held 24 hours at McNary Dam in 1995.

	Transports			Controls		
Date	Number held	Lost tags	mortality	Number held	Lost tags	mortality
22 June	25	1	0	25	0	0
23 June	25	0	0	25	0	0
24 June	50	0	0	25	0	0
25 June	0	0	0	25	0	0
27 June	24	0	0	26	0	0
28 June	24	0	0	25	0	0
30 June	25	2	0	26	0	0
1 July	25	1	0	25	0	1
2 July	25	3	0	25	0	1
3 July	25	0	0	25	0	1
4 July	25	0	0	25	0	0
5 July	25	0	0	25	0	1
6 July	25	0	0	25	0	1
10 July	24	0	0	25	1	0
11 July	25	3	0	24	0	0
12 July	25	0	0	24	1	0
13 July	24	0	0	25	0	0
17 July	25	0	0	25	0	0
20 July	25	0	1	25	1	2
21 July	26	1	0	25	0	0
22 July	25	0	0	24	0	2
23 July	25	0	1	24	0	2
24 July	25	0	2	25	0	0
25 July	25	0	0	25	1	0
26 July	25	0	0	24	2	1
2 August	26	0	0	25	0	0
3 August	25	0	0	26	0	1
4 August	25	0	0	25	0	1
7 August	25	0	0	26	1	0
8 August	25	0	0	25	0	0
9 August	25	0	0	25	0	0
10 August	24	0	0	25	0	0
15 August	25	0	0	24	0	0
16 August	25	0	0	25	0	1
17 August	25	1	0	24	0	1
Total	872	12	4	872	7	16
% tag loss and mortality		1.4	0.5		0.8	1.8

Appendix Table 3.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point in 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207A 9207B 9207C 9207D 9207E 9207F

1992 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAL 1 RASU1 RASU2 RASU3 RASU4 RAZ 1
Wire Codes Used: 232445 232447 232448 232449 232450 232444

NUMBER RELEASED: 55366

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	32	46	4	0	82	0.148
OCEAN FISHERIES							
BRITISH COLUMBIA	0	0	1	0	0	1	0.002
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	2	0	0	0	2	0.004
SNAKE R.	0	8	4	1	0	13	0.023
CLEARWATER R.	0	4	0	0	0	4	0.007
OTHER RIVERS	0	0	3	0	0	3	0.005
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	2	4	0	0	6	0.011
HATCHERIES							
DESCHUTES R. HATCHERIES	1	0	0	0	0	1	0.002
SAWTOOTH H. AND TRAP	0	1	0	0	0	1	0.002
BIG CANYON TRAP	0	1	0	0	0	1	0.002
STREAM SURVEY	0	1	0	0	0	1	0.002
TOTALS	1	51	58	5	0	115	0.208
PERCENT OF RECOVERY %	0.9	44.3	50.4	4.3	0.0		

Appendix Table 3.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 4 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207A

1992 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAL 1
Wire Codes Used: 232445

NUMBER RELEASED: 9199

RECOVERY AREA		YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS								
LOWER GRANITE TRAP		0	12	20	0	0	32	0.348
OCEAN FISHERIES								
BRITISH COLUMBIA		0	0	1	0	0	1	0.011
RIVER SPORT								
SNAKE R.		0	4	2	1	0	7	0.076
CLEARWATER R.		0	2	0	0	0	2	0.022
OTHER RIVERS		0	0	1	0	0	1	0.011
RIVER COMMERCIAL		0	0	0	0	0	0	0.000
INDIAN FISHERIES								
FALL INDIAN NET		0	0	2	0	0	2	0.022
HATCHERIES								
BIG CANYON TRAP		0	1	0	0	0	1	0.011
STREAM SURVEY		0	0	0	0	0	0	0.000
TOTALS		0	19	26	1	0	46	0.500
PERCENT OF RECOVERY	%	0.0	41.3	56.5	2.2	0.0		

Appendix Table 3.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 10 May 1992

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207B

1992 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RASU1
Wire Codes Used: 232447

NUMBER RELEASED: 9418

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	4	9	0	0	13	0.138
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	2	0	0	0	2	0.021
SNAKE R.	0	2	0	0	0	2	0.021
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	0	1	0	0	1	0.011
HATCHERIES	0	0	0	0	0	0	0.000
STREAM SURVEY	0	1	0	0	0	1	0.011
TOTALS	0	9	10	0	0	19	0.202
PERCENT OF RECOVERY %	0.0	47.4	52.6	0.0	0.0		

Appendix Table 3.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 12 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207C

1992 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RASU2
Wire Codes Used: 232448

NUMBER RELEASED: 9137

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	3	2	1	0	6	0.066
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.	0	0	1	0	0	1	0.011
OTHER RIVERS	0	0	1	0	0	1	0.011
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	0	1	0	0	1	0.011
HATCHERIES	0	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	3	5	1	0	9	0.099
PERCENT OF RECOVERY %	0.0	33.3	55.6	11.1	0.0		

Appendix Table 3.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 16 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207D

1992 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RASU3
Wire Codes Used: 232449

NUMBER RELEASED: 9118

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	5	7	1	0	13	0.143
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.	0	2	0	0	0	2	0.022
OTHER RIVERS	0	0	1	0	0	1	0.011
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	2	0	0	0	2	0.022
HATCHERIES							
SAWTOOTH H. AND TRAP	0	1	0	0	0	1	0.011
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	10	8	1	0	19	0.208
PERCENT OF RECOVERY %	0.0	52.6	42.1	5.3	0.0		

Appendix Table 3.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 18 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207E

1992 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RASU4
Wire Codes Used: 232450

NUMBER RELEASED: 9220

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	5	6	2	0	13	0.141
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.	0	0	1	0	0	1	0.011
CLEARWATER R.	0	1	0	0	0	1	0.011
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0	0.000
HATCHERIES							
DESCHUTES R. HATCHERIES	1	0	0	0	0	1	0.011
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	1	6	7	2	0	16	0.174
PERCENT OF RECOVERY %	6.3	37.5	43.8	12.5	0.0		

Appendix Table 3.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 22 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9207F

1992 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAZ 1
Wire Codes Used: 232444

NUMBER RELEASED: 9274

RECOVERY AREA		YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	3	2	0	0	5	0.054
OCEAN FISHERIES		0	0	0	0	0	0	0.000
RIVER SPORT CLEARWATER R.		0	1	0	0	0	1	0.011
RIVER COMMERCIAL		0	0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0	0.000
HATCHERIES		0	0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0	0.000
TOTALS		0	4	2	0	0	6	0.065
PERCENT OF RECOVERY	%	0.0	66.7	33.3	0.0	0.0		

Appendix Table 4.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam in 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208A 9208B 9208C 9208D 9208E 9208F

1992 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 1 LAF 3 LAF 4 LAV 1 LAV 2 LAV 3
Wire Codes Used: 232419 232417 232418 232420 232421 232422

NUMBER RELEASED: 60577

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	32	62	4	0	98	0.162
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	2	2	0	0	4	0.007
SNAKE R.	0	6	8	0	0	14	0.023
CLEARWATER R.	0	0	4	0	0	4	0.007
OTHER RIVERS	0	0	10	0	0	10	0.017
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	1	3	0	0	4	0.007
HATCHERIES							
PAHSIMEROI H.	0	0	1	0	0	1	0.002
DESCHUTES R. HATCHERIES	0	0	1	0	0	1	0.002
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	41	91	4	0	136	0.225
PERCENT OF RECOVERY %	0.0	30.1	66.9	2.9	0.0		

Appendix Table 4.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 4 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208A

1992 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 1
Wire Codes Used: 232419

NUMBER RELEASED: 9740

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	12	22	2	0	36	0.370
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	0	1	0	0	1	0.010
SNAKE R.	0	4	1	0	0	5	0.051
OTHER RIVERS	0	0	4	0	0	4	0.041
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	0	1	0	0	1	0.010
HATCHERIES	0	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	16	29	2	0	47	0.483
PERCENT OF RECOVERY %	0.0	34.0	61.7	4.3	0.0		

Appendix Table 4.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 10 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208B

1992 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 3
Wire Codes Used: 232417

NUMBER RELEASED: 10285

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	11	25	1	0	37	0.360
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	1	1	0	0	2	0.019
SNAKE R.	0	2	6	0	0	8	0.078
CLEARWATER R.	0	0	2	0	0	2	0.019
OTHER RIVERS	0	0	4	0	0	4	0.039
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0	0.000
HATCHERIES							
PAHSIMEROI H.	0	0	1	0	0	1	0.010
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	14	39	1	0	54	0.525
PERCENT OF RECOVERY %	0.0	25.9	72.2	1.9	0.0		

Appendix Table 4.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 12 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208C

1992 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 4
Wire Codes Used: 232418

NUMBER RELEASED: 10149

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	5	11	1	0	17	0.168
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.	0	0	1	0	0	1	0.010
CLEARWATER R.	0	0	2	0	0	2	0.020
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	1	1	0	0	2	0.020
HATCHERIES	0	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	6	15	1	0	22	0.217
PERCENT OF RECOVERY %	0.0	27.3	68.2	4.5	0.0		

Appendix Table 4.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 16 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208D

1992 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LAV 1
Wire Codes Used: 232420

NUMBER RELEASED: 10073

RECOVERY AREA		YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	0	3	0	0	3	0.030
OCEAN FISHERIES		0	0	0	0	0	0	0.000
RIVER SPORT OTHER RIVERS		0	0	1	0	0	1	0.010
RIVER COMMERCIAL		0	0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0	0.000
HATCHERIES		0	0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0	0.000
TOTALS		0	0	4	0	0	4	0.040
PERCENT OF RECOVERY	%	0.0	0.0	100.0	0.0	0.0		

Appendix Table 4.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 18 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208E

1992 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAV 2
Wire Codes Used: 232421

NUMBER RELEASED: 10112

RECOVERY AREA	YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP	0	3	1	0	0	4	0.040
OCEAN FISHERIES	0	0	0	0	0	0	0.000
RIVER SPORT							
COLUMBIA R. BELOW SNAKE R.	0	1	0	0	0	1	0.010
OTHER RIVERS	0	0	1	0	0	1	0.010
RIVER COMMERCIAL	0	0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET	0	0	1	0	0	1	0.010
HATCHERIES							
DESCHUTES R. HATCHERIES	0	0	1	0	0	1	0.010
STREAM SURVEY	0	0	0	0	0	0	0.000
TOTALS	0	4	4	0	0	8	0.079
PERCENT OF RECOVERY %	0.0	50.0	50.0	0.0	0.0		

Appendix Table 4.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 22 May 1992.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9208F

1992 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAV 3
Wire Codes Used: 232422

NUMBER RELEASED: 10218

RECOVERY AREA		YEAR OF RETURN 1992	1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	1	0	0	0	1	0.010
OCEAN FISHERIES		0	0	0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0	0.000
HATCHERIES		0	0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0	0.000
TOTALS		0	1	0	0	0	1	0.010
PERCENT OF RECOVERY	%	0.0	100.0	0.0	0.0	0.0		

Appendix Table 5.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point in 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301A 9301B 9301C 9301D 9301E 9301F 9301G

1993 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAPI1 RAPI2 RAPI3 RAPI4 RAP 1 RAP 2 RAP 3
Wire Codes Used: 232960 232961 232962 232963 233001 233002 233003

NUMBER RELEASED: 62348

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	35	63	0	98	0.157
OCEAN FISHERIES						
WASHINGTON	0	0	1	0	1	0.002
RIVER SPORT						
COLUMBIA R. BELOW SNAKE R.	0	3	0	0	3	0.005
SNAKE R.	0	3	3	0	6	0.010
OTHER RIVERS	0	3	0	0	3	0.005
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES						
FALL INDIAN NET	0	1	0	0	1	0.002
HATCHERIES						
PAHSIMEROI H.	0	1	0	0	1	0.002
DESCHUTES R. HATCHERIES	0	2	0	0	2	0.003
SAWTOOTH H. AND TRAP	0	2	0	0	2	0.003
BIG SHEEP CR. TRAP	0	1	0	0	1	0.002
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	51	67	0	118	0.189
PERCENT OF RECOVERY %	0.0	43.2	56.8	0.0		

Appendix Table 5.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 16 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301A

1993 L.GRANITE — LGR RELEASE SITE — TONGUE POINT

STEELHEAD

Brands Used: RAPI1
Wire Codes Used: 232960

NUMBER RELEASED: 9083

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	6	6	0	12	0.132
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.		0	1	0	0	1	0.011
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET		0	1	0	0	1	0.011
HATCHERIES		0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	8	6	0	14	0.154
PERCENT OF RECOVERY	%	0.0	57.1	42.9	0.0		

Appendix Table 5.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 18 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301B

1993 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAPI2
Wire Codes Used: 232961

NUMBER RELEASED: 9074

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	8	6	0	14	0.154
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.		0	1	0	0	1	0.011
OTHER RIVERS		0	2	0	0	2	0.022
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0.000
HATCHERIES							
PAHSIMEROI H.		0	1	0	0	1	0.011
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	12	6	0	18	0.198
PERCENT OF RECOVERY	%	0.0	66.7	33.3	0.0		

Appendix Table 5.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 23 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301C

1993 L.GRANITE — LGR RELEASE SITE — TONGUE POINT

STEELHEAD

Brands Used: RAPI3
Wire Codes Used: 232962

NUMBER RELEASED: 8920

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	2	4	0	6	0.067
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0.000
HATCHERIES							
BIG SHEEP CR. TRAP		0	1	0	0	1	0.011
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	3	4	0	7	0.078
PERCENT OF RECOVERY	%	0.0	42.9	57.1	0.0		

Appendix Table 5.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 25 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301D

1993 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAPI4
Wire Codes Used: 232963

NUMBER RELEASED: 8834

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	6	1	0	7	0.079
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
COLUMBIA R. BELOW SNAKE R.	0	1	0	0	1	0.011
OTHER RIVERS	0	1	0	0	1	0.011
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0.000
HATCHERIES						
DESCHUTES R. HATCHERIES	0	1	0	0	1	0.011
SAWTOOTH H. AND TRAP	0	2	0	0	2	0.023
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	11	1	0	12	0.136
PERCENT OF RECOVERY %	0.0	91.7	8.3	0.0		

Appendix Table 5.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 29 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301E

1993 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAP 1
Wire Codes Used: 233001

NUMBER RELEASED: 8930

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	7	19	0	26	0.291
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
COLUMBIA R. BELOW SNAKE R.	0	1	0	0	1	0.011
SNAKE R.	0	0	2	0	2	0.022
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0.000
HATCHERIES	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	8	21	0	29	0.325
PERCENT OF RECOVERY %	0.0	27.6	72.4	0.0		

Appendix Table 5.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 1 Jun 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301F

1993 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAP 2
Wire Codes Used: 233002

NUMBER RELEASED: 9111

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	2	5	0	7	0.077
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0.000
HATCHERIES		0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	2	5	0	7	0.077
PERCENT OF RECOVERY	%	0.0	28.6	71.4	0.0		

Appendix Table 5.7. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 4 Jun 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9301G

1993 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAP 3
Wire Codes Used: 233003

NUMBER RELEASED: 8396

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	4	22	0	26	0.310
OCEAN FISHERIES						
WASHINGTON	0	0	1	0	1	0.012
RIVER SPORT						
COLUMBIA R. BELOW SNAKE R.	0	1	0	0	1	0.012
SNAKE R.	0	1	1	0	2	0.024
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0.000
HATCHERIES						
DESCHUTES R. HATCHERIES	0	1	0	0	1	0.012
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	7	24	0	31	0.369
PERCENT OF RECOVERY %	0.0	22.6	77.4	0.0		

Appendix Table 6.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam in 1993

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302A 9302B 9302C 9302D 9302E 9302F 9302G

1993 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LA3 1 LA3 2 LA3 3 LA3 4 LA2 1 LA2 2 LA2 3
Wire Codes Used: 233005 233006 233011 233012 233013 233014 233015

NUMBER RELEASED: 65987

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	47	81	0	128	0.194
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
SNAKE R.	0	5	4	0	9	0.014
CLEARWATER R.	0	1	0	0	1	0.002
OTHER RIVERS	0	2	0	0	2	0.003
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES						
FALL INDIAN NET	0	2	2	0	4	0.006
HATCHERIES						
PAHSIMEROI H.	0	1	0	0	1	0.002
SAWTOOTH H. AND TRAP	0	2	0	0	2	0.003
BIG SHEEP CR. TRAP	0	1	0	0	1	0.002
BIG CANYON TRAP	0	1	0	0	1	0.002
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	62	87	0	149	0.226
PERCENT OF RECOVERY %	0.0	41.6	58.4	0.0		

Appendix Table 6.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 16 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302A

1993 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LA3 1
Wire Codes Used: 233005

NUMBER RELEASED: 8858

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	6	17	0	23	0.260
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
SNAKE R.	0	2	0	0	2	0.023
OTHER RIVERS	0	1	0	0	1	0.011
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0.000
HATCHERIES	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	9	17	0	26	0.294
PERCENT OF RECOVERY %	0.0	34.6	65.4	0.0		

Appendix Table 6.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 18 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302B

1993 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LA3 2
Wire Codes Used: 233006

NUMBER RELEASED: 10086

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	1	0	0	1	0.010
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0.000
HATCHERIES							
BIG SHEEP CR. TRAP		0	1	0	0	1	0.010
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	2	0	0	2	0.020
PERCENT OF RECOVERY	%	0.0	100.0	0.0	0.0		

Appendix Table 6.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 22 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302C

1993 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LA3 3
Wire Codes Used: 233011

NUMBER RELEASED: 9885

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	4	7	0	11	0.111
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.		0	0	1	0	1	0.010
CLEARWATER R.		0	1	0	0	1	0.010
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0	0.000
HATCHERIES		0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	5	8	0	13	0.132
PERCENT OF RECOVERY	%	0.0	38.5	61.5	0.0		

Appendix Table 6.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 24 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302D

1993 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LA3 4
Wire Codes Used: 233012

NUMBER RELEASED: 9843

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	16	15	0	31	0.315
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
SNAKE R.	0	1	1	0	2	0.020
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES						
FALL INDIAN NET	0	1	0	0	1	0.010
HATCHERIES						
PAHSIMEROI H.	0	1	0	0	1	0.010
SAWTOOTH H. AND TRAP	0	1	0	0	1	0.010
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	20	16	0	36	0.366
PERCENT OF RECOVERY %	0.0	55.6	44.4	0.0		

Appendix Table 6.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 29 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302E

1993 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LA2 1
Wire Codes Used: 233013

NUMBER RELEASED: 10097

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	11	15	0	26	0.258
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.		0	1	0	0	1	0.010
OTHER RIVERS		0	1	0	0	1	0.010
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET		0	1	1	0	2	0.020
HATCHERIES							
SAWTOOTH H. AND TRAP		0	1	0	0	1	0.010
BIG CANYON TRAP		0	1	0	0	1	0.010
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	16	16	0	32	0.317
PERCENT OF RECOVERY	%	0.0	50.0	50.0	0.0		

Appendix Table 6.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 31 May 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302F

1993 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LA2 2
Wire Codes Used: 233014

NUMBER RELEASED: 8411

RECOVERY AREA	YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP	0	3	12	0	15	0.178
OCEAN FISHERIES	0	0	0	0	0	0.000
RIVER SPORT						
SNAKE R.	0	0	1	0	1	0.012
RIVER COMMERCIAL	0	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0	0.000
HATCHERIES	0	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0	0.000
TOTALS	0	3	13	0	16	0.190
PERCENT OF RECOVERY %	0.0	18.8	81.3	0.0		

Appendix Table 6.7. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 4 Jun 1993.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9302G

1993 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LA2 3
Wire Codes Used: 233015

NUMBER RELEASED: 8807

RECOVERY AREA		YEAR OF RETURN 1993	1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS							
LOWER GRANITE TRAP		0	6	15	0	21	0.238
OCEAN FISHERIES		0	0	0	0	0	0.000
RIVER SPORT							
SNAKE R.		0	1	1	0	2	0.023
RIVER COMMERCIAL		0	0	0	0	0	0.000
INDIAN FISHERIES							
FALL INDIAN NET		0	0	1	0	1	0.011
HATCHERIES		0	0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0	0.000
TOTALS		0	7	17	0	24	0.273
PERCENT OF RECOVERY	%	0.0	29.2	70.8	0.0		

Appendix Table 7.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point in 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401A 9401B 9401C 9401D 9401E 9401F 9401G 9401H

1994 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAV 1 RAV 2 RAV 3 RAV 4 RAPP1 RAPP2 RASU2 RASU3
Wire Codes Used: 233004 232357 232424 232437 232439 232441 232443 233017

NUMBER RELEASED: 58912

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP		0	64	0	64	0.109
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT						
SNAKE R.		0	2	0	2	0.003
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	66	0	66	0.112
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 16 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401A

1994 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAV 1
Wire Codes Used: 233004

NUMBER RELEASED: 9116

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	18	0	18	0.197
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	18	0	18	0.197
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 18 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401B

1994 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAV 2
Wire Codes Used: 232357

NUMBER RELEASED: 8679

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	10	0	10	0.115
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT SNAKE R.		0	1	0	1	0.012
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	11	0	11	0.127
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 22 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401C

1994 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAV 3
Wire Codes Used: 232424

NUMBER RELEASED: 9140

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	11	0	11	0.120
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	11	0	11	0.120
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 24 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401D

1994 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAV 4
Wire Codes Used: 232437

NUMBER RELEASED: 8363

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	6	0	6	0.072
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	6	0	6	0.072
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 29 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401E

1994 L.GRANITE | LGR RELEASE SITE | TONGUE POINT

STEELHEAD

Brands Used: RAPP1
Wire Codes Used: 232439

NUMBER RELEASED: 8767

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP		0	11	0	11	0.125
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT						
SNAKE R.		0	1	0	1	0.011
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	12	0	12	0.137
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 31 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401F

1994 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RAPP2
Wire Codes Used: 232441

NUMBER RELEASED: 4757

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	4	0	4	0.084
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	4	0	4	0.084
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 7.7. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to Tongue Point on 2 Jun 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9401G

1994 L.GRANITE LGR RELEASE SITE TONGUE POINT

STEELHEAD

Brands Used: RASU2
Wire Codes Used: 232443

NUMBER RELEASED: 7054

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	4	0	4	0.057
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	4	0	4	0.057
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 8.0. Summary of all recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam in 1994

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402A 9402B 9402C 9402D 9402E 9402F 9402G 9402H

1994 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 1 LAF 2 LAF 3 LAF 4 LAS 1 LAS 2 LAAN2 LAAN3
Wire Codes Used: 233016 232356 232423 232436 232438 232440 232442 233018

NUMBER RELEASED: 66776

RECOVERY AREA	YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS					
LOWER GRANITE TRAP	0	25	0	25	0.037
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
CLEARWATER R.	0	1	0	1	0.001
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERIES					
FALL INDIAN NET	0	1	0	1	0.001
HATCHERIES	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0.000
TOTALS	0	27	0	27	0.040
PERCENT OF RECOVERY %	0.0	100.0	0.0		

Appendix Table 8.1. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 16 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402A

1994 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 1
Wire Codes Used: 233016

NUMBER RELEASED: 9878

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	3	0	3	0.030
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	3	0	3	0.030
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 8.2. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 18 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402B

1994 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 2
Wire Codes Used: 232356

NUMBER RELEASED: 9965

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	1	0	1	0.010
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	1	0	1	0.010
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 8.3. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 22 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402C

1994 L.GRANITE | LGR RELEASE SITE | BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 3
Wire Codes Used: 232423

NUMBER RELEASED: 10282

RECOVERY AREA	YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP	0	2	0	2	0.019
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT	0	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERIES	0	0	0	0	0.000
HATCHERIES	0	0	0	0	0.000
STREAM SURVEY	0	0	0	0	0.000
TOTALS	0	2	0	2	0.019
PERCENT OF RECOVERY %	0.0	100.0	0.0		

Appendix Table 8.4. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 24 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402D

1994 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAF 4
Wire Codes Used: 232436

NUMBER RELEASED: 9944

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP		0	9	0	9	0.091
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES						
FALL INDIAN NET		0	1	0	1	0.010
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	10	0	10	0.101
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 8.5. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 29 May 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402E

1994 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAS 1
Wire Codes Used: 232438

NUMBER RELEASED: 9410

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS						
LOWER GRANITE TRAP		0	6	0	6	0.064
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT						
CLEARWATER R.		0	1	0	1	0.011
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	7	0	7	0.074
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 8.6. Recoveries of adult steelhead transported as juveniles by barge from Lower Granite Dam to below Bonneville Dam on 2 Jun 1994.

