



**DIRECT EFFECTS OF DIFFERENTIAL SPILL VOLUMES ON
MORTALITY AND INJURY RATES OF
JUVENILE SALMONIDS AT THE DALLES DAM SPILLWAY,
COLUMBIA RIVER IN FALL 2002 AND SPRING 2003**

Contract No. DACW68-02-D-0002
Task Order DT03

April 2004

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

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EXECUTIVE SUMMARY

Results of some recent juvenile salmonid spillway passage investigations at The Dalles Dam on the lower Columbia River have shown lower than desired ($\geq 98\%$) survival estimates, particularly for southern spillbays, under certain hydraulic conditions. The contributory factors deemed responsible for lower survival and high injury rates were potential fish collisions with downstream solid objects (e.g., dentates, rock outcrops), long exposure-duration to stilling basin turbulence, shallower “water cushion” depths (particularly at a low tailwater elevation), and lateral flow transporting entrained fish from the south to the north side of the stilling basin. The lower survival and high fish injury rates raised concerns for safe passage at the site and stimulated a search for potential solutions. The present investigation was a two part experiment at Spillbays 2 and 4; the first experiment was conducted in fall 2002 (22 October to 3 November) to evaluate the effects of differential spill volumes at low tailwater elevation. The second experiment, conducted from 20 May to 10 June 2003 at high tailwater elevation, was designed to test the hypothesis whether post-passage distribution and survival of entrained fish would be enhanced with higher spill volumes (e.g., 9 to 21 kcfs), spill from an adjacent spillbay acting as a “water barrier wall” simulating a training wall (to minimize lateral transport of fish), and deeper water “cushion” depths.

The investigation utilized the HI-Z balloon tag-recapture technique to (1) estimate direct passage survival of hatchery reared chinook salmon smolts, *Oncorhynchus tshawytscha*, within $\leq \pm 3\%$, 90% of the time under low (fall) and high (spring) tailwater conditions; fish were released at multiple locations within each spillbay, and (2) better understand causal mechanisms for injury/mortality to assist in future spillway modifications for safer fish passage and how injury potential can be minimized.

The various treatments in the two experiments were not directly comparable with respect to spill pattern, spill volume, or fish release locations. The fall experiment consisted of releasing fish (average total fish length 175 mm) at two depths (shallow, 8 ft above the ogee and deep, 4 ft above the ogee) at two spill volumes (4.5 and 12 kcfs) within Spillbays 2 and 4 (eight treatments). The spring experiment (16 treatments, average total fish length 148 mm) consisted of releasing fish at three (Spillbay 4) to four (Spillbay 2) spill volumes of 9, 12, 18, or 21 kcfs. Release depths were 10 ft (deep) and 15 ft (shallow) above the ogee; lateral release locations were mid-spillbay or off-center (Spillbay 2 only). The lateral releases were made to test the assumption (based on results of computational fluid dynamic model) that mid-spillbay released fish were more likely to pass between the baffle blocks downstream of spillbays than off-center releases; fish released off-center within a spillbay were presumed to have a higher probability of collision with baffle blocks resulting in higher injury/mortality rates.

Water temperatures ranged from 9.0 to 14.5°C (48.2 to 58.1°F) in the fall and 12.5 to 15.5°C (54.5 to 60.0°F) in the spring.

Recapture rates (physical retrieval of alive and dead fish) were high for both fall and spring releases (94-100% in the fall and 96-99% in the spring). Little tag dislodgment (fish assumed dead in calculations) occurred in either group, about 0.4% of all treatment fish in each experiment had dislodged tags. Predation rates also were low in spring; ($\leq 1\%$) for any treatment or control group. However, a higher predation rate (up to 4%) was observed for Spillbay 2 deep released fish in the fall; these occurred in the first two trials at water temperatures of $\geq 14.0^\circ\text{C}$ ($\geq 57.2^\circ\text{F}$).

In the fall, higher survival correlated with higher spill volume and total spill volume at both Spillbays 2 and 4. Survival probability was virtually an ideal 1.0 (0.995 to 1.00) for fish released deep at 12 kcfs spill volume and total spill of 72 kcfs; at lower spill volume (4.5 kcfs and total spill of 33 kcfs) fish survival probability at the deep location ranged from 0.925 to 0.965. Survival also differed

between release depths between spillbays but the trend was not consistent. Survival was lower (0.969) for shallow fish released in Spillbay 2 probability than for those released in Spillbay 4 (0.986) at spill volume of 12 kcfs; within Spillbay 2 survival was higher (1.0) for shallow released fish than those released at deeper depth (0.967, total spill volume 12 kcfs). However, survival was similar (0.986 to 0.995) for fish released at two depths within Spillbay 4 at 12 kcfs and total spill volume 72 kcfs, the only condition tested.

In the spring 2003, survival probabilities differed between spill volumes and fish release locations. At Spillbay 2 where four spill volumes (9, 12, 18, and 21 kcfs) were tested, survival was maximized (0.978 to 1.0) at 18 kcfs with generally lower survival at 9 kcfs (0.931 to 0.975) and 21 kcfs (0.931 to 0.982). At Spillbay 4, survival was maximized (0.944) at 12 kcfs. With respect to individual fish release locations, confounding patterns were observed. Fish released through the deep pipe located off-center in Spillbay 2 had substantially lower survival (0.931) at both 9 and 21 kcfs than for those released at the mid-bay location (0.972 to 0.982); the difference at 9 kcfs was significant ($P < 0.10$, one-tailed Z-test). However, a reverse situation was observed for fish released at the shallow location at 21 kcfs; survival was higher (0.982) for off-center released fish than for mid-spillbay released fish (0.951). All Spillbay 4 releases were made at mid-spillbay. Therefore, no off-center data are available from Spillbay 4 in the present study.

Both fall and spring clean fish probabilities (fish without any passage related maladies) generally followed the trends observed for survival estimates. In both seasons, the highest clean fish estimated probabilities were associated with 12 kcfs (fall) or 12 and 18 kcfs (spring) spill volumes. The lowest fall clean fish estimate (0.91) occurred for Spillbay 2 deep fish releases at 12 kcfs. Shallow fish releases in the same spillbay, however, had a 0.98 clean fish estimate at 12 kcfs. The lowest spring clean fish estimates (0.83 to 0.92) were also observed in Spillbay 2 but at 9 and 21 kcfs spill volumes. The fall clean fish estimate for Spillbay 2 at 4.5 kcfs discharge (0.91), although not the lowest, was significantly ($P < 0.10$) lower than the Spillbay 4 estimate (0.99). In spring tests, the lowest clean fish estimate (0.83) also occurred in Spillbay 2 but at the highest (21 kcfs) spill volume tested and at the deep, off-center release. This estimate was significantly ($P < 0.10$) lower than all other spring estimates except for the 21 kcfs, deep, mid-bay releases. Sensor fish data, bead and computational fluid dynamics (CFD) model studies by Pacific Northwest National Laboratory (PNNL) corroborate the clean fish estimates with the worst hydraulic conditions found at Spillbay 2, deep, off-center releases.

In general, the study succeeded to a large extent in identifying spill patterns and spill volumes that are conducive to enhanced fish passage survival. A spill volume of 12 to 18 kcfs accompanied with some spill from other spillbays provided survival > 0.97 ; of the nine estimates only one (0.973 for shallow mid-spillbay released fish at 18 kcfs in Spillbay 4) was slightly less than the desirable survival of ≥ 0.98 . In general, fish released off-center of the spillbay suffered higher mortality/injury than those released in mid-spillbay and appeared to be more prone to collide with downstream concrete baffles.

Eye damage and/or head and body bruises were generally the most prevalent visible injury types in both fall and spring tests. Operculum damage was the next most prevalent visible injury among all test groups followed by internal injury. Shear forces are believed to be the cause of most eye and operculum damage observed on treatment fish. Lacerations and bruises are attributed to contact with spillbay or stilling basin structures. The highest incidence of contact injuries (7%) occurred at the deep/off-center release location in Spillbay 2 with 21 kcfs spill volume. Although the range of estimated impact velocities observed was narrow (66 to 69 ft/s) the highest injury rate (11 %) coincided with impact velocity of 69 ft/s; laboratory experiments show that impact velocity higher than 50 ft/s can inflict injuries.

The “water wall barrier” simulated at Spillbay 6 for the 2003 spring experiment appeared to minimize lateral transport of fish. Observations indicated that fish egress (as indexed by retrieval times) improved relative to similar spillway discharge conditions tested in spring 2002. The retrieval times were shorter(*i.e.*, shorter exposure to stilling basin turbulence) in spring 2003 than in 2002.

In summary, the results of the differential spill experiments at The Dalles Dam suggest that spill volumes of 12 and 18 kcfs through a spillbay were most benign. Overall, differences in survival and clean fish estimates between Spillbays 2 (with bounding retaining walls) and 4 (without retaining walls) are deemed high enough to recommend further testing at Spillbay 4, especially at 21 kcfs spill volume, and with off-center releases to compare with mid-spillbay releases. The treatment conditions studied in the present investigation may not be representative of all the spillbays.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION	1
1.1 Project Description	2
2.0 STUDY DESIGN	2
2.1 Source and Maintenance of Specimens	3
2.2 Sample Size Requirements	3
2.3 Release Conditions	4
2.4 Tagging and Release	5
2.5 Fish Recapture	5
2.6 Classification of Recaptured Fish	6
2.7 Survival and Clean Fish Estimation and Data Analysis	7
2.8 Autonomous Sensor Fish	8
3.0 RESULTS	8
3.1 Fall 2002	8
3.1.1 Recapture Rates	8
3.1.2 Retrieval Times	9
3.1.3 48 h Survival Probabilities	9
3.1.4 Injury Classification, Rates, and Probable Causal Mechanisms	9
3.1.5 Clean Fish Estimates	10
3.2 Spring 2003	11
3.2.1 Recapture Rates	11
3.2.2 Retrieval Times	11
3.2.3 48 h Survival Probabilities	11
3.2.4 Injury Classification, Rates, and Probable Causal Mechanisms	12
3.2.5 Clean Fish Estimates	13
3.3 Sensor Fish	13
4.0 DISCUSSION	13
5.0 CONCLUSIONS	16
6.0 LITERATURE CITED	16

TABLES

FIGURES

APPENDIX A – Hydraulic/Physical Conditions During Testing; Impact Velocity Data

APPENDIX B – Summary of Survival Rates at Other Hydroelectric Dams on the Columbia River
Basin

APPENDIX C – Individual Trial Data; Fish Injury Data; and Daily Fish Disposition Data

APPENDIX D – Derivation of Precision, Sample Size, and Maximum Likelihood Parameters, and
Statistical Analysis

LIST OF TABLES

- Table 2-1 Summary of hydrological and hydraulic conditions and release locations during the juvenile chinook salmon passage survival investigation at low tailwater elevation, The Dalles Dam, October-November 2002.
- Table 2-2 Summary of hydrological and hydraulic conditions and release locations during the release of juvenile chinook salmon through Spillbays 2 and 4 and in the tailrace below Spillbay 3 (control) under four spill patterns at high tailwater elevation, The Dalles Dam, April-May 2003.
- Table 2-3 Daily river temperature and release schedule for juvenile chinook salmon passed through shallow and deep release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) at The Dalles Dam, October-November 2002. Test spill/total spill (kcfs) shown in parentheses.
- Table 2-4 Daily river temperature and release schedule for juvenile chinook salmon passed through shallow/deep and mid-bay (MB)/off-center (OC) release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four spill conditions at high tailwater, The Dalles Dam, May-June 2003. Test spill/total spill (kcfs) shown in parentheses.
- Table 2-5 Required sample sizes (R) if control survival (S) is 0.99, 0.98, or 0.95, recapture rate (P_A) is 0.99, 0.98, or 0.95, and expected survival probability ($\hat{\tau}$) of treatment fish passed is 0.95, 0.97, and 0.99 to achieve a precision level (ϵ) of $\leq \pm 0.03$, 90% of the time. Highlighted values are discussed within the text.
- Table 2-6 Condition codes assigned to fish and dislodged balloon tags for fish passage survival evaluation.
- Table 3-1 Summary of tag-recapture data for juvenile chinook salmon passed through shallow and deep release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Test spill/total spill (kcfs) shown in parentheses. Proportions given in parentheses.
- Table 3-2 Estimated 48 h survival probabilities ($\hat{\tau}$) for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at low tailwater elevation, October-November 2002. Fish released at mid-spillbay. The 90% confidence intervals are shown in parentheses.
- Table 3-3 Summary of the types of visible injuries (excluding predator-related) observed on recaptured juvenile chinook salmon passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Percentage of treatment injuries adjusted for pooled controls. Some fish had multiple injuries.
- Table 3-4 Summary of maladies (loss of equilibrium, scale loss, or visible injuries) observed on recaptured juvenile chinook salmon passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Percentages of treatment maladies adjusted for controls.
- Table 3-5 Estimated clean fish probabilities for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at low tailwater elevation, October-November

	2002. Fish released at mid-spillbay. Standard errors are italicized within parentheses and the 90% confidence intervals are shown in parentheses.
Table 3-6	Summary of tag-recapture data for juvenile chinook salmon released through shallow/deep and mid-bay/off-center release locations1 in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Test spill/total spill (kcfs) shown in parentheses. Proportions given in parentheses.
Table 3-7	Estimated 48 h survival probabilities ($\hat{\tau}$) for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at high tailwater elevation, May-June 2003. The 90% confidence intervals are shown in parentheses.
Table 3-8	Summary of the types of visible injuries (excluding predator-related) observed on recaptured juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations1 in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Percentage of treatment injuries adjusted for pooled controls. Some fish had multiple injuries.
Table 3-9	Summary of maladies (loss of equilibrium, scale loss, or visible injuries) observed on recaptured juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations1 in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Percentages of treatment maladies adjusted for pooled controls.
Table 3-10	Estimated clean fish probabilities for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at high tailwater elevation, May-June 2003. Standard errors are italicized within parentheses and the 90% confidence intervals are shown in parentheses.

LIST OF FIGURES

- Figure 1-1 Location and general configuration of The Dalles Dam.
- Figure 1-2 Cross section of spillbay showing release location for juvenile salmon passed through Spillbays 2 and 4 and energy dissipation structures (baffles-A, end sill-B) at The Dalles Dam, October-November and May-June 2003.
- Figure 1-3 The Dalles Dam spillway with energy dissipation structures (9 ft high baffles and 13 ft high vertical end sill). Photos provided by U.S. Army Corps of Engineers.
- Figure 2-1a Total length (mm) frequency distribution of treatment and control chinook salmon smolts released at Spillbays 2 and 4 at 4.5 and 12 kcfs at The Dalles Dam, October-November 2002.
- Figure 2-1b Total length (mm) frequency distribution of treatment and control chinook salmon smolts released at Spillbays 2 and 4 at 9, 12, 18, and 21 kcfs at The Dalles Dam, May-June 2003.
- Figure 2-2 Pipes (multiple system at Spillbay 2) to release treatment juvenile salmonids into Spillbays 2 and 4 (only deep and shallow mid-bay release points used) at The Dalles Dam, fall 2002 and spring 2003.
- Figure 2-3 System (control site) to release juvenile salmonids at The Dalles Dam spillway.
- Figure 2-4 Release pipe locations in Spillbays 2 (four pipes) and 4 (two pipes) with potential trajectory of treatment fish (dashed line) at The Dalles Dam, spring 2003.
- Figure 2-5 Hydraulic conditions downstream of Spillbay 2 during the lowest (9 kcfs) and highest (21 kcfs) HI-Z tagged juvenile salmonid passage tests at The Dalles Dam spillway, May (spring) 2003.
- Figure 2-6 Hydraulic conditions downstream of Spillbay 4 during the lowest (9 kcfs) and highest (21 kcfs) HI-Z tagged juvenile salmonid passage tests at The Dalles Dam spillway, May (spring) 2003.
- Figure 3-1 Frequency distribution of recapture times (minutes) of treatment and control chinook salmon smolts released at Spillbays 2 and 4 at 4.5 and 12 kcfs at The Dalles Dam, October-November 2002.
- Figure 3-2 Survival estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, October-November 2002.
- Figure 3-3 Clean fish estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, October-November 2002.
- Figure 3-4 Frequency distribution of recapture times (minutes) of treatment and control chinook salmon smolts released at Spillbays 2 and 4 at 9, 12, 18, and 21 kcfs at The Dalles Dam, May-June 2003.
- Figure 3-5 Survival estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, May-June 2003.
- Figure 3-6 Clean fish estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, May-June 2003.

APPENDIX TABLES

Table A-1	Physical conditions at The Dalles Dam during juvenile chinook salmon releases through Spillbays 2 and 4 and downstream of Spillbay 3 (control) at different spill conditions at low tailwater elevation, October-November 2002.
Table A-2	Physical conditions at The Dalles Dam during juvenile chinook salmon releases through Spillbays 2 and 4 and downstream of Spillbay 3 (control) at four different spill conditions at high tailwater elevation, May-June 2003.
Table A-3	Lowest and highest total head and impact velocity associated with 8 test conditions during the release of juvenile chinook salmon through Spillbays 2 and 4 at The Dalles Dam, October-November 2002. Impact velocities calculated by Duncan Hay.
Table A-4	Lowest and highest total head and impact velocity associated with 16 test conditions during the release of juvenile chinook salmon through Spillbays 2 and 4 at The Dalles Dam, May-June 2003. Impact velocities calculated by Duncan Hay.
Table B-1	Sample size, recapture and control survival rates, and estimated 48 h survival (direct effects) of juvenile salmonids in passage through non-turbine exit routes at hydroelectric dams on the Columbia River Basin. Estimates based on balloon tag-recapture methodology (Heisey <i>et al.</i> 1992). Source: Normandeau Associates <i>et al.</i> (2003). Present study data are shown in italics.
Table C-1	Daily tag-recapture data for juvenile chinook salmon passed through deep or shallow release locations ¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation at The Dalles Dam, October-November 2002. Injuries due to predation or unrecovered fish presumed ingested by a predator are shown in parentheses.
Table C-2	Daily tag-recapture data for juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations ¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four spill conditions at high tailwater elevation at The Dalles Dam, May-June 2003. Injuries due to predation or unrecovered fish presumed ingested by a predator are shown in parentheses.
Table C-3	Incidence of injury, scale loss, and temporary loss of equilibrium observed on treatment juvenile salmonids passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002.
Table C-4	Daily malady data for juvenile chinook salmon passed through deep or shallow release locations ¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation at The Dalles Dam, October-November 2002.
Table C-5	Incidence of injury, scale loss, and temporary loss of equilibrium observed on treatment juvenile salmonids passed through shallow/deep and mid-bay/off-center release locations ¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003.
Table C-6	Daily malady data for juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations ¹ in Spillbays 2 and 4 and downstream of

Spillbay 3 (control) under four spill conditions at high tailwater elevation at The Dalles Dam, May-June 2003.

- Table C-7 Short-term turbine passage survival data on individual chinook salmon released in Spillbays 2 and 4 at The Dalles Dam, October-November 2002. Fish were tagged with Normandeau's HI-Z Turb'N tags. Description of condition codes and details on injured fish are presented in Table 2-6.
- Table C-8 Short-term turbine passage survival data on individual chinook salmon released in Spillbays 2 and 4 at The Dalles Dam, May-June 2003. Fish were tagged with Normandeau's HI-Z Turb'N tags. Description of condition codes and details on injured fish are presented in Table 2-6.

1.0 INTRODUCTION

Juvenile salmonids on their seaward journey encounter any or all of the following exit routes at hydro dams: turbines, spillways, and bypasses. There are two inter-related concerns associated with passage through any of these routes for overall survival. One is the proportion of fish utilizing any of these routes during emigration and the other is their subsequent post-passage condition and survival. Spill volumes of varying magnitude and duration is used at most hydro dams on the Columbia River Basin to enhance passage effectiveness and overall survival of juvenile salmonids. However, there are considerable physical and hydraulic differences among dams which may influence spill effectiveness, fish survival, or both. Bell *et al.* (1972) and Heisey *et al.* (2003) have reported survival rates ranging from 83 to 100% in passage through spillways at hydroelectric dams on the Columbia River Basin.

Results of some recent studies at The Dalles Dam on the lower Columbia River indicate that spill effectiveness and fish passage survival vary with spill volume (expressed as a proportion to river flow), duration (continuous, day or nighttime), spillbays, and season (Normandeau Associates *et al.* 1996a, 2003; Dawley *et al.* 1998, 2000a,b). Although fish passage efficiency (FPE) at The Dalles Dam spillway is relatively high, passage survival is unacceptably low ($\leq 98\%$) under certain hydraulic conditions. The contributory factors deemed responsible for lower survival and high injury rates were probable collisions with stilling basin structures (*e.g.*, dentates downstream of the spillbays), long exposure duration to stilling basin turbulence, shallower “water cushion” depths (particularly at low tailwater elevation), and lateral flow transporting entrained fish from the south to the north side of the stilling basin (Normandeau Associates *et al.* 2003).

To further the efforts in finding solutions for improving fish passage conditions at The Dalles Dam spillway, the Corps initiated a series of investigations utilizing physical, hydraulic, and computational fluid dynamics (CFD) models. Preliminary results of these models suggest that an installation of a “training” wall downstream of the spillbays could minimize lateral transport of spilled water in the stilling basin and thus improve fish passage conditions by reducing exposure time to the complex turbulence of the stilling basin. However, this assumption needs to be verified as to whether the proposed structural modifications do indeed minimize injury/mortality (direct effects) of spillway entrained fish. Due to a host of factors, test results from a single spillbay may not be representative of all spillbays, therefore it is desirable to test multiple spillbays (*i.e.* bay with and without retaining walls, deflectors, bottom or top spill). Consequently, in the present study the direct effects of passage through a spillbay with (Spillbay 2) and without a simulated retaining wall (Spillbay 4) were evaluated. Estimation of direct effects has assisted in evaluating the effectiveness of structural modifications on fish condition at hydroelectric dams and the need for testing multiple hydraulic conditions (Normandeau Associates and Skalski 2000a,b, 2001; Normandeau Associates *et al.* 2003; Heisey *et al.* 2003).

The objectives of this study were to estimate the direct effects of passage through Spillbays 2 and 4 at two spill volumes at a low tailwater elevation (October-November 2002) and at four spill volumes at a high tailwater elevation (May-June 2003) on immediate (1 h) and 48 h absolute survival and injury rates of juvenile chinook salmon, *Oncorhynchus tshawytscha*. The resulting survival estimates were to be within $\leq \pm 3\%$, 90% of the time. The high tailwater experiment in May-June 2003 was designed to simulate a training wall barrier by creating a “water wall barrier” with spill from adjacent spillbays. In addition, the effect of the passage location, *i.e.*, deep or shallow releases at mid-spillbay or off-center, was also evaluated. The off-center locations in Spillbay 2 (spring only) were selected to test the model prediction of an increased probability of collisions with stilling basin baffle blocks. Collisions with downstream concrete structures at high velocity (>50 ft/s) could increase

injury/mortality potential. Another objective was to assist with the release and recapture of balloon tagged autonomous sensor fish packages passed through Spillbays 2 and 4; the sensor packages measure the hydraulic conditions that alive fish encounter in spillbay passage and exiting the stilling basin.

1.1 Project Description

The Dalles Dam is the second dam upriver (river mile 191.5 or rkm 306) on the main stem Columbia River (Figure 1-1). The powerhouse was completed in 1957 and is located between Oregon and Washington. The Dalles Dam consists of a powerhouse, a spillway, and a navigation lock. The configuration of this facility is such that the spillway is perpendicular to the river, while the powerhouse is parallel to the river (Figure 1-1). The spillway has an overall length of 1,370 ft and contains 23 gates, each 50 ft wide. Spill is regulated by bottom opening tainter gates that pass water at a maximum depth of approximately 40 ft below the upstream water surface. Each tainter gate passes approximately 1.5 kcfs for each foot the gate is lifted. The typical station hydraulic head is approximately 80 ft (Figure 1-2).

A single row of 9 ft high by 10 ft wide concrete baffles are located in the stilling basin to dissipate energy (Figures 1-2 and 1-3). Three baffles lie downstream of each spillbay approximately 11 ft below normal tailrace elevation. An end sill, another energy dissipation structure, lies about 45 ft downstream of the baffles. This structure is a 13 ft high continuous vertical wall and lies approximately 7 ft below normal tailrace elevation.

2.0 STUDY DESIGN

The study was designed to evaluate the trends in fish passage survival at two spillbays at different spill volumes. All treatments were not duplicated in the two seasons and thus the between season results are not directly comparable. Although the primary emphasis was to obtain precise estimates of passage survival through each spillbay, fish releases were made at multiple locations within each spillbay (laterally and vertically) to evaluate trends, not to detect statistical differences, *per se*. Consequently, statistical tests to detect differences in survival or clean fish estimates could be made only *a posteriori* to examine the trends and sue the information for future investigations. Fish releases in the fall experiment were made between 22 October and 3 November 2002. The spring experiment was conducted between 20 May and 10 June 2003. In both experiments a common control was paired with two treatment releases. This scheme has proven efficient in earlier studies and minimized the use of scarce resources without sacrificing precision (Mathur *et al.* 1999, 2000).