Master File Date : 9 January 1996
RELEASE GROUPS INCLUDED: 9402G

1994 L.GRANITE LGR RELEASE SITE BELOW BONNEVILLE

STEELHEAD

Brands Used: LAAN2
Wire Codes Used: 232442

NUMBER RELEASED: 7994

RECOVERY AREA		YEAR OF RETURN 1994	1995	1996	TOTAL	% RETURN
RIVER SYSTEM TRAPS LOWER GRANITE TRAP		0	4	0	4	0.050
OCEAN FISHERIES		0	0	0	0	0.000
RIVER SPORT		0	0	0	0	0.000
RIVER COMMERCIAL		0	0	0	0	0.000
INDIAN FISHERIES		0	0	0	0	0.000
HATCHERIES		0	0	0	0	0.000
STREAM SURVEY		0	0	0	0	0.000
TOTALS		0	4	0	4	0.050
PERCENT OF RECOVERY	%	0.0	100.0	0.0		

Appendix Table 9.0. Total yearling spring/summer chinook salmon collected and tagged by date at Lower Granite Dam. 1995.

	Facility collection			Number tagged							Percent of collection tagged			Post-tagging mortality					
				In-River			Transports			Total				In-River			Transports		
Date	H*	W*	T*	H	W	T	H	W	T	tagged	H	W	T	H	W	T	H	W	T
08-Apr	1490	3410	4900	81	186	267	63	152	215	482	9.7%	9.9%	9.8%	0	0	0	0	0	0
09-Apr	1078	4022	5100	51	195	246	45	159	204	450	8.9%	8.8%	8.8%	0	0	0	0	0	0
10-Apr	1800	7679	9479	90	381	471	71	297	368	839	8.9%	8.8%	8.9%	0	1	1	0	0	0
11-Apr	4020	11832	15852	211	580	791	143	468	611	1402	8.8%	8.9%	8.8%	1	10	11	0	1	1
12-Apr	6878	12544	19422	292	621	913	279	425	704	1617	8.3%	8.3%	8.3%	0	1	1	0	0	0
13-Apr	11989	16433	28422	551	863	1414	510	589	1099	2513	8.8%	8.8%	8.8%	1	1	2	1	1	2
14-Apr	17197	19665	36862	599	1045	1644	385	956	1341	2985	5.7%	10.2%	8.1%	2	4	6	2	1	3
15-Apr	13200	14250	27450	437	756	1193	293	682	975	2168	5.5%	10.1%	7.9%	8	7	15	0	0	0
16-Apr	14450	14700	29150	633	1117	1750	288	561	849	2599	6.4%	11.4%	8.9%	2	10	12	0	0	0
17-Apr	23200	21200	44400	2286	2183	4469	1499	1233	2732	7201	16.3%	16.1%	16.2%	18	35	53	0	1	1
18-Apr	57550	23250	80800	3795	2242	6037	3048	1495	4543	10580	11.9%	16.1%	13.1%	60	75	135	3	7	10
19-Apr	38200	16800	55000	2267	1169	3436	2233	1187	3420	6856	11.8%	14.0%	12.5%	30	29	59	1	0	1
20-Apr	42400	20200	62600	2188	1148	3336	1980	900	2880	6216	9.8%	10.1%	9.9%	13	11	24	5	4	9
21-Apr	46500	20500	67000	3020	1115	4135	2609	1117	3726	7861	12.1%	10.9%	11.7%	8	8	16	0	0	0
22-Apr	45900	12600	58500	2943	971	3914	2591	550	3141	7055	12.1%	12.1%	12.1%	39	25	64	0	0	0
23-Apr	37900	10000	47900	2308	704	3012	1946	548	2494	5506	11.2%	12.5%	11.5%	9	7	16	0	0	0
24-Apr	35800	7900	43700	2785	698	3483	2152	556	2708	6191	13.8%	15.9%	14.2%	33	16	49	0	0	0
25-Apr	43800	7800	51600	3506	472	3978	2477	454	2931	6909	13.7%	11.9%	13.4%	29	7	36	2	0	2
26-Apr	68200	13900	82100	3546	735	4281	3355	700	4055	8336	10.1%	10.3%	10.2%	76	24	100	4	2	6
27-Apr	77100	16650	93750	3888	762	4650	3458	633	4091	8741	9.5%	8.4%	9.3%	72	18	90	8	2	10
28-Apr	153300	18150	171450	5826	934	6760	5859	830	6689	13449	7.6%	9.7%	7.8%	155	25	180	50	4	54
29-Apr	238500	23550	262050	5393	829	6222	3618	438	4056	10278	3.8%	5.4%	3.9%	154	16	170	14	3	17
30-Apr	144300	16050	160350	7040	854	7894	5582	711	6293	14187	8.7%	9.8%	8.8%	189	26	215	28	5	33
01-May	151350	22050	173400	5481	779	6260	5047	812	5859	12119	7.0%	7.2%	7.0%	129	19	148	30	1	31
02-May	288000	29250	317250	2300	307	2607	2627	349	2976	5583	1.7%	2.2%	1.8%	26	7	33	4	0	4
03-May	198000	30600	228600	7259	886	8145	3730	576	4306	12451	5.6%	4.8%	5.4%	131	23	154	26	3	29
04-May	100800	22350	123150	6412	1230	7642	3861	516	4377	12019	10.2%	7.8%	9.8%	149	29	178	4	2	6
05-May	108600	16050	124650	3620	449	4069	3061	288	3349	7418	6.2%	4.6%	6.0%	69	14	83	1	0	1
06-May	81000	10650	91650	5551	664	6215	3848	522	4370	10585	11.6%	11.1%	11.5%	57	13	70	1	0	1
07-May	72600	9150	81750	3870	524	4394	3074	422	3496	7890	9.6%	10.3%	9.7%	78	11	89	4	0	4
08-May	95850	11700	107550	2144	265	2409	1274	152	1426	3835	3.6%	3.6%	3.6%	4	1	5	0	0	0
09-May	123450	17100	140550	2909	487	3396	2220	294	2514	5910	4.2%	4.6%	4.2%	88	16	104	12	0	12
10-May	127050	28650	155700	3128	471	3599	1912	326	2238	5837	4.0%	2.8%	3.7%	19	5	24	0	0	0
11-May	66000	18450	84450	1221	493	1714	740	253	993	2707	3.0%	4.0%	3.2%	20	6	26	3	0	3
12-May	48150	16650	64800	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
13-May	50100	11400	61500	1041	271	1312	1291	216	1507	2819	4.7%	4.3%	4.6%	17	3	20	2	0	2
14-May	54600	14400	69000	656	216	872	605	157	762	1634	2.3%	2.6%	2.4%	5	1	6	0	0	0
15-May	39300	13050	52350	546	161	707	393	107	500	1207	2.4%	2.1%	2.3%	3	1	4	0	0	0
16-May	21900	7500	29400	786	174	960	671	212	883	1843	6.7%	5.1%	6.3%	2	0	2	0	0	0
17-May	19050	5700	24750	451	76	527	442	89	531	1058	4.7%	2.9%	4.3%	2	1	3	0	0	0
18-May	17400	5250	22650	390	83	473	414	79	493	966	4.6%	3.1%	4.3%	2	0	2	0	0	0
19-May	13000	2900	15900	323	55	378	349	51	400	778	5.2%	3.7%	4.9%	1	0	1	0	0	0
20-May	19200	7000	26200	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
21-May	16100	4500	20600	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
22-May	12700	5300	18000	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
23-May	14400	4700	19100	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
24-May	12400	8600	21000	864	408	1272	785	322	1107	2379	13.3%	8.5%	11.3%	9	7	16	0	0	0
25-May	11700	8900	20600	202	123	325	172	108	280	605	3.2%	2.6%	2.9%	2	0	2	0	0	0
26-May	10300	5100	15400	324	153	477	225	98	323	800	5.3%	4.9%	5.2%	2	1	3	0	0	0
27-May	10700	5300	16000	0	0	0	0	0	0	0	---	---	---	0	0	0	0	0	0
28-May	9300	8200	17500	278	241	519	264	173	437	956	5.8%	5.0%	5.5%	4	1	5	0	0	0
29-May	5900	7200	13100	452	352	804	401	322	723	1527	14.5%	9.4%	11.7%	2	2	4	0	0	0
30-May	5760	5720	11480	113	116	229	91	91	182	411	3.5%	3.6%	3.6%	1	1	2	0	0	0
31-May	3200	2520	5720	120	71	191	94	73	167	358	6.7%	5.7%	6.3%	0	0	0	0	0	0
01-Jun	5812	2789	8601	184	88	272	150	76	226	498	5.7%	5.9%	5.8%	0	1	1	0	0	0
02-Jun	2939	1577	4516	94	57	151	102	39	141	292	6.7%	6.1%	6.5%	0	0	0	0	0	0
03-Jun	4862	3790	8652	237	162	399	168	117	285	684	8.3%	7.4%	7.9%	2	1	3	0	0	0
04-Jun	5094	4893	9987	252	210	462	139	117	256	718	7.7%	6.7%	7.2%	1	0	1	0	0	0
05-Jun	4092	4158	8250	121	141	262	96	94	190	452	5.3%	5.7%	5.5%	0	2	2	0	0	0
06-Jun	4409	6830	11239	132	228	360	116	157	273	633	5.6%	5.6%	5.6%	0	3	3	0	0	0
07-Jun	3657	6279	9936	116	218	334	93	143	236	570	5.7%	5.7%	5.7%	0	0	0	0	1	1
08-Jun	2672	3591	6263	84	122	206	64	84	148	354	5.5%	5.7%	5.7%	0	0	0	0	0	0
09-Jun	1802	3561	5363	67	148	215	56	93	149	364	6.8%	6.8%	6.8%	0	1	1	0	0	0
10-Jun	1587	3189	4776	63	120	183	46	98	144	327	6.9%	6.8%	6.8%	0	1	1	0	0	0
11-Jun	1088	2065	3153	46	113	159	51	69	120	279	8.9%	8.8%	8.8%	0	1	1	0	0	0
12-Jun	821	1543	2364	39	89	128	34	47	81	209	8.9%	8.8%	8.8%	0	0	0	0	0	0
13-Jun	533	1032	1565	19	58	77	25	35	60	137	8.3%	9.0%	8.8%	0	1	1	0	0	0
14-Jun	544	622	1166	22	32	54	24	22	46	100	8.5%	8.7%	8.6%	1	0	1	0	0	0
15-Jun	500	566	1066	17	33	50	27	16	43	93	8.8%	8.7%	8.7%	0	0	0	0	0	0
16-Jun	899	1199	2098	45	51	96	32	54	86	182	8.6%	8.8%	8.7%	0	0	0	0	0	0
17-Jun	622	910	1532	31	49	80	24	32	56	136	8.8%	8.9%	8.9%	0	0	0	0	0	0
18-Jun	533	899	1432	21	51	72	23	29	52	124	8.3%	8.9%	8.7%	1	0	1	0	0	0
19-Jun	1099	1665	2764	50	88	138	45	56	101	239	8.6%	8.6%	8.6%	0	1	1	0	0	0
20-Jun	756	1589	2345	34	82	116	30	57	87	203	8.5%	8.7%	8.7%	0	0	0	0	0	0
21-Jun	933	2256	3189	48	105	153	33	95	128	281	8.7%	8.9%	8.8%	0	0	0	0	0	0
22-Jun	667	2055	2722	40	100	140	20	77	97	237	9.0%	8.6%	8.7%	0	0	0	0	0	0
23-Jun	544	2078	2622	28	101	129	18	80	98	227	8.5%	8.7%	8.7%	0	3	3	0	0	0
24-Jun	367	989	1356	22	46	68	11	41	52	120	9.0%	8.8%	8.8%	0	1	1	0	0	0
25-Jun	167	700	867	10	33	43	5	28	33	76	9.0%	8.7%	8.8%	0	1	1	0	0	0
26-Jun	333	300	633	10	22	32	5	20	25	57	4.5%	14.0%	9.0%	0	0	0	0	0	0
27-Jun	289	511	800	17	24	41	9	22	31	72	9.0%	9.0%	9.0%	0	0	0	1	0	1
28-Jun	489	822	1311	23	42	65	20	30	50	115	8.8%	8.8%	8.8%	0	1	1	0	0	0
29-Jun	456	944	1400	22	47	69	15	35	50	119	8.1%	8.7%	8.5%	1	0	1	0	0	0
30-Jun	111	744	855	6	35	41	4	30	34	75	9.0%	8.7%	8.8%	0	1	1	0	0	0
Totals	2981289	763121	3744410	106077	32310	138387	83560	24142	107702	246089	6.4%	7.4%	6.6%	1727	537	2264	206	38	244

* Note: H = Hatchery origin
W = Wild fish
T = Total number of fish

Appendix Table 10.0. Release numbers by date for yearling spring/summer chinook salmon tagged at Lower Granite Dam, 1995.

Release date	Number released: In-River H	In-River W	In-River T	Transports H	Transports W	Transports T
09-Apr	81	186	267	0	0	0
10-Apr	51	195	246	108	311	419
11-Apr	90	380	470	0	0	0
12-Apr	210	570	780	214	764	978
13-Apr	292	620	912	279	425	704
14-Apr	550	862	1412	509	588	1097
15-Apr	597	1041	1638	383	955	1338
16-Apr	429	749	1178	0	0	0
17-Apr	631	1107	1738	581	1243	1824
18-Apr	2268	2148	4416	1499	1232	2731
19-Apr	3735	2167	5902	3045	1488	4533
20-Apr	2237	1140	3377	2232	1187	3419
21-Apr	2175	1137	3312	1975	896	2871
22-Apr	3012	1107	4119	2609	1117	3726
23-Apr	2904	946	3850	2591	550	3141
24-Apr	2299	697	2996	1946	548	2494
25-Apr	2752	682	3434	2152	556	2708
26-Apr	3477	465	3942	2475	454	2929
27-Apr	3470	711	4181	3351	698	4049
28-Apr	3816	744	4560	3450	631	4081
29-Apr	5671	909	6580	5809	826	6635
30-Apr	5239	813	6052	3604	435	4039
01-May	6851	828	7679	5554	706	6260
02-May	5352	760	6112	5017	811	5828
03-May	2274	300	2574	2623	349	2972
04-May	7128	863	7991	3704	573	4277
05-May	6263	1201	7464	3857	514	4371
06-May	3551	435	3986	3060	288	3348
07-May	5494	651	6145	3847	522	4369
08-May	3792	513	4305	3070	422	3492
09-May	2140	264	2404	1274	152	1426
10-May	2821	471	3292	2208	294	2502
11-May	3109	466	3575	1912	326	2238
12-May	1201	487	1688	737	253	990
13-May	0	0	0	0	0	0
14-May	1024	268	1292	1289	216	1505
15-May	651	215	866	605	157	762
16-May	543	160	703	393	107	500
17-May	784	174	958	671	212	883
18-May	449	75	524	442	89	531
19-May	388	83	471	414	79	493
20-May	322	55	377	349	51	400
21-May	0	0	0	0	0	0
22-May	0	0	0	0	0	0
23-May	0	0	0	0	0	0
24-May	0	0	0	0	0	0
25-May	855	401	1256	785	322	1107
26-May	200	123	323	0	0	0
27-May	322	152	474	397	206	603
28-May	0	0	0	0	0	0
29-May	274	240	514	264	173	437
30-May	450	350	800	0	0	0
31-May	112	115	227	492	413	905
01-Jun	120	71	191	0	0	0
02-Jun	184	87	271	244	149	393
03-Jun	94	57	151	0	0	0
04-Jun	235	161	396	0	0	0
05-Jun	251	210	461	409	273	682
06-Jun	121	139	260	0	0	0
07-Jun	132	225	357	212	251	463
08-Jun	116	218	334	0	0	0
09-Jun	84	122	206	157	226	383
10-Jun	67	147	214	0	0	0
11-Jun	63	119	182	102	191	293
12-Jun	46	112	158	0	0	0
13-Jun	39	89	128	85	116	201
14-Jun	19	57	76	0	0	0
15-Jun	21	32	53	49	57	106
16-Jun	17	33	50	0	0	0
17-Jun	45	51	96	59	70	129
18-Jun	31	49	80	0	0	0
19-Jun	20	51	71	47	61	108
20-Jun	50	87	137	0	0	0
21-Jun	34	82	116	75	113	188
22-Jun	48	105	153	0	0	0
23-Jun	40	100	140	53	172	225
24-Jun	28	98	126	0	0	0
25-Jun	22	45	67	29	121	150
26-Jun	10	32	42	0	0	0
27-Jun	10	22	32	10	48	58
28-Jun	17	24	41	0	0	0
29-Jun	23	41	64	28	52	80
30-Jun	21	47	68	0	0	0
01-Jul	6	34	40	19	65	84
	104350	31773	136123	83354	24104	107458

*Note: H = Hatchery origin
W = Wild fish
T = Total number of fish

Appendix Table 11.0. Summary of spring/summer chinook salmon marked at Lower Granite Dam for the transport study, 1995.

Replicate number	Release site	Marking period	Release period	Brand position[a], symbol, and orientation[b]	Number released		
					Hatchery	Wild	Total
1	Tailrace	4/8 - 4/17	4/9 - 4/18	LAP-1	5,199	7,857	13,056
	Bonneville	4/8 - 4/18	4/9 - 4/19	RAV-1	4,205	5,826	10,031
2	Tailrace	4/17 - 4/20	4/18 - 4/21	LAP-2	8,144	4,446	12,590
	Bonneville	4/18 - 4/20	4/19 - 4/21	RAV-2	6,616	3,261	9,877
3	Tailrace	4/20 - 4/24	4/21 - 4/25	LAP-3	9,716	3,136	12,852
	Bonneville	4/20 - 4/24	4/21 - 4/25	RAV-3	7,595	2,364	9,959
4	Tailrace	4/24 - 4/27	4/25 - 4/28	LAP-4	10,421	1,951	12,372
	Bonneville	4/24 - 4/27	4/25 - 4/28	RAV-4	8,432	1,749	10,181
5	Tailrace	4/27 - 4/29	4/28 - 4/30	LA3-1	10,862	1,828	12,690
	Bonneville	4/27 - 4/28	4/28 - 4/29	RAU-1	8,358	1,268	9,626
6	Tailrace	4/29 - 5/1	4/30 - 5/2	LA3-2	11,541	1,449	12,990
	Bonneville	4/29 - 4/30	4/30 - 5/1	RAU-2	9,158	1,141	10,299
7	Tailrace	5/1 - 5/3	5/2 - 5/4	LA3-4	11,716	1,463	13,179
	Bonneville	5/1 - 5/3	5/2 - 5/4	RAU-3	8,892	1,383	10,275
8	Tailrace	5/4 - 5/6	5/5 - 5/7	LA3-3	11,160	1,793	12,953
	Bonneville	5/3 - 5/5	5/4 - 5/6	RAU-4	8,895	1,106	10,001
9	Tailrace	5/6 - 5/9	5/7 - 5/10	LAZ-1	11,773	1,550	13,323
	Bonneville	5/5 - 5/9	5/6 - 5/10	RAS-1	9,015	1,173	10,188
10	Tailrace	5/9 - 5/19	5/10 - 5/20	LAZ-2	9,599	2,175	11,774
	Bonneville	5/9 - 5/19	5/10 - 5/20	RAS-2[c]	8,668	1,753	10,421
11	Tailrace	5/24 - 6/31	5/25 - 7/1	LA4-1	4,221	4,130	8,351
	Bonneville	5/24 - 6/31	5/25 - 7/1	RAF-2	3,514	3,080	6,594
				Totals - Tailrace	104,352	31,778	136,130
				Bonneville	83,348	24,104	107,452
				Grand totals	187,700	55,882	243,582

[a] RA and LA (position) indicate right and left anterior sides of fish, respectively.

[b] Orientation refers to rotation of brand around its center point.

[c] 400 of these fish (349 hatchery, 51 wild) were branded RAF-1 and released on 5/20/95.

Appendix Table 12.0. Observations (detections) of yearling spring/summer chinook salmon released into the Lower Granite Dam tailrace, 1995.

Tagging file	Goose	Lower Monumental			McNary		Total	Total	Total	Total	Total
	1st Obs	1st Obs	2nd Obs	1st Obs	2nd Obs	3rd Obs	1st Obs	2nd Obs	3rd Obs	obs	tagged
DMM95098.IR1	136	50	45	20	22	15	206	67	15	288	267
DMM95099.IR1	129	41	42	22	21	6	192	63	6	261	246
DMM95100.IR1	247	79	97	42	56	20	368	153	20	541	471
DMM95101.IR1	345	139	102	73	83	24	557	185	24	766	791
DMM95102.IR1	301	167	73	128	84	19	596	157	19	772	913
DMM95103.IR1	345	274	52	224	107	15	843	159	15	1017	1414
DMM95104.IR1	187	178	27	170	69	6	535	96	6	637	935
DMM95104.IR2	156	131	22	137	55	6	424	77	6	507	709
DMM95105.IR2	106	105	16	99	29	5	310	45	5	360	529
DMM95105.IR3	123	121	16	112	51	4	356	67	4	427	664
DMM95106.IR1	147	177	30	176	60	8	500	90	8	598	878
DMM95106.IR2	162	149	29	160	64	14	471	93	14	578	872
DMM95107.IR1	22	37	6	26	13	2	85	19	2	106	162
DMM95107.IR2	265	313	55	270	131	18	848	186	18	1052	1565
DMM95107.IR3	227	272	46	228	110	18	727	156	18	901	1374
DMM95107.IR4	218	276	55	230	105	10	724	160	10	894	1368
DMM95108.IR1	212	299	28	267	118	12	778	146	12	936	1432
DMM95108.IR2	181	232	35	213	94	4	626	129	4	759	1234
DMM95108.IR3	299	365	74	242	138	16	906	212	16	1134	1665
DMM95108.IR4	305	366	64	256	153	15	927	217	15	1159	1706
DMM95109.IR2	407	398	85	326	164	22	1131	249	22	1402	1978
DMM95109.IR3	296	276	76	240	132	26	812	208	26	1046	1458
DMM95110.IR1	429	349	113	202	151	40	980	264	40	1284	1716
DMM95110.IR2	404	353	107	203	140	36	960	248	37	1246	1620
DMM95111.IR1	514	413	143	263	197	52	1190	340	52	1582	2006
DMM95111.IR2	585	405	152	267	204	50	1257	356	50	1663	2129
DMM95112.IR1	633	425	197	236	203	60	1294	400	60	1754	2108
DMM95112.IR2	499	364	159	190	186	48	1053	345	48	1446	1806
DMM95113.IR1	479	298	142	172	163	42	949	305	42	1296	1529
DMM95113.IR2	459	250	136	176	140	39	885	276	39	1200	1483
DMM95114.IR1	577	325	199	189	187	65	1091	386	65	1542	1795
DMM95114.IR2	543	259	153	165	163	40	967	316	40	1323	1688
DMM95115.IR1	751	367	258	204	219	68	1322	477	68	1867	2173
DMM95115.IR2	628	287	212	203	181	64	1118	393	64	1575	1805
DMM95116.IR1	767	397	263	203	208	75	1367	471	75	1913	2278
DMM95116.IR2	682	364	232	180	182	68	1226	414	68	1708	2003
DMM95117.IR1	752	456	284	235	222	93	1443	506	93	2042	2338
DMM95117.IR2	728	461	266	236	231	83	1425	497	83	2005	2312
DMM95118.IR1	1278	752	469	287	420	147	2317	889	147	3353	3569
DMM95118.IR2	1129	658	479	238	343	124	2025	822	124	2971	3190
DMM95119.IR1	376	206	163	72	104	52	654	267	52	973	1050
DMM95119.IR2	339	223	126	55	103	41	617	229	41	887	968
DMM95119.IR3	693	443	283	178	213	85	1314	496	85	1895	2073
DMM95119.IR4	733	509	299	169	245	80	1411	544	80	2035	2131
DMM95120.IR1	456	271	201	84	121	58	811	322	58	1191	1210
DMM95120.IR2	17	9	7	3	3	3	29	10	3	42	47
DMM95120.IR3	734	475	294	178	233	87	1387	527	87	2001	2140
DMM95120.IR4	357	223	144	81	116	42	661	260	42	963	1006
DMM95120.IR5	114	77	48	20	43	15	211	91	15	317	301
DMM95120.IR6	145	98	56	31	51	16	274	107	16	397	442
DMM95120.IR7	586	333	225	132	205	79	1051	430	79	1560	1626
DMM95120.IR8	416	233	151	86	123	49	735	274	49	1058	1122
DMM95121.IR2	511	304	219	73	149	73	888	368	73	1329	1355
DMM95121.IR3	319	173	129	68	94	43	560	223	43	826	839
DMM95121.IR4	833	492	324	178	258	96	1503	582	96	2181	2146
DMM95121.IR6	707	452	299	142	241	96	1301	540	96	1937	1920
DMM95122.IR2	300	241	112	80	127	42	621	239	42	902	936
DMM95122.IR3	253	208	98	65	115	36	526	213	36	775	770
DMM95122.IR4	61	46	30	16	23	16	123	53	16	192	173
DMM95122.IR5	160	128	63	51	71	20	339	134	20	493	470
DMM95122.IR6	99	62	47	22	35	18	183	82	18	283	258
DMM95123.IR1	266	180	95	54	87	32	500	182	32	714	807
DMM95123.IR2	255	165	117	60	84	29	480	201	29	710	731
DMM95123.IR3	748	467	299	162	237	109	1377	536	109	2022	2066
DMM95123.IR4	734	465	282	164	232	90	1363	514	90	1967	1991
DMM95123.IR5	549	355	226	121	174	79	1025	400	79	1504	1481
DMM95123.IR6	237	133	86	48	81	30	418	167	30	615	574
DMM95123.IR7	167	152	61	35	76	20	354	137	20	511	495
DMM95124.IR1	304	215	120	92	99	34	611	219	34	864	936
DMM95124.IR2	355	276	134	108	127	52	739	261	52	1052	1126
DMM95124.IR3	306	231	119	79	113	32	616	232	32	880	921

Appendix Table 12.0. Continued.

	Goose	Lower Monumental			McNary		Total	Total	Total	Total	Total
	1st Obs	1st Obs	2nd Obs	1st Obs	2nd Obs	3rd Obs	1st Obs	2nd Obs	3rd Obs	obs	tagged
DMM95124.IR4	238	187	103	61	80	36	486	183	36	705	767
DMM95124.IR5	643	541	248	160	200	69	1344	448	69	1861	2096
DMM95124.IR6	325	230	122	87	91	39	642	213	39	894	1034
DMM95124.IR7	261	192	104	54	87	29	507	191	29	727	762
DMM95125.IR1	704	449	265	147	193	82	1300	458	82	1840	2037
DMM95125.IR2	715	477	265	150	214	84	1342	479	84	1905	2032
DMM95126.IR1	984	625	383	177	305	125	1786	688	125	2599	2647
DMM95126.IR2	861	514	336	165	264	106	1540	600	106	2246	2293
DMM95126.IR3	285	147	132	61	68	44	493	200	44	737	700
DMM95126.IR4	220	150	94	37	78	28	407	172	28	607	575
DMM95127.IR1	856	526	369	157	254	124	1539	623	124	2286	2380
DMM95127.IR2	751	438	288	128	196	106	1317	484	106	1907	2014
DMM95128.IR2	411	310	161	80	145	57	801	306	57	1164	1147
DMM95128.IR3	460	272	190	117	128	65	849	318	65	1232	1262
DMM95129.IR1	410	520	143	175	154	42	1105	297	42	1444	1874
DMM95129.IR2	312	410	115	168	157	44	890	272	44	1206	1522
DMM95130.IR1	363	506	128	177	141	25	1046	269	25	1340	1753
DMM95130.IR2	392	507	139	153	169	23	1052	308	23	1383	1845
DMM95131.IR1	229	223	88	41	63	25	493	151	25	669	883
DMM95131.IR2	218	228	84	50	68	20	496	152	20	668	831
DMM95133.IR1	359	348	114	61	75	20	768	189	20	977	1257
DMM95133.IR2	19	19	9	2	1	1	40	10	1	51	55
DMM95134.IR1	179	165	61	34	35	11	378	96	11	485	652
DMM95134.IR2	59	57	21	11	11	4	127	32	4	163	220
DMM95135.IR1	109	96	38	18	25	11	223	63	11	297	389
DMM95135.IR2	79	81	24	18	13	9	178	37	9	224	318
DMM95136.IR1	227	210	74	48	47	16	485	121	16	622	845
DMM95136.IR2	33	23	13	9	8	1	65	21	1	87	115
DMM95137.IR1	129	98	41	23	28	8	250	69	8	327	402
DMM95137.IR2	36	28	18	5	4	6	69	22	6	97	125
DMM95138.IR1	141	105	44	26	34	9	272	78	9	359	473
DMM95139.IR1	155	79	65	25	35	16	259	100	16	375	378
DMM95144.IR1	507	242	154	74	92	43	823	246	43	1112	1272
DMM95145.IR1	116	58	42	19	19	10	193	61	10	264	325
DMM95146.IR1	173	74	56	16	25	8	263	81	8	352	477
DMM95148.IR1	186	109	73	22	34	11	317	107	11	435	519
DMM95149.IR1	262	176	98	28	38	17	466	136	17	619	804
DMM95150.IR1	84	50	35	6	12	6	140	47	6	193	229
DMM95151.IR1	54	50	28	5	10	2	109	38	2	149	191
DMM95152.IR1	103	61	49	6	7	6	170	56	6	232	272
DMM95153.IR1	46	48	17	4	11	1	98	28	1	127	151
DMM95154.IR1	167	102	93	8	19	19	277	112	19	408	399
DMM95155.IR1	221	118	119	11	20	13	350	139	13	502	462
DMM95156.IR1	140	69	83	5	22	15	214	105	15	334	262
DMM95157.IR1	231	57	136	5	22	29	293	158	29	480	360
DMM95158.IR1	209	54	110	9	20	31	272	130	31	433	334
DMM95159.IR1	127	29	70	5	8	12	161	78	12	251	206
DMM95160.IR1	119	32	59	6	14	10	157	73	10	240	215
DMM95161.IR1	110	29	48	4	10	12	143	58	12	213	183
DMM95162.IR1	99	25	48	1	16	10	125	64	10	199	159
DMM95163.IR1	71	26	32	0	8	8	97	40	8	145	128
DMM95164.IR1	38	20	13	0	10	4	58	23	4	85	77
DMM95165.IR1	29	9	14	1	7	5	39	21	5	65	54
DMM95166.IR1	31	7	11	0	4	2	38	15	2	55	50
DMM95167.IR1	59	15	21	6	6	4	80	27	4	111	96
DMM95168.IR1	42	11	18	3	7	4	56	25	4	85	80
DMM95169.IR1	35	17	14	3	4	4	55	18	4	77	72
DMM95170.IR1	84	16	42	5	10	10	105	52	10	167	138
DMM95171.IR1	59	17	32	3	7	12	79	39	12	130	116
DMM95172.IR1	78	34	45	3	19	17	115	64	17	196	153
DMM95173.IR1	83	24	53	6	16	17	113	69	17	199	140
DMM95174.IR1	75	19	46	1	10	17	95	56	17	168	129
DMM95175.IR1	45	10	22	1	7	8	56	29	8	93	68
DMM95176.IR1	23	6	16	2	6	9	31	22	9	62	43
DMM95177.IR1	14	5	6	4	3	1	23	9	1	33	32
DMM95178.IR1	20	7	9	2	4	2	29	13	2	44	41
DMM95179.IR1	30	12	15	1	7	8	43	22	8	73	65
DMM95180.IR1	36	13	20	7	10	10	56	30	10	96	69
DMM95181.IR1	17	10	5	2	8	2	29	13	2	44	41
	43920	30015	15983	13159	13542	4730	87094	29525	4730	121349	138730

Appendix Table 13.0. Locations of observations (detections) of PIT-tagged spring/summer chinook salmon within the Little Goose Dam juvenile fish facility, 1995.

Recdate	SepDiv	Div	SepDivSamp	Sep	SepSamp	Samp	SepRace	Race	Total obs.
12-Apr	6	0	0	0	1	0	1	1	1
13-Apr	11	0	0	0	4	0	4	0	4
14-Apr	63	2	0	4	22	0	13	11	26
15-Apr	143	0	0	6	31	3	30	6	37
16-Apr	140	1	0	9	6	8	36	12	15
17-Apr	127	0	0	5	3	4	19	19	8
18-Apr	112	4	0	19	6	0	49	22	25
19-Apr	103	1	1	22	13	4	30	19	35
20-Apr	118	1	0	11	13	2	49	20	24
21-Apr	111	1	0	15	17	3	69	34	32
22-Apr	100	1	0	15	18	3	70	20	33
23-Apr	75	1	0	16	18	8	65	37	34
24-Apr	52	0	0	15	11	2	40	26	26
25-Apr	93	1	0	16	15	7	78	35	31
26-Apr	164	1	0	41	26	6	127	78	67
27-Apr	227	2	0	67	21	14	170	100	88
28-Apr	471	24	0	181	3	8	267	264	184
29-Apr	1,001	31	0	12	23	0	31	81	35
30-Apr	2,004	37	0	8	22	12	3	178	30
01-May	1,817	30	0	6	25	0	6	167	31
02-May	2,209	52	0	5	14	0	7	217	19
03-May	1,823	44	0	7	9	3	13	178	16
04-May	1,930	32	0	12	9	3	8	198	21
05-May	2,008	34	0	7	29	1	19	192	36
06-May	1,815	29	0	11	14	10	34	232	25
07-May	2,173	31	0	61	21	0	26	266	82
08-May	1,949	21	0	24	24	9	9	244	48
09-May	1,292	36	0	16	14	4	66	156	30
10-May	1,791	15	0	94	12	0	375	241	106
11-May	2,839	50	0	124	37	7	331	410	161
12-May	1,180	13	0	70	11	3	150	123	81
13-May	462	3	0	20	0	1	163	52	20
14-May	328	5	0	6	3	1	91	22	9
15-May	358	0	0	6	24	1	67	18	30
16-May	323	0	0	6	5	0	69	11	11
17-May	233	0	0	3	3	2	49	14	6
18-May	178	0	0	1	2	0	41	5	3
19-May	142	0	0	0	2	0	43	7	2
20-May	145	0	0	3	4	0	40	7	7
21-May	144	1	0	2	12	0	49	8	14
22-May	133	0	0	1	1	0	33	3	2
23-May	138	0	0	2	2	0	33	1	4
24-May	150	1	0	9	5	0	26	8	14
25-May	110	0	0	1	4	0	10	2	5
26-May	99	0	0	1	8	0	9	2	9
27-May	59	0	0	0	0	0	2	0	0
28-May	82	0	0	1	1	0	11	3	2
29-May	98	0	0	4	0	0	21	0	4

Appendix Table 13.0. Continued.

Recdate	SepDiv	Div	SepDivSamp	Sep	SepSamp	Samp	SepRace	Race	Total obs.
30-May	68	1	0	0	1	0	10	1	1
31-May	93	0	0	1	2	0	21	1	3
01-Jun	124	0	0	2	5	0	19	4	7
02-Jun	145	0	0	4	4	0	16	1	8
03-Jun	145	0	0	1	15	1	21	2	16
04-Jun	129	0	0	1	10	0	8	1	11
05-Jun	147	0	0	0	10	0	4	1	10
06-Jun	86	0	0	1	4	0	3	1	5
07-Jun	100	0	0	0	5	0	2	0	5
08-Jun	238	0	0	1	12	0	8	2	13
09-Jun	183	0	0	0	20	0	2	0	20
10-Jun	168	0	0	1	9	0	5	2	10
11-Jun	195	0	0	0	11	0	1	2	11
12-Jun	119	1	0	1	11	0	6	0	12
13-Jun	117	0	0	3	10	0	2	0	13
14-Jun	72	0	0	1	10	0	1	1	11
15-Jun	53	0	0	0	7	1	1	0	7
16-Jun	68	0	0	4	25	0	0	0	29
17-Jun	83	0	0	1	10	0	0	1	11
18-Jun	53	0	0	0	9	0	1	0	9
19-Jun	57	0	0	1	5	0	0	0	6
20-Jun	36	0	0	0	5	0	0	0	5
21-Jun	33	0	0	0	2	0	1	0	2
22-Jun	77	0	0	0	10	0	0	0	10
23-Jun	82	1	0	1	12	0	1	0	13
24-Jun	57	0	0	1	3	0	0	0	4
25-Jun	12	0	0	0	5	0	0	0	5
26-Jun	6	0	0	0	0	0	1	0	0
27-Jun	46	0	0	0	5	0	1	0	5
28-Jun	110	0	0	0	12	0	2	0	12
29-Jun	69	0	0	0	6	0	1	0	6
30-Jun	47	0	0	0	4	0	1	1	4
01-Jul	36	0	0	0	3	0	0	0	3
02-Jul	26	0	0	0	3	0	0	0	3
03-Jul	29	0	0	0	3	0	1	0	3
04-Jul	17	0	0	0	0	0	0	0	0
05-Jul	11	0	0	0	0	0	0	0	0
06-Jul	7	0	0	0	0	0	0	0	0
07-Jul	10	0	0	0	7	0	0	0	7
08-Jul	6	0	0	1	0	0	0	0	1
09-Jul	21	0	0	0	0	0	0	0	0
10-Jul	7	0	0	0	1	0	0	0	1
11-Jul	14	0	0	0	0	0	0	0	0
12-Jul	8	0	0	0	0	0	1	0	0
13-Jul	4	0	0	0	1	0	0	0	1
14-Jul	3	0	0	0	0	0	1	0	0
15-Jul	2	0	0	0	0	0	0	0	0
16-Jul	3	0	0	0	0	0	0	0	0
17-Jul	3	0	1	0	0	0	0	1	0
18-Jul	5	0	0	0	0	0	0	0	0

Appendix Table 13.0. Continued.

Recdate	SepDiv	Div	SepDivSamp	Sep	SepSamp	Samp	SepRace	Race	Total obs.
19-Jul	2	0	0	0	0	0	0	0	0
20-Jul	2	0	0	0	0	0	0	0	0
21-Jul	1	0	0	0	0	0	0	0	0
22-Jul	1	0	0	0	0	0	0	0	0
23-Jul	1	0	0	0	0	0	0	0	0
25-Jul	4	0	0	0	0	0	0	0	0
27-Jul	1	0	0	0	0	0	0	0	0
29-Jul	1	0	0	0	0	0	0	0	0
01-Aug	1	0	0	0	0	0	0	0	0
02-Aug	1	0	0	0	0	0	0	0	0
04-Aug	1	0	0	0	0	0	0	0	0
06-Aug	0	0	0	2	0	0	0	0	2
08-Aug	1	0	0	0	0	0	0	0	0
14-Aug	1	0	0	0	0	0	0	0	0
15-Aug	1	0	0	0	0	0	0	0	0
18-Aug	1	0	0	0	0	0	0	0	0
07-Sep	1	0	0	0	0	0	0	0	0
	34,380	508	2	993	845	131	3,094	3,772	1,838

Appendix Table 14.0. Locations of observations (detections) of PIT-tagged spring/summer chinook salmon within the Lower Monumental Dam juvenile fish facility, 1995.

Recdate	SepDiv	SepRiv	Div	Riv	SepDivSamp	DivSamp	Sep	SepSamp	Samp	SepRace	Race	Total obs.
13-Apr	0	0	0	0	0	0	0	1	0	0	0	1
14-Apr	2	0	0	0	0	0	0	1	0	1	0	4
15-Apr	7	0	0	0	0	0	2	0	1	4	3	17
16-Apr	12	0	0	0	0	0	1	4	0	10	10	37
17-Apr	49	0	0	0	0	0	4	5	1	24	12	95
18-Apr	58	0	0	0	0	0	2	5	2	29	5	101
19-Apr	127	0	0	0	0	0	5	12	0	24	1	169
20-Apr	75	0	0	0	0	0	7	9	0	73	5	169
21-Apr	104	0	0	0	0	0	9	13	1	106	16	249
22-Apr	78	0	0	0	0	0	4	2	1	77	4	166
23-Apr	44	0	1	0	0	0	10	0	0	37	4	96
24-Apr	38	0	8	0	0	0	5	5	3	46	81	186
25-Apr	121	0	0	0	0	0	3	4	5	38	58	229
26-Apr	377	0	2	0	0	0	6	9	0	90	31	515
27-Apr	283	0	8	0	0	0	7	4	0	141	16	459
28-Apr	736	0	4	0	0	0	1	16	0	10	15	782
29-Apr	1058	0	0	0	0	0	2	10	1	5	14	1090
30-Apr	972	0	1	0	0	0	2	9	0	7	4	995
01-May	1261	2	1	3	0	0	2	11	0	2	6	1288
02-May	1202	8	0	8	19	0	4	71	1	1	1	1315
03-May	1427	36	4	17	18	2	7	103	2	0	0	1616
04-May	2532	6	2	20	0	0	4	19	1	0	0	2584
05-May	2675	22	8	24	6	0	7	53	0	0	0	2795
06-May	2337	6	2	6	1	0	7	114	0	10	17	2500
07-May	2949	0	6	0	0	0	3	14	0	30	35	3037
08-May	2976	0	7	0	0	0	1	11	0	6	34	3035
09-May	2245	0	20	0	0	0	3	46	1	15	27	2357
10-May	1768	10	7	7	0	0	6	85	3	5	8	1899
11-May	2069	9	1	10	0	0	0	11	0	0	0	2100
12-May	2465	10	7	32	0	0	6	62	0	0	0	2582
13-May	2842	7	9	34	0	0	4	37	0	11	15	2959
14-May	1297	0	8	0	0	0	4	23	2	9	20	1363
15-May	980	0	5	0	0	0	0	13	0	4	20	1022
16-May	752	0	0	0	0	0	2	16	0	0	13	783
17-May	635	0	0	0	0	0	0	9	0	5	6	655
18-May	645	0	0	0	0	0	1	13	0	1	8	668
19-May	294	0	0	0	0	0	3	6	0	2	3	308
20-May	231	0	0	0	0	0	1	38	0	1	3	274
21-May	257	0	0	0	0	0	1	0	0	1	4	263
22-May	295	0	0	0	0	0	1	2	0	4	1	303
23-May	288	0	2	0	0	0	0	4	0	3	3	300
24-May	192	0	0	0	0	0	0	3	0	0	3	198
25-May	158	0	1	0	0	0	1	9	1	1	1	172
26-May	200	0	0	0	0	0	0	3	0	1	1	205
27-May	105	0	0	0	0	0	1	1	0	0	0	107
28-May	79	0	1	0	0	0	4	1	0	0	2	87
30-May	36	0	9	0	0	0	0	4	10	1	0	60
31-May	80	0	5	0	0	0	0	1	0	1	0	87
01-Jun	117	0	2	0	0	0	0	4	0	2	2	127
02-Jun	108	0	0	0	0	0	0	3	0	0	1	112
03-Jun	159	0	0	0	0	0	0	3	0	5	2	169
04-Jun	149	0	0	0	0	0	0	1	0	1	3	154
05-Jun	134	0	0	0	0	0	1	8	0	1	3	147
06-Jun	146	0	0	0	0	0	0	3	0	4	2	155
07-Jun	128	0	0	0	0	0	0	7	0	6	1	142
08-Jun	128	0	0	0	0	0	1	3	0	0	1	133
09-Jun	178	0	0	0	0	0	0	14	1	1	1	195
10-Jun	209	0	0	0	0	0	0	7	0	2	0	218
11-Jun	116	0	0	0	0	0	0	3	1	3	1	124
12-Jun	120	0	0	0	0	0	0	7	0	0	2	129
13-Jun	109	0	0	0	0	0	1	10	0	3	1	124
14-Jun	149	0	0	0	0	0	1	8	0	5	0	163
15-Jun	95	0	0	0	0	0	0	3	0	4	2	104
16-Jun	92	0	0	0	0	0	1	5	0	1	1	100
17-Jun	64	0	0	0	0	0	0	7	0	2	0	73

Appendix Table 14.0. Continued.