There are two primary components of effects on fish using any exit route: direct and indirect effects. Direct effects are manifested immediately after passage (*e.g.*, instantaneous fish mortality, injury, loss of equilibrium); indirect effects (*e.g.*, predation, disease, physiological stress) may occur over an extended period or distance after passage. The present study was designed to estimate direct effects of passage by a straightforward approach of introducing a known number of balloon tagged alive fish into each spillbay (treatment), recapturing them immediately after passage, enumerating the alive and dead fish, and then carefully examining the condition of each fish. The latter provides an avenue to assess the probable causal mechanisms for injury/mortality and use the resulting information for potential mitigative measures that improve fish passage conditions. Treatment fish were released at multiple locations within Spillbays 2 and 4 at pre-specified spill volumes of 4.5 and 12 kcfs in fall 2002 and 9, 12, 18, and 21 kcfs in spring 2003 (Tables 2-1 and 2-2). Control fish were released downstream of Spillbay 3. During the fall, total spill ranged from 4.5 to 72 kcfs and river flow was 88 to 188 kcfs. In the spring, spill ranged from 98 to 160 kcfs and river flow was 203 to 386 kcfs. Generally, total spill in the spring was approximately 40% of river flow. Appendix Tables A-1 and A-2 provide hourly hydraulic and physical conditions on fish release dates.

2.1 Source and Maintenance of Specimens

Juvenile chinook salmon smolts were obtained from the Carson National Fish Hatchery, Bingen, Washington. Lots of 500 to 800 fish were transported from the hatchery via truck to the headworks of The Dalles Dam and were held in two tanks with a 200 or 600 gal capacity. The fish transport tank was equipped with a recirculation system and supplemental oxygen supply. The approximate transport time from the hatchery to the study site was 0.5 h. Approximately 24 h prior to tagging 150 fish were transferred to a 200 gal holding tank on the upper spillway deck. All fish holding tanks/pools were supplied continuously with ambient river water and were equipped with degassing units (spring only). Fish were held a minimum of 24 h prior to tagging to alleviate handling stress and to acclimate them to ambient river conditions. Ambient river temperature ranged from 9.0 to 14.5°C (48.2 to 58.1°F) in the fall and 12.4 to 15.5°C (54.5 to 60.0°F) in the spring (Tables 2-3 and 2-4).

Lots of 5 to 10 treatment fish on any given day were netted from the supply tank on the upper spillway deck and transferred to the adjacent tagging site with a water-sanctuary equipped net. Fish displaying abnormal behavior, severe injury, fungal infection, or descaling (>20% per side) were not used. The same fish selection criteria were applied to control groups.

Chinook salmon smolts were larger sized in the fall (mean approximately 175 mm TL) than in the spring (mean approximately 148 mm TL). Figure 2-1 shows the length frequency distribution of the treatment and control fish groups in each season.

2.2 Sample Size Requirements

One of the main considerations of the present study was to release an adequate number of fish such that the resulting survival estimates for each spill volume within a spillbay tested would be within $\leq \pm 3\%$, 90% of the time. However, the sample size was not pre-selected to detect differences (*i.e.*, for test of hypothesis) in survival between spillbays or spill volumes though *a posteriori* comparisons were made. The sample size is a function of the recapture rate (P), expected passage survival ($\hat{\tau}$) or mortality ($1 - \hat{\tau}$), survival of control fish (S), and the desired precision (ϵ) at a given probability of significance (α). In general, sample size requirements decrease with an increase in control survival and recapture rates. Only precision (ϵ) and α levels can be strictly controlled by an investigator.

In performing the sample size calculations, we assumed capture data from replicate daily releases could be pooled (*i.e.*, natural variability $\sigma_{\tau}^2 = 0$). We calculated that with the following assumptions: a recapture rate of 0.98, control survival rate (S) of 0.99, and spillbay survival ($\hat{\tau}$) of 0.97, a precision (ϵ) level of $\leq \pm 0.03$, 90% of the time may be achievable with releasing 264 fish per treatment (Table 2-5).

Based on the results of several spillbay survival experiments (Normandeau Associates *et al.* 2003) from other sites on the Columbia River Basin, including The Dalles Dam, a sample size of approximately 325 fish (assuming 98% control survival, recapture rate of 98%, and expected passage survival of 97%) per treatment spillbay and spill volume may be sufficient to attain a prespecified precision level (ϵ) of $\leq \pm 3\%$, 90% of the time (Table 2-5). Although survival estimates, along with their associated precision (ϵ) levels for fish released through each release pipe were generated, they were used only to examine trends. As stated above, the primary emphasis was to release an adequate number of fish such that the resulting survival estimates of entrained fish through each spillbay at specific spill volumes would be within the prespecified precision (ϵ) criterion.

Appendix Table B-1 provides sample sizes used, spill volume, and estimated survival rates from other sites on the Columbia River Basin.

Past experience has suggested that the sample sizes can be adjusted as a study progresses because the results are available daily. If recapture and control survival rates are higher than initially assumed, sample size can be reduced. Conversely, if the values of these parameters are lower than initially assumed, then sample size must be increased to achieve the pre-specified statistical precision. Indeed, during the fall experiment at the prespecified spill volume of 12 kcfs through Spillbays 2 and 4 and total spill of 72 kcfs, the desired precision (ϵ) of $\leq \pm 3\%$, 90% of the time on survival estimates had been met with a release of 240 fish; initially 320 fish had been allocated. The remaining fish were released to estimate passage survival with only 4.5 or 12 kcfs spill volume through Spillbay 2 (Table 2-3).

2.3 Release Conditions

All treatment fish releases were made in Spillbays 2 and 4. Two (Spillbay 4) to four (Spillbay 2) release pipes (6 in diameter) were installed approximately 10 ft upstream of the tainter gate of each spillbay and secured with guide wires and/or brackets to ensure that they remained at the desired depth, did not rotate, or were not drawn toward the spill gate (Figures 1-2 and 2-2). A four inch diameter flexible hose was threaded inside the steel pipe. The terminus of each treatment release hose was secured inside a 6 in sweep elbow oriented downstream. Control fish for all experiments were released in the tailwater below Spillbay 3 near the end sill (Figures 1-2 and 2-3). The control release hose was secured to the end sill by a steel support beam that positioned the end of the hose 3 to 5 ft above the tailwater and was oriented to discharge the fish and water in the direction of the flow.

Release pipe location depth differed between the fall and spring experiments. Pipes were positioned 4 ft (deep) and 8 ft (shallow) above the ogee in the fall 2002 (Figure 1-2). In spring 2003, they were positioned 10 ft (deep) and 15 ft (shallow) above the ogee. Differences in pipe depth release locations were necessitated by the higher spill volumes, particularly >12 kcfs in the spring, precluding the deeper positioning in the fall. Lateral placement of the pipes were the same for spillbays in the fall with both deep and shallow pipes positioned near mid spillbay. In the spring an additional set of pipes was installed in Spillbay 2, approximately 8.5 ft away from the mid-bay pipes (Figure 2-2). These off-center pipes were installed to evaluate the assumption (based on physical-hydraulic model studies) that fish exiting off-center pipes were more likely to strike the downstream baffle blocks than mid-bay releases (Figure 2-4). The exit velocity of the discharge pipe was generally close to the velocity of the river water approaching the tainter gate opening.

The fall 2002 investigation (eight treatments) was conducted at two spill volumes (4.5 and 12 kcfs) through Spillbay 2 with total spill volumes of 4.5, 12, 33, or 72 kcfs (Table 2-1). The 2003 spring study (16 treatments) was conducted at spill volumes of 9, 12, 18, and 21 kcfs through Spillbay 2 and at spill volumes of 9, 12, and 18 kcfs through Spillbay 4 (Table 2-2 and Figures 2-5 and 2-6). The total spill volume for the four individual spillbay spill volumes of 9, 12, 18, and 21 kcfs were 113, 108, 102, and 98.5 kcfs respectively. These spill volumes were maintained for all tests except 9 kcfs on May 30 and 31 when total spill volume was 7 to 47 kcfs in excess of the above stated spill.

Fall tailwater elevations (75.2 to 78.9 ft) were lower than spring elevations (79.0 to 85.3 ft). Net hydraulic head was higher during the fall test (80.1 to 83.3 ft) than spring (73.5 to 79.6 ft); however, the impact velocity of the discharge jet upon intercepting the tailwater was similar, 65.6 to 68.3 fps in the fall and 63.3 to 69.0 fps in the spring. The impact velocity was calculated by adding the vertical and horizontal vectors of velocity. The vertical component was calculated based on the vertical distance from the center of the jet (one half of the critical depth above the ogee) to the water surface in the tailwater. The horizontal component of velocity used in the calculation was the critical velocity

through the gate opening (Duncan Hay, personal communication). Appendix Tables A-3 and A-4 provide impact velocity estimated for each release condition.

2.4 Tagging and Release

The balloon tagging-recapture technique (Heisey *et al.* 1992) followed that used earlier at The Dalles Dam and other hydroelectric projects on the Columbia River Basin (Normandeau Associates *et al.* 1996a,b,c). Briefly, lots of 5 to 10 fish were randomly removed from holding tanks and taken to the adjacent tagging site using a water sanctuary equipped net. Fish displaying abnormal behavior, severe injury, fungal infection, or descaling (>20% per side) were not used. The same fish selection criteria was applied to both treatment and control groups. Fish selected for tagging were anesthetized in a 0.5% MS 222 solution (<5 min) and equipped with two uninflated balloon tags and a miniature radio tag with the dorsal balloon tag (Heisey *et al.* 1992).

Balloon tags were attached via a stainless steel pin inserted through the musculature beneath the dorsal and adipose fins. A uniquely numbered VI tag (Visual Implant, Northwest Marine Technology, Inc., Shaw Island, Washington) was also be inserted in the postocular tissue for use in tracking 48 h survival of individual recaptured fish. Fish also received a fin clip in the event the VI tag became dislodged. Balloon tagged fish were placed in a covered, 20 gal container continually supplied with ambient river water until fully recovered from anesthesia (generally 30 to 45 min, minimum 20 min). After full recovery from anesthesia, fish were individually placed into the induction system, tags were activated, and the fish was released. Inflation time of the tags was partially regulated by the temperature and amount of water injected into the tags just prior to release.

All treatment and control fish were released through an induction apparatus (Figure 2-3) that consisted of a small holding basin attached to a 4 in diameter flexible hose (Normandeau Associates and Skalski 1999, 2000a; Normandeau Associates *et al.* 1996a,b,c). The release hose was supplied with river water to ensure fish were transported quickly within a continuous flow of water to the desired release point (see Section 2.3). The same induction system and release hoses were used to release the sensor fish. In the fall, 675 and 585 treatment fish were released through Spillbays 2 and 4, respectively with a matching control of 530 fish (Table 2-3). This release scheme proved logistically effective and provided some economy and utilized a relatively smaller number of fish without sacrificing precision. In the spring, 1595 and 810 treatment fish were released through Spillbays 2 and 4, respectively with a matching control group of 750 fish (Table 2-4).

2.5 Fish Recapture

Upon passage, fish were tracked and retrieved when buoyed to the surface downstream of the spillbays by one of three or four recapture boat crews. In the fall study, boat crews were not permitted to enter the no boating zone until spill had been stopped and clearance was granted from powerhouse personnel. Boat crews were notified of the radio tag frequency of each fish upon its release. Only crew members trained in fish handling were used to retrieve tagged fish. To minimize crew bias, no crew was specifically assigned to retrieve either control or treatment fish.

Radio signals were received on a 5-element Yagi antenna coupled to an Advanced Telemetry receiver. The radio signal transmission enabled the boat crew(s) to follow the movement of each fish after passage and position the boats downstream for retrieval when the balloon tag buoyed the fish to the surface; the boats were required to remain a safe distance downstream of the turbulent discharge. Active radio tags which failed to surface were tracked for a minimum of 30 minutes and then checked periodically thereafter to ascertain if fish displayed movement patterns typical of emigrating smolts or that of a predator. Recaptured fish were placed into an on-board holding facility, and tags were removed (Heisey *et al.* 1992). Each fish was examined for descaling and injuries and assigned appropriate condition codes, if necessary, per the descriptions presented in Table 2-6. Tagging and

data recording personnel were notified via a two-way radio system of each fish's recovery time and condition.

Each recaptured fish was immediately examined for visible injuries and later a likely causal mechanism was assigned. Limited controlled experiments (Neitzel *et al.* 2000; Pacific Northwest National Laboratory (PNNL) *et al.* 2001) to replicate and correlate injury type and characteristic to a specific causative mechanism provides some indication of the cause of observed injuries in the field. However, some injury symptoms can be manifested by two different sources which may lessen the probability of accurate delineation of a cause and effect relationship (Eicher Associates 1987). Detailed descriptions of all injured fish were recorded. To minimize bias, injuries which were known or suspected to be caused by predators and those attributed to the tag (tearing at tag site) were not included in quantifying spillbay passage-related afflictions.

All fish recaptured alive were transferred in 5 gal pails to an on-shore holding pool for assessment of delayed effects (48 h). Pools were continuously supplied with ambient river water and shielded to prevent potential fish escape and avian predation. Each day's treatment and control fish were held together in the same pool for 48 h.

As a precautionary measure, the Corps secured the services of personnel from the U. S. Department of Agriculture to scare gulls from the tailrace. Past experience has shown that the hazing of gulls minimizes the potential loss of buoyed experimental fish, and thus maintains the use of prespecified sample sizes. However, predation by piscivores (*e.g.*, northern pikeminnow and smallmouth bass) on tagged fish could not be controlled.

2.6 Classification of Recaptured Fish

As in previous similar investigations (Normandeau Associates *et al.* 1996a,b,c, 1997; Normandeau Associates and Skalski 1998, 1999, 2000a,b,c) the immediate post-passage status of an individual recaptured fish and recovery of inflated tags dislodged from fish was classified as alive, dead, inflated tag(s) recovered, unknown, or predation. The following criteria have been established to make these designations: (1) alive--recaptured alive and remaining so for 1 h; (2) alive--fish does not surface but radio signals indicate movement patterns typical of emigrating juveniles; (3) dead--recaptured dead or dead within 1 h of release; (4) dead--only inflated tag(s) without fish are recovered and telemetric tracking, or the manner in which inflated tags surfaced, is not indicative of predation; (5) unknown--no fish or dislodged tags are recaptured, or radio signals are received only briefly, and the subsequent status cannot be ascertained; and (6) predation--fish are either observed being preyed upon, the predator is buoyed to the surface, or subsequent radio telemetric tracking indicates predation (*i.e.*, rapid movements of tagged fish in and out of turbulent waters or sudden appearance of fully inflated tags). Preyed upon fish are assumed dead in the survival calculations. The status of unknown fish was assigned alive or dead proportional to the fish of known status. Appendix Tables C-1 through C-7 provide daily trial summaries and disposition of individual fish.

Mortalities of recaptured fish occurring after 1 h were assigned to 48 h although fish were observed at approximately 12 h intervals. Specimens were examined for descaling and injury, and those that died were necropsied to determine the probable cause of death. Additionally, all specimens alive at 48 h were re-anesthetized and closely examined for injury and descaling. The re-examination of immobilized fish minimizes the need for extensive handling and associated stress upon immediate recapture. The initial examination allows detection of some injuries, such as bleeding and minor bruising that may not be evident after 48 h due to natural healing processes (Normandeau Associates *et al.* 1996a,b,c). Injury and descaling were categorized by type, extent, and area of body.

Fish without any visible injuries that were not actively swimming or swimming erratically at recapture were classified as "loss of equilibrium". This condition has been noted in most past studies

and often disappears within 10 to 15 min after recapture if the fish is not injured (Normandeau Associates *et al.* 1996a,b,c). A malady category was established to include fish with visible injuries, major scale loss (greater than 20% on either side), or loss of equilibrium. Dead fish without any of these symptoms were not included in this category. Fish without maladies were designated “clean fish”.

This clean fish metric was developed to standardize depiction of passage-related injury rate and is based solely on fish physically recaptured and examined. Additionally, the clean fish metric in concert with site-specific hydraulic and physical data may provide comparative insights into safer fish passage conditions.

Injuries were also categorized as minor or major (Appendix C), based on laboratory studies by PNNL *et al.* (2001). These are as follows:

- Minor – Injuries that were visible but not life threatening and tended to heal and disappear over the post-exposure observation period. Small bruises (approximately 0.5 cm in diameter) with minor discoloration (most commonly observed at the dorsal insertion of the operculum) were given a minor injury rating because fish quickly recovered from such injuries with no apparent ill effects.
- Major – Any injury that resulted in prolonged (48 h) loss of equilibrium was life threatening, or persisted throughout the post-exposure observation were rated major. For example, a large bruise (approximately 0.5 cm in diameter), damage to the spinal column, cuts with visible bleeding, injured eyeballs (bulging, hemorrhaged, or missing), gill damage (inverted gill arches severe enough to result in bleeding).

2.7 Survival and Clean Fish Estimation and Data Analysis

Passage survival probabilities for each spillbay were estimated relative to the control fish survival (Heisey *et al.* 2003; Mathur *et al.* 1999). Data from the daily control releases were pooled; chi-square test indicated homogeneity ($P > 0.05$) between daily trials. The daily trials for each treatment group were also homogeneous ($P > 0.05$) and thus were also pooled. The two treatment conditions (two spillbays) and one control condition were simultaneously analyzed and modeled by joint likelihood (Normandeau Associates *et al.* 2000). A likelihood ratio test was used to determine whether recapture probabilities were similar for alive (P_A) and dead (P_D) fish. The statistic tested the null hypothesis of the simplified model ($H_0: P_A = P_D$) versus the alternative of the generalized model ($H_A: P_A \neq P_D$). Depending upon the outcome of this analysis for the 1 h survival the parameters and their associated standard errors were calculated using that model for the 48 h estimation as well.

Separate chi-square contingency tests (Burnham *et al.* 1987) were performed to detect homogeneity ($P = 0.05$) between daily trials of each treatment and control group with respect to the frequency of alive, dead, and unknown fish; the statistical outputs of these tests are given in Appendix D along with other chi-square tests and exact probabilities. Contingency tests allow for checking for homogeneity and suggest subsets of data to be pooled in the final estimates (Burnham *et al.* 1987). If heterogeneity ($P < 0.05$) was detected, separate survival estimates (weighted by the inverse of their respective variance) were calculated for each trial and results summarized as weighted average.

The clean fish estimate (CFE) was calculated from only recaptured fish. Fish with injuries attributed solely to predator attack or tag induced (tear at tag insertion site) were not included with those having passage related maladies. CFE probabilities for each spillbay were estimated relative to control fish that were free of any maladies using the likelihood model indicated above for estimating survival probabilities. Only the reduced model ($H_0: P_A = P_D$) results were used because the analysis was based on only recaptured fish free of injuries.

The 90% confidence intervals were calculated using the profile likelihood method (Normandeau Associates *et al.* 1996a,b,c). Differences in fish survival and clean fish estimates between spillbays, spill volumes, or fish release locations were tested, *a posteriori*, by z-statistic. These tests allowed the examination of trends in these metrics and not as hypothesis testing. As indicated earlier, sample sizes for the study were selected to achieve a prespecified precision (ϵ) level at a given probabilities level. Also, it should be noted that because of the nature of these multiple comparisons the generalized probability level ($P=0.05$) is not deemed exact.

The statistical outputs are provided in Appendix D (output discussed in the report are highlighted). All statistical analyses were performed using the Statistical Analysis System (SAS). Only summarized information is discussed in the main body of the report.

2.8 Autonomous Sensor Fish

Sensor fish, an instrumented package designed to determine exposure histories to turbulence and pressure during passage (PNNL *et al.* 2001) were also equipped with two or three balloon tags and a miniature radio tag and released using the identical induction release hose into the same spillbays as for the alive fish. Sensor fish were also released through the control release hose. A total of 120 and 265 treatment sensor fish were released in fall and spring, respectively. Some 40 and 73 control sensor fish were released during the respective study periods. The results of sensor fish passage will be provided by PNNL in a separate report.

3.0 RESULTS

Because of differences in fish release locations, spill volumes, and objectives between the fall 2002 and spring 2003 tests, results for each season are presented separately below. These differences preclude direct statistical comparisons of survival or clean fish estimates. Also, for the sake of brevity and practicality, only the 48 h survival probabilities established for each treatment condition are discussed within the text; however, statistical outputs in Appendix D contain estimates of both 1 h and 48 h survival probabilities.

3.1 Fall 2002 (October to November)

3.1.1 Recapture Rates

Recapture rates (physical retrieval of both alive and dead fish) were high for all release groups (Table 3-1). For treatment groups they were >95% (range 95 to 100%) and for control groups they exceeded 97% (range 97.7 to 98.9%). Most of the recaptured fish were alive. A relatively high proportion (0.038 to 0.044) of fish was assigned dead primarily for Spillbay 2 at deep releases with spill volumes of 4.5 and 12 kcfs. Many of these fish were assumed preyed upon, particularly in the first two daily trials when the water temperature was $\geq 14^{\circ}\text{C}$ ($\geq 57.2^{\circ}\text{F}$). The proportion of treatment fish assigned dead at Spillbay 4 was 0.017 and 0.024 for controls.

Except for daily trials for one treatment (only 4.5 kcfs spill volume, fish released through the deep pipe), chi-square tests indicated homogeneity ($P>0.05$) between the daily trials within other treatment groups, suggesting the daily trial data could be pooled and released fish experienced similar tailrace conditions. The exception noted occurred primarily due to predation or unknown fish status in the first two trials. Of the total chi-square calculated value of 33.12, about 69% of this value was due to the first two treatment trials. Consequently, the average survival probabilities, weighted by the inverse of the variance, were calculated. Likewise, there was some evidence that all the daily control trials may not have experienced similar tailrace conditions over time. In the first daily control trial on 22 October, 23 of 45 (6.7%) were classified as dead or unknown. This trial contributed about 50% of

the total chi-square value of 22.16. However, the difference in frequency of recapture of alive, dead, and unknowns over time was not significant at $P=0.05$ ($P=0.075$).

Likelihood ratio tests indicated no significant difference ($P>0.05$) between the simplified ($H_0:P_A=P_D$) and generalized ($H_A:P_A\neq P_D$) models. Thus, survival probabilities and their associated standard errors using the reduced model are presented.

3.1.2 Retrieval Times

Average retrieval times (the time interval between release through the induction system until the fish was retrieved) for treatment groups ranged from 15.6 to 17.1 min and control groups averaged 14.5 min (Figure 3-1). Average retrieval time at Spillbay 2 (15.6 to 16.4 min) was shorter than at Spillbay 4 (16.5 to 17.1 min). Retrieval times for the 12 kcfs tests were slightly longer than from the 4.5 kcfs tests.

3.1.3 48 h Survival Probabilities

Survival differed between spill volumes, spill patterns, and release locations within a spillbay (Table 3-2 and Figure 3-2). With respect to the effects of spill volume within a spillbay, when only 4.5 kcfs spill occurred, survival was lower (0.925) at Spillbay 2; at only 12 kcfs spill volume, survival was higher (0.967) but due to a small sample size ($n=45$) this difference was not declared statistically significant ($P>0.10$). Survival (0.965) within Spillbay 4 with 4.5 kcfs and an additional 28.5 kcfs spill from other spillbays, was lower than at 12 kcfs spill volume and an additional spill of 60 kcfs from other spillbays (0.995).

With respect to spill pattern and spillbays, differences were more pronounced within Spillbay 2 than in Spillbay 4 and showed opposing trends depending on the fish release locations (Table 3-2 and Figure 3-2). In Spillbay 2 with 12 kcfs and total spill of 72 kcfs, the shallow released fish had a significantly ($P<0.10$, one-tailed z-statistic=1.592) lower survival (0.969) than the deep released fish (1.00). However, with only 12 kcfs spill volume through Spillbay 2 the shallow released fish had a significantly ($P<0.05$, one-tailed z-statistic=1.685) higher survival (1.00) than deep released fish (0.967). The shallow released fish with 12 kcfs in Spillbay 4 and 72 kcfs total spill showed only a slightly lower survival than the deep released fish (0.986 versus 0.995).

With respect to survival between spillbays at comparable spill volumes and spill patterns (12 kcfs and 72 kcfs total) survival was higher (0.986), though non-significant ($P>0.10$), for shallow released fish in Spillbay 4 than for those (0.969) released at the same depth in Spillbay 2 (Table 3-2 and Figure 3-2). For the same 12 kcfs and 72 kcfs total spill at Spillbays 2 and 4, the survival for the deep released fish was near 1.00 for both.

In summary, overall passage survival through Spillbay 4 appears higher at 12 kcfs with additional spill from other spillbays.

3.1.4 Injury Classification, Rates, and Probable Causal Mechanisms

A high percentage (96.7 and 98.5%) of the treatment fish released through Spillbays 2 and 4 was recaptured and available for examination of injuries. Injury percentages given below are based on the total number of recaptured treatment fish examined, adjusted for injured controls, and not on the total number of fish released (Table 3-3). A complete list of injuries and maladies is presented in Appendix Tables C-3 and C-4.

The spill volumes with or without additional spill through other spillbays did not appear to display a definitive trend relative to injury rates (Table 3-3). Visible injuries (excluding loss of equilibrium and scale loss) related to passage were present on 4.1 and 1.5% of all of the examined treatment fish passed through Spillbays 2 and 4, respectively.

The injury rate for the single 4.5 kcfs test condition at Spillbay 2 was 4.8% and ranged from 0 to 7.4% for the four tests at 12 kcfs. The highest rate was for fish passed via the deep pipe. The injury rate for the single 4.5 kcfs test at Spillbay 4 was 0.8 but higher (1.6 and 3.2%) for the two tests at 12 kcfs. The most benign treatment (0.0% injury rate) was shallow release point at Spillbay 2 with only 12 kcfs; however, this is based on only 45 fish. Spillbay 4 deep release with 4.5 kcfs and a total spill of 33 kcfs was also relatively benign with only 0.8% of 339 fish injured.

Visible injuries observed included eye damage (hemorrhaged or ruptured), opercular damage (scrapes and tears), bruises and/or scrapes on the head or body, lacerations on the head and/or body, and internal hemorrhage (Table 3-3). Eye damage (2.1%), bruises/scrapes to the body/head (1.4%), and opercular damage (1.3%) accounted for the majority of the injuries observed for fish that passed Spillbay 2. The test conditions at Spillbay 2 which elicited the highest rate of eye damage (3.2%) was at the 4.5 kcfs spill, deep release; opercular damage (2.3%) and bruises/scrapes (2.8%) were highest at the 12 kcfs spill, deep release (total spill 72 kcfs). Eye damage and opercular damage were the injuries most often observed at Spillbay 4 but at very low rates (0.7 and 0.8%, respectively). Eye damage (1.5%) and bruises/scrapes (1.1%) were highest at Spillbay 4 for the 12 kcfs shallow release. Opercular damage (1.5%) was highest for the 12 kcfs deep release. About 16% of all visibly injured fish died during the delayed assessment period. No single injury type was more likely to be lethal over other types. Another 1.4% of all test fish died without visible injuries.

Shear and physical contact with spillway structures were the probable causes of most injuries. Shear was the probable cause of many eye and opercular injuries (especially tears at the dorsal insertion). Physical contact with spillbay surfaces or tailwater structures in the stilling basin was the probable cause of most scrapes and bruises.

The malady rates (all visibly injured fish, plus fish with scale loss of >20% per side, and/or only loss of equilibrium), adjusted for controls, were similar to the injury rates. The overall malady rates at Spillbays 2 and 4 were 5.5 and 1.6%, respectively (Table 3-4). The specific test condition with the highest malady rate (9.2%) occurred for Spillbay 2 deep released fish at 12 kcfs (72 kcfs total spill). Malady rates were considerably less at Spillbay 4, with a maximum of 2.5% at 12 kcfs for both deep and shallow releases.

3.1.5 Clean Fish Estimates

Estimates of clean fish (*i.e.*, recaptured fish without visible injury, scale loss, or loss of equilibrium), along with their 90% confidence intervals are given in Table 3-5 and Figure 3-3. Spillbay 2 clean fish estimates ranged from 0.906 to 1.00 and Spillbay 4 estimates ranged from 0.974 to 0.991. The clean fish estimates for both spillbays at the 12 kcfs spill volume were similar for 5 of 6 test conditions; the exception was 0.906 at Spillbay 2 deep release (12 kcfs spill and 72 kcfs total spill). The two deep release treatment conditions at 4.5 kcfs, though not directly comparable to total spill volumes, through Spillbays 2 and 4 for fish released through the deep pipe were different. The Spillbay 2 estimate (0.928, 90% CI=0.898 to 0.954) was substantially lower than for fish released in Spillbay 4 (0.991, 90% CI= 0.972 to 1.00). At Spillbay 4, the spill volume of 4.5 kcfs was accompanied with a total spill of 33 kcfs; at Spillbay 2 spill was only 4.5 kcfs. Depth of release appeared to be spillbay specific (Table 3-5). Under the same release conditions in Spillbay 2, the clean fish estimate for deep releases (0.906, 90% CI=0.858 to 0.955) was significantly ($P<0.05$, z-statistic) lower than for the shallow released fish (0.983, 90% CI=0.953 to 1.00).

3.2 Spring 2003 (May to June)

3.2.1 Recapture Rates

Recapture rates (physical retrieval of both alive and dead fish) were high but differed between specific hydraulic conditions (Table 3-6). Recapture rates of treatment groups ranged from 95.8 to 100.0%. Recapture rates in Spillbays 2 and 4 ranged from 95.8 to 100% and 97.5 to 100%, respectively. The lowest recapture rate was for Spillbay 2 fish released deep and off-center at 9 kcfs. Recapture rates of control fish ranged from 98.6 to 100.0%. Although most recaptured fish were alive, a greater proportion of Spillbay 2 fish were dead at recapture or were assigned to the dead category (up to 5.3%) than Spillbay 4 (up to 3.7%) fish (Table 3-6). However, less than 0.5% of all fish were preyed on.

Chi-square tests indicated homogeneity ($P > 0.05$) between daily trials within each treatment group, suggesting the daily trial data could be pooled; all the daily treatment trials experienced similar tailrace conditions over time. However, chi-square tests indicated daily control trials were not homogeneous at the $P = 0.10$ level but were so at $P = 0.05$. Most of the variability (about 68% of the total calculated value of chi-square) arose due to one control trial at 18 kcfs spill volume and 102 kcfs total spill on 22 May 2003. Three of 40 fish (7.5%) were presumed preyed upon; virtually all other fish over all control trials were categorized alive. Likelihood ratio tests indicated no significant difference ($P > 0.05$) between the simplified ($H_0: P_A = P_D$) and generalized ($H_A: P_A \neq P_D$) models. Thus, survival probabilities and their associated standard errors using the reduced model are presented. These values are highlighted in Appendix D (statistical outputs).

3.2.2 Retrieval Times

Average retrieval times (the time interval between release through the induction system until the fish was retrieved) for treatment groups ranged from 6.5 to 8.5 min and controls averaged 7.2 min (Figure 3-4). Average retrieval time at Spillbay 2 (6.5 to 7.6 min) was slightly shorter than that at Spillbay 4 (7.1 to 8.5 min). Retrieval times were similar for the four discharge volumes tested in Spillbay 2 (6.5 to 7.6 min) and the three discharge volumes tested in Spillbay 4 (7.1 to 8.5 min). Spring retrieval times were shorter than fall retrieval times primarily because during the spring the spill was not stopped after each group of 10 fish were released, consequently, fish were swept downstream towards recapture boats quicker than in the fall.

3.2.3 48 h Survival Probabilities

As in the fall investigation, survival varied between spill volumes and fish release locations within each spillbay (Table 3-7 and Figure 3-5). At Spillbay 2, where four spill volumes (9, 12, 18, and 21 kcfs) were tested, survival was maximized (0.985 to 1.00) for deep mid-bay and off-center released fish at 12 and 18 kcfs. Similarly, in Spillbay 4 where three spill volumes (9, 12, and 18 kcfs) were tested, survival was higher (0.973 to 0.999) at 12 and 18 kcfs than at 9 kcfs (0.966)

With respect to lateral fish release locations in Spillbay 2 (mid-bay versus off-center) survival was generally lower (3 of 4 tests) for off-center deep released fish than those released at mid-bay; the differences (0.04 to 0.05) were most pronounced at 9 and 21 kcfs at which the lowest survival (0.931) was observed. Survival for fish released off-center deep in Spillbay at 9 kcfs spill volume and total spill of 113 kcfs was significantly higher ($P < 0.05$, z-statistic one-tailed test=1.74); also off-center deep released fish had significantly ($P < 0.10$, z-statistic one-tailed test=1.54) than for off-center shallow released fish (0.982). However, this was not the case for the shallow mid-bay and shallow off-center released fish in Spillbay 2 (Table 3-7 and Figure 3-5). Survival for shallow off-center released fish at 18 kcfs was slightly lower (0.978) than for mid-bay released fish (0.992). At

21 kcfs, survival (0.982) for off-center released fish was 0.031 higher than for those released at a shallow depth in the mid-bay area.

With respect to vertical fish release locations (shallow or deep) at comparable spill volumes, survival patterns were consistent within each Spillbay (Table 3-7 and Figure 3-5). At Spillbay 2, survival was slightly higher for deep released fish at both 18 and 21 kcfs (deep and shallow 18 kcfs 1.00 and 0.92; deep and shallow 21 kcfs 0.982 and 0.951). The same trend continued at Spillbay 4, where deep released fish had a higher survival (0.997) than shallow (0.973) released fish at 18 kcfs; no other spill volume was tested at both deep and shallow pipes at this spillbay (Table 3-7).

In summary, across all conditions tested, passage survival at both spillbays approached or exceeded the desired 98% at 12 and 18 kcfs spill with additional spill from other spillbays. Poorest survival (0.931) occurred at 9 and 21 kcfs for deep, off-center released fish.

3.2.4 Injury Classification, Rates, and Probable Causal Mechanisms

As stated earlier, injury percentages presented below are based on the total number of treatment fish examined, adjusted for injured controls, and not on the total number of fish released. However, nearly all of the fish released (99.1, 98.5, and 99.2% for Spillbays 2 and 4 and controls, respectively) were recaptured.

The injury rate for all test conditions combined at Spillbays 2 and 4 were 3.4 and 2.8%, respectively (Table 3-8). The spill volumes tested at Spillbay 2 (9, 12, 18, and 21 kcfs) and Spillbay 4 (9, 12, and 18 kcfs) appeared to affect injury rates. Spillbay 2 injury rates tended to be lower at 12 (2.8 to 4.5%) and 18 kcfs (0.7 to 4.7%) and higher at 9 (2.1 to 11.0%) and 21 kcfs (3.0 to 11%). Injury rates at Spillbay 4 were highest (4.3%) at the 9 kcfs discharge and similar (1.5 to 2.9%) at 12 and 18 kcfs.

Passage location also tended to affect injury rates (Table 3-8). The highest injury rate at Spillbay 2 (11.0%) was for fish that passed by the deeper pipe that was lined up with a stilling basin baffle block (Table 3-8). Lowest injury rate (0.7%) was obtained at shallow, mid-bay with 18 kcfs. The effect of passage location was mixed at Spillbay 4 where the highest injury rate (4.3%) was at the deep pipe with 9 kcfs spill, but low injury rates (1.5 and 1.9%) also occurred for fish passed via the deep pipe at 12 and 18 kcfs.

Visible injuries observed included eye damage (hemorrhage or ruptured), opercular damage (scrapes and tears), bruises and/or scrapes to the head or body, lacerations on the head and/or body, and internal hemorrhage. The primary injury types at Spillbay 2 were eye damage (1.6%), bruises/scrapes (1.3%), and opercular damage (1.0%). Eye damage (1.8%) and bruises/scrapes (0.9%) were the primary injury types observed at Spillbay 4. The test conditions at Spillbay 2 which resulted in the highest incidence of eye damage (4.0%) and bruises/scrapes (5.0%) was at the deep off-center release site. Opercular damage (3.1%) was also highest at the 21 kcfs discharge but at the shallow mid-bay release site at 21 kcfs. Eye damage (3.0%) at Spillbay 4 was highest for the 9 kcfs deep and mid-bay releases. Bruises/scrapes (2%) and opercular damage (1.0%) at Spillbay 4 were highest for the 18 kcfs shallow mid-bay releases. About 41% of all visibly injured fish died during the delayed assessment period. As with fall injuries, no single injury type was more likely to be lethal. A small number of test fish (0.3%) died with no visible injuries.

As observed in the fall, shear and physical contact with solid objects were the probable causes of most injuries. Shear was the probable cause of many eye and opercular injuries (especially tears at the dorsal insertion). Physical contact with spillbay surfaces or tailwater structures in the stilling basin was the probable cause of most scrapes and bruises. The highest incidence of eye damage (4.0%) and scrapes and bruises (5.0%) observed for the highest discharge (21 kcfs) deep off-center

releases at Spillbay 2 may have been partially due to higher impact velocities in the vicinity of the baffle blocks.

The malady rates (visible injury plus scale loss and loss of equilibrium) were 5.4 and 3.4% at Spillbays 2 and 4, respectively (Table 3-9). None of the treatment fish incurred scale loss (>20% per side); however, the incidence of loss of equilibrium was 2.0 and 0.6% for the combined treatment test conditions at Spillbays 2 and 4, respectively. The highest incidence of loss of equilibrium (5.9 and 6.9%) occurred for Spillbay 2 fish passed at 21 kcfs through the deep pipe positioned near mid-bay or lined up with a baffle block. The highest malady rate (16.9%) at Spillbay 2 was for 21 kcfs at the deep, off-center release point. The highest malady rate (4.3%) at Spillbay 4 occurred at the 18 kcfs, shallow mid-bay test.

3.2.5 Clean Fish Estimates

Estimates of clean fish (*i.e.*, without visible injury, scale loss, or loss of equilibrium), were based on recaptured fish data provided in Table 3-9. Clean fish estimates along with their 90% confidence intervals are given in Table 3-10 and Figure 3-6.

Spillbay 2 clean fish estimates ranged from 0.852 (21 kcfs, deep, off-center release) to 0.988 (18 kcfs, deep, mid-bay release). Spillbay 4 estimates ranged from 0.957 (18 kcfs, shallow mid-bay release) to 0.982 (12 kcfs, deep, mid-bay release). Six of the 12 clean fish estimates at Spillbay 2 were $\geq 95\%$ while all of the estimates at Spillbay 4 were at this level. The trend of higher survival at 12 and 18 kcfs was also evident for the clean fish estimates (Figures 3-5 and 3-6). The clean fish probabilities for Spillbays 2 and 4 were similar (0.918 to 0.988) for deep mid-bay releases at 9, 12, and 18 kcfs. However, there were significant differences ($P < 0.05$) between the mid-bay and off-center releases within Spillbay 2 at 9 and 12 kcfs.

The lowest clean fish rates occurred at 21 kcfs for deep releases in Spillbay 2 (Table 3-10). The off-center (0.852) and mid-bay (0.901) releases at 21 kcfs were significant ($P > 0.05$). The off-center shallow and deep releases at 21 kcfs differed significantly from each other ($P < 0.05$), but the mid-bay and deep releases did not ($P > 0.05$). At the highest test discharge of 21 kcfs, clean fish estimates appear to be influenced more by the depth of release than by off-center or mid-bay release position. The lowest clean fish estimate (0.831) was at deep, off-center; however the highest value at this discharge was at shallow off-center (0.951). The clean fish estimates for both deep and shallow releases at 18 kcfs in Spillbays 2 (0.948 and 0.988) and 4 (0.968 and 0.974) were not statistically different ($P > 0.05$).

3.3 Sensor Fish

Preliminary data from the sensor fish passed through Spillbays 2 and 4 indicated that alive fish may have been exposed to more severe hydraulic conditions in Spillbay 2 than in Spillbay 4, particularly at the highest spill volume tested (21 kcfs); more severe conditions were observed at 21 kcfs, and highest incidence of impacting a spillbay structures occurred at 21 kcfs, off-center, deep release. Retention time in the stilling basin (upstream of end sill) was longer for Spillbay 4 than Spillbay 2 sensor fish releases; however the hydraulic forces also appeared to be less severe. A complete analysis of the sensor fish data is to be provided in a report by PNNL.

4.0 DISCUSSION

The primary objectives and assumptions established for the fall 2002 (October to November) and spring 2003 (May to June) investigations were met. Also, the embedded flexibility in the study design allowed evaluation of two additional spill patterns, though with smaller sample releases, during the fall investigation at Spillbay 2. After the pre-specified precision level (ϵ) of $\leq \pm 3\%$, 90% of the time, on the

survival estimates had been achieved with fewer than the proposed fish allocation, the remaining fish were used to assess the potential effects of spill volumes of 4.5 and 12 kcfs from Spillbay 2; no additional spill from other spillbays occurred during these tests.

Identifying the spill volumes and spill patterns may provide regional fishery managers avenues to enhance survival of downmigrants utilizing the spillway for passage at The Dalles Dam. The present study succeeded to a large extent in identifying some hydraulic conditions that appear safer than others.

The survival estimates generated (eight in the fall, 16 during spring) in the present study indicate that a threshold range of spill volume exists at which survival may be maximized. A spill volume of 12 to 18 kcfs accompanied with some spill from other spillbays can enhance fish survival. Of the eight survival estimates for the fall 2002 experiment four exceeded 0.98 (two at Spillbay 4 and two at Spillbay 2) and occurred at 12 kcfs, particularly accompanied with additional spill from other spillbays (total of 72 kcfs). The lowest estimate (0.93) occurred at Spillbay 2 with only 4.5 kcfs spill volume; the survival was 0.965 at Spillbay 4 at spill volume of 4.5 kcfs with a total spill volume of 33 kcfs. Of the 16 survival estimates generated from the spring 2003 experiment, 9 were ≥ 0.98 ; two were nearly 0.98 (0.975 to 0.978). The three lowest survival estimates (0.930 to 0.951) occurred at 9 and 21 kcfs accompanied with total spill volume of 98.5 to 113 kcfs.

These results are corroborated to a certain extent by a previous study using the identical tag-recapture techniques at The Dalles Dam spillway, though the hydraulic conditions were not identical (Normandeau Associates *et al.* 2003). In the 2002 spring investigation at Spillbay 4 with a spill volume of 7.5 to 10.5 kcfs, the survival of chinook salmon smolts was estimated at 0.97; the total spill volume was 40% of the river flow (Normandeau Associates *et al.* 2003).

The hypothesis that fish released off-center in Spillbay 2 would have a lower survival was partially supported in the spring experiment. Of the six pairs of mid-spillbay and off-center releases, survival was lower for four of the off-center releases. These occurred at 9 and 21 kcfs; one occurred at 21 kcfs for fish released at the shallow mid-bay location. Two of the estimates (0.93) were among the lowest obtained during the study. It is likely that at certain spill patterns and spill volumes there is an increased probability of entrained fish colliding with baffle blocks. The most adverse interaction with a baffle block appeared to occur for fish released at the highest tested spill volume, through the deep off-center pipe at Spillbay 2. The lowest fish survival estimates (0.93) and clean fish estimates (0.83) and highest incidence of visible injury (0.11) and malady (0.17) occurred at this condition. The highest incidence of damaged eye (0.04), abrasion (0.05), and laceration (0.02) also occurred at this test condition. Sensor fish data and results of model studies (release of neutrally buoyant beads in a physical model and CFD) also indicate that the worst hydraulic conditions existed for this condition (Richmond *et al.* 2003).

No overall consistent trend was observed for deep vs. shallow releases. In the fall, highest survival at Spillbay 2 was equally divided between deep and shallow releases; in Spillbay 4, deep and shallow survival values were nearly identical (1.0 deep, 0.99 shallow). In the spring, vertical release effects appeared to be spillbay and spill volume specific. At Spillbay 2, the survival of deep mid-bay released fish was virtually identical (1.0) to that of the shallow released fish (0.99) at 18 kcfs. However, at 21 kcfs the survival was lower for shallow released fish (0.95) than for deep released fish (0.98). At Spillbay 4 with a spill volume of 18 kcfs the survival of deep released fish was higher (1.0), though statistically non-significant, than for shallow released fish (0.97). Except for one estimate, the absence of a clear trend between survival and depth of release was also noted for injury and clean fish estimates. The notable exception was in the spring test at 21 kcfs at Spillbay 2 where the clean fish estimate for shallow, off-center released fish (0.95) was significantly ($P=0.10$) higher than the estimate for deep, off-center released (0.83) fish.

Passage through spillways can subject entrained fish to widely varying stilling basin hydraulic conditions and resulting survivability may be site-specific. Some of the site-specific characteristics include obstructions in the flow path, abrasive surfaces, magnitude of water cushion, spill pattern, spill volume, spillway configuration, pressure changes, and shear. As in the previous similar investigations at The Dalles Dam spillway, the actual path traversed by each alive balloon tagged fish released into each spillbay is unknown. Although data from concurrent release of “sensor fish” by Battelle Northwest Laboratory personnel to simulate the hydraulic conditions experienced by alive released fish are partially available at present to provide insights into the magnitude and duration of exposure to prevailing hydraulic conditions. When sensor fish data are complete, more detailed analysis of hydraulic conditions will be possible. Initial sensor fish data in Spillbay 2 and 4 indicated that only a few sensors seemed to be exposed for longer times than observed in earlier studies at Spillbays 9, 11, and 13. There was little evidence in the present study that many Spillbay 4 fish were retained and laterally transported across the stilling basin; and few fish appeared to be trapped in eddy areas. Minimization of lateral transport of fish may be attributed to the “water wall barrier” created by spill from adjacent spillbays to Spillbay 4. Model studies with physical and “water wall barriers” had indicated that a lateral transport across the stilling basin may be reduced by a training wall and thus enhancing egress of spillway entrained fish with a decreased level of potential injury/mortality. As entrainment duration increases, fish have an increased probability of collisions with hard objects and exposure to shear forces.

Survival is lower when a fish strikes a solid object, even at lower velocities, than when they enter standing water without obstructions. A variable mortality rate was observed by Bell *et al.* (1972) when fish struck a solid object at a velocity exceeding 20 fps. No fish injury was observed when fish impacted flowing water at a velocity of about 60 fps. They concluded that fish could be injured in any high-energy flow situation that creates momentarily localized sharp velocity changes. Based on field and laboratory tests on fish little to no injury (<1%) was observed on juvenile salmon subjected to entry velocities as high as 50 fps (PNNL *et al.* 2001). The estimated impact velocity of the discharge jet upon tailrace interception ranged from 66 to 68 fps during the fall 2002 investigation and 63 to 69 fps during the spring 2003 investigation at The Dalles Dam. The highest estimates of impact velocity in the spring (69 fps) was associated with the 21 kcfs spill volume for Spillbay 2 deep off-center releases. This condition produced the lowest survival and clean fish estimates observed in the spring experiment. It suggests that under certain hydraulic and specific fish release locations fish did collide with hard objects such as downstream baffle blocks. The highest incidence (7%) of injuries attributed to contact with hard objects occurred for deep released fish lined up with a baffle block (off-center) at 21 kcfs. CFD model and particle analysis (Richmond *et al.* 2003) indicate the potential injurious impact velocities at the baffle blocks, especially at 21 kcfs discharge for Spillbay 2. The modeling data supports the higher survival and clean fish estimates obtained in the present study in Spillbays 2 and 4 at 12 and 18 kcfs.

Although the spill conditions tested were not duplicated at both spillbays, results suggest that passage survival may not be assumed equal across all of the spillbays. At comparable spill patterns, fish survival was up to 2% higher at Spillbay 4 than at Spillbay 2 in the fall; however in the spring, survival was generally up to 2% higher at Spillbay 2 than at Spillbay 4. Similar differences in survival between spillbays were reported in earlier investigations (Normandeau Associates *et al.* 1996a, 2003). Survival was about 4% higher at Spillbay 4 than at Spillbays 3 and 6 in the fall 1995 investigations; in the 2002 spring investigation survival was about 4% higher at Spillbay 4 and 9 than at Spillbay 13.

Clean fish estimates also varied between spillbays and corroborated the trends in survival rates noted above. Fall clean fish estimates were up to 7% higher at Spillbay 4 than at Spillbay 2 at comparable discharges while spring estimates were mixed for both spillbays. In earlier investigations, (Normandeau Associates *et al.* 2003) clean fish estimates at Spillbays 4 and 9 were 1 to 3% higher than the estimates for Spillbays 11 or 13. These findings may have important implications when combined with detailed

fish distributions (vertically and laterally within and between spillbays) in predicting the impact on naturally entrained emigrants. There may be a need to evaluate fish passage survival and condition through multiple spillbays and patterns to determine the project spillway impacts on in-river migrants.

One of the objectives of the current study was to evaluate the effect of the “water wall barrier” on fish egress. Observations from previous studies at The Dalles Dam (Normandeau Associates and Mid Columbia Consulting 2001; Normandeau Associates *et al.* 2003) indicated that up to 25% of the tagged fish were carried into the south channel and nearby rock shelves. This was particularly evident for fish passed through Spillbays 9, 11, and 13. In the present investigation, few fish were carried towards the south channel and associated rock shelves; most released fish tended to remain in the dominant flow and little lateral transport was observed. The “water wall barrier” and spill pattern may have improved the fish egress pattern. These field observations corroborate the dye studies conducted at the USACE Vicksburg model.

Visual observations of the spill flow patterns, tailrace topography, and dispersal of post-passage tagged fish indicate that some spill patterns downstream of The Dalles Dam spillbay may be more conducive for fish predation losses, especially at warmer water temperatures. A combination of deep channels and adjacent rock shelf areas downstream of the spillway appears to provide ideal staging areas for predators. A large proportion of the project water carrying with it entrained juvenile salmonids passes through and over an extensive shallow rock shelf that lies across approximately two-thirds of the spill basin. The spill pattern during the spring test, along with the “water wall barrier” may explain the minimal predation levels (0.5%) observed.

5.0 CONCLUSIONS

Spill volume through a single spillbay of ≥ 12 kcfs along with spill from other spillbays and patterns enhanced survival and thus should be considered in future spill strategies; spill volume of >18 kcfs and ≤ 9 kcfs appeared detrimental. The safe fish passage was maximized at spill volumes of 12 and 18 kcfs with a total spill of 112 to 108 kcfs. Data from sensor fish releases and results of CFD model and neutrally buoyant bead release experiments corroborate the above conclusions.