Recdate	SepDiv	SepRiv	Div	Riv	SepDivSamp	DivSamp	Sep	SepSamp	Samp	SepRace	Race	Total obs.
18-Jun	71	0	0	0	0	0	0	10	0	2	0	83
19-Jun	74	0	0	0	0	0	2	4	0	3	1	84
20-Jun	48	0	0	0	0	0	0	14	0	3	0	65
21-Jun	47	0	0	0	0	0	1	2	0	0	0	50
22-Jun	41	0	0	0	0	0	0	2	0	0	0	43
23-Jun	15	0	0	0	0	0	0	0	0	0	0	15
24-Jun	24	0	0	0	0	0	0	3	0	0	0	27
25-Jun	10	0	0	0	0	0	1	0	0	2	0	13
26-Jun	13	0	0	0	0	0	0	0	0	3	0	16
27-Jun	24	0	0	0	0	0	0	4	0	2	0	30
28-Jun	46	0	0	0	0	0	1	1	0	0	0	48
29-Jun	67	0	0	0	0	0	1	11	0	3	0	82
30-Jun	77	0	0	0	0	0	0	11	0	1	2	91
01-Jul	65	0	0	0	0	0	1	4	0	0	0	70
02-Jul	31	0	0	0	0	0	0	1	0	0	0	32
03-Jul	43	0	0	0	0	0	1	1	0	1	0	46
04-Jul	44	0	0	0	0	0	1	1	0	2	0	48
05-Jul	30	0	0	0	0	0	2	0	0	4	0	36
06-Jul	10	0	0	0	0	0	1	1	0	3	0	15
07-Jul	10	0	0	0	0	0	1	1	0	2	0	14
08-Jul	16	0	0	0	0	0	0	2	0	2	0	20
09-Jul	42	0	0	0	0	0	0	4	0	0	0	46
10-Jul	10	0	0	0	0	0	0	0	0	1	0	11
11-Jul	8	0	0	0	0	0	1	0	0	2	0	11
12-Jul	2	0	0	0	0	0	0	0	0	1	0	3
13-Jul	7	0	0	0	0	0	0	0	0	2	0	9
14-Jul	2	0	0	0	0	0	0	0	0	0	0	2
15-Jul	1	0	0	0	0	0	0	1	0	0	0	2
16-Jul	3	0	0	0	0	0	0	1	0	0	0	4
17-Jul	11	0	0	0	0	0	0	3	0	0	0	14
18-Jul	4	0	0	0	0	0	0	0	0	0	0	4
19-Jul	5	0	0	0	0	0	0	0	0	0	0	5
20-Jul	4	0	0	0	0	0	0	0	0	0	0	4
21-Jul	5	0	0	0	0	0	0	0	0	0	0	5
22-Jul	2	0	0	0	0	0	0	0	0	0	0	2
23-Jul	1	0	0	0	0	0	0	0	0	0	0	1
24-Jul	4	0	0	0	0	0	0	0	0	0	0	4
25-Jul	3	0	0	0	0	0	1	0	0	0	0	4
26-Jul	0	0	0	0	0	0	0	0	0	0	0	0
27-Jul	3	0	0	0	0	0	0	0	0	0	0	3
28-Jul	4	0	0	0	0	0	0	0	0	0	0	4
29-Jul	4	0	0	0	0	0	0	0	0	0	0	4
30-Jul	1	0	0	0	0	0	0	0	0	0	0	1
31-Jul	0	0	0	0	0	0	1	0	0	0	0	1
01-Aug	1	0	0	0	0	0	0	0	0	0	0	1
02-Aug	0	0	0	0	0	0	0	0	0	0	0	0
03-Aug	1	0	0	0	0	0	0	0	0	0	0	1
04-Aug	2	0	0	0	0	0	0	0	0	0	0	2
05-Aug	1	0	0	0	0	0	0	0	0	0	0	1
06-Aug	3	0	0	0	0	0	0	0	0	0	0	3
07-Aug	0	0	0	0	0	0	0	0	0	0	0	0
08-Aug	0	0	0	0	0	0	0	1	0	0	0	1
09-Aug	0	0	0	0	0	0	0	0	0	0	0	0
10-Aug	1	0	0	0	0	0	0	0	0	0	0	1
20-Aug	1	0	0	0	0	0	0	0	0	0	0	1
21-Aug	2	0	0	0	0	0	0	0	0	0	0	2
27-Aug	1	0	0	0	0	0	0	0	0	0	0	1
01-Sep	1	0	0	0	0	0	0	0	0	0	0	1
09-Sep	1	0	0	0	0	0	0	0	0	0	0	1
18-Sep	0	0	0	0	0	0	0	1	0	0	0	1
30-Sep	1	0	0	0	0	0	0	0	0	0	0	1
Totals	42,562	116	131	161	44	2	164	1,072	38	915	536	45,741

Appendix Table 15.0. Locations of observations (detections) of PIT-tagged spring/summer chinook salmon within the McNary Dam juvenile fish facility, 1995.

Recdate	SepDiv	Div	SepDivSamp	DivSamp	Sep*	SepSamp*	Samp*	SepRace*	SepDivRace*	Race*	Total obs.
19-Apr	2	0	1	0	0	0	0	0	0	0	3
20-Apr	0	0	0	0	1	0	0	0	0	0	1
21-Apr	16	0	1	0	0	0	0	0	0	0	17
22-Apr	16	1	0	0	2	0	0	0	0	0	19
23-Apr	26	1	0	0	2	0	0	0	0	0	29
24-Apr	42	3	1	0	2	0	0	0	0	0	48
25-Apr	42	0	0	0	1	0	0	0	0	0	43
26-Apr	83	4	0	0	2	0	0	0	0	0	89
27-Apr	95	7	3	0	7	0	0	0	0	0	112
28-Apr	241	18	2	0	5	0	0	0	0	0	266
29-Apr	346	20	8	0	6	0	0	0	0	0	380
30-Apr	632	51	8	0	14	1	1	0	0	0	707
01-May	616	53	6	0	29	0	0	0	0	0	704
02-May	743	25	9	0	165	0	0	0	0	0	942
03-May	539	8	9	0	259	0	0	0	0	0	815
04-May	657	7	9	0	161	0	0	0	0	0	834
05-May	797	14	12	0	206	1	0	8	12	0	1,050
06-May	753	6	12	0	248	0	0	65	92	0	1,176
07-May	1,302	34	19	1	428	1	0	35	22	0	1,842
08-May	1,312	44	18	1	513	0	0	0	0	0	1,888
09-May	1,235	47	15	1	316	0	0	0	0	0	1,614
10-May	1,654	29	16	0	271	0	0	0	0	0	1,970
11-May	2,012	8	20	1	9	0	0	0	0	0	2,050
12-May	1,861	17	9	0	9	12	0	0	0	0	1,908
13-May	1,527	5	0	0	6	12	0	0	0	0	1,550
14-May	1,348	3	0	0	10	11	0	0	0	0	1,372
15-May	914	118	0	0	3	8	4	0	0	0	1,047
16-May	1,638	32	0	0	71	11	0	0	0	0	1,752
17-May	970	3	0	0	655	17	0	0	0	0	1,645
18-May	764	3	0	0	476	10	0	0	0	0	1,253
19-May	392	0	0	0	290	3	0	0	0	0	685
20-May	304	2	0	0	197	9	0	0	0	0	512
21-May	206	1	0	0	129	2	0	0	0	0	338
22-May	173	1	0	0	102	2	0	0	0	0	278
23-May	106	0	0	0	183	1	0	0	0	0	290
24-May	49	0	0	0	54	1	0	0	0	0	104
25-May	13	0	0	0	70	1	0	0	0	0	84
26-May	41	0	0	0	53	2	0	0	0	0	96
27-May	16	0	0	0	56	4	0	0	0	0	76
28-May	19	0	0	0	71	2	0	0	0	0	92
29-May	0	0	0	0	82	3	0	0	0	0	85
30-May	22	0	0	0	35	1	0	0	0	0	58
31-May	26	0	0	0	29	1	0	0	0	0	56
01-Jun	26	0	0	0	77	2	0	0	0	0	105
02-Jun	13	0	0	0	28	0	0	0	0	0	41
03-Jun	13	0	0	0	30	1	0	0	0	0	44
04-Jun	0	0	0	0	73	2	0	0	0	0	75
05-Jun	0	0	0	0	83	2	0	0	0	0	85
06-Jun	0	0	0	0	89	4	0	0	0	0	93
07-Jun	0	0	0	0	57	3	0	0	0	0	60
08-Jun	0	0	0	0	18	0	0	0	0	0	18
09-Jun	0	0	0	0	67	1	0	0	0	0	68
10-Jun	0	0	0	0	10	1	0	29	0	0	40
11-Jun	0	0	0	0	21	1	0	9	0	0	31
12-Jun	0	0	0	0	28	3	0	0	0	0	31
13-Jun	0	0	0	0	31	3	0	0	0	0	34
14-Jun	0	0	0	0	21	1	0	0	0	0	22
15-Jun	0	0	0	0	14	1	0	0	0	0	15
16-Jun	0	0	0	0	43	2	0	0	0	0	45
17-Jun	0	0	0	0	43	3	0	0	0	0	46
18-Jun	0	0	0	0	41	3	0	0	0	0	44
19-Jun	0	0	0	0	46	2	0	0	0	0	48
20-Jun	11	0	0	0	6	1	0	1	0	0	19
21-Jun	21	0	0	0	0	0	0	0	0	0	21
22-Jun	23	0	0	0	0	3	0	1	0	0	27

Appendix Table 15.0. Continued.

Recdate	SepDiv	Div	SepDivSamp	DivSamp	Sep*	SepSamp*	Samp*	SepRace*	SepDivRace*	Race*	Total obs.
23-Jun	10	0	0	0	0	0	0	0	0	0	10
24-Jun	11	0	0	0	0	0	0	0	0	0	11
25-Jun	11	0	0	0	0	5	0	1	0	0	17
26-Jun	2	0	0	0	0	1	0	2	0	0	5
27-Jun	8	0	0	0	0	0	0	0	0	0	8
28-Jun	2	0	0	0	0	0	0	0	0	0	2
29-Jun	4	0	0	0	0	0	0	0	0	0	4
30-Jun	6	0	0	0	0	0	0	0	0	0	6
01-Jul	14	0	0	0	0	0	0	1	0	0	15
02-Jul	27	0	0	0	0	2	0	0	0	0	29
03-Jul	34	0	0	0	0	0	0	1	0	0	35
04-Jul	21	0	0	0	0	1	0	0	0	0	22
05-Jul	27	0	0	0	0	1	0	0	0	0	28
06-Jul	25	0	0	0	0	2	0	0	0	0	27
07-Jul	26	0	0	0	0	0	0	0	0	0	26
08-Jul	20	0	0	0	0	0	0	3	0	0	23
09-Jul	23	0	0	0	0	0	0	1	0	1	25
10-Jul	9	0	0	0	0	0	0	1	0	0	10
11-Jul	19	0	0	0	0	0	0	0	0	0	19
12-Jul	25	0	0	0	0	1	0	1	0	0	27
13-Jul	13	0	0	0	0	0	0	1	0	0	14
14-Jul	9	0	0	0	0	1	0	0	0	0	10
15-Jul	8	0	0	0	0	0	0	0	0	0	8
16-Jul	5	0	0	0	0	2	0	0	0	0	7
17-Jul	2	0	0	0	0	1	0	0	0	0	3
18-Jul	3	0	0	0	0	0	0	1	0	0	4
19-Jul	1	0	1	0	0	0	0	0	0	0	2
20-Jul	2	0	0	0	0	1	0	0	0	0	3
21-Jul	3	0	0	0	0	0	1	0	0	0	4
22-Jul	2	0	0	0	0	1	0	0	0	0	3
23-Jul	2	0	0	0	0	1	0	0	0	0	3
25-Jul	2	0	0	0	0	0	0	1	0	0	3
26-Jul	1	0	0	0	0	0	0	1	0	0	2
27-Jul	2	0	0	0	0	1	0	0	0	0	3
29-Jul	5	0	0	0	0	0	0	1	0	0	6
30-Jul	3	0	0	0	0	1	0	0	0	0	4
31-Jul	2	0	0	0	0	0	0	0	0	0	2
01-Aug	2	0	0	0	1	0	0	0	0	0	3
02-Aug	3	0	0	0	0	0	0	0	0	0	3
04-Aug	1	0	0	0	0	0	0	0	0	0	1
05-Aug	1	0	0	0	0	0	0	0	0	0	1
06-Aug	1	0	0	0	0	0	0	0	0	0	1
08-Aug	1	0	0	0	0	0	0	0	0	0	1
12-Aug	1	0	0	0	0	0	0	0	0	0	1
14-Aug	1	0	0	0	0	0	0	0	0	0	1
15-Aug	1	0	0	0	0	0	0	0	0	0	1
16-Aug	1	0	0	0	0	0	0	0	0	0	1
20-Aug	1	0	0	0	0	1	0	0	0	0	2
21-Aug	2	0	0	0	0	0	0	0	0	0	2
26-Aug	1	0	0	0	0	0	0	0	0	0	1
08-Sep	1	0	0	0	0	0	0	0	0	0	1
20-Sep	0	0	0	0	0	1	0	0	0	0	1
	24,064	565	179	4	6,055	179	6	164	126	1	31,343

*Note: Prior to June 20, 1995, all fish entering the McNary Dam juvenile fish facility were bypassed to the river. Transportation from McNary Dam began on June 20.

Appendix Table 16.0. Numbers of PIT-tagged and nontagged salmonids diverted per hourly test of the PIT-tag detection/diversion system, flume "A" at McNary Dam, 1995.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
08 MAY	0900	38	0	0	0	38	8	0	0	1	9	43	0.21	88.37
08 MAY	1000	71	2	0	0	73	31	6	3	3	43	89	0.48	82.02
08 MAY	1100	78	4	0	0	82	37	9	3	6	55	78	0.71	105.13
08 MAY	1200	93	2	0	0	95	36	3	2	0	41	69	0.59	137.68
09 MAY	0800	55	2	0	0	57	37	0	1	2	40	73	0.55	78.08
09 MAY	0900	41	0	0	0	41	10	0	0	0	10	21	0.48	195.24
09 MAY	1000	42	2	0	0	44	15	2	2	0	19	36	0.53	122.22
09 MAY	1100	27	1	0	0	28	17	1	0	1	19	36	0.53	77.78
09 MAY	1200	17	0	0	0	17	25	3	0	0	28	37	0.76	45.95
09 MAY	1300	49	3	0	0	52	13	3	1	2	19	63	0.30	82.54
09 MAY	1400	50	5	0	0	55	29	2	0	0	31	72	0.43	76.39
09 MAY	1500	80	4	0	0	84	54	3	4	1	62	132	0.47	63.64
10 MAY	0800	43	0	0	0	43	21	1	0	0	22	48	0.46	89.58
10 MAY	0900	39	1	0	0	40	12	1	0	0	13	25	0.52	160.00
11 MAY	0800	95	2	0	0	97	23	6	0	1	30	114	0.26	85.09
11 MAY	0900	114	3	0	0	117	43	3	0	1	47	66	0.71	177.27
11 MAY	1000	53	2	0	0	55	47	5	3	1	56	61	0.92	90.16
11 MAY	1100	35	2	0	0	37	16	0	1	3	20	50	0.40	74.00
11 MAY	1200	72	1	0	0	73	65	6	8	3	82	85	0.96	85.88
11 MAY	1300	122	3	0	0	125	60	4	2	3	69	124	0.56	100.80
11 MAY	1400	90	1	0	0	91	93	9	5	5	112	106	1.06	85.85
12 MAY	0800	46	0	0	0	46	20	0	0	0	20	41	0.49	112.20
12 MAY	0900	39	4	0	0	43	14	1	3	2	20	31	0.65	138.71
12 MAY	1000	31	1	0	0	32	30	0	2	9	41	39	1.05	82.05
12 MAY	1100	73	2	0	0	75	37	3	11	1	52	88	0.59	85.23
12 MAY	1200	65	3	0	0	68	24	3	2	2	31	71	0.44	95.77
12 MAY	1300	66	2	0	0	68	47	3	4	2	56	87	0.64	78.16
12 MAY	1400	92	1	0	0	93	49	0	6	4	59	71	0.83	131.00
13 MAY	0800	60	2	0	0	62	49	2	1	5	57	66	0.86	93.94
13 MAY	0900	35	3	0	0	38	11	3	1	3	18	40	0.45	95.00
13 MAY	1000	48	2	0	0	50	20	2	0	1	23	52	0.44	96.15
13 MAY	1100	50	4	0	0	54	20	0	4	1	25	46	0.54	117.39
13 MAY	1200	37	2	0	0	39	22	6	1	3	32	42	0.76	92.86
13 MAY	1300	58	0	1	0	59	22	2	1	0	25	49	0.51	120.41
14 MAY	0800	62	2	0	0	64	44	2	1	0	47	62	0.76	103.23

Appendix Table 16.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
14 MAY	0900	48	0	0	0	48	18	1	0	0	19	55	0.35	87.27
14 MAY	1000	51	0	0	0	51	36	2	0	0	38	54	0.70	94.44
14 MAY	1100	62	1	0	0	63	22	2	2	1	27	54	0.50	116.67
14 MAY	1200	43	2	1	0	46	35	4	0	1	40	53	0.75	86.79
14 MAY	1300	102	0	0	0	102	73	4	2	1	80	96	0.83	106.25
16 MAY	1600	51	4	0	0	55	65	5	1	0	71	76	0.93	72.37
16 MAY	1700	76	5	0	0	81	66	6	3	2	77	81	0.95	100.00
16 MAY	1800	138	2	0	0	140	162	3	19	1	185	125	1.48	112.00
16 MAY	1900	53	2	0	0	55	29	4	12	0	45	72	0.63	76.39
16 MAY	2000	46	1	1	0	48	17	1	9	0	27	56	0.48	85.71
16 MAY	2100	88	15	0	0	103	98	25	73	4	200	108	1.85	95.37
16 MAY	2200	51	4	0	0	55	37	17	27	7	88	66	1.33	83.33
17 MAY	1700	50	2	0	0	52	49	4	4	0	57	66	0.86	78.79
17 MAY	1800	90	5	1	0	96	61	6	11	1	79	84	0.94	114.29
17 MAY	1900	41	1	1	0	43	18	0	5	0	23	46	0.50	93.48
17 MAY	2000	39	0	0	0	39	24	4	7	0	35	44	0.80	88.64
17 MAY	2100	99	5	4	0	108	95	16	83	7	201	101	1.99	106.93
18 MAY	1600	75	4	0	0	79	76	4	14	1	95	96	0.99	82.29
18 MAY	1700	82	2	0	0	84	71	7	15	2	95	83	1.14	101.20
18 MAY	1800	63	2	0	0	65	36	2	11	0	49	59	0.83	110.17
18 MAY	1900	20	1	0	0	21	7	0	5	0	12	30	0.40	70.00
18 MAY	2000	30	1	0	0	31	6	0	8	1	15	28	0.54	110.71
18 MAY	2100	43	3	1	0	47	39	7	26	4	76	47	1.62	100.00
19 MAY	1600	39	0	0	0	39	34	1	5	0	40	50	0.80	78.00
19 MAY	1700	37	1	0	0	38	23	1	2	0	26	41	0.63	92.68
19 MAY	1800	22	3	0	0	25	14	0	2	0	16	27	0.59	92.59
19 MAY	1900	20	0	0	0	20	3	1	2	0	6	17	0.35	117.64
19 MAY	2000	11	2	0	0	13	4	0	3	0	7	14	0.50	92.86
19 MAY	2100	35	6	0	0	41	47	3	28	0	78	47	1.66	87.23
20 MAY	1600	20	1	0	0	21	10	4	0	0	14	38	0.37	55.26
20 MAY	1700	37	1	0	0	38	33	2	7	0	42	32	1.31	118.75
20 MAY	1800	17	1	1	0	19	3	1	2	0	6	20	0.30	95.00
20 MAY	1900	12	0	0	0	12	18	0	3	0	21	18	1.17	66.67
20 MAY	2000	1	0	0	0	1	3	0	1	0	4	5	0.80	20.00
20 MAY	2100	19	3	2	0	24	15	1	15	0	31	25	1.24	96.00
20 MAY	2200	27	3	0	0	30	5	0	4	0	9	15	0.60	200.00
22 MAY	0900	18	1	0	0	19	8	7	0	0	15	33	0.45	57.58

Appendix Table 16.0. Continued.