Fish released at deeper depth and off-center in Spillbay 2 appeared to suffer greater injury rate, perhaps due to collisions with hard objects downstream of this spillbay. Although the range of estimated impact velocities was narrow (63 to 69 ft/s, spill jet into tailwater) the highest injury rate (11 %) coincided with the highest estimated impact velocity (69 ft/s); results of laboratory studies indicate fish suffer injury at impact velocity greater than 50 ft/s

Because only one spillbay (Spillbay 2) was tested with multiple release locations and spill volumes it is unknown whether these results are representative of other spillbays. To enhance certainty and confirm these results it is recommended that another spillbay be tested with a similar release scheme. The “water wall barrier” created at Spillbay 6 to simulate a physical barrier on the south side of Spillbay 4 with spill from adjacent spillbays in the May-June 2003 experiment appeared to minimize the lateral transport and retention of fish in the stilling basin. The “water wall barrier” appeared to improve fish egress out of the stilling basin.

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TABLES

Table 2-1

Summary of hydrological and hydraulic conditions and release locations during the juvenile chinook salmon passage survival investigation at low tailwater elevation, The Dalles Dam, October-November 2002.

Test/Total Spill (kcfs)	Release Location ¹	River Flow (kcfs)	Elevation (ft)		Net Head (ft)	Impact Velocity (fps)
			Forebay	Tailwater		
<i>Spillbay 2</i>						
4.5/4.5	Deep	87.8-160.4	158.3-159.7	75.2-77.9	80.8-83.3	65.6-66.8
12/12*	Deep	89.3-131.2	158.4-159.0	76.2-76.7	81.7-82.7	67.9-68.3
	Shallow	130.4-139.1	158.8-159.0	77.6-77.8	81.2	67.5-67.6
12/72	Deep	119.2-175.3	157.7-158.8	76.5-78.1	80.1-81.6	67.4-68.0
	Shallow	140.9-179.6	157.5-158.9	75.9-77.7	80.8-82.7	67.8-68.3
<i>Spillbay 4</i>						
4.5/33	Deep	117.3-179.6	158.0-159.6	75.9-78.4	80.1-83.3	65.3-66.6
12/72	Deep	114.3-167.7	157.7-159.5	76.1-78.9	80.1-82.2	67.4-68.1
	Shallow	134.1-176.5	157.8-159.5	76.2-78.9	80.2-82.5	67.4-68.2
<i>Control</i>						
4.5/4.5		112.1-160.9	158.2-159.4	76.2-78.7	80.1-83.1	
4.5/33		103.2-148.5	158.1-159.1	75.4-77.6	81.5-83.7	
12/72		119.2-187.9	157.2-159.0	76.0-78.5	80.1-81.8	

1 Fish released at mid-spillbay, 4 ft (deep) and 8 ft (shallow) above ogee.

* Special test, Spillbay 2 only.

Table 2-2

Summary of hydrological and hydraulic conditions and release locations during the release of juvenile chinook salmon through Spillbays 2 and 4 and in the tailrace below Spillbay 3 (control) under four spill patterns at high tailwater elevation, The Dalles Dam, April-May 2003.

Test/Total Spill (kcfs)	Release Location ¹	River Flow (kcfs)	Elevation (ft)		Net Head (ft)	Impact Velocity (fps)	
			Forebay	Tailwater			
<i>Spillbay 2</i>							
9/113	Deep	Mid-bay	217.6-360.5	158.0-159.4	80.2-84.7	74.5-78.7	63.3-65.5
		Off-center	216.5-366.9	158.1-159.5	80.0-84.8	74.7-78.6	63.3-65.5
12/108	Deep	Mid-bay	203.1-323.2	157.2-158.6	79.0-83.7	73.5-79.6	64.2-66.8
		Off-center	203.1-321.9	157.1-158.5	79.1-83.6	73.5-79.4	64.2-66.8
18/102	Deep	Mid-bay	238.5-313.7	158.4-158.7	80.0-82.5	76.1-78.6	66.7-68.0
		Off-center	241.3-313.7	158.4-159.1	80.1-82.5	76.1-78.8	66.7-68.0
	Shallow	Mid-bay	240.9-317.8	157.4-159.5	79.8-82.5	74.9-79.0	66.6-68.1
		Off-center	242.4-310.9	157.1-159.6	80.0-81.9	75.2-78.6	66.9-68.0
21/98.5	Deep	Mid-bay	276.2-313.3	158.5-159.3	80.6-82.4	76.7-78.0	67.7-68.5
		Off-center	241.7-289.5	158.3-159.6	79.9-80.9	77.4-79.6	68.4-69.0
	Shallow	Mid-bay	308.4-315.3	158.5-158.6	82.0-82.3	76.2-76.6	67.7-67.9
		Off-center	287.7-312.2	158.1-158.7	80.5-82.3	75.9-78.2	67.7-68.6
<i>Spillbay 4</i>							
9/113	Deep	Mid-bay	214.0-384.6	157.9-159.3	80.2-85.3	73.9-78.4	63.0-65.3
12/108	Deep	Mid-bay	202.7-327.6	157.4-158.5	79.3-83.7	73.7-79.2	64.2-66.7
18/102	Deep	Mid-bay	226.4-303.8	158.2-159.8	80.3-81.8	76.5-79.4	67.0-67.9
	Shallow	Mid-bay	203.8-303.8	157.0-159.6	79.6-82.3	74.7-78.9	66.6-68.0
<i>Control</i>							
9/113			224.0-386.5	157.9-159.4	80.0-85.3	73.9-78.4	
12/108			222.7-337.5	157.2-158.5	79.7-83.4	73.8-78.8	
18/102			231.2-314.4	157.2-153.5	80.0-82.5	74.8-78.8	
21/98.5			286.7-311.8	157.8-159.6	80.5-82.4	75.4-78.2	

¹ Fish were released 10 ft above ogee (deep-mid and deep off-center) and 15 ft above ogee (shallow-mid and shallow off-center). Off-center releases were offset 8.5 ft from mid-spillbay.

Table 2-3

Daily river temperature and release schedule for juvenile chinook salmon passed through shallow and deep release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) at The Dalles Dam, October-November 2002. Test spill/total spill (kcfs) shown in parentheses.

Date	River		Spillbay 2				Spillbay 4			Control			Total	
	Temperature (°C)	(°F)	(4.5/4.5) Deep	(12/12)* Deep	(12/72) Shallow	(12/72) Deep	(4.5/33) Deep	(12/72) Deep	(12/72) Shallow	(4.5/4.5)	(4.5/33)	(12/72)		
22 Oct	14.5	58.1	60				45				45		150	
23 Oct	14.0	57.2	45				60				45		150	
24 Oct	13.5	56.3	45				45			60			150	
25 Oct	13.0	55.4				30	30		45			45	150	
26 Oct	13.0	55.4					45		30	30		45	150	
28 Oct	13.0	55.4		15		45		45				60	165	
29 Oct	13.0	55.4	60	15			45			45			165	
30 Oct	11.5	52.7	45	15			60			45			165	
31 Oct	10.5	50.9	45		15		45				60		165	
01 Nov	9.5	49.1	45		30		45			20	20		160	
02 Nov	9.0	48.2				30	30		30	30		30	150	
03 Nov	9.0	48.2				15	15		15	15		10	70	
Totals			345	45	45	120	120	345	120	120	170	170	190	1,790

1 Fish released at mid-spillbay, 4 ft (deep) and 8 ft (shallow) above ogee.

* Special test, Spillbay 2 only.

Table 2-4

Daily river temperature and release schedule for juvenile chinook salmon passed through shallow/deep and mid-bay (MB)/off-center (OC) release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four spill conditions at high tailwater, The Dalles Dam, May-June 2003. Test spill/total spill (kcfs) shown in parentheses.

Date	River Temperature (°C) (°F)		Spillbay 2								Spillbay 4				Control				Total						
			(9/113)		(12/108)		(18/102)		(21/98.5)		(9/113)	(12/108)	(18/102)		(9/113)	(12/108)	(18/102)	(21/98.5)							
			Deep		Deep		Deep	Shallow	Deep	Shallow	Deep	Deep	Deep	Shallow											
		MB	OC	MB	OC	MB	OC	MB	OC	MB	OC	MB	OC	MB	MB	MB	MB								
20 May	12.5	54.5			30	30																	160		
21 May	12.4	54.4					30	30	39	30					60								40	159	
22 May	12.4	54.4					29		30								40	30					40	169	
23 May	13.5	56.3						40									40	49					40	169	
24 May	14.0	57.2							40								48	50					30	168	
25 May	14.0	57.2	40	40										50								40		170	
26 May	13.5	56.3	40	40										51								40		171	
28 May	14.0	57.2			40	39											50					40		169	
29 May	15.5	60.0			40	39											50					40		169	
30 May	14.5	58.1	30	30										50								30		140	
31 May	14.5	58.1	40	39										50								40		169	
02 Jun	14.5	58.1					50	40										40					30	160	
03 Jun	14.5	58.1	40	40										40								30		150	
04 Jun	14.0	57.2						40	40									40					30	150	
05 Jun	14.5	58.1					40	40									30						40	150	
06 Jun	15.0	59.0								50	50													50	150
07 Jun	15.0	59.0										50	50											50	150
08 Jun	15.0	59.0						40	40								42						40	162	
09 Jun	15.5	60.0								50	50													50	150
10 Jun	15.5	60.0										50	50											20	120
Totals			190	189	110	108	149	150	149	150	100	100	100	100	241	160	200	209	180	120	280	170		3,155	

¹ Fish were released 10 ft above ogee (deep-mid and deep off-center) and 15 ft above ogee (shallow-mid and shallow off-center). Off-center releases were offset 8.5 ft from mid-spillbay.

Table 2-5

Required sample sizes (R) if control survival (S) is 0.99, 0.98, or 0.95, recapture rate (P_A) is 0.99, 0.98, or 0.95, and expected survival probability ($\hat{\tau}$) of treatment fish passed is 0.95, 0.97, and 0.99 to achieve a precision level (ϵ) of $\leq \pm 0.03$, 90% of the time. Highlighted values are discussed within the text.

Control Survival (S)	Expected Survival ($\hat{\tau}$)		
	0.95	0.97	0.99
<i>Recapture Rate=0.99</i>			
0.99	256	205	150
0.98	314	264	212
0.95	496	451	405
<i>Recapture Rate=0.98</i>			
0.99	314	264	218
0.98	373	325	274
0.95	556	514	469
<i>Recapture Rate=0.95</i>			
0.99	496	451	405
0.98	556	514	469
0.95	745	709	670

Table 2-6

Condition codes assigned to fish and dislodged balloon tags for fish passage survival evaluation.

FISH CODES

- A** No visible marks on fish
- B** Flesh tear at tag site(s)
- C** Minor scale loss, 3 to 20% (%s for entire body in immediate recovery; for detailed injury examination %s are for section only)
- D** Major scale loss, >20% per side
- E** Laceration(s); tear(s) on body
- F** Severed body parts
- G** Hemorrhaging, bruised
- H** Stressed (lethargic, swimming poorly or sporadically)
- I** Spasmodic movement of body
- J** Very weak, barely gilling, died within 60 minutes of recovery
- K** Failed to enter system
- L** Fish likely preyed on based on telemetry, and/or circumstances relative to Turb'N recapture
- M** Substantial bleeding at tag site
- N** Bulging or missing eye(s)
- P** Observed predator attack or marks indicative of predator
- Q** Other information
- R** Replaced due to entrapment in unrecoverable locations (i.e., in rocks, gate slot; recovery time expired)
- T** Trapped inside tunnel/gate well
- V** Fins damaged (ripped, split, torn) or pulled from origin
- W** Abrasion/scrape
- X** No recovery information at all; fish remains unrecovered
- Z** Radio telemetry or other information; fish remains unrecovered

DISSECTION CODES

- B** Swim bladder ruptured or expanded
- D** Kidneys damaged (hemorrhaging)
- E** Broken bones obvious
- F** Hemorrhaging internally
- L** Organ displacement
- N** Heart damage, ruptured, hemorrhaging, etc.
- O** Liver damage, ruptured, hemorrhaging, etc.
- R** Necropsied, no obvious injuries
- S** Necropsied, internal injuries observed
- W** Head removed, i.e., otolith

TURB'N TAG CODES (not used in database)

- A** Fully inflated
 - B** Partially inflated
 - C** Pinhole, leaking
 - D** Burst
 - E** Not inflated at all
-
-

Table 3-1

Summary of tag-recapture data for juvenile chinook salmon passed through shallow and deep release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Test spill/total spill (kcfs) shown in parentheses. Proportions given in parentheses.

	Spillbay 2					
	(4.5/4.5)		(12/12*)		(12/72)	
	Deep	Deep	Shallow	Deep	Shallow	
Number released	345	45	45	120	120	
Number recaptured alive	326 (0.945)	43 (0.956)	45 (1.000)	119 (0.992)	117 (0.975)	
Number recaptured dead	2 (0.006)	0 (0.000)	0 (0.000)	0 (0.000)	1 (0.008)	
Number assigned dead**	13 (0.038)	2 (0.044)	0 (0.000)	0 (0.000)	0 (0.000)	
Unknown	4 (0.012)	0 (0.000)	0 (0.000)	1 (0.008)	2 (0.017)	
Number held	326	43	45	119	117	
Number alive at 48 h	313	43	45	118	113	

	Spillbay 4			Control		
	(4.5/33)	(12/72*)		(4/5/4.5)	(4.5/33)	(12/72)
	Deep	Deep	Shallow			
Number released	345	120	120	170	170	190
Number recaptured alive	338 (0.980)	118 (0.983)	119 (0.992)	165 (0.971)	167 (0.982)	188 (0.989)
Number recaptured dead	1 (0.003)	0 (0.000)	0 (0.000)	1 (0.006)	0 (0.000)	0 (0.000)
Number assigned dead**	5 (0.014)	2 (0.017)	1 (0.008)	4 (0.024)	1 (0.006)	0 (0.000)
Unknown	1 (0.003)	0 (0.000)	0 (0.000)	0 (0.000)	2 (0.012)	2 (0.011)
Number held	338	118	119	165	167	188
Number alive at 48 h	328	118	117	165	167	188

¹ Fish released mid-bay, 4 ft (deep) and 8 ft (shallow) above ogee.

* Special test, Spillbay 2 only.

** Includes dislodged tags, predation and stationary signals

Table 3-2

Estimated 48 h survival probabilities ($\hat{\tau}$) for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at low tailwater elevation, October-November 2002. Fish released at mid-spillbay. The 90% confidence intervals are shown in parentheses.

Release Location*	Spillbay 2 (Test/Total kcfs Spill Volume)			Spillbay 4 (Test/Total kcfs Spill Volume)	
	4.5/4.5 (special spill)	12/72	12/12 (special spill)	4.5/33	12/72
Deep	0.949 (0.929-0.9647)**	1.003 (0.987-1.019)	0.967 (0.915-1.018)	0.965 (0.942-0.983)	0.995 (0.974-1.016)
Shallow		0.969 (0.937-1.000)	1.012 (1.004-1.019)		0.986 (0.961-1.011)

* Fish released either 4 ft (deep) or 8 ft (shallow) above ogee.

** Survival based on weighted average (inverse of variance) of daily trials (see Section 3.1.3).

Table 3-3

Summary of the types of visible injuries (excluding predator-related) observed on recaptured juvenile chinook salmon passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Percentage of treatment injuries adjusted for pooled controls. Some fish had multiple injuries.

Test/ Total Spill (kcs)	Release Location ¹	Number Released	Number Examined	Visible Injuries Related to Passage	Injury Type				
					Damaged/ Hemorrhaged Eye(s)	Operculum Damage	Bruise/ Scrapes on Body/Head	Lacerations Body/Head	Internal Injury
<i>Spillbay 2</i>									
4.5/4.5	Deep	345	328 (95.1%)	19 (4.8%)	11 (3.2%)	6 (1.6%)	8 (1.9%)	0 (0.0%)	0 (0.0%)
12/12*	Deep	45	43 (95.6%)	1 (1.4%)	1 (2.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Shallow	45	45 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
12/72	Deep	120	119 (99.2%)	10 (7.4%)	3 (2.3%)	3 (2.3%)	4 (2.8%)	0 (0.0%)	0 (0.0%)
	Shallow	120	118 (98.3%)	3 (1.6%)	0 (0.0%)	1 (0.7%)	1 (0.3%)	0 (0.0%)	1 (0.8%)
<i>Spillbay 2 pooled</i>		675	653 (96.7%)	33 (4.1%)	15 (2.1%)	10 (1.3%)	13 (1.4%)	0 (0.0%)	1 (0.2%)
<i>Spillbay 4</i>									
4.5/33	Deep	345	339 (98.3%)	6 (0.8%)	2 (0.4%)	3 (0.7%)	2 (0.0%)	1 (0.3%)	0 (0.0%)
12/72	Deep	120	118 (98.3%)	3 (1.6%)	1 (0.7%)	2 (1.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Shallow	120	119 (99.2%)	5 (3.2%)	2 (1.5%)	1 (0.6%)	2 (1.1%)	0 (0.0%)	0 (0.0%)
<i>Spillbay 4 pooled</i>		585	576 (98.5%)	14 (1.5%)	5 (0.7%)	6 (0.8%)	4 (0.1%)	1 (0.2%)	0 (0.0%)
<i>Control</i>									
4.5/4.5		170	166 (97.6%)	2 (1.2%)	0 (0.0%)	1 (0.6%)	1 (0.6%)	0 (0.0%)	0 (0.0%)
4.5/33		170	167 (98.2%)	2 (1.2%)	0 (0.0%)	0 (0.0%)	2 (1.2%)	0 (0.0%)	0 (0.0%)
12/72		190	188 (98.9%)	1 (0.5%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<i>Control pooled</i>		530	521 (98.3%)	5 (1.0%)	1 (0.2%)	1 (0.2%)	3 (0.6%)	0 (0.0%)	0 (0.0%)

1 Fish released mid-bay, 4 ft (deep) and 8 ft (shallow) above ogee.

* Special test, Spillbay 2 only.

Table 3-4

Summary of maladies (loss of equilibrium, scale loss, or visible injuries) observed on recaptured juvenile chinook salmon passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002. Percentages of treatment maladies adjusted for pooled controls.

Test/Total Spill (kcf)	Release Location ¹	Number Released	Number Examined	Loss of Equilibrium (exclusively)	Major Scale Loss (exclusively)	Visible Injuries Related to Passage	Combined Maladies
<i>Spillbay 2</i>							
4.5/4.5	Deep	345	328 (95.1%)	7 (1.4%)	3 (0.9%)	19 (4.8%)	29 (7.1%)
12/12*	Deep	45	43 (95.6%)	0 (0.0%)	0 (0.0%)	1 (1.4%)	1 (0.6%)
	Shallow	45	45 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
12/72	Deep	120	119 (99.2%)	2 (0.9%)	1 (0.8%)	10 (7.4%)	13 (9.2%)
	Shallow	120	118 (98.3%)	1 (0.1%)	0 (0.0%)	3 (1.6%)	4 (1.7%)
<i>Spillbay 2 pooled</i>		675	653 (96.7%)	10 (0.8%)	4 (0.6%)	33 (4.1%)	47 (5.5%)
<i>Spillbay 4</i>							
4.5/33	Deep	345	339 (98.3%)	2 (0.0%)	1 (0.3%)	6 (0.8%)	9 (0.9%)
12/72	Deep	120	118 (98.3%)	2 (0.9%)	0 (0.0%)	3 (1.6%)	5 (2.5%)
	Shallow	120	119 (99.2%)	0 (0.0%)	0 (0.0%)	5 (3.2%)	5 (2.5%)
<i>Spillbay 4 pooled</i>		585	576 (98.5%)	4 (0.0%)	1 (0.2%)	14 (1.5%)	19 (1.6%)
<i>Control</i>							
4.5/4.5		170	166 (97.6%)	1 (0.6%)	0 (0.0%)	2 (1.2%)	3 (1.8%)
4.5/33		170	167 (98.2%)	1 (0.6%)	0 (0.0%)	2 (1.2%)	3 (1.8%)
12/72		190	188 (98.9%)	2 (1.1%)	0 (0.0%)	1 (0.5%)	3 (1.6%)
<i>Control pooled</i>		530	521 (98.3%)	4 (0.8%)	0 (0.0%)	5 (1.0%)	9 (1.7%)

1 Fish released mid-bay, 4 ft (deep) and 8 ft (shallow) above ogee.

* Special test, Spillbay 2 only.

Table 3-5

Estimated clean fish probabilities for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at low tailwater elevation, October-November 2002. Fish released at mid-spillbay. Standard errors are italicized within parentheses and the 90% confidence intervals are shown in parentheses.

Release Location*	Spillbay 2 (Test/Total kcfs Spill Volume)			Spillbay 4 (Test/Total kcfs Spill Volume)	
	4.5/4.5	12/72	12/12 (special spill)	4.5/33	12/72
Deep	0.928 (<i>0.017</i>) (0.898-0.954)	0.906 (<i>0.030</i>) (0.856-0.955)	0.994 (<i>0.024</i>) (0.933-1.00)	0.991 (<i>0.011</i>) (0.972-1.00)	0.974 (<i>0.020</i>) (0.935-1.00)
Shallow		0.983 (<i>0.018</i>) (0.953-1.00)	1.00 (--) (0.970-1.00)		0.975 (<i>0.020</i>) (0.936-1.00)

* Fish released either 4 ft (deep) or 8 ft (shallow) above ogee.

Table 3-6

Summary of tag-recapture data for juvenile chinook salmon released through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Test spill/total spill (kcfs) shown in parentheses. Proportions given in parentheses.

	Spillbay 2											
	(9/113)		(12/108)		(18/102)				(21/98.5)			
	Deep		Deep		Deep		Shallow		Deep		Shallow	
	Mid-bay	Off-center	Mid-bay	Off-center	Mid-bay	Off-center	Mid-bay	Off-center	Mid-bay	Off-center	Mid-bay	Off-center
Number released	190	189	110	108	149	150	149	150	100	100	100	100
Number recaptured alive	187 (0.984)	178 (0.942)	108 (0.982)	106 (0.981)	149 (1.000)	150 (1.000)	147 (0.987)	146 (0.973)	97 (0.970)	95 (0.950)	97 (0.970)	98 (0.980)
Number recaptured dead	1 (0.005)	3 (0.016)	2 (0.018)	0 (0.000)	0 (0.000)	0 (0.000)	1 (0.007)	2 (0.013)	3 (0.030)	5 (0.050)	1 (0.010)	2 (0.020)
Number assigned dead*	2 (0.011)	7 (0.037)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	1 (0.007)	1 (0.007)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)
Unknown	0 (0.000)	1 (0.005)	0 (0.000)	1 (0.009)	0 (0.000)	0 (0.000)	0 (0.000)	1 (0.007)	0 (0.000)	0 (0.000)	2 (0.020)	0 (0.000)
Number held	187	178	108	106	149	150	147	146	97	95	97	98
Number alive at 48 h	183	173	107	106	149	147	146	144	97	92	94	97
	Spillbay 4											
	(9/113)	(12/108)	(18/102)		Control							
	Deep		Deep		Control							
	Mid-bay	Mid-bay	Mid-bay	Mid-bay	(9/113)	(12/108)	(18/102)	(21/98.5)				
Number released	241	160	200	209	180	120	280	170				
Number recaptured alive	232 (0.963)	157 (0.981)	197 (0.985)	203 (0.971)	180 (1.000)	119 (0.992)	275 (0.982)	169 (0.994)				
Number recaptured dead	3 (0.012)	1 (0.006)	3 (0.015)	2 (0.010)	0 (0.000)	0 (0.000)	1 (0.004)	0 (0.000)				
Number assigned dead*	6 (0.025)	1 (0.006)	0 (0.000)	4 (0.019)	0 (0.000)	1 (0.008)	4 (0.014)	1 (0.006)				
Unknown	0 (0.000)	1 (0.006)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)	0 (0.000)				
Number held	232	157	197	203	180	119	275	169				
Number alive at 48 h	230	157	197	201	178	119	275	169				

¹ Fish released 10 ft (deep/mid-spillbay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-spillbay.

* Includes dislodged tags, predation and stationary signals

Table 3-7

Estimated 48 h survival probabilities ($\hat{\tau}$) for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at high tailwater elevation, May-June 2003. The 90% confidence intervals are shown in parentheses.

Release Location*	Spillbay 2 (Test/Total kcfs Spill Volume)				Spillbay 4 (Test/Total kcfs Spill Volume)		
	9/113	12/108	18/102	21/98.5	9/113	12/108	18/102
Deep							
Mid-bay	0.975 (0.951-0.998)	0.985 (0.958-1.011)	1.009 (1.005-1.019)	0.982 (0.953-1.011)	0.966 (0.943-0.989)	0.999 (0.983-1.016)	0.997 (0.981-1.013)
Off-center	0.931 (0.898-0.965)	0.993 (0.971-1.016)	0.992 (0.972-1.012)	0.931 (0.886-0.977)			
Shallow							
Mid-bay			0.992 (0.972-1.012)	0.951 (0.911-0.992)			0.973 (0.950-0.996)
Off-center			0.978 (0.953-1.004)	0.982 (0.953-1.011)			

* Fish released 10 ft (deep/mid-spillbay and deep/off-center) and 15 ft (shallow/mid-spillbay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-spillbay.

Table 3-8

Summary of the types of visible injuries (excluding predator-related) observed on recaptured juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Percentage of treatment injuries adjusted for pooled controls. Some fish had multiple injuries.

Test/ Total Spill (kcfs)	Release Location ¹	Number Released	Number Examined	Visible Injuries Related to Passage	Injury Type					
					Damaged/ Hemorrhaged Eye(s)	Operculum Damage	Bruise/ Scrapes on Body/Head	Lacerations Body/Head	Internal Injury	
<i>Spillbay 2</i>										
9/113	Deep	Mid-bay	190	188 (98.9%)	4 (2.1%)	2 (1.1%)	2 (1.1%)	2 (1.1%)	0 (0.0%)	0 (0.0%)
		Off-center	189	181 (95.8%)	9 (5.0%)	4 (2.2%)	1 (0.6%)	4 (2.2%)	0 (0.0%)	0 (0.0%)
12/108	Deep	Mid-bay	110	110 (100.0%)	5 (4.5%)	3 (2.7%)	1 (0.9%)	1 (0.9%)	0 (0.0%)	1 (0.9%)
		Off-center	108	108 (100.0%)	3 (2.8%)	2 (1.9%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	2 (1.9%)
18/102	Deep	Mid-bay	149	149 (100.0%)	2 (1.3%)	1 (0.7%)	0 (0.0%)	1 (0.7%)	0 (0.0%)	0 (0.0%)
		Off-center	150	150 (100.0%)	7 (4.7%)	5 (3.3%)	1 (0.7%)	2 (1.3%)	0 (0.0%)	2 (1.3%)
	Shallow	Mid-bay	149	148 (99.3%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	0 (0.0%)	0 (0.0%)
		Off-center	150	148 (98.7%)	2 (1.4%)	0 (0.0%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	2 (1.4%)
21/98.5	Deep	Mid-bay	100	100 (100.0%)	3 (3.0%)	2 (2.0%)	1 (1.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
		Off-center	100	100 (100.0%)	11 (11.0%)	4 (4.0%)	2 (2.0%)	5 (5.0%)	2 (2.0%)	0 (0.0%)
	Shallow	Mid-bay	100	98 (98.0%)	3 (3.1%)	0 (0.0%)	3 (3.1%)	3 (3.1%)	1 (1.0%)	0 (0.0%)
		Off-center	100	100 (100.0%)	4 (4.0%)	1 (1.0%)	2 (2.0%)	2 (2.0%)	0 (0.0%)	1 (1.0%)
<i>Spillbay 2 pooled</i>			<i>1,595</i>	<i>1,580 (99.1%)</i>	<i>54 (3.4%)</i>	<i>25 (1.6%)</i>	<i>16 (1.0%)</i>	<i>21 (1.3%)</i>	<i>3 (0.2%)</i>	<i>8 (0.5%)</i>
<i>Spillbay 4</i>										
9/113	Deep	Mid-bay	241	235 (97.5%)	10 (4.3%)	7 (3.0%)	2 (0.9%)	2 (0.9%)	1 (0.4%)	1 (0.4%)
12/108	Deep	Mid-bay	160	158 (98.8%)	3 (1.9%)	3 (1.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
18/102	Deep	Mid-bay	200	200 (100.0%)	3 (1.5%)	2 (1.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)	0 (0.0%)
	Shallow	Mid-bay	209	205 (98.1%)	6 (2.9%)	2 (1.0%)	2 (1.0%)	4 (2.0%)	0 (0.0%)	0 (0.0%)
<i>Spillbay 4 pooled</i>			<i>810</i>	<i>798 (98.5%)</i>	<i>22 (2.8%)</i>	<i>14 (1.8%)</i>	<i>4 (0.5%)</i>	<i>7 (0.9%)</i>	<i>1 (0.1%)</i>	<i>1 (0.1%)</i>
<i>Control</i>										
9/113			180	180 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
12/108			120	119 (99.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
18/102			280	276 (98.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
21/98.5			170	169 (99.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<i>Control pooled</i>			<i>750</i>	<i>744 (99.2%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>

¹ Fish released 10 ft (deep/mid-spillbay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-spillbay.

Table 3-9

Summary of maladies (loss of equilibrium, scale loss, or visible injuries) observed on recaptured juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003. Percentages of treatment maladies adjusted for pooled controls.

Test/Total Spill (kcfs)	Release Location ¹		Number Released	Number Examined	Loss of Equilibrium (exclusively)	Major Scale Loss (exclusively)	Visible Injuries Related to Passage	Combined Maladies
<i>Spillbay 2</i>								
9/113	Deep	Mid-bay	190	188 (98.9%)	2 (0.9%)	0 (0.0%)	4 (2.1%)	6 (3.1%)
		Off-center	189	181 (95.8%)	6 (3.2%)	0 (0.0%)	9 (5.0%)	15 (8.2%)
12/108	Deep	Mid-bay	110	110 (100.0%)	2 (1.7%)	0 (0.0%)	5 (4.5%)	7 (6.2%)
		Off-center	108	108 (100.0%)	0 (0.0%)	0 (0.0%)	3 (2.8%)	3 (2.6%)
18/102	Deep	Mid-bay	149	149 (100.0%)	0 (0.0%)	0 (0.0%)	2 (1.3%)	2 (1.2%)
		Off-center	150	150 (100.0%)	1 (0.5%)	0 (0.0%)	7 (4.7%)	8 (5.2%)
	Shallow	Mid-bay	149	148 (99.3%)	3 (1.9%)	0 (0.0%)	1 (0.7%)	4 (2.6%)
		Off-center	150	148 (98.7%)	3 (1.9%)	0 (0.0%)	2 (1.4%)	5 (3.2%)
21/98.5	Deep	Mid-bay	100	100 (100.0%)	7 (6.9%)	0 (0.0%)	3 (3.0%)	10 (9.9%)
		Off-center	100	100 (100.0%)	6 (5.9%)	0 (0.0%)	11 (11.0%)	17 (16.9%)
	Shallow	Mid-bay	100	98 (98.0%)	3 (2.9%)	0 (0.0%)	3 (3.1%)	6 (6.0%)
		Off-center	100	100 (100.0%)	1 (0.9%)	0 (0.0%)	4 (4.0%)	5 (4.9%)
<i>Spillbay 2 pooled</i>			<i>1,595</i>	<i>1,580 (99.1%)</i>	<i>34 (2.0%)</i>	<i>0 (0.0%)</i>	<i>54 (3.4%)</i>	<i>88 (5.4%)</i>
<i>Spillbay 4</i>								
9/113	Deep	Mid-bay	241	235 (97.5%)	0 (0.0%)	0 (0.0%)	10 (4.3%)	10 (4.1%)
12/108	Deep	Mid-bay	160	158 (98.8%)	0 (0.0%)	0 (0.0%)	3 (1.9%)	3 (1.8%)
18/102	Deep	Mid-bay	200	200 (100.0%)	3 (1.4%)	0 (0.0%)	3 (1.5%)	6 (2.9%)
		Shallow	209	205 (98.1%)	3 (1.3%)	0 (0.0%)	6 (2.9%)	9 (4.3%)
<i>Spillbay 4 pooled</i>			<i>810</i>	<i>798 (98.5%)</i>	<i>6 (0.6%)</i>	<i>0 (0.0%)</i>	<i>22 (2.8%)</i>	<i>28 (3.4%)</i>
<i>Control</i>								
9/113			180	180 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
12/108			120	119 (99.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
18/102			280	276 (98.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
21/98.5			170	169 (99.4%)	1 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
<i>Control pooled</i>			<i>750</i>	<i>744 (99.2%)</i>	<i>1 (0.1%)</i>	<i>0 (0.0%)</i>	<i>0 (0.0%)</i>	<i>1 (0.1%)</i>

¹ Fish released 10 ft (deep/mid-spillbay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-spillbay.

Table 3-10

Estimated clean fish probabilities for juvenile chinook salmon in passage through Spillbays 2 and 4 at The Dalles Dam at high tailwater elevation, May-June 2003. Standard errors are italicized within parentheses and the 90% confidence intervals are shown in parentheses.

Release Location*	Spillbay 2 (Test/Total kcfs Spill Volume)				Spillbay 4 (Test/Total kcfs Spill Volume)		
	9/113	12/108	18/102	21/98.5	9/113	12/108	18/102
Deep							
Mid-bay	0.969 (<i>0.013</i>) (0.948-0.991)	0.938 (<i>0.023</i>) (0.899-0.976)	0.988 (<i>0.010</i>) (0.972-1.00)	0.901 (<i>0.030</i>) (0.852-0.951)	0.959 (<i>0.013</i>) (0.937-0.980)	0.982 (<i>0.013</i>) (0.980-0.984)	0.971 (<i>0.012</i>) (0.951-0.991)
Off-center	0.918 (<i>0.021</i>) (0.884-0.952)	0.974 (<i>0.016</i>) (0.947-0.999)	0.948 (<i>0.018</i>) (0.918-0.978)	0.831 (<i>0.038</i>) (0.769-0.893)			
Shallow							
Mid-bay			0.974 (<i>0.013</i>) (0.952-0.996)	0.940 (<i>0.024</i>) (0.900-0.980)			0.957 (<i>0.014</i>) (0.933-0.981)
Off-center			0.968 (<i>0.015</i>) (0.943-0.998)	0.951 (<i>0.022</i>) (0.915-0.987)			

* Fish released 10 ft (deep/mid-spillbay and deep/off-center) and 15 ft (shallow/mid-spillbay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-spillbay.

FIGURES

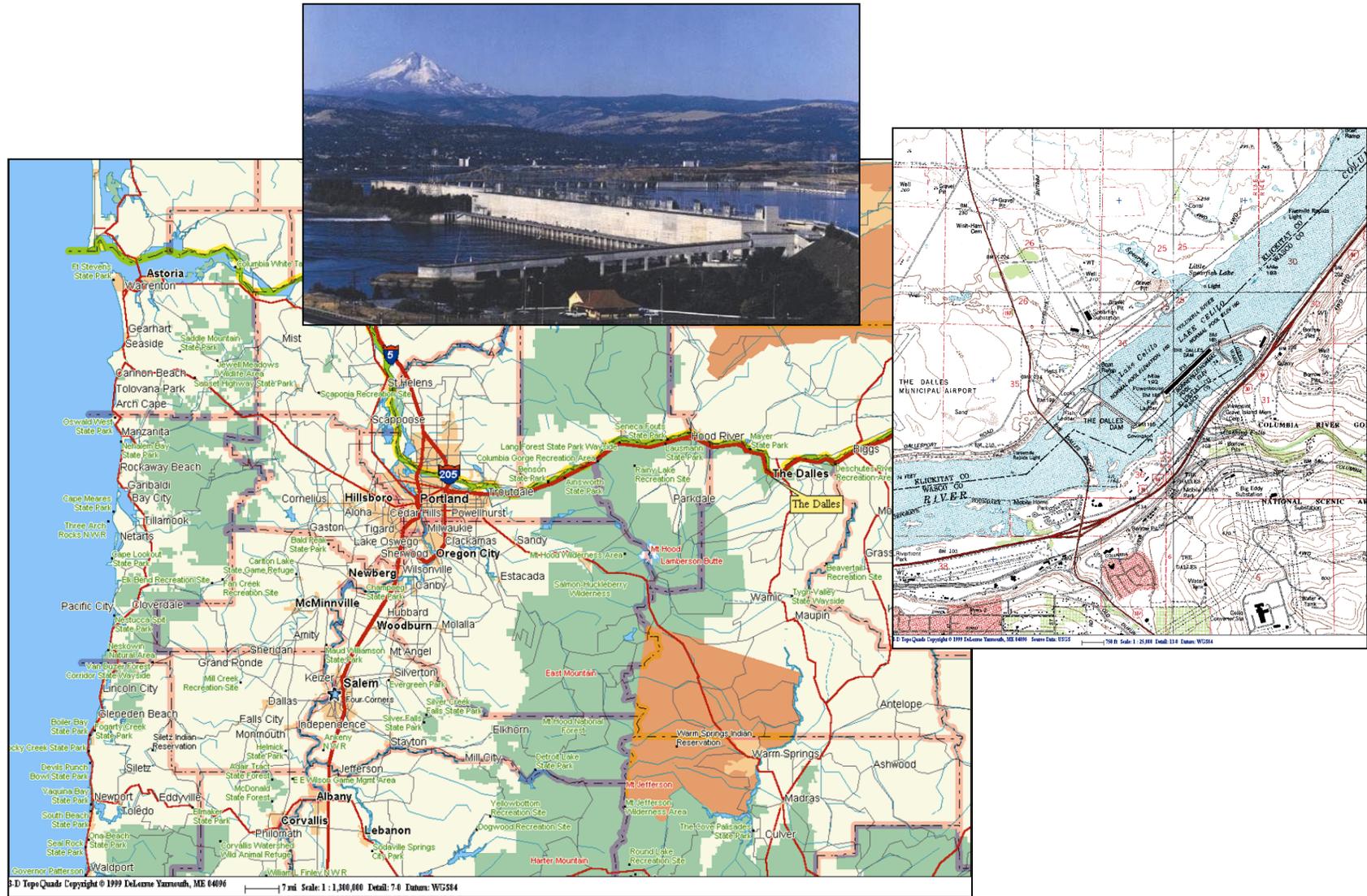


Figure 1-1

Location and general configuration of The Dalles Dam.

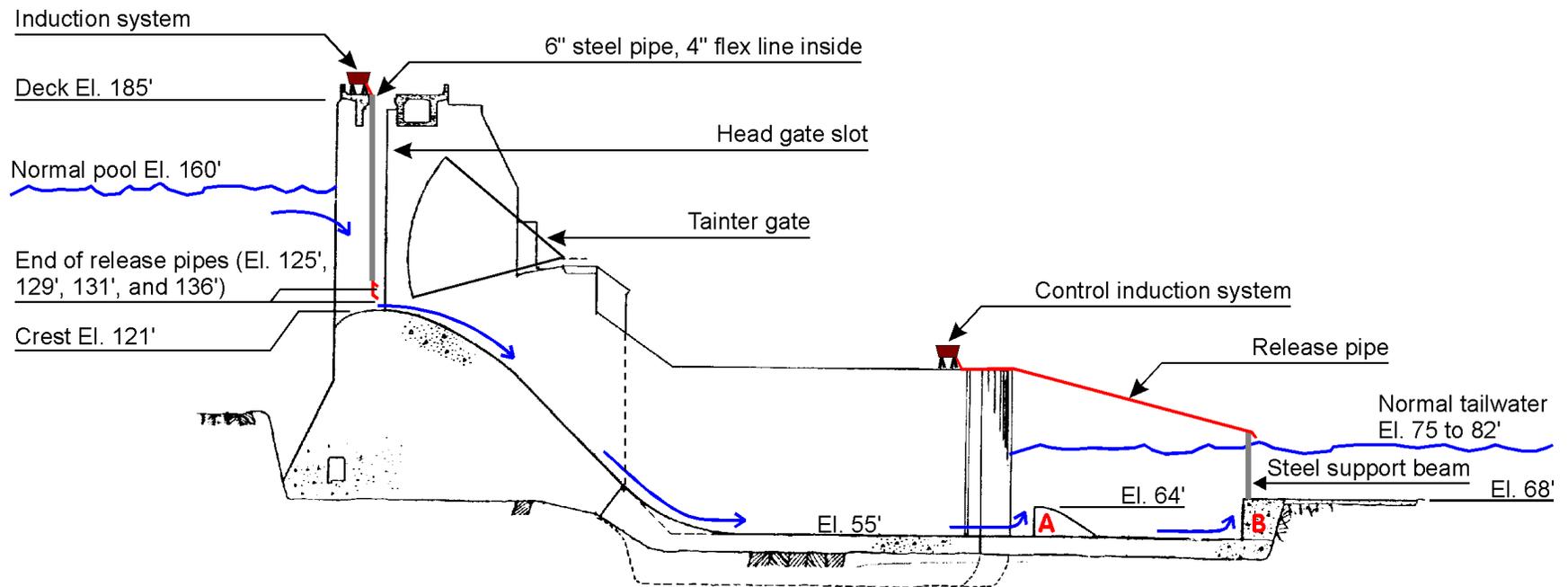


Figure 1-2

Cross section of spillbay showing release location for juvenile salmon passed through Spillbays 2 and 4 and energy dissipation structures (baffles-A, end sill-B) at The Dalles Dam, October-November and May-June 2003.



Figure 1-3

The Dalles Dam spillway with energy dissipation structures (9 ft high baffles and 13 ft high vertical end sill). Photos provided by U.S. Army Corps of Engineers.

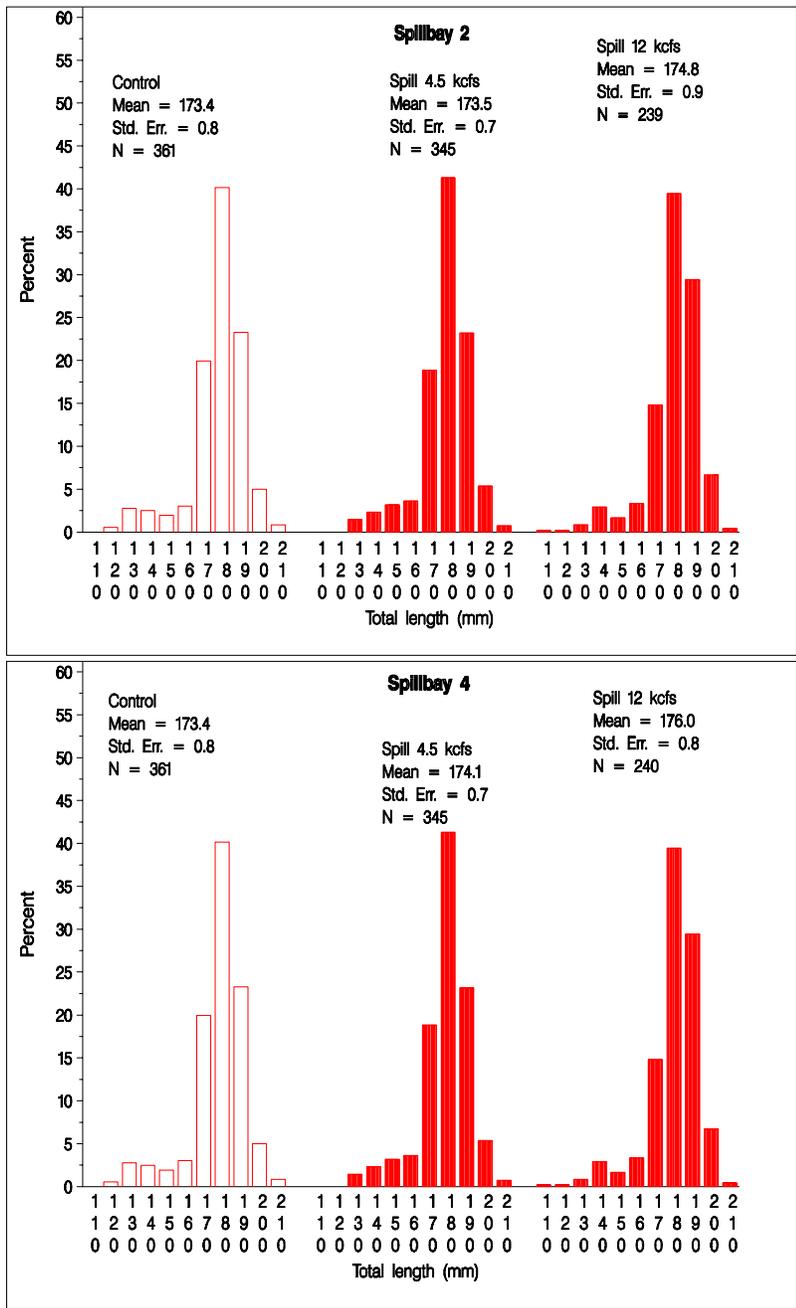


Figure 2-1a Total length (mm) frequency distribution of treatment and control chinook salmon smolts, released at Spillbays 2 and 4 at 4.5 and 12 kcfs at the Dalles Dam, October 2002.

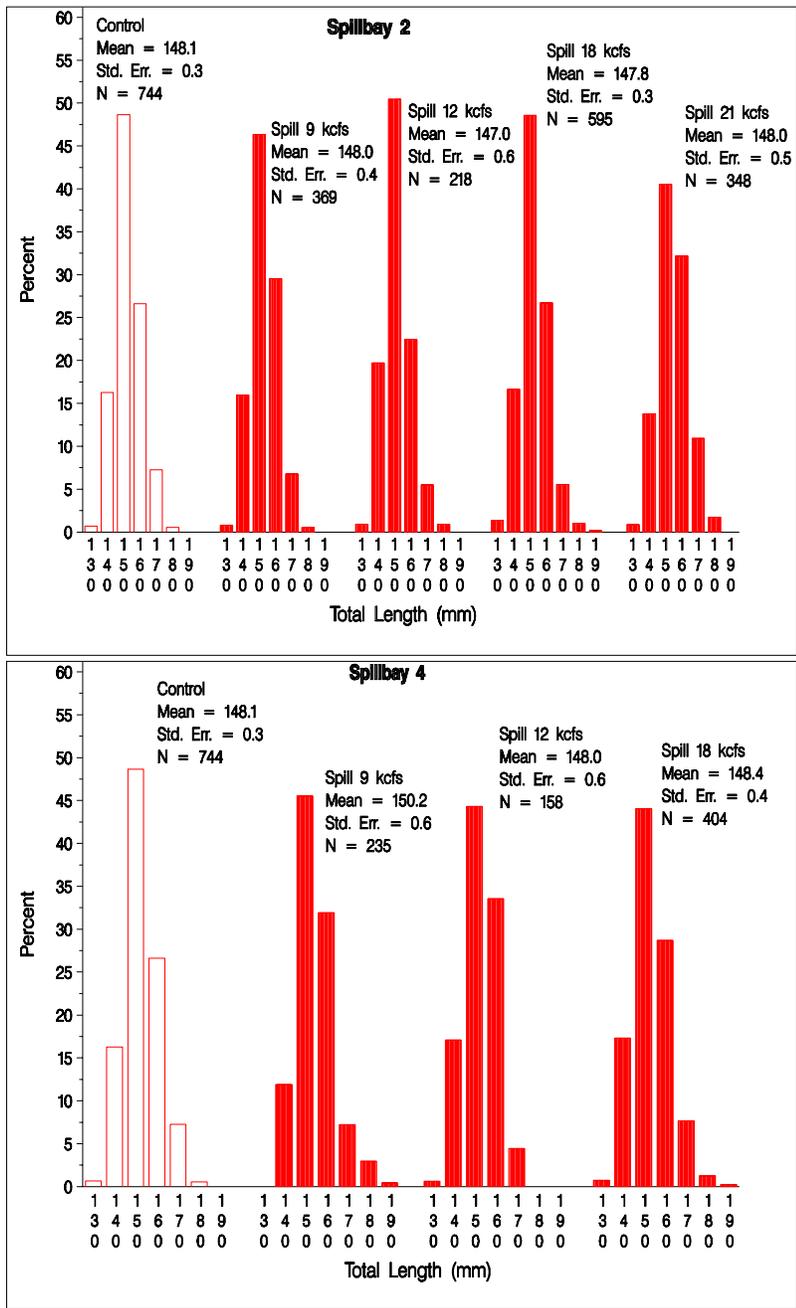


Figure 2-1b Total length (mm) frequency distribution of treatment and control chinook salmon smolts, released at Spillbays 2 and 4 at 9,12, 18 and 21 kcf discharge volumes at the Dalles Dam, May - June 2003.

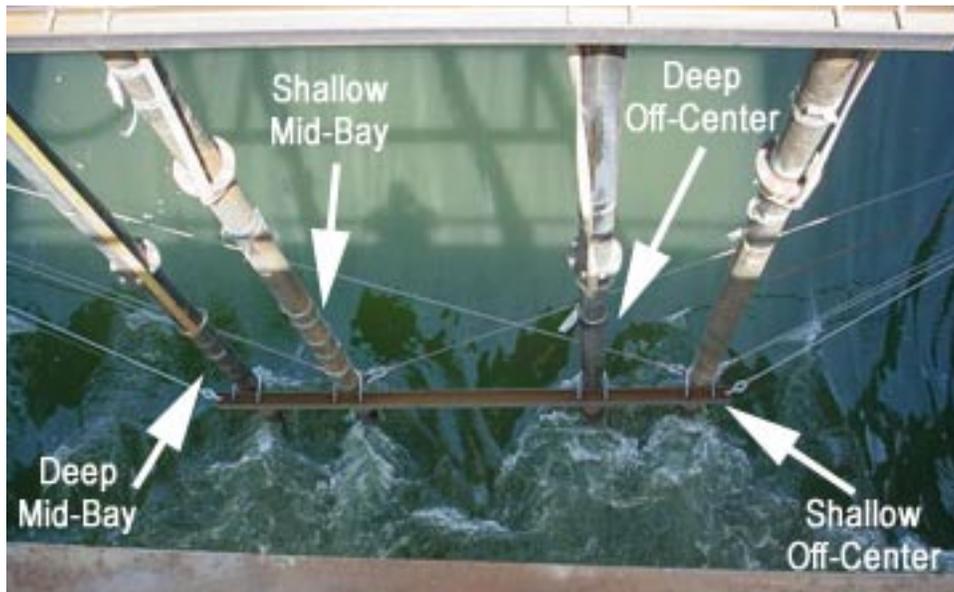


Figure 2-2

Pipes (multiple system at Spillbay 2) to release treatment juvenile salmonids into Spillbays 2 and 4 (only deep and shallow mid-bay release points used) at The Dalles Dam, fall 2002 and spring 2003.