Test Date	Test Time	Tagged				Total Tagged	Untagged				Total Untagged	Total Cycles	Untagged per Cycle	Slidegate Efficiency
		Chin	Sthd	Sock	Coho		Chin	Sthd	Sock	Coho				
22 MAY	1000	6	1	0	0	7	2	0	0	0	2	9	0.22	77.78
22 MAY	1100	24	3	0	0	27	69	7	1	1	78	24	3.25	112.50
22 MAY	1200	12	1	0	0	13	10	1	1	0	12	29	0.41	44.83
22 MAY	1300	25	4	1	0	30	39	8	0	0	47	27	1.74	111.11
22 MAY	1400	25	3	0	0	28	22	1	0	0	23	17	1.35	164.71
23 MAY	0700	14	1	0	0	15	22	3	0	0	25	17	1.47	88.24
23 MAY	0800	10	1	0	0	11	2	0	0	0	2	13	0.15	84.62
23 MAY	0900	11	2	0	0	13	10	0	0	0	10	12	0.83	108.33
23 MAY	1000	16	2	0	0	18	4	0	0	0	4	21	0.19	85.71
23 MAY	1100	16	1	0	0	17	30	2	0	0	32	19	1.68	89.47
23 MAY	1200	30	5	0	0	35	13	2	0	0	15	37	0.41	94.59
23 MAY	1300	33	1	0	0	34	145	9	2	3	159	32	4.97	106.25
23 MAY	1400	20	6	0	0	26	67	11	1	1	80	27	2.96	96.30
24 MAY	0700	5	1	0	0	6	1	0	0	0	1	5	0.20	120.00
24 MAY	0800	7	2	0	0	9	11	0	0	0	11	8	1.38	112.50
24 MAY	0900	4	5	0	0	9	13	0	0	0	13	9	1.44	100.00
24 MAY	1000	6	0	0	0	6	10	0	0	0	10	8	1.25	75.00
24 MAY	1100	7	1	0	0	8	3	2	0	0	5	9	0.56	88.89
24 MAY	1200	6	1	0	0	7	4	1	0	0	5	12	0.42	58.33
24 MAY	1300	8	2	0	0	10	2	0	0	0	2	14	0.14	71.43
24 MAY	1400	13	2	0	0	15	4	0	0	0	4	7	0.57	214.29
25 MAY	0800	9	2	0	0	11	7	1	0	0	8	10	0.80	110.00
26 MAY	0700	7	3	0	0	10	7	0	0	0	7	12	0.58	83.33
26 MAY	0800	9	1	0	0	10	1	0	0	0	1	8	0.13	125.00
26 MAY	0900	10	0	0	0	10	9	1	0	0	10	12	0.83	83.33
26 MAY	1000	1	1	0	0	2	6	0	0	0	6	6	1.00	33.33
26 MAY	1100	6	1	0	0	7	3	0	0	0	3	7	0.43	100.00
26 MAY	1200	18	0	0	0	18	73	0	4	1	78	32	2.44	56.25
26 MAY	1300	10	2	0	0	12	7	0	0	0	7	7	1.00	171.43
26 MAY	1400	3	1	0	0	4	4	0	0	0	4	5	0.80	80.00
27 MAY	0700	6	0	0	0	6	0	0	0	0	0	6	0.00	100.00
27 MAY	0800	9	1	0	0	10	3	10	0	0	13	11	1.18	90.91
27 MAY	0900	6	1	0	0	7	3	0	0	0	3	4	0.75	175.00
27 MAY	1000	2	0	0	0	2	0	0	0	0	0	4	0.00	50.00
27 MAY	1100	5	1	0	0	6	1	0	0	0	1	6	0.17	100.00
28 MAY	0700	11	0	0	0	11	7	0	0	0	7	10	0.70	110.00
28 MAY	0800	8	2	0	0	10	28	0	0	0	28	10	2.80	100.00

Appendix Table 16.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
28 MAY	0900	2	0	0	0	2	4	0	0	0	4	3	1.33	66.67
30 MAY	1100	0	1	0	0	1	0	0	0	0	0	1	0.00	100.00
30 MAY	1200	7	1	0	0	8	5	0	1	0	6	9	0.67	88.89
30 MAY	1300	5	1	0	0	6	9	0	1	0	10	7	1.43	85.71
30 MAY	1400	6	1	0	0	7	18	0	0	0	18	8	2.25	87.50
30 MAY	1500	5	3	0	0	8	5	1	0	0	6	8	0.75	100.00
30 MAY	1600	4	1	0	0	5	14	1	0	0	15	5	3.00	100.00
30 MAY	1700	3	0	0	0	3	0	1	0	0	1	3	0.33	100.00
30 MAY	1800	3	0	0	0	3	2	0	0	0	2	3	0.67	100.00
31 MAY	1100	4	1	0	0	5	24	1	0	1	26	2	13.00	250.00
31 MAY	1200	10	0	0	0	10	14	1	0	0	15	12	1.25	83.33
31 MAY	1300	7	1	0	0	8	44	0	2	0	46	9	5.11	88.89
31 MAY	1400	6	0	0	0	6	0	0	0	0	0	6	0.00	100.00
31 MAY	1500	0	0	0	0	0	0	0	0	0	0	0	-0-	-0-
31 MAY	1600	13	0	0	0	13	53	1	2	0	56	10	5.60	130.00
31 MAY	1700	11	0	0	0	11	39	0	2	0	41	11	3.73	100.00
01 JUN	1100	6	4	0	0	10	3	1	0	0	4	15	0.27	66.67
01 JUN	1200	7	0	1	0	8	15	0	0	0	15	11	1.36	72.73
01 JUN	1300	10	0	0	0	10	30	0	2	0	32	10	3.20	100.00
01 JUN	1400	3	1	0	0	4	1	0	0	0	1	5	0.20	80.00
01 JUN	1500	0	0	0	0	0	1	0	0	0	1	2	0.50	0.00
01 JUN	1600	5	0	0	0	5	13	1	0	0	14	3	4.67	166.67
01 JUN	1700	7	2	0	0	9	29	0	1	0	30	9	3.33	100.00
02 JUN	1100	2	1	0	0	3	3	0	0	0	3	3	1.00	100.00
02 JUN	1200	2	2	0	0	4	2	1	0	0	3	4	0.75	100.00
02 JUN	1300	4	3	0	0	7	11	2	0	0	13	7	1.86	100.00
02 JUN	1400	4	1	1	0	6	6	1	2	0	9	7	1.29	85.71
02 JUN	1500	3	1	0	0	4	5	0	0	0	5	5	1.00	80.00
02 JUN	1600	4	2	0	0	6	0	0	1	0	1	5	0.20	120.00
02 JUN	1700	4	0	0	0	4	12	0	0	0	12	3	4.00	133.33
03 JUN	1200	8	2	0	0	10	6	1	0	0	7	11	0.64	90.91
03 JUN	1300	3	3	0	0	6	6	0	0	0	6	6	1.00	100.00
03 JUN	1400	0	0	0	0	0	0	0	0	0	0	0	-0-	-0-
03 JUN	1500	1	1	1	0	3	8	0	3	0	11	4	2.75	75.00
03 JUN	1600	6	0	0	0	6	5	0	1	0	6	12	0.50	50.00
03 JUN	1700	5	0	0	0	5	5	1	0	0	6	14	0.43	35.71
03 JUN	1800	2	0	0	0	2	1	0	0	0	1	2	0.50	100.00

Appendix Table 16.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
Totals		4412	246	17	0	4675	3496	312	510	106	4424	5031		
Averages		30.2	1.7	0.1	0.0	32.0	23.9	2.1	3.5	0.7	30.3	34.5	0.88	92.92

Appendix Table 17.0. Numbers of PIT-tagged and nontagged salmonids diverted per hourly test of the "A" flume PIT-tag detection/diversion system at McNary Dam, 1995.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
08 MAY	0900	38	0	0	0	38	8	0	0	1	9	43	0.21
08 MAY	1000	71	2	0	0	73	31	6	3	3	43	89	0.48
08 MAY	1100	78	4	0	0	82	37	9	3	6	55	78	0.71
08 MAY	1200	93	2	0	0	95	36	3	2	0	41	69	0.59
09 MAY	0800	55	2	0	0	57	37	0	1	2	40	73	0.55
09 MAY	0900	41	0	0	0	41	10	0	0	0	10	21	0.48
09 MAY	1000	42	2	0	0	44	15	2	2	0	19	36	0.53
09 MAY	1100	27	1	0	0	28	17	1	0	1	19	36	0.53
09 MAY	1200	17	0	0	0	17	25	3	0	0	28	37	0.76
09 MAY	1300	49	3	0	0	52	13	3	1	2	19	63	0.30
09 MAY	1400	50	5	0	0	55	29	2	0	0	31	72	0.43
09 MAY	1500	80	4	0	0	84	54	3	4	1	62	132	0.47
10 MAY	0800	43	0	0	0	43	21	1	0	0	22	48	0.46
10 MAY	0900	39	1	0	0	40	12	1	0	0	13	25	0.52
11 MAY	0800	95	2	0	0	97	23	6	0	1	30	114	0.26
11 MAY	0900	114	3	0	0	117	43	3	0	1	47	66	0.71
11 MAY	1000	53	2	0	0	55	47	5	3	1	56	61	0.92
11 MAY	1100	35	2	0	0	37	16	0	1	3	20	50	0.40
11 MAY	1200	72	1	0	0	73	65	6	8	3	82	85	0.96
11 MAY	1300	122	3	0	0	125	60	4	2	3	69	124	0.56
11 MAY	1400	90	1	0	0	91	93	9	5	5	112	106	1.06
12 MAY	0800	46	0	0	0	46	20	0	0	0	20	41	0.49
12 MAY	0900	39	4	0	0	43	14	1	3	2	20	31	0.65
12 MAY	1000	31	1	0	0	32	30	0	2	9	41	39	1.05
12 MAY	1100	73	2	0	0	75	37	3	11	1	52	88	0.59
12 MAY	1200	65	3	0	0	68	24	3	2	2	31	71	0.44
12 MAY	1300	66	2	0	0	68	47	3	4	2	56	87	0.64
12 MAY	1400	92	1	0	0	93	49	0	6	4	59	71	0.83
13 MAY	0800	60	2	0	0	62	49	2	1	5	57	66	0.86
13 MAY	0900	35	3	0	0	38	11	3	1	3	18	40	0.45
13 MAY	1000	48	2	0	0	50	20	2	0	1	23	52	0.44
13 MAY	1100	50	4	0	0	54	20	0	4	1	25	46	0.54
13 MAY	1200	37	2	0	0	39	22	6	1	3	32	42	0.76
13 MAY	1300	58	0	1	0	59	22	2	1	0	25	49	0.51
14 MAY	0800	62	2	0	0	64	44	2	1	0	47	62	0.76
14 MAY	0900	48	0	0	0	48	18	1	0	0	19	55	0.35
14 MAY	1000	51	0	0	0	51	36	2	0	0	38	54	0.70
14 MAY	1100	62	1	0	0	63	22	2	2	1	27	54	0.50
14 MAY	1200	43	2	1	0	46	35	4	0	1	40	53	0.75
14 MAY	1300	102	0	0	0	102	73	4	2	1	80	96	0.83

Appendix Table 17.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
16 MAY	1600	51	4	0	0	55	65	5	1	0	71	76	0.93
16 MAY	1700	76	5	0	0	81	66	6	3	2	77	81	0.95
16 MAY	1800	138	2	0	0	140	162	3	19	1	185	125	1.48
16 MAY	1900	53	2	0	0	55	29	4	12	0	45	72	0.63
16 MAY	2000	46	1	1	0	48	17	1	9	0	27	56	0.48
16 MAY	2100	88	15	0	0	103	98	25	73	4	200	108	1.85
16 MAY	2200	51	4	0	0	55	37	17	27	7	88	66	1.33
17 MAY	1700	50	2	0	0	52	49	4	4	0	57	66	0.86
17 MAY	1800	90	5	1	0	96	61	6	11	1	79	84	0.94
17 MAY	1900	41	1	1	0	43	18	0	5	0	23	46	0.50
17 MAY	2000	39	0	0	0	39	24	4	7	0	35	44	0.80
17 MAY	2100	99	5	4	0	108	95	16	83	7	201	101	1.99
18 MAY	1600	75	4	0	0	79	76	4	14	1	95	96	0.99
18 MAY	1700	82	2	0	0	84	71	7	15	2	95	83	1.14
18 MAY	1800	63	2	0	0	65	36	2	11	0	49	59	0.83
18 MAY	1900	20	1	0	0	21	7	0	5	0	12	30	0.40
18 MAY	2000	30	1	0	0	31	6	0	8	1	15	28	0.54
18 MAY	2100	43	3	1	0	47	39	7	26	4	76	47	1.62
19 MAY	1600	39	0	0	0	39	34	1	5	0	40	50	0.80
19 MAY	1700	37	1	0	0	38	23	1	2	0	26	41	0.63
19 MAY	1800	22	3	0	0	25	14	0	2	0	16	27	0.59
19 MAY	1900	20	0	0	0	20	3	1	2	0	6	17	0.35
19 MAY	2000	11	2	0	0	13	4	0	3	0	7	14	0.50
19 MAY	2100	35	6	0	0	41	47	3	28	0	78	47	1.66
20 MAY	1600	20	1	0	0	21	10	4	0	0	14	38	0.37
20 MAY	1700	37	1	0	0	38	33	2	7	0	42	32	1.31
20 MAY	1800	17	1	1	0	19	3	1	2	0	6	20	0.30
20 MAY	1900	12	0	0	0	12	18	0	3	0	21	18	1.17
20 MAY	2000	1	0	0	0	1	3	0	1	0	4	120	0.03
20 MAY	2100	19	3	2	0	24	15	1	15	0	31	25	1.24
20 MAY	2200	27	3	0	0	30	5	0	4	0	9	15	0.60
22 MAY	0900	18	1	0	0	19	8	7	0	0	15	33	0.45
22 MAY	1000	6	1	0	0	7	2	0	0	0	2	9	0.22
22 MAY	1100	24	3	0	0	27	69	7	1	1	78	24	3.25
22 MAY	1200	12	1	0	0	13	10	1	1	0	12	29	0.41
22 MAY	1300	25	4	1	0	30	39	8	0	0	47	27	1.74
22 MAY	1400	25	3	0	0	28	22	1	0	0	23	17	1.35
23 MAY	0700	14	1	0	0	15	22	3	0	0	25	17	1.47
23 MAY	0800	10	1	0	0	11	2	0	0	0	2	13	0.15
23 MAY	0900	11	2	0	0	13	10	0	0	0	10	12	0.83
23 MAY	1000	16	2	0	0	18	4	0	0	0	4	21	0.19
23 MAY	1100	16	1	0	0	17	30	2	0	0	32	19	1.68

Appendix Table 17.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
23 MAY	1200	30	5	0	0	35	13	2	0	0	15	37	0.41
23 MAY	1300	33	1	0	0	34	145	9	2	3	159	32	4.97
23 MAY	1400	20	6	0	0	26	67	11	1	1	80	27	2.96
24 MAY	0700	5	1	0	0	6	1	0	0	0	1	5	0.20
24 MAY	0800	7	2	0	0	9	11	0	0	0	11	8	1.38
24 MAY	0900	4	5	0	0	9	13	0	0	0	13	9	1.44
24 MAY	1000	6	0	0	0	6	10	0	0	0	10	8	1.25
24 MAY	1100	7	1	0	0	8	3	2	0	0	5	9	0.56
24 MAY	1200	6	1	0	0	7	4	1	0	0	5	12	0.42
24 MAY	1300	8	2	0	0	10	2	0	0	0	2	14	0.14
24 MAY	1400	13	2	0	0	15	4	0	0	0	4	7	0.57
25 MAY	0800	9	2	0	0	11	7	1	0	0	8	10	0.80
26 MAY	0700	7	3	0	0	10	7	0	0	0	7	12	0.58
26 MAY	0800	9	1	0	0	10	1	0	0	0	1	8	0.13
26 MAY	0900	10	0	0	0	10	9	1	0	0	10	12	0.83
26 MAY	1000	1	1	0	0	2	6	0	0	0	6	6	1.00
26 MAY	1100	6	1	0	0	7	3	0	0	0	3	7	0.43
26 MAY	1200	18	0	0	0	18	73	0	4	1	78	32	2.44
26 MAY	1300	10	2	0	0	12	7	0	0	0	7	7	1.00
26 MAY	1400	3	1	0	0	4	4	0	0	0	4	5	0.80
27 MAY	0700	6	0	0	0	6	0	0	0	0	0	6	0.00
27 MAY	0800	9	1	0	0	10	3	10	0	0	13	11	1.18
27 MAY	0900	6	1	0	0	7	3	0	0	0	3	4	0.75
27 MAY	1000	2	0	0	0	2	0	0	0	0	0	4	0.00
27 MAY	1100	5	1	0	0	6	1	0	0	0	1	6	0.17
28 MAY	0700	11	0	0	0	11	7	0	0	0	7	10	0.70
28 MAY	0800	8	2	0	0	10	28	0	0	0	28	10	2.80
28 MAY	0900	2	0	0	0	2	4	0	0	0	4	3	1.33
30 MAY	1100	0	1	0	0	1	0	0	0	0	0	1	0.00
30 MAY	1200	7	1	0	0	8	5	0	1	0	6	9	0.67
30 MAY	1300	5	1	0	0	6	9	0	1	0	10	7	1.43
30 MAY	1400	6	1	0	0	7	18	0	0	0	18	8	2.25
30 MAY	1500	5	3	0	0	8	5	1	0	0	6	8	0.75
30 MAY	1600	4	1	0	0	5	14	1	0	0	15	5	3.00
30 MAY	1700	3	0	0	0	3	0	1	0	0	1	3	0.33
30 MAY	1800	3	0	0	0	3	2	0	0	0	2	3	0.67
31 MAY	1100	4	1	0	0	5	24	1	0	1	26	2	13.00
31 MAY	1200	10	0	0	0	10	14	1	0	0	15	12	1.25
31 MAY	1300	7	1	0	0	8	44	0	2	0	46	9	5.11
31 MAY	1400	6	0	0	0	6	0	0	0	0	0	6	0.00
31 MAY	1500	0	0	0	0	0	0	0	0	0	0	0	0.00
31 MAY	1600	13	0	0	0	13	53	1	2	0	56	10	5.60

Appendix Table 17.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
31 MAY	1700	11	0	0	0	11	39	0	2	0	41	11	3.73
01 JUN	1100	6	4	0	0	10	3	1	0	0	4	15	0.27
01 JUN	1200	7	0	1	0	8	15	0	0	0	15	11	1.36
01 JUN	1300	10	0	0	0	10	30	0	2	0	32	10	3.20
01 JUN	1400	3	1	0	0	4	1	0	0	0	1	5	0.20
01 JUN	1500	0	0	0	0	0	1	0	0	0	1	2	0.50
01 JUN	1600	5	0	0	0	5	13	1	0	0	14	3	4.67
01 JUN	1700	7	2	0	0	9	29	0	1	0	30	9	3.33
02 JUN	1100	2	1	0	0	3	3	0	0	0	3	3	1.00
02 JUN	1200	2	2	0	0	4	2	1	0	0	3	4	0.75
02 JUN	1300	4	3	0	0	7	11	2	0	0	13	7	1.86
02 JUN	1400	4	1	1	0	6	6	1	2	0	9	7	1.29
02 JUN	1500	3	1	0	0	4	5	0	0	0	5	5	1.00
02 JUN	1600	4	2	0	0	6	0	0	1	0	1	5	0.20
02 JUN	1700	4	0	0	0	4	12	0	0	0	12	3	4.00
03 JUN	1200	8	2	0	0	10	6	1	0	0	7	11	0.64
03 JUN	1300	3	3	0	0	6	6	0	0	0	6	6	1.00
03 JUN	1400	0	0	0	0	0	0	0	0	0	0	0	0.00
03 JUN	1500	1	1	1	0	3	8	0	3	0	11	4	2.75
03 JUN	1600	6	0	0	0	6	5	0	1	0	6	12	0.50
03 JUN	1700	5	0	0	0	5	5	1	0	0	6	14	0.43
03 JUN	1800	2	0	0	0	2	1	0	0	0	1	2	0.50
Totals		4412	246	17	0	4675	3496	312	510	106	4424	5031	
Averages		30.2	1.7	0.1	0.0	32.0	23.9	2.1	3.5	0.7	30.3	34.5	0.88

Appendix Table 18.0. Injury and descaling data for hourly tests of the "A" flume PIT-tag detection/diversion system at McNary Dam, 1995.

Test date	Time	Chinook		Steelhead		Sockeye		Coho		Total inj/des	Total fish	Percent inj/des
		Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des			
08 MAY	0900	37	9	0	0	0	0	0	1	10	47	21.28
08 MAY	1000	85	17	7	1	3	0	3	0	18	116	15.52
08 MAY	1100	95	20	13	0	3	0	5	1	21	137	15.33
08 MAY	1200	113	16	5	0	2	0	0	0	16	136	11.76
09 MAY	0800	82	10	1	1	1	0	2	0	11	97	11.34
09 MAY	0900	46	5	0	0	0	0	0	0	5	51	9.80
09 MAY	1000	40	17	4	0	2	0	0	0	17	63	26.98
09 MAY	1100	37	7	2	0	0	0	1	0	7	47	14.89
09 MAY	1200	37	5	2	1	0	0	0	0	6	45	13.33
09 MAY	1300	49	13	5	1	1	0	2	0	14	71	19.72
09 MAY	1400	69	10	7	0	0	0	0	0	10	86	11.63
09 MAY	1500	122	12	6	1	4	0	1	0	13	146	8.90
10 MAY	0800	56	8	1	0	0	0	0	0	8	65	12.31
10 MAY	0900	45	6	2	0	0	0	0	0	6	53	11.32
11 MAY	0800	99	19	8	0	0	0	1	0	19	127	14.96
11 MAY	0900	130	27	6	0	0	0	1	0	27	164	16.46
11 MAY	1000	85	15	5	2	3	0	1	0	17	111	15.32
11 MAY	1100	44	7	2	0	1	0	1	2	9	57	15.79
11 MAY	1200	118	19	6	1	7	1	3	0	21	155	13.55
11 MAY	1300	149	33	7	0	2	0	3	0	33	194	17.01
11 MAY	1400	157	26	10	0	5	0	5	0	26	203	12.81
12 MAY	0800	61	5	0	0	0	0	0	0	5	66	7.58
12 MAY	0900	47	6	3	2	3	0	2	0	8	63	12.70
12 MAY	1000	48	13	1	0	1	1	7	2	16	73	21.92
12 MAY	1100	86	24	3	2	7	4	1	0	30	127	23.62
12 MAY	1200	68	21	6	0	2	0	2	0	21	99	21.21
12 MAY	1300	93	20	4	1	2	2	2	0	23	124	18.55
12 MAY	1400	126	15	1	0	4	2	3	1	18	152	11.84
13 MAY	0800	96	13	3	1	1	0	5	0	14	119	11.76
13 MAY	0900	38	8	6	0	1	0	3	0	8	56	14.29
13 MAY	1000	60	8	4	0	0	0	1	0	8	73	10.96
13 MAY	1100	64	6	4	0	3	1	1	0	7	79	8.86
13 MAY	1200	50	9	7	1	1	0	3	0	10	71	14.08
13 MAY	1300	62	18	2	0	2	0	0	0	18	84	21.43
14 MAY	0800	95	11	4	0	1	0	0	0	11	111	9.91
14 MAY	0900	56	10	0	1	0	0	0	0	11	67	16.42

Appendix Table 18.0. Continued.