Figure 2-3

System (control site) to release juvenile salmonids at The Dalles Dam spillway.

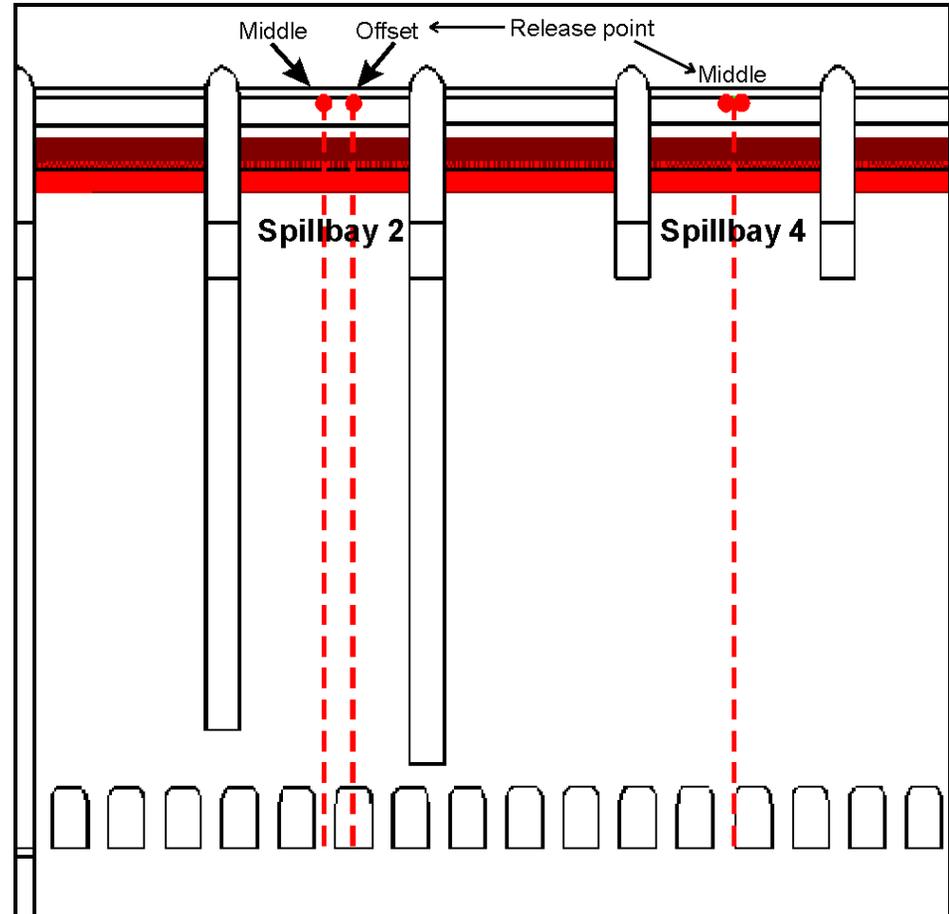
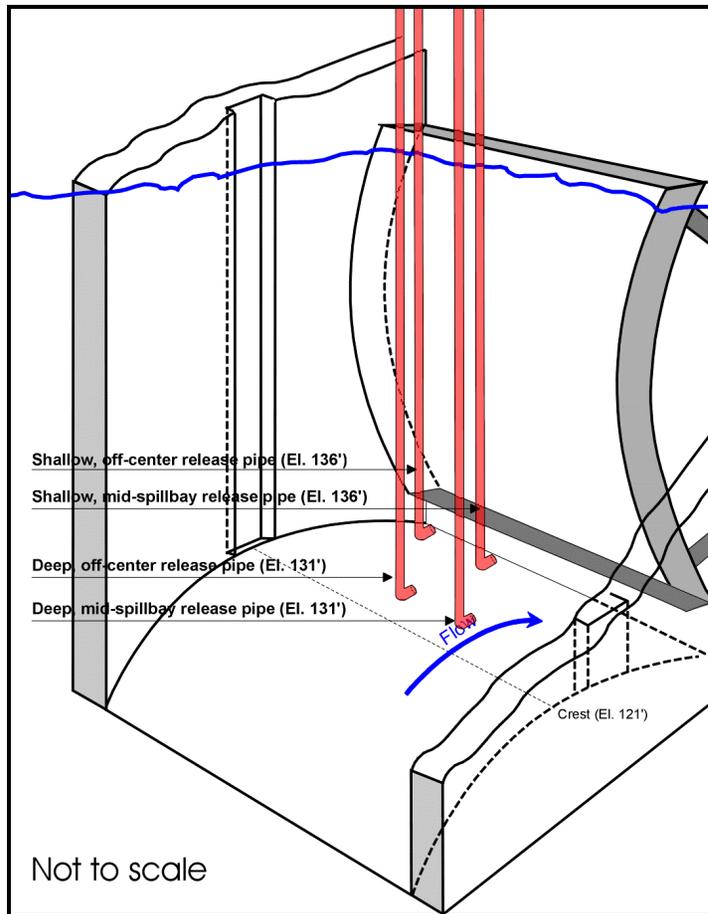


Figure 2-4

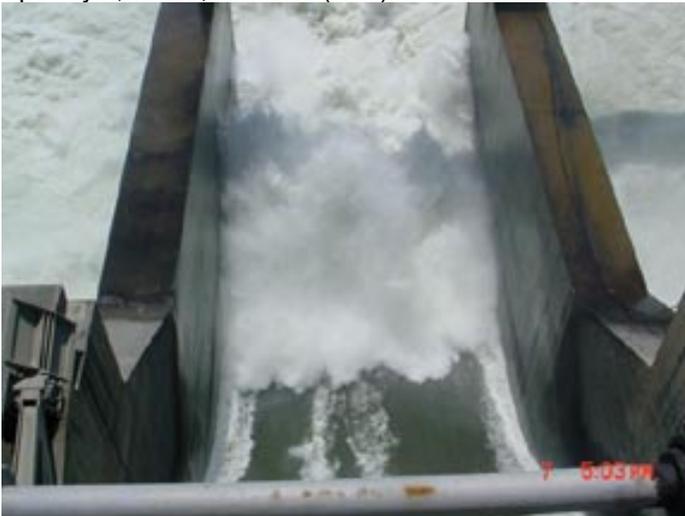
Release pipe locations in Spillbays 2 (four pipes) and 4 (two pipes) with potential trajectory of treatment fish (dashed line) at The Dalles Dam, spring 2003.



Spillbay 2, 9 kcfs, 113 kcfs (total)



Spillbay 2, 21 kcfs



Spillbay 2, 21 kcfs



Spillbay 2, 21 kcfs, 99 kcfs (total)

Figure 2-5

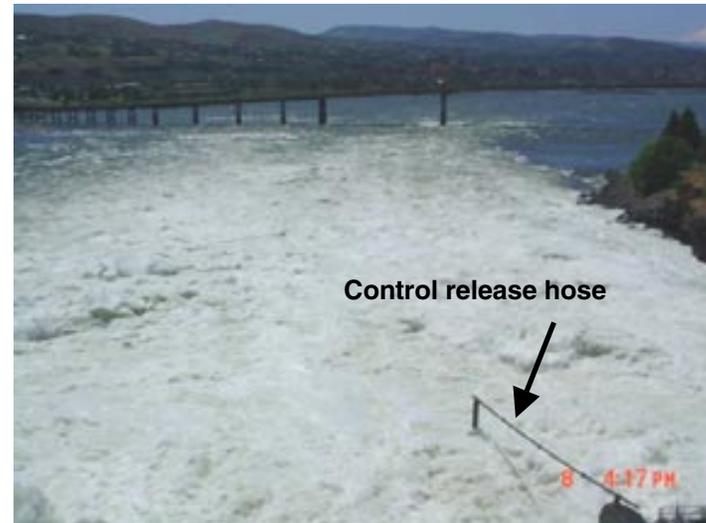
Hydraulic conditions downstream of Spillbay 2 during the lowest (9 kcfs) and highest (21 kcfs) HI-Z tagged juvenile salmonid passage tests at The Dalles Dam spillway, May (spring) 2003.



Spillbay 4, 9 kcfs, 135 kcfs (total)



Spillbay 4, 18 kcfs, 102 kcfs (total)



Spillbay 4, 18 kcfs, 102 kcfs (total)

Figure 2-6

Hydraulic conditions downstream of Spillbay 4 during the lowest (9 kcfs) and highest (21 kcfs) HI-Z tagged juvenile salmonid passage tests at The Dalles Dam spillway, May (spring) 2003.

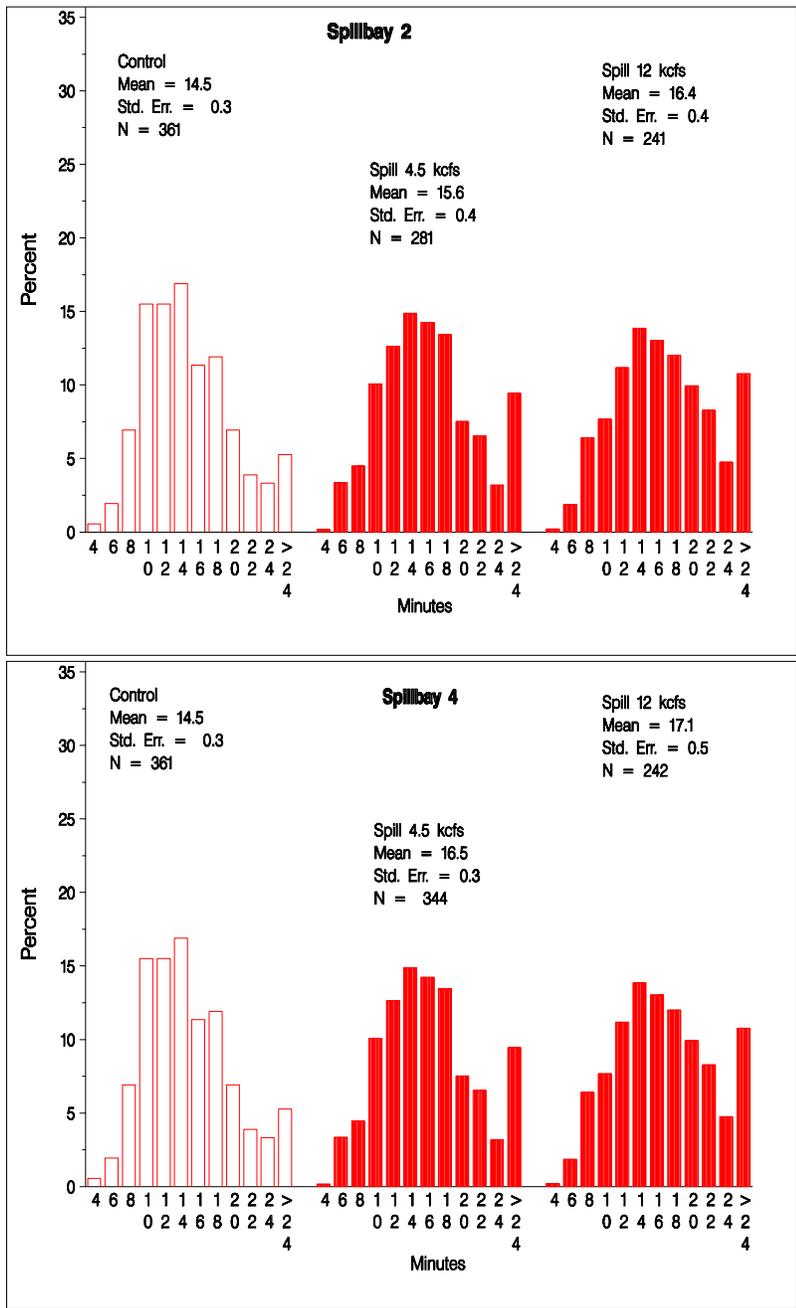
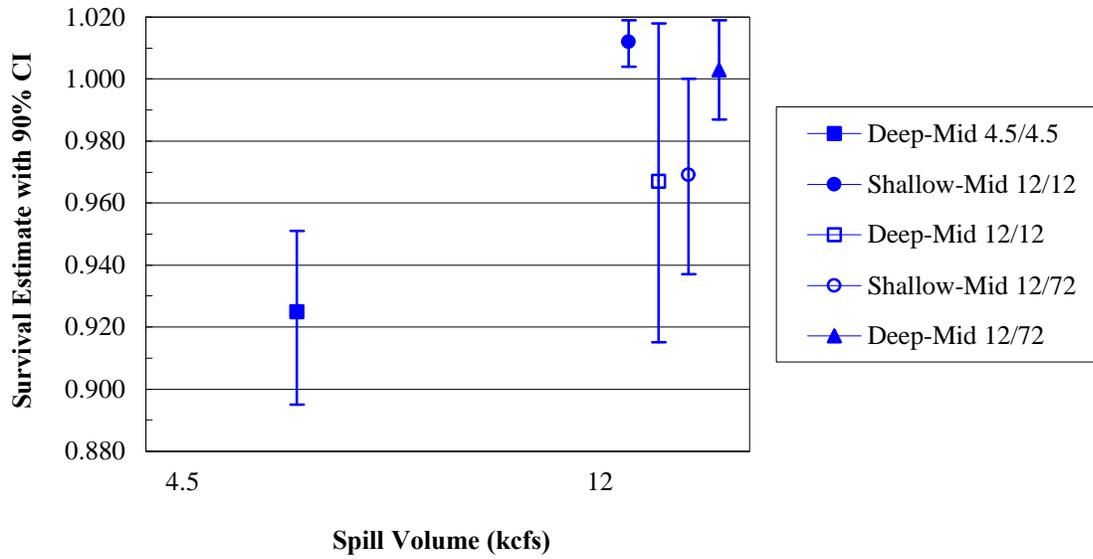


Figure 3-1 Frequency distribution of recapture times (minutes) of treatment and control chinook salmon smolts, released at Spillbays 2 and 4 at 4.5 and 12 kcfs at Dalles Dam, October–November 2002.

Spillbay 2



Spillbay 4

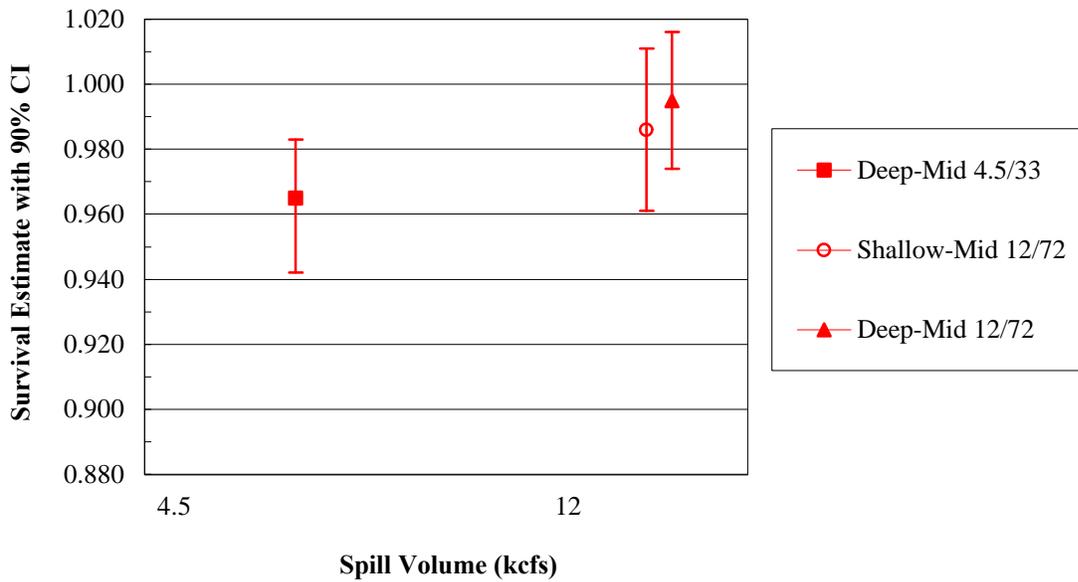
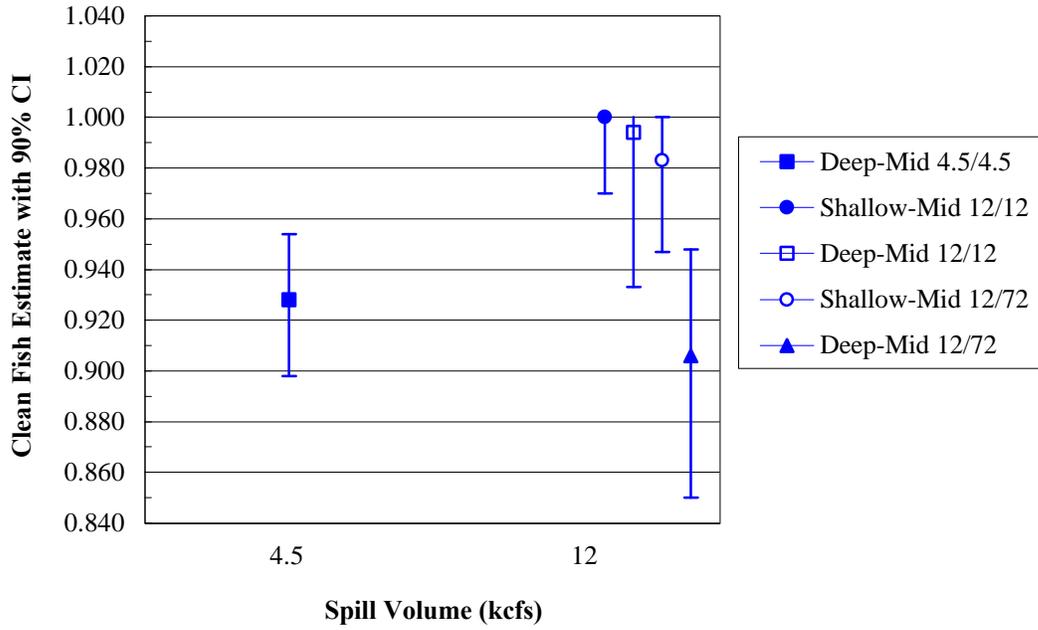


Figure 3-2

Survival estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, October-November 2002.

Spillbay 2



Spillbay 4

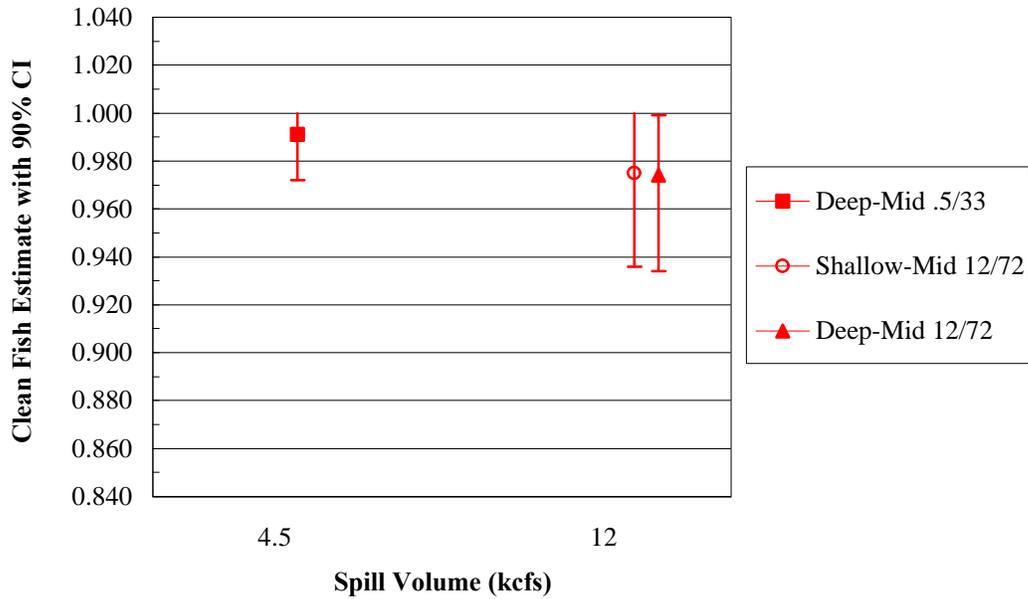


Figure 3-3

Clean fish estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, October-November 2002.

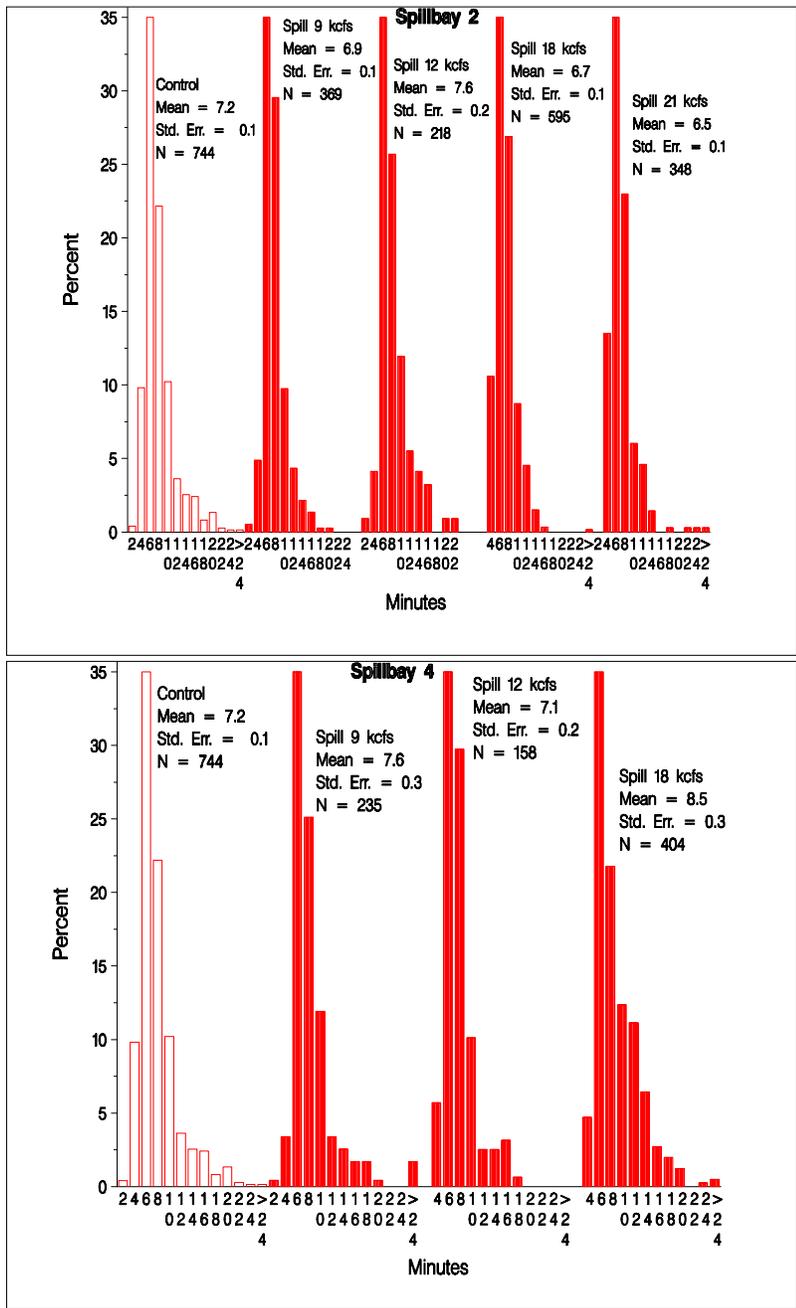
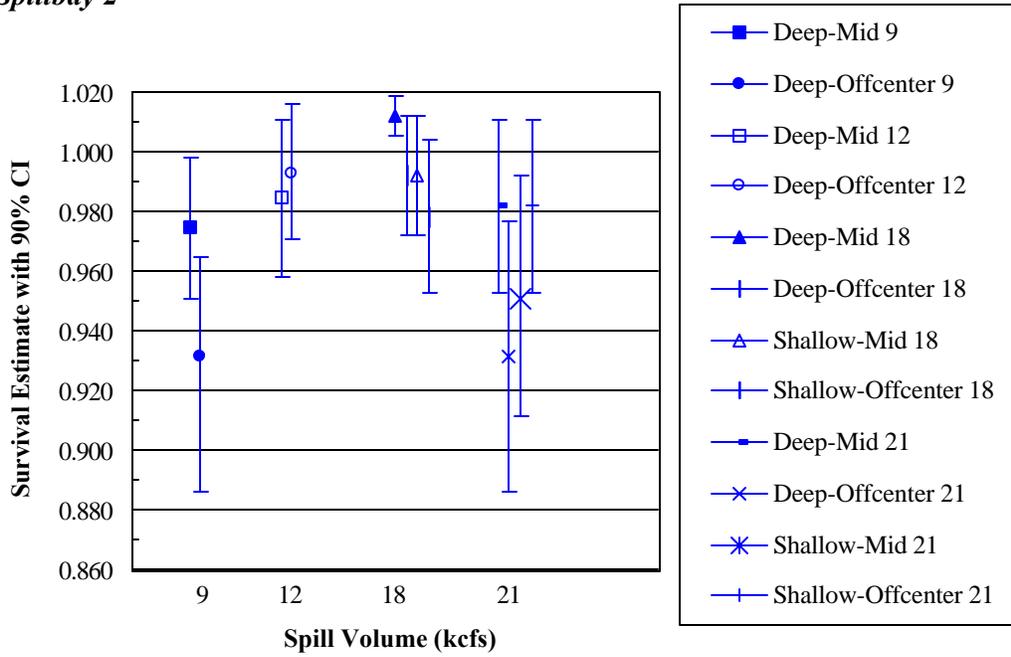


Figure 3-4 Frequency distribution of recapture times (minutes) of treatment and control chinook salmon smolts, released at Spillbays 2 and 4 at 9, 12, 18 and 21 kcfs discharge volumes at Dalles Dam, May - June 2003.

Spillbay 2



Spillbay 4

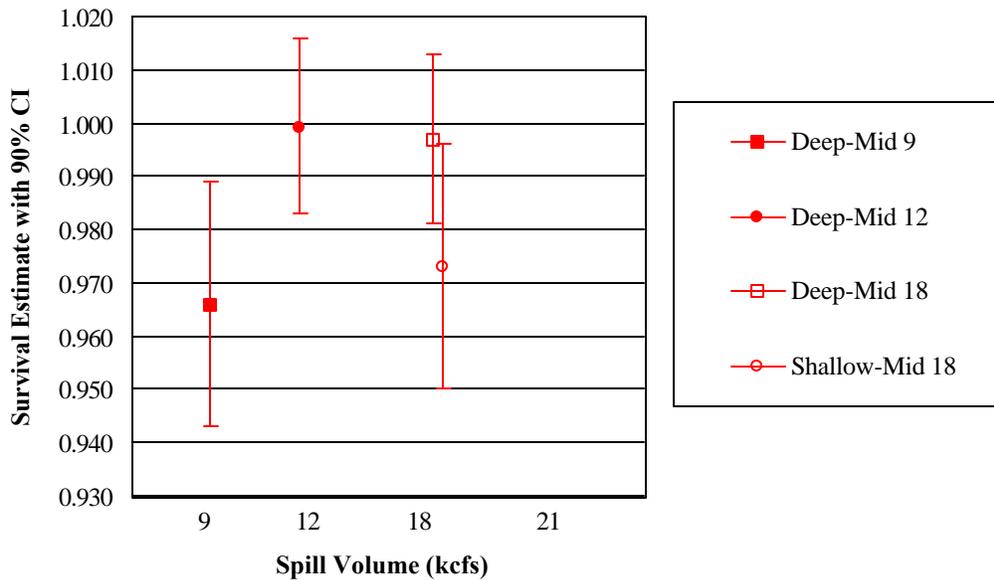
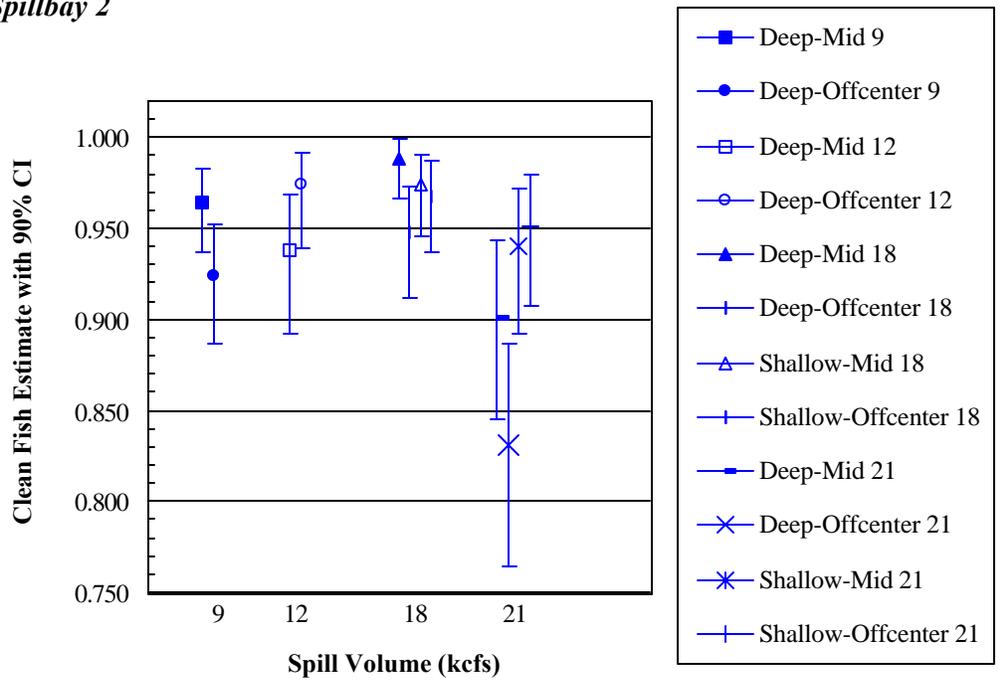


Figure 3-5

Survival estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, May-June 2003.

Spillbay 2



Spillbay 4

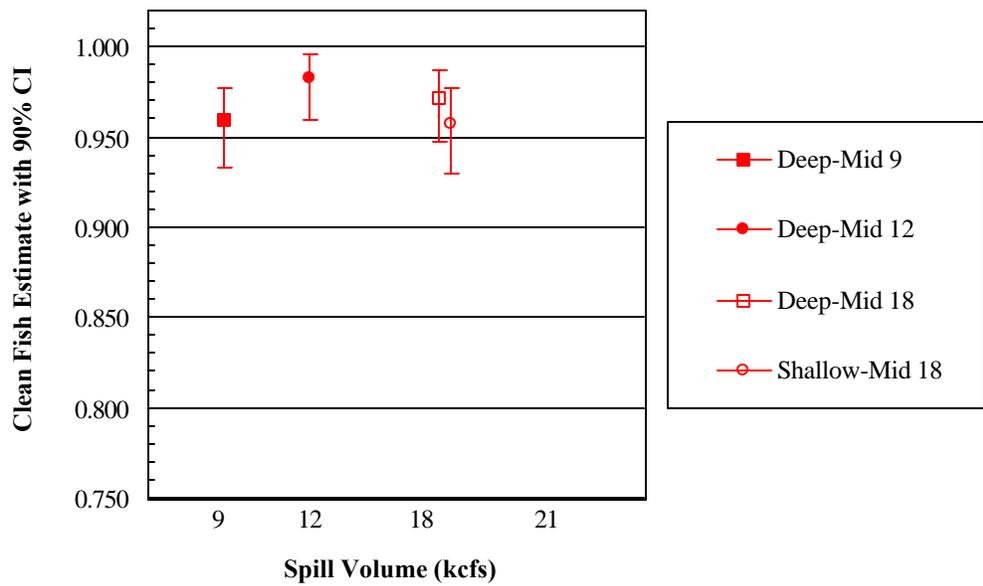


Figure 3-6

Clean fish estimate versus spill volume at Spillbays 2 and 4, The Dalles Dam, May-June 2003.

APPENDIX A

HYDRAULIC/PHYSICAL CONDITIONS DURING TESTING; IMPACT VELOCITY DATA

Appendix Table A-1

Physical conditions at The Dalles Dam during juvenile chinook salmon releases through Spillbays 2 and 4 and downstream of Spillbay 3 (control) at different spill conditions at low tailwater elevation, October-November 2002.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
22 Oct	0900	4.5		4.5	87.8	158.5	75.2	83.3
22 Oct	1000	4.5		4.5	104.9	158.5	75.2	83.3
22 Oct	1100	4.5		4.5	105.8	158.5	75.2	83.3
22 Oct	1200	4.5		4.5	116.5	158.4	75.2	83.2
22 Oct	1300		4.5	33	117.3	158.4	76.5	81.9
22 Oct	1400		4.5	33	123.8	158.3	76.8	81.5
22 Oct	1500		4.5c	33	120.2	158.3	76.9	81.4
22 Oct	1600		4.5c	33	120.9	158.2	76.9	81.3
22 Oct	1700		4.5c	33	112.1	158.3	76.8	81.5
23 Oct	0900		4.5	33	138.7	159.1	76.9	82.2
23 Oct	1000		4.5	33	139.2	159.1	76.7	82.4
23 Oct	1100		4.5	33	149	159	76.4	82.6
23 Oct	1200		4.5	33	119.3	159.3	76	83.3
23 Oct	1300		4.5c	33	121	159.3	76.2	83.1
23 Oct	1400		4.5c	33	124.9	159.4	76.9	82.5
23 Oct	1500	4.5		4.5	128.2	159.4	76.7	82.7
23 Oct	1600	4.5		4.5	133.2	159.4	76.9	82.5
23 Oct	1700	4.5		4.5	133.7	159.3	76.9	82.4
24 Oct	0900		4.5c	4.5	103.2	159.1	75.5	83.6
24 Oct	1000		4.5c	4.5	103.6	159.1	75.4	83.7
24 Oct	1100		4.5c	4.5	110.1	159.1	75.4	83.7
24 Oct	1200		4.5	33	134.6	158.9	76.2	82.7
24 Oct	1300		4.5	33	137.1	158.3	76.6	81.7
24 Oct	1400		4.5	33	137.1	158.7	75.9	82.8
24 Oct	1500	4.5		4.5	132.9	158.3	75.7	82.6
24 Oct	1600	4.5		4.5	110.5	158.4	76	82.4
25 Oct	0900	12		72	159.6	158.4	75.9	82.5
25 Oct	1000	12		72	162.1	158.6	75.9	82.7
25 Oct	1100	12		72	157.6	158.1	77.3	80.8
25 Oct	1200		12	72	156	158.1	76.5	81.6
25 Oct	1300		12	72	153.2	158	76.7	81.3
25 Oct	1400		12	72	176.5	157.9	76.9	81.0
25 Oct	1500		12c	72	137.6	157.6	77.1	80.5
25 Oct	1600		12c	72	136.3	157.2	76.9	80.3
25 Oct	1700		12c	72	123.9	157.7	76.6	81.1

Appendix Table A-1

Continued.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
26 Oct	0900		12	72	157.3	158.2	76.8	81.4
26 Oct	1000		12	72	167.7	157.8	77.6	80.2
26 Oct	1100		12	72	165.3	158.1	76.1	82.0
26 Oct	1200		12c	72	148.4	157.8	76	81.8
26 Oct	1300		12c	72	144.4	157.7	77.2	80.5
26 Oct	1400	12		72	159.1	157.7	76.4	81.3
26 Oct	1500	12		72	146.7	157.6	76.4	81.2
26 Oct	1600	12		72	160	157.6	76.7	80.9
26 Oct	1700	12		72	160.5	157.5	76.7	80.8
28 Oct	0800	12c		72	157.5	158.3	76.9	81.4
28 Oct	0900	12c		72	149.4	157.9	77.8	80.1
28 Oct	1000	12c		72	147.9	157.8	76.8	81.0
28 Oct	1100	12		72	128	158.1	76.7	81.4
28 Oct	1200	12		72	124.2	158	76.8	81.2
28 Oct	1300		12	72	119.2	157.7	77.6	80.1
28 Oct	1400		12	72	114.3	158	77.8	80.2
28 Oct	1500		12	72	122.1	158.5	77	81.5
28 Oct	1600	12		12	89.3	159	76.7	82.3
29 Oct	0800	4.5		4.5	111.8	158.5	76.2	82.3
29 Oct	0900	4.5		4.5	113.5	158.7	76.3	82.4
29 Oct	1000	4.5		4.5	112.4	158.8	76.2	82.6
29 Oct	1100		4.5	33	133.8	158.9	76.1	82.8
29 Oct	1200		4.5	33	124.6	158.9	76.2	82.7
29 Oct	1300		4.5c	4.5	126	158.9	76.4	82.5
29 Oct	1400		4.5c	4.5	111.1	158.8	76.2	82.6
29 Oct	1500		4.5c	4.5	107.3	158.6	76	82.6
29 Oct	1600	12		12	103.2	158.9	76.2	82.7
30 Oct	0800		4.5	33	148.6	158	77.2	80.8
30 Oct	0900		4.5	33	124	158	76.5	81.5
30 Oct	1000		4.5	33	135.3	158	76.2	81.8
30 Oct	1100		4.5	33	143.7	158	76.2	81.8
30 Oct	1200		4.5c	4.5	122.4	158.1	76.5	81.6
30 Oct	1300		4.5c	4.5	123.5	158.2	76.4	81.8
30 Oct	1400	4.5		4.5	127.1	158.3	76.6	81.7
30 Oct	1500	4.5		4.5	123.9	158.3	76.6	81.7
30 Oct	1600	12		12	131.2	158.4	76.7	81.7

Appendix Table A-1

Continued.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
31 Oct	0800		4.5	33	179.6	158.5	78.4	80.1
31 Oct	0900		4.5	33	172.5	158.4	78.1	80.3
31 Oct	1000	4.5	4.5	33, 4.5	137.8	158.7	77.4	81.3
31 Oct	1100	4.5		4.5	122.7	158.7	77.7	81.0
31 Oct	1200	4.5		4.5	133.1	158.7	77.9	80.8
31 Oct	1300	4.5c		33	141	158.8	78	80.8
31 Oct	1400	4.5c		33	145.5	158.8	78.7	80.1
31 Oct	1500	12		12	130.4	159	77.8	81.2
01 Nov	0800	4.5		4.5	147.5	159.7	77.2	82.5
01 Nov	0900	4.5		4.5	144.9	159.7	77.1	82.6
01 Nov	1000		4.5	33	160.4	159.6	77.6	82.0
01 Nov	1100		4.5	33	160.6	159.4	77.4	82.0
01 Nov	1200		4.5	33	146.9	159	77.8	81.2
01 Nov	1300		4.5	33	153.6	159.2	77.5	81.7
01 Nov	1400		4.5c	4.5	148.5	159.1	77.6	81.5
01 Nov	1500		4.5c	33	160.9	159.1	77.7	81.4
01 Nov	1600	12		12	139.1	158.8	77.6	81.2
02 Nov	0800	12		72	171.5	158.9	77.6	81.3
02 Nov	0900	12		72	179.6	158.9	77.7	81.2
02 Nov	1000	12		72	175.3	158.8	78.1	80.7
02 Nov	1100	12c		72	187.9	158.7	78.5	80.2
02 Nov	1200	12c		72	163.5	158.5	78.4	80.1
02 Nov	1300	12c		72	119.2	159	77.6	81.4
02 Nov	1400		12	72	134.1	159.3	77.9	81.4
02 Nov	1500		12	72	157.8	159.5	78.9	80.6
02 Nov	1600		12	72	153.3	159.3	78.6	80.7
03 Nov	0900		12	33	138.3	158.6	76.4	82.2
03 Nov	1000		12	33	134.5	158.7	76.2	82.5
03 Nov	1100	12	12c	72	156.1	158.4	77.7	80.7
03 Nov	1200	12		72	140.9	158.8	77.4	81.4

c = control releases

Appendix Table A-2

Physical conditions at The Dalles Dam during juvenile chinook salmon releases through Spillbays 2 and 4 and downstream of Spillbay 3 (control) at four different spill conditions at high tailwater elevation, May-June 2003.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
5/20/03	0900	12		108	206	158.6	79	79.6
5/20/03	1000	12		108	203.1	158.5	79.1	79.4
5/20/03	1100	12		108	203.2	158.5	79.2	79.3
5/20/03	1200		12	108	202.7	158.5	79.3	79.2
5/20/03	1300		12	108	224.8	158.4	79.6	78.8
5/20/03	1400		12c	108	224.8	158.5	79.7	78.8
5/20/03	1500		12c	108	238.5	158.5	79.7	78.8
5/20/03	1600		12c	108	222.7	158.4	79.8	78.6
5/21/03	0900	18		102	240.9	158.8	79.8	79
5/21/03	1000	18		102	248.1	158.7	80.1	78.6
5/21/03	1100	18c		102	240.7	158.8	80	78.8
5/21/03	1200	18c		102	237.6	158.7	80	78.7
5/21/03	1300	18		102	238.5	158.6	80	78.6
5/21/03	1400	18		102	242.4	158.6	80	78.6
5/21/03	1500	18		102	256.8	158.6	80	78.6
5/21/03	1600	18		102	241.3	158.4	80.2	78.2
5/22/03	0900	18		102	267.1	158.9	80.7	78.2
5/22/03	1000	18c		102	259.4	159	80.7	78.3
5/22/03	1100	18c		102	254.8	159.1	80.6	78.5
5/22/03	1200	18		102	256.9	159	80.8	78.2
5/22/03	1300		18	102	257.4	158.9	80.9	78
5/22/03	1400		18	102	258.7	158.9	80.8	78.1
5/22/03	1500		18	102	263.4	158.9	80.7	78.2
5/22/03	1600		18	102	247.5	158.8	80.6	78.2
5/22/03	1700	18		102	245.1	158.7	81.1	77.6
5/23/03	0900		18	102	251.7	159.8	80.4	79.4
5/23/03	1000		18	102	250.4	159.7	80.4	79.3
5/23/03	1100	18		102	252.7	159.1	80.3	78.8
5/23/03	1200	18		102	251.1	158.9	80.1	78.8
5/23/03	1300		18	102	242.5	158.9	80	78.9
5/23/03	1400		18	102	240.7	158.8	80	78.8
5/23/03	1500		18	102	223.8	158.8	80	78.8
5/23/03	1600		18c	102	269.2	158.4	80.7	77.7
5/23/03	1700		18c	102	277.2	158.4	81	77.4
5/23/03	1800		18c	102	270.6	158.5	81.2	77.3
5/24/03	0900	18		102	254.8	158	80.8	77.2
5/24/03	1000	18		102	263.6	158.2	80.4	77.8
5/24/03	1100		18	102	234.9	158.4	80	78.4

Appendix Table A-2

Continued.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
5/24/03	1200		18	102	226.8	158.3	79.7	78.6
5/24/03	1300		18	102	203.8	158.4	79.6	78.8
5/24/03	1400		18	102	226.5	158.2	80.3	77.9
5/24/03	1500		18	102	226.4	158.2	80.3	77.9
5/24/03	1600		18c	102	231.2	158.3	80.6	77.7
5/24/03	1700		18c	102	232.6	158.6	80.7	77.9
5/25/03	0900	9c		113	236.7	158.9	80.5	78.4
5/25/03	1000	9c		113	236	158.9	80.5	78.4
5/25/03	1100	9		113	220	158.9	80.2	78.7
5/25/03	1200	9		113	217.6	158.8	80.2	78.6
5/25/03	1300	9		113	222.5	158.8	80.3	78.5
5/25/03	1400	9		113	219.1	158.6	80.2	78.4
5/25/03	1500		9	113	214	158.5	80.2	78.3
5/25/03	1600		9	113	220	158.2	80.7	77.5
5/25/03	1700		9	113	221.6	158.2	80.6	77.6
5/26/03	0900		9	113	254.9	159	80.8	78.2
5/26/03	1000		9	113	241.8	159	80.6	78.4
5/26/03	1100	9		113	244.6	158.9	80.6	78.3
5/26/03	1200	9		113	238	158.8	80.4	78.4
5/26/03	1300	9		113	223.4	158.6	80.1	78.5
5/26/03	1400	9		113	216.5	158.5	80	78.5
5/26/03	1500	9c		113	229.4	158.3	80	78.3
5/26/03	1600	9c		113	224	158.2	80.1	78.1
5/28/03	0900		12	108	327.6	157.6	83.7	73.9
5/28/03	1000		12	108	326.2	157.4	83.7	73.7
5/28/03	1100	12		108	323.2	157.2	83.7	73.5
5/28/03	1200	12		108	319.3	157.2	83.6	73.6
5/28/03	1300	12		108	312.5	157.2	83.4	73.8
5/28/03	1400	12		108	321.9	157.1	83.6	73.5
5/28/03	1500	12c		108	337.5	157.2	83.4	73.8
5/28/03	1600	12c		108	316.6	157.3	83	74.3
5/29/03	0900	12		108	315.5	158.4	81.7	76.7
5/29/03	1000	12		108	317.5	158.4	81.9	76.5
5/29/03	1100	12		108	317.4	158.4	82	76.4
5/29/03	1200	12		108	318.5	158.3	82.3	76
5/29/03	1300	12c		108	318.9	158.4	82.3	76.1
5/29/03	1400	12c		108	313.6	158.5	82.4	76.1
5/29/03	1500	12c		108	316.1	158.3	82.3	76
5/29/03	1600		12	108	311.8	158.2	82.4	75.8
5/29/03	1700		12	108	311.7	158	82.3	75.7

Appendix Table A-2

Continued.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
5/30/03	1300		9	135	363.1	159.3	84.5	74.8
5/30/03	1400		9	135	361.7	159.2	84.7	74.5
5/30/03	1500	9		135	360.5	159.2	84.7	74.5
5/30/03	1600	9		135	360.2	159.2	84.3	74.9
5/30/03	1700	9c		135	354.2	159.3	84.2	75.1
5/30/03	1800	9c		135	358.5	159.3	84.2	75.1
5/31/03	0900	9		113	336.3	159.1	83.9	75.2
5/31/03	1000	9		120	345.5	159.4	84.1	75.3
5/31/03	1100	9		120	342.5	159.5	84.3	75.2
5/31/03	1200	9		140	366.9	159.5	84.8	74.7
5/31/03	1300	9c		160	386.5	159.4	85.1	74.3
5/31/03	1400	9c	9	160	384.2	159.2	85.3	73.9
5/31/03	1500		9	160	384.6	159.2	85.3	73.9
5/31/03	1600		9	160	383.2	159.2	85	74.2
5/31/03	1700		9	160	381.6	159.1	85	74.1
6/ 2/03	0900	18		102	311.6	158.6	82.4	76.2
6/ 2/03	1000	18		102	313.7	158.6	82.5	76.1
6/ 2/03	1100	18		102	296.6	158.6	82	76.6
6/ 2/03	1200	18		102	295.3	158.4	82	76.4
6/ 2/03	1300		18	102	296.8	158.2	81.8	76.4
6/ 2/03	1400		18	102	289.1	158.2	81.6	76.6
6/ 2/03	1500		18c	102	286.5	158.1	81.7	76.4
6/ 2/03	1600		18c	102	287.7	158	81.8	76.2
6/ 3/03	1100	9c		113	321.7	158.2	82.4	75.8
6/ 3/03	1200	9c		113	319.2	157.9	82.2	75.7
6/ 3/03	1300	9		113	293	158	81.5	76.5
6/ 3/03	1400	9		113	272.1	158.2	81	77.2
6/ 3/03	1500	9		113	291.7	158.1	81.7	76.4
6/ 3/03	1600	9	9	113	298.6	158	81.5	76.5
6/ 3/03	1700		9	113	289.3	158	81.4	76.6
6/ 3/03	1800		9	113	320.7	157.9	81.9	76
6/ 4/03	0900	18		102	315.1	157.7	82.4	75.3
6/ 4/03	1000	18		102	317.8	157.4	82.5	74.9
6/ 4/03	1100	18		102	310.9	157.1	81.9	75.2
6/ 4/03	1200	18		102	267.4	157.1	81.9	75.2
6/ 4/03	1300		18	102	293.2	157	82.3	74.7
6/ 4/03	1400		18	102	294.8	157.1	82.3	74.8
6/ 4/03	1500		18c	102	295.7	157.2	82.3	74.9
6/ 4/03	1600		18c	102	294.4	157.3	82.5	74.8

Appendix Table A-2

Continued.