Test date	Time	Chinook Not inj/des	Chinook inj/des	Steelhead Not inj/des	Steelhead inj/des	Sockeye Not inj/des	Sockeye inj/des	Coho Not inj/des	Coho inj/des	Total inj/des	Total fish	Percent inj/des
14 MAY	1000	72	15	2	0	0	0	0	0	15	89	16.85
14 MAY	1100	72	12	2	1	2	0	1	0	13	90	14.44
14 MAY	1200	69	9	5	1	1	0	1	0	10	86	11.63
14 MAY	1300	149	26	4	0	0	2	1	0	28	182	15.38
16 MAY	1600	98	18	7	2	1	0	0	0	20	126	15.87
16 MAY	1700	109	33	8	3	2	1	1	1	38	158	24.05
16 MAY	1800	227	73	5	0	7	12	1	0	85	325	26.15
16 MAY	1900	66	16	5	1	12	0	0	0	17	100	17.00
16 MAY	2000	52	11	2	0	5	5	0	0	16	75	21.33
16 MAY	2100	159	27	34	6	54	19	4	0	52	303	17.16
16 MAY	2200	69	19	15	6	18	9	7	0	34	143	23.78
17 MAY	1700	79	20	6	0	3	1	0	0	21	109	19.27
17 MAY	1800	146	5	6	5	8	4	1	0	14	175	8.00
17 MAY	1900	46	13	1	0	4	2	0	0	15	66	22.73
17 MAY	2000	51	12	3	1	7	0	0	0	13	74	17.57
17 MAY	2100	147	47	21	0	61	26	7	0	73	309	23.62
18 MAY	1600	106	45	6	2	9	5	1	0	52	174	29.89
18 MAY	1700	104	49	9	0	12	3	2	0	52	179	29.05
18 MAY	1800	69	30	4	0	5	6	0	0	36	114	31.58
18 MAY	1900	20	7	1	0	1	4	0	0	11	33	33.33
18 MAY	2000	29	7	1	0	7	1	1	0	8	46	17.39
18 MAY	2100	67	15	10	0	22	5	4	0	20	123	16.26
19 MAY	1600	52	21	0	1	3	2	0	0	24	79	30.38
19 MAY	1700	53	7	1	1	1	1	0	0	9	64	14.06
19 MAY	1800	31	5	3	0	2	0	0	0	5	41	12.20
19 MAY	1900	19	4	1	0	2	0	0	0	4	26	15.38
19 MAY	2000	14	1	2	0	2	1	0	0	2	20	10.00
19 MAY	2100	65	17	8	1	19	9	0	0	27	119	22.69
20 MAY	1600	22	8	3	2	0	0	0	0	10	35	28.57
20 MAY	1700	54	16	3	0	7	0	0	0	16	80	20.00
20 MAY	1800	17	3	2	0	3	0	0	0	3	25	12.00
20 MAY	1900	21	9	0	0	3	0	0	0	9	33	27.27
20 MAY	2000	2	2	0	0	0	1	0	0	3	5	60.00
20 MAY	2100	31	3	3	1	17	0	0	0	4	55	7.27
20 MAY	2200	22	10	3	0	4	0	0	0	10	39	25.64
22 MAY	0900	24	2	7	1	0	0	0	0	3	34	8.82
22 MAY	1000	8	0	1	0	0	0	0	0	0	9	0.00
22 MAY	1100	73	20	9	1	0	1	1	0	22	105	20.95

Appendix Table 18.0. Continued.

Test date	Time	Chinook		Steelhead		Sockeye		Coho		Total inj/des	Total fish	Percent inj/des
		Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des			
22 MAY	1200	16	6	2	0	1	0	0	0	6	25	24.00
22 MAY	1300	48	16	11	1	0	1	0	0	18	77	23.38
22 MAY	1400	41	6	4	0	0	0	0	0	6	51	11.76
23 MAY	0700	26	10	3	1	0	0	0	0	11	40	27.50
23 MAY	0800	11	1	1	0	0	0	0	0	1	13	7.69
23 MAY	0900	19	2	2	0	0	0	0	0	2	23	8.70
23 MAY	1000	18	2	2	0	0	0	0	0	2	22	9.09
23 MAY	1100	38	8	3	0	0	0	0	0	8	49	16.33
23 MAY	1200	32	11	7	0	0	0	0	0	11	50	22.00
23 MAY	1300	136	42	9	1	1	1	3	0	44	193	22.80
23 MAY	1400	78	9	15	2	1	0	1	0	11	106	10.38
24 MAY	0700	6	0	1	0	0	0	0	0	0	7	0.00
24 MAY	0800	17	1	2	0	0	0	0	0	1	20	5.00
24 MAY	0900	16	1	3	2	0	0	0	0	3	22	13.64
24 MAY	1000	14	2	0	0	0	0	0	0	2	16	12.50
24 MAY	1100	7	3	3	0	0	0	0	0	3	13	23.08
24 MAY	1200	9	1	1	1	0	0	0	0	2	12	16.67
24 MAY	1300	9	1	2	0	0	0	0	0	1	12	8.33
24 MAY	1400	16	1	2	0	0	0	0	0	1	19	5.26
25 MAY	0800	14	2	2	1	0	0	0	0	3	19	15.79
26 MAY	0700	12	2	3	0	0	0	0	0	2	17	11.76
26 MAY	0800	9	1	1	0	0	0	0	0	1	11	9.09
26 MAY	0900	18	1	1	0	0	0	0	0	1	20	5.00
26 MAY	1000	6	1	0	1	0	0	0	0	2	8	25.00
26 MAY	1100	9	0	1	0	0	0	0	0	0	10	0.00
26 MAY	1200	84	7	0	0	3	1	1	0	8	96	8.33
26 MAY	1300	11	6	2	0	0	0	0	0	6	19	31.58
26 MAY	1400	6	1	1	0	0	0	0	0	1	8	12.50
27 MAY	0700	6	0	0	0	0	0	0	0	0	6	0.00
27 MAY	0800	9	3	10	1	0	0	0	0	4	23	17.39
27 MAY	0900	9	0	1	0	0	0	0	0	0	10	0.00
27 MAY	1000	2	0	0	0	0	0	0	0	0	2	0.00
27 MAY	1100	6	0	1	0	0	0	0	0	0	7	0.00
28 MAY	0700	17	1	0	0	0	0	0	0	1	18	5.56
28 MAY	0800	35	1	2	0	0	0	0	0	1	38	2.63
28 MAY	0900	6	0	0	0	0	0	0	0	0	6	0.00
30 MAY	1100	0	0	1	0	0	0	0	0	0	1	0.00
30 MAY	1200	11	1	1	0	1	0	0	0	1	14	7.14

Appendix Table 18.0. Continued.

Test date	Time	Chinook		Steelhead		Sockeye		Coho		Total inj/des	Total fish	Percent inj/des
		Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des			
30 MAY	1300	13	1	1	0	1	0	0	0	1	16	6.25
30 MAY	1400	24	0	1	0	0	0	0	0	0	25	0.00
30 MAY	1500	8	2	3	1	0	0	0	0	3	14	21.43
30 MAY	1600	18	0	2	0	0	0	0	0	0	20	0.00
30 MAY	1700	2	1	1	0	0	0	0	0	1	4	25.00
30 MAY	1800	5	0	0	0	0	0	0	0	0	5	0.00
31 MAY	1100	28	0	2	0	0	0	1	0	0	31	0.00
31 MAY	1200	21	3	1	0	0	0	0	0	3	25	11.54
31 MAY	1300	48	3	1	0	2	0	0	0	3	54	5.56
31 MAY	1400	6	0	0	0	0	0	0	0	0	6	0.00
31 MAY	1500	0	0	0	0	0	0	0	0	0	0	0.00
31 MAY	1600	64	2	1	0	2	0	0	0	2	69	2.90
31 MAY	1700	48	2	0	0	2	0	0	0	2	52	3.85
01 JUN	1100	7	2	5	0	0	0	0	0	2	14	14.29
01 JUN	1200	17	5	0	0	1	0	0	0	5	23	21.74
01 JUN	1300	35	5	0	0	2	0	0	0	5	42	11.90
01 JUN	1400	2	2	1	0	0	0	0	0	2	5	40.00
01 JUN	1500	1	0	0	0	0	0	0	0	0	1	0.00
01 JUN	1600	16	2	1	0	0	0	0	0	2	19	10.53
01 JUN	1700	32	4	2	0	1	0	0	0	4	39	10.26
02 JUN	1100	4	1	1	0	0	0	0	0	1	6	16.67
02 JUN	1200	4	0	3	0	0	0	0	0	0	7	0.00
02 JUN	1300	13	2	5	0	0	0	0	0	2	20	10.00
02 JUN	1400	8	2	2	0	3	0	0	0	2	15	13.33
02 JUN	1500	8	0	1	0	0	0	0	0	0	9	0.00
02 JUN	1600	4	0	1	1	1	0	0	0	1	7	14.29
02 JUN	1700	16	0	0	0	0	0	0	0	0	16	0.00
03 JUN	1200	11	3	3	0	0	0	0	0	3	17	17.65
03 JUN	1300	9	0	3	0	0	0	0	0	0	12	0.00
03 JUN	1400	0	0	0	0	0	0	0	0	0	0	0.00
03 JUN	1500	9	0	1	0	4	0	0	0	0	14	0.00
03 JUN	1600	11	0	0	0	1	0	0	0	0	12	0.00
03 JUN	1700	7	3	1	0	0	0	0	0	3	11	27.27
03 JUN	1800	3	0	0	0	0	0	0	0	0	3	0.00
Totals		6588	1320	493	65	393	134	98	8	1527	9099	
Averages		45.14	9.04	3.34	0.45	2.69	0.92	0.67	0.05	10.46	62.32	16.78

Appendix Table 19.0. Numbers of PIT-tagged and nontagged salmonids diverted per hourly test of the PIT-tag detection/diversion system, flume "B" at McNary Dam, 1995.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
08 MAY	0900	8	6	1	0	15	7	2	2	5	16	14	1.14	107.14
08 MAY	1000	14	2	1	0	17	4	2	1	1	8	22	0.36	77.27
08 MAY	1100	12	2	0	0	14	1	5	0	1	7	20	0.35	70.00
08 MAY	1200	21	2	0	0	23	14	3	1	9	27	42	0.64	54.76
09 MAY	0800	63	6	0	0	69	20	7	1	5	33	56	0.59	123.21
09 MAY	0900	10	4	0	0	14	8	6	0	1	15	26	0.58	53.85
09 MAY	1000	33	8	0	0	41	13	5	4	1	23	36	0.64	113.89
09 MAY	1100	31	6	0	0	37	10	7	5	7	29	43	0.67	86.05
09 MAY	1200	25	3	0	0	28	12	10	2	3	27	57	0.47	49.12
09 MAY	1300	15	9	0	0	24	9	16	2	4	31	54	0.57	44.44
09 MAY	1400	57	7	0	0	64	39	24	3	9	75	67	1.12	95.52
09 MAY	1500	81	8	0	0	89	28	12	11	4	55	102	0.54	87.25
10 MAY	0800	26	4	0	0	30	6	6	2	1	15	38	0.39	78.95
10 MAY	0900	28	8	0	0	36	12	7	2	0	21	37	0.57	97.30
11 MAY	0800	16	4	0	0	20	38	12	3	14	67	24	2.79	83.33
11 MAY	0900	37	8	0	0	45	27	7	4	21	59	73	0.81	61.64
11 MAY	1000	42	5	0	0	47	28	10	6	8	52	49	1.06	95.92
11 MAY	1100	39	8	0	0	47	17	8	5	8	38	50	0.76	94.00
11 MAY	1200	74	11	0	0	85	69	21	20	17	127	97	1.31	87.63
11 MAY	1300	80	11	2	0	93	67	13	21	10	111	69	1.61	134.78
11 MAY	1400	24	8	1	0	33	44	21	4	14	83	63	1.32	52.38
12 MAY	0800	20	8	0	0	28	14	7	5	7	33	30	1.10	93.33
12 MAY	0900	15	7	0	0	22	4	6	0	1	11	23	0.48	95.65
12 MAY	1000	38	8	2	0	48	18	2	12	10	42	47	0.89	102.13
12 MAY	1100	49	15	0	0	64	34	8	10	14	66	61	1.08	104.92
12 MAY	1200	46	6	0	0	52	28	12	8	14	62	57	1.09	91.23
12 MAY	1300	110	15	1	0	126	162	29	20	47	258	119	2.17	105.88
12 MAY	1400	46	9	1	0	56	23	5	9	6	43	68	0.63	82.35
13 MAY	0800	35	5	0	0	40	18	7	7	19	51	44	1.16	90.91
13 MAY	0900	40	5	0	0	45	17	5	4	4	30	31	0.97	145.16
13 MAY	1000	47	8	0	0	55	22	3	6	12	43	54	0.80	101.85
13 MAY	1100	43	14	0	0	57	24	17	14	14	69	62	1.11	91.94
13 MAY	1200	63	16	1	0	80	52	31	8	18	109	71	1.54	112.68
13 MAY	1300	49	10	0	0	59	25	10	15	5	55	61	0.90	96.72
14 MAY	0800	44	5	0	0	49	21	3	5	8	37	30	1.23	163.33

Appendix Table 19.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
14 MAY	0900	26	2	1	0	29	14	1	5	7	27	29	0.93	100.00
14 MAY	1000	22	4	0	0	26	6	6	4	1	17	30	0.57	86.67
14 MAY	1100	31	4	0	0	35	14	5	3	1	23	34	0.68	102.94
14 MAY	1200	15	8	0	0	23	5	4	2	6	17	28	0.61	82.14
14 MAY	1300	35	5	0	0	40	19	8	2	4	33	41	0.80	97.56
16 MAY	1600	17	11	0	0	28	13	10	5	0	28	48	0.58	58.33
16 MAY	1700	12	10	0	0	22	6	5	5	0	16	29	0.55	75.86
16 MAY	1800	27	7	0	0	34	15	1	2	3	21	125	0.17	27.20
16 MAY	1900	6	3	0	0	9	0	3	1	0	4	17	0.24	52.94
16 MAY	2000	15	5	0	0	20	7	6	8	0	21	28	0.75	71.43
16 MAY	2100	16	34	2	0	52	16	39	39	3	97	66	1.47	78.79
16 MAY	2200	64	31	1	0	96	26	32	32	6	96	77	1.25	124.68
17 MAY	1700	30	6	0	0	36	24	8	8	0	40	47	0.85	76.60
17 MAY	1800	20	11	0	0	31	7	6	7	0	20	27	0.74	114.81
17 MAY	1900	20	7	0	0	27	11	7	9	0	27	29	0.93	93.10
17 MAY	2000	15	8	1	0	24	12	9	2	0	23	38	0.61	63.16
17 MAY	2100	84	50	3	0	137	147	74	144	7	372	115	3.23	119.13
18 MAY	1600	17	7	1	0	25	19	15	10	1	45	32	1.41	78.13
18 MAY	1700	10	7	0	0	17	6	5	4	1	16	17	0.94	100.00
18 MAY	1800	2	2	0	0	4	0	0	2	0	2	10	0.20	40.00
18 MAY	1900	11	2	0	0	13	5	2	4	0	11	14	0.79	92.86
18 MAY	2000	12	6	1	0	19	9	6	9	0	24	23	1.04	82.61
18 MAY	2100	26	14	2	0	42	18	11	20	2	51	34	1.50	123.53
19 MAY	1600	17	3	0	0	20	16	5	8	1	30	28	1.07	71.43
19 MAY	1700	12	3	0	0	15	10	2	2	0	14	18	0.78	83.33
19 MAY	1800	1	2	0	0	3	0	0	3	0	3	4	0.75	75.00
19 MAY	1900	9	4	0	0	13	2	1	1	0	4	10	0.40	130.00
19 MAY	2000	7	4	0	0	11	1	0	1	0	2	13	0.15	84.62
19 MAY	2100	21	10	2	0	33	28	9	18	3	58	36	1.61	91.67
20 MAY	1600	10	4	0	0	14	11	0	4	0	15	17	0.88	82.35
20 MAY	1700	13	3	0	0	16	3	2	5	0	10	18	0.56	88.89
20 MAY	1800	6	7	0	0	13	1	1	0	0	2	11	0.18	118.18
20 MAY	1900	3	3	0	0	6	1	0	1	0	2	6	0.33	100.00
20 MAY	2000	4	2	0	0	6	0	0	0	0	0	6	0.00	100.00
20 MAY	2100	8	8	0	0	16	4	1	5	0	10	17	0.59	94.12
20 MAY	2200	10	13	1	0	24	5	6	3	0	14	24	0.58	100.00
22 MAY	0900	8	7	0	0	15	5	2	0	0	7	26	0.27	57.69

Appendix Table 19.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
22 MAY	1000	8	12	1	0	21	1	4	1	0	6	21	0.29	100.00
22 MAY	1100	11	17	0	0	28	14	24	0	0	38	29	1.31	96.55
22 MAY	1200	13	27	0	0	40	7	9	4	0	20	45	0.44	88.89
22 MAY	1300	18	28	0	0	46	21	22	4	1	48	51	0.94	90.20
22 MAY	1400	17	17	0	0	34	8	5	5	1	19	31	0.61	109.68
23 MAY	0700	7	12	0	0	19	6	1	0	0	7	23	0.30	82.61
23 MAY	0800	10	13	0	0	23	2	5	2	0	9	22	0.41	104.55
23 MAY	0900	10	10	0	0	20	4	1	1	0	6	22	0.27	90.91
23 MAY	1000	14	16	0	0	30	15	8	1	0	24	32	0.75	93.75
23 MAY	1100	18	15	1	0	34	6	5	2	0	13	35	0.37	97.14
23 MAY	1200	8	1	0	0	9	11	4	0	0	15	32	0.47	28.13
23 MAY	1300	19	22	0	0	41	22	17	1	0	40	41	0.98	100.00
23 MAY	1400	8	20	0	0	28	33	19	3	1	56	27	2.07	103.70
24 MAY	0700	4	5	0	0	9	4	5	0	0	9	14	0.64	64.29
24 MAY	0800	2	5	0	0	7	0	0	0	0	0	9	0.00	77.78
24 MAY	0900	3	8	0	0	11	1	3	0	0	4	10	0.40	110.00
24 MAY	1000	14	15	0	0	29	7	12	2	0	21	29	0.72	100.00
24 MAY	1100	9	4	0	0	13	0	4	0	0	4	15	0.27	86.67
24 MAY	1200	10	14	0	0	24	7	4	6	0	17	25	0.68	96.00
24 MAY	1300	13	16	0	0	29	6	7	2	0	15	32	0.47	90.63
24 MAY	1400	7	9	1	0	17	6	4	1	0	11	16	0.69	106.25
25 MAY	0800	13	9	0	0	22	6	2	0	0	8	22	0.36	100.00
26 MAY	0700	3	8	1	0	12	4	1	1	0	6	13	0.46	92.31
26 MAY	0800	7	6	0	0	13	2	1	0	0	3	13	0.23	100.00
26 MAY	0900	2	6	0	0	8	1	0	0	0	1	9	0.11	88.89
26 MAY	1000	3	8	0	0	11	2	3	0	0	5	10	0.50	110.00
26 MAY	1100	10	7	0	0	17	4	2	1	2	9	19	0.47	89.47
26 MAY	1200	6	4	0	0	10	8	3	1	0	12	12	1.00	83.33
26 MAY	1300	11	6	0	0	17	5	2	0	0	7	18	0.39	94.44
26 MAY	1400	8	9	0	0	17	3	0	4	0	7	16	0.44	106.25
27 MAY	0700	4	5	0	0	9	3	2	0	0	5	11	0.45	81.82
27 MAY	0800	3	10	0	0	13	8	6	0	0	14	13	1.08	100.00
27 MAY	0900	6	7	0	0	13	5	1	0	0	6	13	0.46	100.00
27 MAY	1000	4	6	0	0	10	3	1	0	0	4	11	0.36	90.91
27 MAY	1100	1	3	1	0	5	2	1	0	0	3	4	0.75	125.00
28 MAY	0700	3	9	0	0	12	6	0	0	0	6	16	0.38	75.00
28 MAY	0800	8	10	0	0	18	13	2	0	0	15	15	1.00	120.00

Appendix Table 19.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
28 MAY	0900	5	6	0	0	11	1	1	0	0	2	13	0.15	84.62
30 MAY	1100	4	5	0	0	9	2	0	0	0	2	8	0.25	112.50
30 MAY	1200	11	11	0	0	22	14	2	0	0	16	23	0.70	95.65
30 MAY	1300	7	7	0	0	14	8	0	0	0	8	14	0.57	100.00
30 MAY	1400	4	22	1	0	27	18	4	2	0	24	27	0.89	100.00
30 MAY	1500	4	10	0	0	14	12	2	0	0	14	13	1.08	107.69
30 MAY	1600	1	7	1	0	9	5	2	0	0	7	10	0.70	90.00
30 MAY	1700	2	4	0	0	6	7	2	0	0	9	7	1.29	85.71
30 MAY	1800	1	2	0	0	3	3	0	0	0	3	3	1.00	100.00
31 MAY	1100	8	9	0	0	17	17	2	2	0	21	7	3.00	242.86
31 MAY	1200	12	9	2	0	23	17	0	5	0	22	35	0.63	65.71
31 MAY	1300	14	11	0	0	25	38	1	9	0	48	27	1.78	92.59
31 MAY	1400	10	12	1	0	23	53	6	7	0	66	18	3.67	127.78
31 MAY	1500	5	2	1	0	8	4	0	1	0	5	7	0.71	114.29
31 MAY	1600	8	4	0	0	12	8	1	0	0	9	14	0.64	85.71
31 MAY	1700	6	4	0	0	10	15	0	7	0	22	9	2.44	111.11
01 JUN	1100	10	5	0	0	15	4	0	1	0	5	16	0.31	93.75
01 JUN	1200	8	6	1	0	15	18	2	2	0	22	15	1.47	100.00
01 JUN	1300	21	10	1	0	32	39	3	5	0	47	33	1.42	96.97
01 JUN	1400	8	4	1	0	13	11	2	0	0	13	14	0.93	92.86
01 JUN	1500	4	7	0	0	11	5	1	2	0	8	12	0.67	91.67
01 JUN	1600	4	3	0	0	7	7	0	2	0	9	7	1.29	100.00
01 JUN	1700	3	1	0	0	4	2	0	0	0	2	2	1.00	200.00
02 JUN	1100	2	7	0	0	9	0	2	0	0	2	8	0.25	112.50
02 JUN	1200	2	6	0	0	8	2	1	0	0	3	9	0.33	88.89
02 JUN	1300	7	6	0	0	13	1	0	0	0	1	12	0.08	108.33
02 JUN	1400	5	2	0	0	7	3	0	0	0	3	8	0.38	87.50
02 JUN	1500	10	3	0	0	13	7	1	1	0	9	12	0.75	108.33
02 JUN	1600	4	2	0	0	6	6	0	0	0	6	8	0.75	75.00
02 JUN	1700	3	5	0	0	8	3	1	2	0	6	9	0.67	88.89
03 JUN	1200	8	6	0	0	14	6	1	0	0	7	14	0.50	100.00
03 JUN	1300	10	18	2	0	30	26	0	1	0	27	28	0.96	107.14
03 JUN	1400	2	4	0	0	6	1	0	0	0	1	9	0.11	66.67
03 JUN	1500	3	7	0	0	10	9	1	2	0	12	11	1.09	90.91
03 JUN	1600	2	2	0	0	4	1	0	0	0	1	3	0.33	133.33
03 JUN	1700	5	1	0	0	6	11	0	1	0	12	7	1.71	85.71
03 JUN	1800	0	1	0	0	1	1	0	0	0	1	1	1.00	100.00

Appendix Table 19.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle	Slidegate efficiency
		chin	sthd	sock	coho		chin	sthd	sock	coho				
Totals		2580	1208	41	0	3829	2062	869	694	373	3998	4218		
Averages		17.7	8.3	0.3	0.0	26.2	14.1	6.0	4.8	2.6	27.4	28.9	0.95	90.78

Appendix Table 20.0. Numbers of PIT-tagged and nontagged salmonids diverted per hourly test of the "B" flume PIT-tag detection/diversion system at McNary Dam, 1995.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
08 MAY	0900	8	6	1	0	15	7	2	2	5	16	14	1.14
08 MAY	1000	14	2	1	0	17	4	2	1	1	8	22	0.36
08 MAY	1100	12	2	0	0	14	1	5	0	1	7	20	0.35
08 MAY	1200	21	2	0	0	23	14	3	1	9	27	42	0.64
09 MAY	0800	63	6	0	0	69	20	7	1	5	33	56	0.59
09 MAY	0900	10	4	0	0	14	8	6	0	1	15	26	0.58
09 MAY	1000	33	8	0	0	41	13	5	4	1	23	36	0.64
09 MAY	1100	31	6	0	0	37	10	7	5	7	29	43	0.67
09 MAY	1200	25	3	0	0	28	12	10	2	3	27	57	0.47
09 MAY	1300	15	9	0	0	24	9	16	2	4	31	54	0.57
09 MAY	1400	57	7	0	0	64	39	24	3	9	75	67	1.12
09 MAY	1500	81	8	0	0	89	28	12	11	4	55	102	0.54
10 MAY	0800	26	4	0	0	30	6	6	2	1	15	38	0.39
10 MAY	0900	28	8	0	0	36	12	7	2	0	21	37	0.57
11 MAY	0800	16	4	0	0	20	38	12	3	14	67	24	2.79
11 MAY	0900	37	8	0	0	45	27	7	4	21	59	73	0.81
11 MAY	1000	42	5	0	0	47	28	10	6	8	52	49	1.06
11 MAY	1100	39	8	0	0	47	17	8	5	8	38	50	0.76
11 MAY	1200	74	11	0	0	85	69	21	20	17	127	97	1.31
11 MAY	1300	80	11	2	0	93	67	13	21	10	111	69	1.61
11 MAY	1400	24	8	1	0	33	44	21	4	14	83	63	1.32
12 MAY	0800	20	8	0	0	28	14	7	5	7	33	30	1.10
12 MAY	0900	15	7	0	0	22	4	6	0	1	11	23	0.48
12 MAY	1000	38	8	2	0	48	18	2	12	10	42	47	0.89
12 MAY	1100	49	15	0	0	64	34	8	10	14	66	61	1.08
12 MAY	1200	46	6	0	0	52	28	12	8	14	62	57	1.09
12 MAY	1300	110	15	1	0	126	162	29	20	47	258	119	2.17
12 MAY	1400	46	9	1	0	56	23	5	9	6	43	68	0.63
13 MAY	0800	35	5	0	0	40	18	7	7	19	51	44	1.16
13 MAY	0900	40	5	0	0	45	17	5	4	4	30	31	0.97
13 MAY	1000	47	8	0	0	55	22	3	6	12	43	54	0.80
13 MAY	1100	43	14	0	0	57	24	17	14	14	69	62	1.11
13 MAY	1200	63	16	1	0	80	52	31	8	18	109	71	1.54
13 MAY	1300	49	10	0	0	59	25	10	15	5	55	61	0.90
14 MAY	0800	44	5	0	0	49	21	3	5	8	37	30	1.23
14 MAY	0900	26	2	1	0	29	14	1	5	7	27	29	0.93
14 MAY	1000	22	4	0	0	26	6	6	4	1	17	30	0.57
14 MAY	1100	31	4	0	0	35	14	5	3	1	23	34	0.68
14 MAY	1200	15	8	0	0	23	5	4	2	6	17	28	0.61

Appendix Table 20.0. Continued.

Test Date	Test Time	Tagged				Total Tagged	Untagged				Total Untagged	Total Cycles	Untagged per Cycle
		Chinook	Steelhead	Sockeye	Coho		Chinook	Steelhead	Sockeye	Coho			
14 MAY	1300	35	5	0	0	40	19	8	2	4	33	41	0.80
16 MAY	1600	17	11	0	0	28	13	10	5	0	28	48	0.58
16 MAY	1700	12	10	0	0	22	6	5	5	0	16	29	0.55
16 MAY	1800	27	7	0	0	34	15	1	2	3	21	125	0.17
16 MAY	1900	6	3	0	0	9	0	3	1	0	4	17	0.24
16 MAY	2000	15	5	0	0	20	7	6	8	0	21	28	0.75
16 MAY	2100	16	34	2	0	52	16	39	39	3	97	66	1.47
16 MAY	2200	64	31	1	0	96	26	32	32	6	96	77	1.25
17 MAY	1700	30	6	0	0	36	24	8	8	0	40	47	0.85
17 MAY	1800	20	11	0	0	31	7	6	7	0	20	27	0.74
17 MAY	1900	20	7	0	0	27	11	7	9	0	27	29	0.93
17 MAY	2000	15	8	1	0	24	12	9	2	0	23	38	0.61
17 MAY	2100	84	50	3	0	137	147	74	144	7	372	115	3.23
18 MAY	1600	17	7	1	0	25	19	15	10	1	45	32	1.41
18 MAY	1700	10	7	0	0	17	6	5	4	1	16	17	0.94
18 MAY	1800	2	2	0	0	4	0	0	2	0	2	10	0.20
18 MAY	1900	11	2	0	0	13	5	2	4	0	11	14	0.79
18 MAY	2000	12	6	1	0	19	9	6	9	0	24	23	1.04
18 MAY	2100	26	14	2	0	42	18	11	20	2	51	34	1.50
19 MAY	1600	17	3	0	0	20	16	5	8	1	30	28	1.07
19 MAY	1700	12	3	0	0	15	10	2	2	0	14	18	0.78
19 MAY	1800	1	2	0	0	3	0	0	3	0	3	4	0.75
19 MAY	1900	9	4	0	0	13	2	1	1	0	4	10	0.40
19 MAY	2000	7	4	0	0	11	1	0	1	0	2	13	0.15
19 MAY	2100	21	10	2	0	33	28	9	18	3	58	36	1.61
20 MAY	1600	10	4	0	0	14	11	0	4	0	15	17	0.88
20 MAY	1700	13	3	0	0	16	3	2	5	0	10	18	0.56
20 MAY	1800	6	7	0	0	13	1	1	0	0	2	11	0.18
20 MAY	1900	3	3	0	0	6	1	0	1	0	2	6	0.33
20 MAY	2000	4	2	0	0	6	0	0	0	0	0	6	0.00
20 MAY	2100	8	8	0	0	16	4	1	5	0	10	17	0.59
20 MAY	2200	10	13	1	0	24	5	6	3	0	14	24	0.58
22 MAY	0900	8	7	0	0	15	5	2	0	0	7	26	0.27
22 MAY	1000	8	12	1	0	21	1	4	1	0	6	21	0.29
22 MAY	1100	11	17	0	0	28	14	24	0	0	38	29	1.31
22 MAY	1200	13	27	0	0	40	7	9	4	0	20	45	0.44
22 MAY	1300	18	28	0	0	46	21	22	4	1	48	51	0.94
22 MAY	1400	17	17	0	0	34	8	5	5	1	19	31	0.61
23 MAY	0700	7	12	0	0	19	6	1	0	0	7	23	0.30
23 MAY	0800	10	13	0	0	23	2	5	2	0	9	22	0.41
23 MAY	0900	10	10	0	0	20	4	1	1	0	6	22	0.27
23 MAY	1000	14	16	0	0	30	15	8	1	0	24	32	0.75

Appendix Table 20.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
23 MAY	1100	18	15	1	0	34	6	5	2	0	13	35	0.37
23 MAY	1200	8	1	0	0	9	11	4	0	0	15	32	0.47
23 MAY	1300	19	22	0	0	41	22	17	1	0	40	41	0.98
23 MAY	1400	8	20	0	0	28	33	19	3	1	56	27	2.07
24 MAY	0700	4	5	0	0	9	4	5	0	0	9	14	0.64
24 MAY	0800	2	5	0	0	7	0	0	0	0	0	9	0.00
24 MAY	0900	3	8	0	0	11	1	3	0	0	4	10	0.40
24 MAY	1000	14	15	0	0	29	7	12	2	0	21	29	0.72
24 MAY	1100	9	4	0	0	13	0	4	0	0	4	15	0.27
24 MAY	1200	10	14	0	0	24	7	4	6	0	17	25	0.68
24 MAY	1300	13	16	0	0	29	6	7	2	0	15	32	0.47
24 MAY	1400	7	9	1	0	17	6	4	1	0	11	16	0.69
25 MAY	0800	13	9	0	0	22	6	2	0	0	8	22	0.36
26 MAY	0700	3	8	1	0	12	4	1	1	0	6	13	0.46
26 MAY	0800	7	6	0	0	13	2	1	0	0	3	13	0.23
26 MAY	0900	2	6	0	0	8	1	0	0	0	1	9	0.11
26 MAY	1000	3	8	0	0	11	2	3	0	0	5	10	0.50
26 MAY	1100	10	7	0	0	17	4	2	1	2	9	19	0.47
26 MAY	1200	6	4	0	0	10	8	3	1	0	12	12	1.00
26 MAY	1300	11	6	0	0	17	5	2	0	0	7	18	0.39
26 MAY	1400	8	9	0	0	17	3	0	4	0	7	16	0.44
27 MAY	0700	4	5	0	0	9	3	2	0	0	5	11	0.45
27 MAY	0800	3	10	0	0	13	8	6	0	0	14	13	1.08
27 MAY	0900	6	7	0	0	13	5	1	0	0	6	13	0.46
27 MAY	1000	4	6	0	0	10	3	1	0	0	4	11	0.36
27 MAY	1100	1	3	1	0	5	2	1	0	0	3	4	0.75
28 MAY	0700	3	9	0	0	12	6	0	0	0	6	16	0.38
28 MAY	0800	8	10	0	0	18	13	2	0	0	15	15	1.00
28 MAY	0900	5	6	0	0	11	1	1	0	0	2	13	0.15
30 MAY	1100	4	5	0	0	9	2	0	0	0	2	8	0.25
30 MAY	1200	11	11	0	0	22	14	2	0	0	16	23	0.70
30 MAY	1300	7	7	0	0	14	8	0	0	0	8	14	0.57
30 MAY	1400	4	22	1	0	27	18	4	2	0	24	27	0.89
30 MAY	1500	4	10	0	0	14	12	2	0	0	14	13	1.08
30 MAY	1600	1	7	1	0	9	5	2	0	0	7	10	0.70
30 MAY	1700	2	4	0	0	6	7	2	0	0	9	7	1.29
30 MAY	1800	1	2	0	0	3	3	0	0	0	3	3	1.00
31 MAY	1100	8	9	0	0	17	17	2	2	0	21	7	3.00
31 MAY	1200	12	9	2	0	23	17	0	5	0	22	35	0.63
31 MAY	1300	14	11	0	0	25	38	1	9	0	48	27	1.78
31 MAY	1400	10	12	1	0	23	53	6	7	0	66	18	3.67
31 MAY	1500	5	2	1	0	8	4	0	1	0	5	7	0.71

Appendix Table 20.0. Continued.

Test date	Test time	Tagged				Total tagged	Untagged				Total untagged	Total cycles	Untagged per cycle
		chinook	steelhead	sockeye	coho		chinook	steelhead	sockeye	coho			
31 MAY	1600	8	4	0	0	12	8	1	0	0	9	14	0.64
31 MAY	1700	6	4	0	0	10	15	0	7	0	22	9	2.44
01 JUN	1100	10	5	0	0	15	4	0	1	0	5	16	0.31
01 JUN	1200	8	6	1	0	15	18	2	2	0	22	15	1.47
01 JUN	1300	21	10	1	0	32	39	3	5	0	47	33	1.42
01 JUN	1400	8	4	1	0	13	11	2	0	0	13	14	0.93
01 JUN	1500	4	7	0	0	11	5	1	2	0	8	12	0.67
01 JUN	1600	4	3	0	0	7	7	0	2	0	9	7	1.29
01 JUN	1700	2	1	0	0	3	2	0	0	0	2	5	0.40
02 JUN	1100	2	7	0	0	9	0	2	0	0	2	11	0.18
02 JUN	1200	2	6	0	0	8	2	1	0	0	3	9	0.33
02 JUN	1300	7	6	0	0	13	1	0	0	0	1	12	0.08
02 JUN	1400	5	2	0	0	7	3	0	0	0	3	8	0.38
02 JUN	1500	10	3	0	0	13	7	1	1	0	9	12	0.75
02 JUN	1600	4	2	0	0	6	6	0	0	0	6	8	0.75
02 JUN	1700	3	5	0	0	8	3	1	2	0	6	9	0.67
03 JUN	1200	8	6	0	0	14	6	1	0	0	7	14	0.50
03 JUN	1300	10	18	2	0	30	26	0	1	0	27	28	0.96
03 JUN	1400	2	4	0	0	6	1	0	0	0	1	9	0.11
03 JUN	1500	3	7	0	0	10	9	1	2	0	12	11	1.09
03 JUN	1600	2	2	0	0	4	1	0	0	0	1	3	0.33
03 JUN	1700	5	1	0	0	6	11	0	1	0	12	7	1.71
03 JUN	1800	0	1	0	0	1	1	0	0	0	1	2	0.50
Totals		2580	1208	41	0	3829	2062	869	694	373	3998	4218	
Averages		17.7	8.3	0.3	0.0	26.2	14.1	6.0	4.8	2.6	27.4	28.9	0.8

Appendix Table 21.0. Injury and descaling data for hourly tests of the "B" flume PIT-tag detection/diversion system at McNary Dam, 1995.

Test date	Time	Chinook		Steelhead		Sockeye		Coho		Total inj/des	Total fish	Percent inj/des
		Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des			
08 MAY	0900	11	4	7	1	3	0	4	1	6	31	19.35
08 MAY	1000	18	0	4	0	2	0	1	0	0	25	0.00
08 MAY	1100	12	1	6	1	0	0	1	0	2	21	9.52
08 MAY	1200	28	7	3	2	1	0	9	0	9	50	18.00
09 MAY	0800	71	12	9	4	1	0	5	0	16	102	15.69
09 MAY	0900	14	4	7	3	0	0	1	0	7	29	24.14
09 MAY	1000	39	7	12	1	4	0	1	0	8	64	12.50
09 MAY	1100	35	6	12	1	4	1	7	0	8	66	12.12
09 MAY	1200	30	7	12	1	2	0	3	0	8	55	14.55
09 MAY	1300	19	5	24	1	2	0	4	0	6	55	10.91
09 MAY	1400	84	12	29	2	3	0	8	1	15	139	10.79
09 MAY	1500	94	15	18	2	11	0	4	0	17	144	11.81
10 MAY	0800	28	4	9	1	0	2	1	0	7	45	15.56
10 MAY	0900	36	4	13	2	1	1	0	0	7	57	12.28
11 MAY	0800	48	6	15	1	3	0	14	0	7	87	8.05
11 MAY	0900	49	15	15	0	4	0	19	2	17	104	16.35
11 MAY	1000	60	10	13	2	5	1	8	0	13	99	13.13
11 MAY	1100	48	8	11	5	5	0	7	1	14	85	16.47
11 MAY	1200	123	20	31	1	16	4	15	2	27	212	12.74
11 MAY	1300	117	30	23	1	21	2	7	3	36	204	17.65
11 MAY	1400	63	5	29	0	5	0	14	0	5	116	4.31
12 MAY	0800	29	5	15	0	5	0	7	0	5	61	8.20
12 MAY	0900	18	1	10	3	0	0	1	0	4	33	12.12
12 MAY	1000	51	5	9	1	13	1	7	3	10	90	11.11
12 MAY	1100	65	18	20	3	6	4	11	3	28	130	21.54
12 MAY	1200	60	14	16	2	6	2	13	1	19	114	16.67
12 MAY	1300	190	82	37	7	17	4	36	11	104	384	27.08
12 MAY	1400	64	5	13	1	9	1	6	0	7	99	7.07
13 MAY	0800	44	9	11	1	5	2	16	3	15	91	16.48
13 MAY	0900	46	11	8	2	4	0	4	0	13	75	17.33
13 MAY	1000	60	9	11	0	6	0	10	2	11	98	11.22
13 MAY	1100	53	14	28	3	10	4	12	2	23	126	18.25
13 MAY	1200	85	30	40	7	6	3	15	3	43	189	22.75
13 MAY	1300	64	10	19	1	14	1	5	0	12	114	10.53
14 MAY	0800	54	11	8	0	4	1	8	0	12	86	13.95
14 MAY	0900	36	4	2	1	4	2	6	1	8	56	14.29

Appendix Table 21.0. Continued.

Test date	Time	Chinook Not inj/des	Chinook inj/des	Steelhead Not inj/des	Steelhead inj/des	Sockeye Not inj/des	Sockeye inj/des	Coho Not inj/des	Coho inj/des	Total inj/des	Total fish	Percent inj/des
14 MAY	1000	23	5	8	2	2	2	1	0	9	43	20.93
14 MAY	1100	41	4	8	1	0	3	1	0	8	58	13.79
14 MAY	1200	18	2	11	1	2	0	6	0	3	40	7.50
14 MAY	1300	43	11	12	1	1	1	4	0	13	73	17.81
16 MAY	1600	27	3	20	1	2	3	0	0	7	56	12.50
16 MAY	1700	9	9	15	0	3	2	0	0	11	38	28.95
16 MAY	1800	33	9	8	0	2	0	3	0	9	55	16.36
16 MAY	1900	6	0	5	1	1	0	0	0	1	13	7.69
16 MAY	2000	15	7	11	0	6	2	0	0	9	41	21.95
16 MAY	2100	25	7	58	15	19	22	2	1	45	149	30.20
16 MAY	2200	66	24	56	7	19	14	5	1	46	192	23.96
17 MAY	1700	34	20	14	0	5	3	0	0	23	76	30.26
17 MAY	1800	22	5	12	5	3	4	0	0	14	51	27.45
17 MAY	1900	24	7	11	3	7	2	0	0	12	54	22.22
17 MAY	2000	25	2	13	4	1	2	0	0	8	47	19.05
17 MAY	2100	175	56	103	21	73	74	5	2	153	509	30.06
18 MAY	1600	22	14	21	1	7	4	1	0	19	70	27.14
18 MAY	1700	9	7	9	3	1	3	1	0	13	33	39.39
18 MAY	1800	2	0	2	0	1	1	0	0	1	6	16.67
18 MAY	1900	11	5	4	0	2	2	0	0	7	24	29.17
18 MAY	2000	18	3	11	1	7	3	0	0	7	43	16.28
18 MAY	2100	33	11	22	3	18	4	2	0	18	93	19.35
19 MAY	1600	22	11	6	2	4	4	1	0	17	50	34.00
19 MAY	1700	19	3	5	0	1	1	0	0	4	29	13.79
19 MAY	1800	1	0	2	0	2	1	0	0	1	6	16.67
19 MAY	1900	9	2	4	1	0	1	0	0	4	17	23.53
19 MAY	2000	7	1	4	0	0	1	0	0	2	13	15.38
19 MAY	2100	42	7	17	2	13	7	3	0	16	91	17.39
20 MAY	1600	18	3	2	2	2	2	0	0	7	29	24.14
20 MAY	1700	11	5	4	1	4	1	0	0	7	26	26.92
20 MAY	1800	3	4	8	0	0	0	0	0	4	15	26.67
20 MAY	1900	3	1	3	0	0	1	0	0	2	8	25.00
20 MAY	2000	3	1	1	1	0	0	0	0	2	6	33.33
20 MAY	2100	9	3	7	2	1	4	0	0	9	26	34.62
20 MAY	2200	11	4	17	2	4	0	0	0	6	38	15.79
22 MAY	0900	11	2	7	2	0	0	0	0	4	22	18.18
22 MAY	1000	7	2	13	3	2	0	0	0	5	27	18.52
22 MAY	1100	18	7	33	8	0	0	0	0	15	66	22.73

Appendix Table 21.0. Continued.

Test date	Time	Chinook		Steelhead		Sockeye		Coho		Total	Total	Percent
		Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	Not inj/des	inj/des	inj/des	fish	inj/des
22 MAY	1200	17	3	30	6	0	4	0	0	13	60	21.67
22 MAY	1300	30	9	42	8	0	4	1	0	21	94	22.34
22 MAY	1400	21	4	17	5	1	4	1	0	13	53	24.53
23 MAY	0700	12	1	10	3	0	0	0	0	4	26	15.38
23 MAY	0800	11	1	15	3	0	2	0	0	6	32	18.75
23 MAY	0900	11	3	10	1	0	1	0	0	5	26	19.23
23 MAY	1000	19	10	22	2	0	1	0	0	13	54	24.07
23 MAY	1100	18	6	16	4	1	2	0	0	12	47	25.53
23 MAY	1200	16	3	1	4	0	0	0	0	7	24	29.17
23 MAY	1300	33	8	32	7	0	1	0	0	16	81	19.75
23 MAY	1400	33	8	29	10	1	2	1	0	20	84	23.81
24 MAY	0700	7	1	9	1	0	0	0	0	2	18	11.11
24 MAY	0800	2	0	5	0	0	0	0	0	0	7	0.00
24 MAY	0900	2	2	10	1	0	0	0	0	3	15	20.00
24 MAY	1000	16	5	21	6	1	1	0	0	12	50	24.00
24 MAY	1100	8	1	7	1	0	0	0	0	2	17	11.76
24 MAY	1200	12	5	16	2	2	4	0	0	11	41	26.83
24 MAY	1300	17	2	20	3	2	0	0	0	5	44	11.36
24 MAY	1400	13	0	11	2	2	0	0	0	2	28	7.14
25 MAY	0800	18	1	11	0	0	0	0	0	1	30	3.33
26 MAY	0700	6	1	8	1	1	1	0	0	3	18	16.67
26 MAY	0800	7	2	7	0	0	0	0	0	2	16	12.50
26 MAY	0900	2	1	4	2	0	0	0	0	3	9	33.33
26 MAY	1000	4	1	9	2	0	0	0	0	3	16	18.75
26 MAY	1100	11	3	9	0	1	0	2	0	3	26	11.54
26 MAY	1200	11	3	5	2	0	1	0	0	6	22	27.27
26 MAY	1300	13	3	7	1	0	0	0	0	4	24	16.67
26 MAY	1400	10	1	9	0	3	1	0	0	2	24	8.33
27 MAY	0700	7	0	6	1	0	0	0	0	1	14	7.14
27 MAY	0800	10	1	15	1	0	0	0	0	2	27	7.41
27 MAY	0900	11	0	8	0	0	0	0	0	0	19	0.00
27 MAY	1000	6	1	5	2	0	0	0	0	3	14	21.43
27 MAY	1100	3	0	4	0	1	0	0	0	0	8	0.00
28 MAY	0700	9	0	7	2	0	0	0	0	2	18	11.11
28 MAY	0800	19	2	12	0	0	0	0	0	2	33	6.06
28 MAY	0900	5	1	7	0	0	0	0	0	1	13	7.69
30 MAY	1100	6	0	4	1	0	0	0	0	1	11	9.09
30 MAY	1200	22	3	11	2	0	0	0	0	5	38	13.16

Appendix Table 21.0. Continued.

Test date	Time	Chinook Not inj/des	Chinook inj/des	Steelhead Not inj/des	Steelhead inj/des	Sockeye Not inj/des	Sockeye inj/des	Coho Not inj/des	Coho inj/des	Total inj/des	Total fish	Percent inj/des
30 MAY	1300	13	2	4	3	0	0	0	0	5	22	22.73
30 MAY	1400	18	4	22	4	3	0	0	0	8	51	15.69
30 MAY	1500	14	2	12	0	0	0	0	0	2	28	7.14
30 MAY	1600	4	2	8	1	1	0	0	0	3	16	18.75
30 MAY	1700	7	2	6	0	0	0	0	0	2	15	13.33
30 MAY	1800	4	0	2	0	0	0	0	0	0	6	0.00
31 MAY	1100	21	4	9	2	1	1	0	0	7	38	18.42
31 MAY	1200	25	4	9	0	7	0	0	0	4	45	8.89
31 MAY	1300	48	4	12	0	9	0	0	0	4	73	5.48
31 MAY	1400	56	7	14	4	7	1	0	0	12	89	13.48
31 MAY	1500	7	2	2	0	2	0	0	0	2	13	15.38
31 MAY	1600	16	0	4	1	0	0	0	0	1	21	4.76
31 MAY	1700	17	4	4	0	7	0	0	0	4	32	12.50
01 JUN	1100	13	1	4	1	1	0	0	0	2	20	10.00
01 JUN	1200	18	8	8	0	3	0	0	0	8	37	21.62
01 JUN	1300	55	5	12	1	5	1	0	0	7	79	8.86
01 JUN	1400	16	3	6	0	1	0	0	0	3	26	11.54
01 JUN	1500	8	1	8	0	2	0	0	0	1	19	5.26
01 JUN	1600	8	3	2	1	2	0	0	0	4	16	25.00
01 JUN	1700	3	1	1	0	0	0	0	0	1	5	16.67
02 JUN	1100	2	0	8	1	0	0	0	0	1	11	9.09
02 JUN	1200	1	3	5	2	0	0	0	0	5	11	45.45
02 JUN	1300	7	1	6	0	0	0	0	0	1	14	7.14
02 JUN	1400	8	0	2	0	0	0	0	0	0	10	0.00
02 JUN	1500	17	0	4	0	1	0	0	0	0	22	0.00
02 JUN	1600	9	1	2	0	0	0	0	0	1	12	8.33
02 JUN	1700	6	0	5	1	1	1	0	0	2	14	14.29
03 JUN	1200	13	1	7	0	0	0	0	0	1	21	4.76
03 JUN	1300	33	3	16	2	2	1	0	0	6	57	10.53
03 JUN	1400	3	0	2	2	0	0	0	0	2	7	28.57
03 JUN	1500	12	0	8	0	1	1	0	0	1	22	4.55
03 JUN	1600	3	0	2	0	0	0	0	0	0	5	0.00
03 JUN	1700	15	1	1	0	1	0	0	0	1	18	5.56
03 JUN	1800	1	0	1	0	0	0	0	0	0	2	0.00
Totals		3800	842	1805	272	490	245	330	43	1402	7827	
Averages		26.04	5.77	12.34	1.86	3.36	1.68	2.26	0.29	9.60	53.59	17.91

Appendix Table 22.0. Physical parameters of hourly tests of the "B" flume PIT-tag diversion system at McNary Dam, 1995.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/08/95	9:00:00	0.800	1500.0
05/08/95	10:00:00	0.800	800.0
05/08/95	11:00:00	0.800	600.0
05/08/95	12:00:00	0.800	1500.0
05/09/95	8:00:00	0.800	900.0
05/09/95	9:00:00	0.800	1600.0
05/09/95	10:00:00	0.800	2900.0
05/09/95	11:00:00	0.800	1500.0
05/09/95	12:00:00	0.800	1900.0
05/09/95	13:00:00	0.800	1700.0
05/09/95	14:00:00	0.800	2300.0
05/09/95	15:00:00	0.800	1500.0
05/10/95	8:00:00	0.800	1200.0
05/10/95	9:00:00	0.800	600.0
05/11/95	8:00:00	0.800	1500.0
05/11/95	9:00:00	0.800	1700.0
05/11/95	10:00:00	0.800	1100.0
05/11/95	11:00:00	0.800	1400.0
05/11/95	12:00:00	0.800	2400.0
05/11/95	13:00:00	0.800	2800.0
05/11/95	14:00:00	0.800	2800.0
05/12/95	8:00:00	0.800	2100.0
05/12/95	9:00:00	0.800	700.0
05/12/95	10:00:00	0.800	1000.0
05/12/95	11:00:00	0.800	2100.0
05/12/95	12:00:00	0.800	1400.0
05/12/95	13:00:00	0.800	6800.0
05/12/95	14:00:00	0.800	1600.0
05/13/95	8:00:00	0.800	1900.0
05/13/95	9:00:00	0.800	1100.0
05/13/95	10:00:00	0.800	1500.0
05/13/95	11:00:00	0.800	2600.0
05/13/95	12:00:00	0.800	900.0
05/13/95	13:00:00	0.800	3300.0
05/14/95	8:00:00	0.800	1100.0
05/14/95	9:00:00	0.800	1500.0
05/14/95	10:00:00	0.800	1600.0
05/14/95	11:00:00	0.800	1800.0
05/14/95	12:00:00	0.800	1100.0
05/14/95	13:00:00	0.800	1600.0
05/16/95	16:00:00	0.800	2800.0
05/16/95	17:00:00	0.800	1100.0
05/16/95	18:00:00	0.800	1200.0

Appendix Table 22.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/16/95	19:00:00	0.800	1300.0
05/16/95	20:00:00	0.800	2600.0
05/16/95	21:00:00	0.800	5200.0
05/16/95	22:00:00	0.800	3000.0
05/17/95	17:00:00	0.800	2500.0
05/17/95	18:00:00	0.800	1900.0
05/17/95	19:00:00	0.800	2700.0
05/17/95	20:00:00	0.800	2800.0
05/17/95	21:00:00	0.800	7300.0
05/18/95	16:00:00	0.800	2000.0
05/18/95	17:00:00	0.800	2200.0
05/18/95	18:00:00	0.800	600.0
05/18/95	19:00:00	0.800	1200.0
05/18/95	20:00:00	0.800	2300.0
05/18/95	21:00:00	0.800	3400.0
05/19/95	16:00:00	0.800	1100.0
05/19/95	17:00:00	0.800	900.0
05/19/95	18:00:00	0.800	900.0
05/19/95	19:00:00	0.800	700.0
05/19/95	20:00:00	0.800	900.0
05/19/95	21:00:00	0.800	2100.0
05/20/95	16:00:00	0.800	1800.0
05/20/95	17:00:00	0.800	1200.0
05/20/95	18:00:00	0.800	500.0
05/20/95	19:00:00	0.800	400.0
05/20/95	20:00:00	0.800	1100.0
05/20/95	21:00:00	0.800	1700.0
05/20/95	22:00:00	0.800	1500.0
05/22/95	9:00:00	0.800	526.3
05/22/95	10:00:00	0.800	676.7
05/22/95	11:00:00	0.800	1954.9
05/22/95	12:00:00	0.800	1052.6
05/22/95	13:00:00	0.800	676.7
05/22/95	14:00:00	0.800	1654.1
05/23/95	7:00:00	0.800	1052.6
05/23/95	8:00:00	0.800	977.4
05/23/95	9:00:00	0.800	827.1
05/23/95	10:00:00	0.800	1654.1
05/23/95	11:00:00	0.800	1879.7
05/23/95	12:00:00	0.800	1954.9
05/23/95	13:00:00	0.800	751.9
05/23/95	14:00:00	0.800	902.3
05/24/95	7:00:00	0.800	601.5
05/24/95	8:00:00	0.800	751.9
05/24/95	9:00:00	0.800	827.1

Appendix Table 22.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/24/95	10:00:00	0.800	526.3
05/24/95	11:00:00	0.800	225.6
05/24/95	12:00:00	0.800	676.7
05/24/95	13:00:00	0.800	827.1
05/24/95	14:00:00	0.800	676.7
05/25/95	8:00:00	0.800	1100.0
05/26/95	7:00:00	0.800	350.0
05/26/95	8:00:00	0.800	950.0
05/26/95	9:00:00	0.800	750.0
05/26/95	10:00:00	0.800	500.0
05/26/95	11:00:00	0.800	350.0
05/26/95	12:00:00	0.800	1300.0
05/26/95	13:00:00	0.800	750.0
05/26/95	14:00:00	0.800	850.0
05/27/95	7:00:00	0.800	666.7
05/27/95	8:00:00	0.800	515.2
05/27/95	9:00:00	0.800	757.6
05/27/95	10:00:00	0.800	666.7
05/27/95	11:00:00	0.800	787.9
05/28/95	7:00:00	0.800	575.8
05/28/95	8:00:00	0.800	1333.3
05/28/95	9:00:00	0.800	575.8
05/30/95	11:00:00	0.800	3060.6
05/30/95	12:00:00	0.800	2151.5
05/30/95	13:00:00	0.800	2454.5
05/30/95	14:00:00	0.800	757.6
05/30/95	15:00:00	0.800	727.3
05/30/95	16:00:00	0.800	545.5
05/30/95	17:00:00	0.800	303.0
05/30/95	18:00:00	0.800	272.7
05/31/95	11:00:00	0.800	666.7
05/31/95	12:00:00	0.800	2848.5
05/31/95	13:00:00	0.800	1121.2
05/31/95	14:00:00	0.800	1454.5
05/31/95	15:00:00	0.800	606.1
05/31/95	16:00:00	0.800	1272.7
05/31/95	17:00:00	0.800	969.7
06/01/95	11:00:00	0.800	700.0
06/01/95	12:00:00	0.800	1800.0
06/01/95	13:00:00	0.800	1850.0
06/01/95	14:00:00	0.800	1300.0
06/01/95	15:00:00	0.800	650.0
06/01/95	16:00:00	0.800	950.0
06/01/95	17:00:00	0.800	650.0
06/02/95	11:00:00	0.800	300.0

Appendix Table 22.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
06/02/95	12:00:00	0.800	900.0
06/02/95	13:00:00	0.800	750.0
06/02/95	14:00:00	0.800	950.0
06/02/95	15:00:00	0.800	1800.0
06/02/95	16:00:00	0.800	750.0
06/02/95	17:00:00	0.800	450.0
06/03/95	12:00:00	0.800	400.0
06/03/95	13:00:00	0.800	1250.0
06/03/95	14:00:00	0.800	500.0
06/03/95	15:00:00	0.800	900.0
06/03/95	16:00:00	0.800	450.0
06/03/95	17:00:00	0.800	250.0
06/03/95	18:00:00	0.800	200.0

Appendix Table 23.0. Physical parameters of hourly tests of the "A" flume PIT-tag diversion system at McNary Dam, 1995.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/08/95	9:00:00	0.800	1000.0
05/08/95	10:00:00	0.800	2500.0
05/08/95	11:00:00	0.800	3200.0
05/08/95	12:00:00	0.800	1400.0
05/09/95	8:00:00	0.800	1300.0
05/09/95	9:00:00	0.800	500.0
05/09/95	10:00:00	0.800	900.0
05/09/95	11:00:00	0.800	1600.0
05/09/95	12:00:00	0.800	1200.0
05/09/95	13:00:00	0.800	1100.0
05/09/95	14:00:00	0.800	1500.0
05/09/95	15:00:00	0.800	1100.0
05/10/95	8:00:00	0.800	1400.0
05/10/95	9:00:00	0.800	400.0
05/11/95	8:00:00	0.800	2000.0
05/11/95	9:00:00	0.800	1400.0
05/11/95	10:00:00	0.800	2400.0
05/11/95	11:00:00	0.800	900.0
05/11/95	12:00:00	0.800	1900.0
05/11/95	13:00:00	0.800	2800.0
05/11/95	14:00:00	0.800	1300.0
05/12/95	8:00:00	0.800	700.0
05/12/95	9:00:00	0.800	1400.0
05/12/95	10:00:00	0.800	700.0
05/12/95	11:00:00	0.800	3000.0
05/12/95	12:00:00	0.800	1000.0
05/12/95	13:00:00	0.800	1500.0
05/12/95	14:00:00	0.800	2000.0
05/13/95	8:00:00	0.800	1300.0
05/13/95	9:00:00	0.800	500.0
05/13/95	10:00:00	0.800	800.0
05/13/95	11:00:00	0.800	900.0
05/13/95	12:00:00	0.800	800.0
05/13/95	13:00:00	0.800	1800.0
05/14/95	8:00:00	0.800	1200.0
05/14/95	9:00:00	0.800	900.0
05/14/95	10:00:00	0.800	900.0
05/14/95	11:00:00	0.800	1600.0
05/14/95	12:00:00	0.800	1500.0
05/14/95	13:00:00	0.800	2000.0
05/16/95	16:00:00	0.800	1300.0
05/16/95	17:00:00	0.800	3500.0
05/16/95	18:00:00	0.800	2400.0

Appendix Table 23.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/16/95	19:00:00	0.800	2800.0
05/16/95	20:00:00	0.800	3200.0
05/16/95	21:00:00	0.800	4500.0
05/16/95	22:00:00	0.800	3700.0
05/17/95	17:00:00	0.800	3200.0
05/17/95	18:00:00	0.800	1900.0
05/17/95	19:00:00	0.800	1900.0
05/17/95	20:00:00	0.800	2100.0
05/17/95	21:00:00	0.800	5700.0
05/18/95	16:00:00	0.800	3400.0
05/18/95	17:00:00	0.800	1800.0
05/18/95	18:00:00	0.800	2900.0
05/18/95	19:00:00	0.800	1200.0
05/18/95	20:00:00	0.800	1600.0
05/18/95	21:00:00	0.800	3800.0
05/19/95	16:00:00	0.800	2100.0
05/19/95	17:00:00	0.800	1900.0
05/19/95	18:00:00	0.800	400.0
05/19/95	19:00:00	0.800	1100.0
05/19/95	20:00:00	0.800	600.0
05/19/95	21:00:00	0.800	4200.0
05/20/95	16:00:00	0.800	2300.0
05/20/95	17:00:00	0.800	1400.0
05/20/95	18:00:00	0.800	1100.0
05/20/95	19:00:00	0.800	800.0
05/20/95	20:00:00	0.800	1400.0
05/20/95	21:00:00	0.800	2700.0
05/20/95	22:00:00	0.800	1500.0
05/22/95	9:00:00	0.800	751.9
05/22/95	10:00:00	0.800	1654.1
05/22/95	11:00:00	0.800	1954.9
05/22/95	12:00:00	0.800	1052.6
05/22/95	13:00:00	0.800	902.3
05/22/95	14:00:00	0.800	977.4
05/23/95	7:00:00	0.800	676.7
05/23/95	8:00:00	0.800	676.7
05/23/95	9:00:00	0.800	1127.8
05/23/95	10:00:00	0.800	1428.6
05/23/95	11:00:00	0.800	1578.9
05/23/95	12:00:00	0.800	1428.6
05/23/95	13:00:00	0.800	827.1
05/23/95	14:00:00	0.800	225.6
05/24/95	7:00:00	0.800	375.9
05/24/95	8:00:00	0.800	451.1
05/24/95	9:00:00	0.800	225.6

Appendix Table 23.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
05/24/95	10:00:00	0.800	225.6
05/24/95	11:00:00	0.800	150.4
05/24/95	12:00:00	0.800	375.9
05/24/95	13:00:00	0.800	601.5
05/24/95	14:00:00	0.800	676.7
05/25/95	8:00:00	0.800	750.0
05/26/95	7:00:00	0.800	250.0
05/26/95	8:00:00	0.800	300.0
05/26/95	9:00:00	0.800	500.0
05/26/95	10:00:00	0.800	450.0
05/26/95	11:00:00	0.800	150.0
05/26/95	12:00:00	0.800	1700.0
05/26/95	13:00:00	0.800	100.0
05/26/95	14:00:00	0.800	550.0
05/27/95	7:00:00	0.800	393.9
05/27/95	8:00:00	0.800	515.2
05/27/95	9:00:00	0.800	333.3
05/27/95	10:00:00	0.800	454.5
05/27/95	11:00:00	0.800	303.0
05/28/95	7:00:00	0.800	575.8
05/28/95	8:00:00	0.800	787.9
05/28/95	9:00:00	0.800	424.2
05/30/95	11:00:00	0.800	2606.1
05/30/95	12:00:00	0.800	909.1
05/30/95	13:00:00	0.800	757.6
05/30/95	14:00:00	0.800	818.2
05/30/95	15:00:00	0.800	1121.2
05/30/95	16:00:00	0.800	484.8
05/30/95	17:00:00	0.800	393.9
05/30/95	18:00:00	0.800	363.6
05/31/95	11:00:00	0.800	272.7
05/31/95	12:00:00	0.800	848.5
05/31/95	13:00:00	0.800	848.5
05/31/95	14:00:00	0.800	2424.2
05/31/95	15:00:00	0.800	242.4
05/31/95	16:00:00	0.800	636.4
05/31/95	17:00:00	0.800	545.5
06/01/95	11:00:00	0.800	850.0
06/01/95	12:00:00	0.800	550.0
06/01/95	13:00:00	0.800	900.0
06/01/95	14:00:00	0.800	350.0
06/01/95	15:00:00	0.800	650.0
06/01/95	16:00:00	0.800	800.0
06/01/95	17:00:00	0.800	350.0
06/02/95	11:00:00	0.800	300.0

Appendix Table 23.0. Continued.

Test date	Start test time	Slide-gate cycle time	Expanded hourly count
06/02/95	12:00:00	0.800	250.0
06/02/95	13:00:00	0.800	800.0
06/02/95	14:00:00	0.800	450.0
06/02/95	15:00:00	0.800	950.0
06/02/95	16:00:00	0.800	700.0
06/02/95	17:00:00	0.800	650.0
06/03/95	12:00:00	0.800	1000.0
06/03/95	13:00:00	0.800	850.0
06/03/95	14:00:00	0.800	900.0
06/03/95	15:00:00	0.800	400.0
06/03/95	16:00:00	0.800	250.0
06/03/95	17:00:00	0.800	300.0
06/03/95	18:00:00	0.800	200.0