Date	Hour	Test Spill (kcfs)		Total Spill (kcfs)	River Flow (kcfs)	Elevation (ft)		Net Head (ft)
		Spillbay 2	Spillbay 4			Forebay	Tailwater	
6/ 5/03	0900	18		102	301.1	158.6	81.7	76.9
6/ 5/03	1000	18		102	302.6	158.6	81.7	76.9
6/ 5/03	1100	18		102	301.5	158.4	81.7	76.7
6/ 5/03	1200		18	102	294.5	158.3	81.7	76.6
6/ 5/03	1300		18	102	300.7	158.3	81.8	76.5
6/ 5/03	1400		18c	102	301.9	158.2	82	76.2
6/ 5/03	1500		18c	102	301.5	158	82	76
6/ 6/03	0900	21		99	276.4	158.6	80.6	78
6/ 6/03	1000	21		99	276.2	158.5	80.6	77.9
6/ 6/03	1100	21		99	287.2	158.4	80.9	77.5
6/ 6/03	1200	21		99	289.5	158.3	80.9	77.4
6/ 6/03	1300		21c	99	288.3	158.2	81	77.2
6/ 6/03	1400		21c	99	290	158.3	81.1	77.2
6/ 6/03	1500		21c	99	289.5	158.3	81.1	77.2
6/ 7/03	0900	21		99	268.3	158.7	80	78.7
6/ 7/03	1000	21		99	277.5	158.7	80.4	78.3
6/ 7/03	1100	21		99	287.7	158.7	80.7	78
6/ 7/03	1200	21		99	289.1	158.7	80.5	78.2
6/ 7/03	1300	21c		99	288	158.6	80.5	78.1
6/ 7/03	1400	21c		99	288.1	158.6	80.7	77.9
6/ 7/03	1500	21c		99	288.5	158.6	80.7	77.9
6/ 8/03	0900	18		102	242.6	159.2	80.5	78.7
6/ 8/03	1000	18		102	276.6	159.5	81.2	78.3
6/ 8/03	1100	18	18	102	296.5	159.6	81.5	78.1
6/ 8/03	1200		18	102	303.8	159.6	81.8	77.8
6/ 8/03	1300		18c	102	312	159.5	81.9	77.6
6/ 8/03	1400		18c	102	314.4	159.4	82	77.4
6/ 8/03	1500		18c	102	313.4	159.1	82	77.1
6/ 9/03	0900	21		98.5	241.7	159.5	79.9	79.6
6/ 9/03	1000	21		98.5	259.7	159.6	80.5	79.1
6/ 9/03	1100	21c		98.5	286.7	159.6	81.4	78.2
6/ 9/03	1200	21c		98.5	311.8	159.4	82.1	77.3
6/ 9/03	1300	21		98.5	313.3	159.3	82.3	77
6/ 9/03	1400	21		98.5	311.1	159.2	82.2	77
6/ 9/03	1500	21		98.5	309.9	159.1	82.4	76.7
6/10/03	0900	21		98.5	308.4	158.6	82	76.6
6/10/03	1000	21		98.5	315.3	158.5	82.3	76.2
6/10/03	1100	21		98.5	312.2	158.3	82.3	76
6/10/03	1200	21		98.5	311.1	158.1	82.2	75.9
6/10/03	1300	21c		98.5	311.8	157.8	82.4	75.4

c -control fish

Appendix Table A-3

Lowest and highest total head and impact velocity associated with 8 test conditions during the release of juvenile chinook salmon through Spillbays 2 and 4 at The Dalles Dam, October-November 2002. Impact velocities calculated by Duncan Hay.

Date	Hour	Test/Total Spill (kcfs)	Release Location	River Flow (kcfs)	Elevation (ft)		Net Head (ft)	Impact Velocity (ft/s)
					Forebay	Tailwater		
<i>Spillbay 2</i>								
10/31	1200	4.5/4.5	Deep	133.1	158.7	77.9	80.8	65.6
10/22	1100	4.5/4.5	Deep	105.8	158.5	75.2	83.3	66.8
10/30	1600	12/12	Deep	131.2	158.4	76.7	81.7	67.9
10/29	1600	12/12	Deep	103.2	158.9	76.2	82.7	68.3
10/31	1500	12/12	Shallow	130.4	159	77.8	81.2	67.5
11/1	1600	12/12	Shallow	139.1	158.8	77.6	81.2	67.6
10/28	1300	12/72	Deep	119.2	157.7	77.6	80.1	67.4
10/25	1200	12/72	Deep	156	158.1	76.5	81.6	68.0
10/26	1700	12/72	Shallow	160.5	157.5	76.7	80.8	67.8
10/25	1000	12/72	Shallow	162.1	158.6	75.9	82.7	68.3
<i>Spillbay 4</i>								
10/31	800	4.5/33	Deep	179.6	158.5	78.4	80.1	65.3
10/23	1200	4.5/33	Deep	119.3	159.3	76	83.3	66.6
10/28	1300	12/72	Deep	119.2	157.7	77.6	80.1	67.4
11/3	900	12/72	Deep	138.3	158.6	76.4	82.2	68.1
10/26	1000	12/72	Shallow	167.7	157.8	77.6	80.2	67.4
11/3	1000	12/72	Shallow	134.5	158.7	76.2	82.5	68.2

Appendix Table A-4

Lowest and highest total head and impact velocity associated with 16 test conditions during the release of juvenile chinook salmon through Spillbays 2 and 4 at The Dalles Dam, May-June 2003. Impact velocities calculated by Duncan Hay.

Date	Hour	Test/Total Spill (kcfs)	Release Location	River Flow (kcfs)	Elevation (ft)		Net Head (ft)	Impact Velocity (ft/s)
					Forebay	Tailwater		
<i>Spillbay 2</i>								
5/30/03	1500	9/135	Deep, Mid-bay	360.5	159.2	84.7	74.5	63.3
5/25/03	1100	9/113	Deep, Mid-bay	220	158.9	80.2	78.7	65.5
5/31/03	1200	9/140	Deep, Off-center	366.9	159.5	84.8	74.7	63.3
5/25/03	1200	9/113	Deep, Off-center	217.6	158.8	80.2	78.6	65.5
5/28/03	1100	12/108	Deep, Mid-bay	323.2	157.2	83.7	73.5	64.2
5/20/03	0900	12/108	Deep, Mid-bay	206	158.6	79	79.6	66.8
5/28/03	1400	12/108	Deep, Off-center	321.9	157.1	83.6	73.5	64.2
5/20/03	1000	12/108	Deep, Off-center	203.1	158.5	79.1	79.4	66.8
6/ 2/03	1000	18/102	Deep, Mid-bay	313.7	158.6	82.5	76.1	66.7
5/21/03	1300	18/102	Deep, Mid-bay	238.5	158.6	80	78.6	68.0
6/ 2/03	1000	18/102	Deep, Off-center	313.7	158.6	82.5	76.1	66.7
5/23/03	1200	18/102	Deep, Off-center	251.1	158.9	80.1	78.8	68.0
6/ 4/03	1000	18/102	Shallow, Mid-bay	317.8	157.4	82.5	74.9	66.6
5/21/03	0900	18/102	Shallow, Mid-bay	240.9	158.8	79.8	79	68.1
6/ 4/03	1100	18/102	Shallow, Off-center	310.9	157.1	81.9	75.2	66.9
5/21/03	1400	18/102	Shallow, Off-center	242.4	158.6	80	78.6	68.0
6/ 9/03	1500	21/98.5	Deep, Mid-bay	309.9	159.1	82.4	76.7	67.7
6/ 6/03	0900	21/99	Deep, Mid-bay	276.4	158.6	80.6	78	68.5
6/ 6/03	1200	21/98.5	Deep, Off-center	289.5	158.3	80.9	77.4	68.4
6/ 9/03	0900	21/98.5	Deep, Off-center	241.7	159.5	79.9	79.6	69.0
6/10/03	1000	21/98.5	Shallow, Mid-bay	315.3	158.5	82.3	76.2	67.7
6/10/03	0900	21/98.5	Shallow, Mid-bay	308.4	158.6	82	76.6	67.9
6/10/03	1200	21/98.5	Shallow, Off-center	311.1	158.1	82.2	75.9	67.7
6/ 7/03	1200	21/99	Shallow, Off-center	289.1	158.7	80.5	78.2	68.6
<i>Spillbay 4</i>								
5/31/03	1500	9/160	Deep, Mid-bay	384.6	159.2	85.3	73.9	63.0
5/26/03	1000	9/113	Deep, Mid-bay	241.8	159	80.6	78.4	65.3
5/28/03	1000	12/108	Deep, Mid-bay	326.2	157.4	83.7	73.7	64.2
5/20/03	1200	12/109	Deep, Mid-bay	202.7	158.5	79.3	79.2	66.7
6/ 5/03	1300	18/102	Deep, Mid-bay	300.7	158.3	81.8	76.5	67.0
5/23/03	0900	18/102	Deep, Mid-bay	251.7	159.8	80.4	79.4	67.9
6/ 4/03	1300	18/102	Shallow, Mid-bay	293.2	157	82.3	74.7	66.6
5/23/03	1300	18/102	Shallow, Mid-bay	242.5	158.9	80	78.9	68.0

APPENDIX B

SUMMARY OF SURVIVAL RATES AT OTHER HYDROELECTRIC DAMS ON THE COLUMBIA RIVER BASIN

Appendix Table B-1

Sample size, recapture and control survival rates, and estimated 48 h survival (direct effects) of juvenile salmonids in passage through non-turbine exit routes at hydroelectric dams on the Columbia River Basin. Estimates based on balloon tag-recapture methodology (Heisey *et al.* 1992). Source: Normandeau Associates *et al.* (2003). Present study data are shown in italics.

Station	Exit Route	Species	Water Temperature (°C)	Sample Size	Head (ft)	Test Spill Volume (kcfs)	Recapture Rates (%)		Control Survival (%)	Passage Survival (%)
							Control	Treatment		
The Dalles, WA	Spillway	Chinook salmon	15-17	270	81	10.5	97.0	94.1	97.0	95.5
	Spillway ^b	Chinook salmon	15-17	271	81	10.5	97.0	97.4	97.0	99.3
	Spillway ^b	Chinook salmon	15-17	210	81	4.5	96.2	94.3	96.2	99.0
	Spillway	Chinook salmon	10-14	391	75-80	7.5-10.5	98.7	96.7	98.0	97.4
	Spillway	Chinook salmon	10-14	396	75-80	4.5-7.5	98.7	95.4	98.0	97.4
	Spillway	Chinook salmon	10-14	405	75-80	3.0-6.0	98.7	93.8	98.0	93.8
	Spillway ^g	<i>Chinook salmon</i>	<i>9-15</i>	<i>345</i>	<i>80-84</i>	<i>4.5</i>	<i>97.6</i>	<i>95.1</i>	<i>97.1</i>	<i>92.5</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>9-15</i>	<i>45</i>	<i>80-84</i>	<i>12.0</i>	<i>N/A</i>	<i>95.6</i>	<i>N/A</i>	<i>96.7</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>9-15</i>	<i>45</i>	<i>80-84</i>	<i>12.0</i>	<i>N/A</i>	<i>100.0</i>	<i>N/A</i>	<i>100.0</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>9-15</i>	<i>120</i>	<i>80-84</i>	<i>12.0</i>	<i>98.9</i>	<i>99.2</i>	<i>98.9</i>	<i>100.0</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>9-15</i>	<i>120</i>	<i>80-84</i>	<i>12.0</i>	<i>98.9</i>	<i>98.3</i>	<i>98.9</i>	<i>96.9</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>9-15</i>	<i>345</i>	<i>80-84</i>	<i>4.5</i>	<i>98.2</i>	<i>98.3</i>	<i>98.2</i>	<i>96.5</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>9-15</i>	<i>120</i>	<i>80-84</i>	<i>12.0</i>	<i>98.9</i>	<i>98.3</i>	<i>98.9</i>	<i>99.5</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>9-15</i>	<i>120</i>	<i>80-84</i>	<i>12.0</i>	<i>98.9</i>	<i>99.2</i>	<i>98.9</i>	<i>98.6</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>190</i>	<i>75-79</i>	<i>9.0</i>	<i>100</i>	<i>98.9</i>	<i>98.9</i>	<i>97.5</i>
	Spillway ^{f,g}	<i>Chinook salmon</i>	<i>13-16</i>	<i>189</i>	<i>75-79</i>	<i>9.0</i>	<i>100.0</i>	<i>95.8</i>	<i>98.9</i>	<i>93.1</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>110</i>	<i>74-80</i>	<i>12.0</i>	<i>99.2</i>	<i>100.0</i>	<i>99.2</i>	<i>98.5</i>
	Spillway ^{f,g}	<i>Chinook salmon</i>	<i>13-16</i>	<i>108</i>	<i>74-80</i>	<i>12.0</i>	<i>99.2</i>	<i>98.1</i>	<i>99.2</i>	<i>99.3</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>149</i>	<i>76-79</i>	<i>18.0</i>	<i>98.6</i>	<i>100.0</i>	<i>98.2</i>	<i>100.0</i>
	Spillway ^{f,g}	<i>Chinook salmon</i>	<i>13-16</i>	<i>150</i>	<i>76-79</i>	<i>18.0</i>	<i>98.6</i>	<i>100.0</i>	<i>98.2</i>	<i>99.2</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>13-16</i>	<i>149</i>	<i>75-80</i>	<i>18.0</i>	<i>98.6</i>	<i>99.3</i>	<i>98.2</i>	<i>99.2</i>
	Spillway ^{f,h}	<i>Chinook salmon</i>	<i>13-16</i>	<i>150</i>	<i>75-79</i>	<i>18.0</i>	<i>98.6</i>	<i>98.7</i>	<i>98.2</i>	<i>97.8</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>100</i>	<i>77-78</i>	<i>21.0</i>	<i>99.4</i>	<i>100.0</i>	<i>99.4</i>	<i>98.2</i>
	Spillway ^{f,g}	<i>Chinook salmon</i>	<i>13-16</i>	<i>100</i>	<i>77-80</i>	<i>21.0</i>	<i>99.4</i>	<i>100.0</i>	<i>99.4</i>	<i>93.1</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>13-16</i>	<i>100</i>	<i>76-77</i>	<i>21.0</i>	<i>99.4</i>	<i>98.0</i>	<i>99.4</i>	<i>95.1</i>
	Spillway ^{f,h}	<i>Chinook salmon</i>	<i>13-16</i>	<i>100</i>	<i>76-78</i>	<i>21.0</i>	<i>99.4</i>	<i>100.0</i>	<i>99.4</i>	<i>98.2</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>241</i>	<i>74-78</i>	<i>9.0</i>	<i>100.0</i>	<i>97.5</i>	<i>98.9</i>	<i>96.6</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>160</i>	<i>74-79</i>	<i>12.0</i>	<i>99.2</i>	<i>98.8</i>	<i>99.2</i>	<i>99.9</i>
	Spillway ^g	<i>Chinook salmon</i>	<i>13-16</i>	<i>200</i>	<i>77-79</i>	<i>18.0</i>	<i>98.6</i>	<i>100.0</i>	<i>98.2</i>	<i>99.7</i>
	Spillway ^h	<i>Chinook salmon</i>	<i>13-16</i>	<i>209</i>	<i>75-79</i>	<i>18.0</i>	<i>98.6</i>	<i>98.1</i>	<i>98.2</i>	<i>97.3</i>

Appendix Table B-1

Continued.

Station	Exit Route	Species	Water Temperature (°C)	Sample Size	Head (ft)	Test Spill Volume (kcfs)	Recapture Rates (%)		Control Survival (%)	Passage Survival (%)
							Control	Treatment		
Wanapum, WA	Sluice	Chinook salmon	5-8	195	79	2.0	100.0	97.9	100.0	97.4
	Spillway	Chinook salmon	5-8	235	79	4.3	100.0	99.6	99.6	99.6
	Spillway ^a	Chinook salmon	5-8	235	79	4.3	100.0	97.9	99.6	95.7
	Spillway ^b	Chinook salmon	5-8	155	79	2.0	100.0	97.4	100.0	92.0
	Spillway ^b	Chinook salmon	5-8	160	79	4.0	96.7	98.8	96.7	96.9
	Spillway	Chinook salmon	17-18	180	82	2.8	100.0	100.0	94.5	100.0
	Spillway	Chinook salmon	17-18	244	82	6.0	100.0	99.6	95.8	99.3
	Spillway	Chinook salmon	17-18	130	82	11.5	98.4	99.2	94.3	94.6
	Spillway ^a	Chinook salmon	17-18	200	82	2.8	100.0	100.0	96.5	99.0
	Spillway ^a	Chinook salmon	17-18	199	82	6.0	100.0	98.5	95.3	97.6
	Spillway ^a	Chinook salmon	17-18	191	82	11.5	98.4	96.7	94.3	92.8
	Spillway	Chinook salmon	16	180	82	2.8	100.0	100.0	97.5	99.4
	Spillway	Chinook salmon	16	169	82	6.0	100.0	100.0	95.8	97.6
	Spillway	Chinook salmon	16	198	82	7.5	100.0	100.0	94.3	99.5
	Spillway ^a	Chinook salmon	16	180	82	2.8	100.0	100.0	96.5	98.3
	Spillway ^a	Chinook salmon	16	170	82	6.0	100.0	98.8	95.3	98.2
	Spillway ^a	Chinook salmon	16	210	82	7.5	100.0	99.0	82.3	97.6
	Bypass Pipe	Chinook salmon	16	500	76-80	0.4	99.6	99.8	99.6	100.0
	Spillway ^{a,b}	Chinook salmon	5-6	300	81-82	10.4-12.5	100.0	99.0	97.3	99.0
	Bonneville, WA	Spillway	Chinook salmon	15-17	280	60	12.0	96.1	96.8	96.1
Spillway ^a		Chinook salmon	15-17	280	60	12.0	96.1	99.3	96.1	100.0
Spillway ^a		Chinook salmon	12-14	130	54-58	3.2-4.8	100.0	97.7	97.7	97.9
Spillway ^{a*}		Chinook salmon	12-14	166	54-58	3.2-6.4	100.0	95.8	97.7	95.9
Spillway ^a		Chinook salmon	12-14	238	50-55	5.1-7.9	95.4	98.3	97.7	98.6
Spillway ^{a*}		Chinook salmon	12-14	241	50-55	7.1-9.8	95.4	97.1	97.7	99.0
Spillway ^a		Chinook salmon	20-21	166	60-65	4.0-4.1	86.9	83.7	82.6	90.5
Spillway ^{a*}		Chinook salmon	20-21	175	60-65	5.0-6.0	86.9	88.1	82.6	88.6
Spillway ^a		Chinook salmon	20-21	250	60-64	5.0-6.0	87.6	87.6	82.6	100.0
Spillway ^{a*}		Chinook salmon	20-21	250	60-64	6.9-7.9	87.6	89.6	82.6	100.0
Powerhouse I sluice		Chinook salmon	15-17	100	60	0.2-0.3	NA	93.0	NA	93.0
Powerhouse II sluice		Chinook salmon	15-17	100	60	0.7	NA	90.0	NA	89.0
Powerhouse II sluice		Chinook salmon	14-16	250	50-58	1.0	99.6	100.0	99.6	99.6
Powerhouse II sluice		Chinook salmon	14-16	251	50-58	2.5	99.6	100.0	99.6	100.0
Powerhouse II sluice		Chinook salmon	16-18	348	63-67	1.0	99.4	100.0	99.4	100.0
Powerhouse II sluice	Chinook salmon	16-18	345	63-67	2.5	99.4	100.0	99.4	99.4	

Appendix Table B-1

Continued.

Station	Exit Route	Species	Water Temperature (°C)	Sample Size	Head (ft)	Test Spill Volume (kcfs)	Recapture Rates (%)		Control Survival (%)	Passage Survival (%)
							Control	Treatment		
Lower Granite, WA	Spillway ^a	Chinook salmon	9-10	120	90	3.4	100.0	100.0	100.0	97.5
	Surface Bypass Collector ^a	Chinook salmon	9-10	120	90	3.4	100.0	99.2	100.0	95.8
	Spillway ^a	Chinook salmon	8-10	130	90	3.4	92.1	94.6	92.1	97.6
	Surface Bypass Collector ^a	Chinook salmon	8-10	133	90	3.4	92.1	97.8	92.1	97.0
	Spillway ^a	Chinook salmon	10-11	130	97-98	5.7	100.0	100.0	100.0	100.0
	Spillway ^{a,b} (RSW)	Chinook salmon	10-11	260	97-99	7.0	100.0	99.2	100.0	98.1
Little Goose, WA	Spillway	Steelhead	8-9	150	90	5.6	100.0	100.0	100.0	100.0
	Spillway	Steelhead	8-9	150	90	9.5	100.0	100.0	100.0	100.0
	Spillway	Steelhead	8-9	100	90	1.8	99.0	100.0	99.0	100.0
	Spillway ^c	Steelhead	8-9	40	90	5.6	100.0	98.0	100.0	100.0
	Spillway ^c	Steelhead	8-9	120	90	9.5	100.0	99.0	100.0	98.3
	Spillway ^a	Steelhead	8-9	150	90	5.6	100.0	99.0	100.0	98.0
	Spillway ^a	Steelhead	8-9	150	90	9.5	100.0	100.0	100.0	100.0
	Spillway ^a	Steelhead	8-9	100	90	1.8	99.0	100.0	99.0	99.0
	Spillway ^{a,c}	Steelhead	8-9	39	90	5.6	100.0	100.0	100.0	100.0
	Spillway ^{a,c}	Steelhead	8-9	120	90	9.5	100.0	99.0	100.0	99.2
Ice Harbor, WA ¹	Spillway ^a	Chinook salmon	10-12	310	93-96	3.4-5.1	99.3	99.7	99.3	98.7
	Spillway ^a	Chinook salmon	10-12	225	94-96	4.3-8.5	99.3	99.1	99.3	99.5
	Spillway ^a	Chinook salmon	10-12	120	96-97	8.5	99.3	100.0	99.3	98.7
Rock Island, WA	Spillway ^{b,d}	Chinook salmon	4	250	41	1.9	NA	98.0	NA	95.1
	Spillway ^b	Chinook salmon	4	250	41	10.0	NA	100.0	NA	98.4
	Spillway ^b	Chinook salmon	13-14	200	41-49	2.5	100.0	99.5	99.5	99.5
	Spillway ^b	Chinook salmon	13-14	200	41-49	10.0	100.0	100.0	99.5	99.5
	Spillway ^{a,b,e}	Chinook salmon	14-15	200	40-43	2.5	100.0	99.5	100.0	99.0
	Spillway ^{a,b}	Chinook salmon	14-15	200	40-43	2.5	100.0	100.0	100.0	100.0
	Spillway ^{a,b,e}	Chinook salmon	9-10	200	39-43	2.5	100.0	99.5	100.0	99.0
	Spillway ^{a,b}	Chinook salmon	9-10	200	39-43	2.5	100.0	100.0	100.0	99.0
North Fork, OR	Spillway	Chinook/coho	9-11	126	135	0.7	100.0	100.0	93.6	87.3
	Spillway	Chinook/coho	9-11	129	135	2.0	100.0	99.2	86.1	80.1
	Spillway	Steelhead	9-11	129	135	0.7	100.0	100.0	98.4	85.6
	Spillway	Steelhead	9-11	128	135	2.0	100.0	100.0	92.3	96.5

a Spillbay with flow deflector.

a* Spillbay with deep flow deflector.

b Overflow weir or slot to attract surface oriented juvenile salmonids.

c Fish released into head pond vortices upstream of tainter gates.

d Spill directed onto concrete slab; survival is relative to survival at another spillbay.

e Periphery release.

f Off-center release.

g Deep release.

h Shallow release.

1 Spring tests only.

APPENDIX C

INDIVIDUAL TRIAL DATA; FISH INJURY DATA; AND DAILY FISH DISPOSITION DATA

Appendix Table C-1

Daily tag-recapture data for juvenile chinook salmon passed through deep or shallow release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation at The Dalles Dam, October-November 2002. Injuries due to predation or unrecovered fish presumed ingested by a predator are shown in parentheses.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 2 (4.5/4.5 kcfs) Deep Release</i>														
Released	60	45	45	--	--	--	--	60	45	45	45	--	--	345
Recovered alive	52	40	43	--	--	--	--	57	44	45	45	--	--	326
Recovered dead	0	0	0	--	--	--	--	2 (1)	0	0	0	--	--	2(1)
Assigned dead*	8	2	2	--	--	--	--	1	0	0	0	--	--	13
Dislodged tags	1	0	1	--	--	--	--	1	0	0	0	--	--	3
Stationary radio signals	7 (5)	2 (2)	1 (1)	--	--	--	--	0	0	0	0	--	--	10(8)
Unknown	0	3	0	--	--	--	--	0	1	0	0	--	--	4
Held	52	40	43	--	--	--	--	57	44	45	45	--	--	326
Alive - 48 h	46	38	41	--	--	--	--	55	44	45	44	--	--	313
<i>Spillbay 2 (12/12 kcfs²) Deep Release</i>														
Released	--	--	--	--	--	--	15	15	15	--	--	--	--	45
Recovered alive	--	--	--	--	--	--	15	13	15	--	--	--	--	43
Recovered dead	--	--	--	--	--	--	0	0	0	--	--	--	--	0
Assigned dead*	--	--	--	--	--	--	0	2	0	--	--	--	--	2
Dislodged tags	--	--	--	--	--	--	0	0	0	--	--	--	--	0
Stationary radio signals	--	--	--	--	--	--	0	2 (2)	0	--	--	--	--	2(2)
Unknown	--	--	--	--	--	--	0	0	0	--	--	--	--	0
Held	--	--	--	--	--	--	15	13	15	--	--	--	--	43
Alive - 48 h	--	--	--	--	--	--	15	13	15	--	--	--	--	43
<i>Spillbay 2 (12/12 kcfs*) Shallow Release</i>														
Released	--	--	--	--	--	--	--	--	--	15	30	--	--	45
Recovered alive	--	--	--	--	--	--	--	--	--	15	30	--	--	45
Recovered dead	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Assigned dead*	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Dislodged tags	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Stationary radio signals	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Unknown	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Held	--	--	--	--	--	--	--	--	--	15	30	--	--	45
Alive - 48 h	--	--	--	--	--	--	--	--	--	15	30	--	--	45

Appendix Table C-1

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 2 (12/72 kcfs) Deep Release</i>														
Released	--	--	--	30	--	--	45	--	--	--	--	30	15	120
Recovered alive	--	--	--	30	--	--	45	--	--	--	--	29	15	119
Recovered dead	--	--	--	0	--	--	0	--	--	--	--	0	0	0
Assigned dead*	--	--	--	0	--	--	0	--	--	--	--	0	0	0
Dislodged tags	--	--	--	0	--	--	0	--	--	--	--	0	0	0
Stationary radio signals	--	--	--	0	--	--	0	--	--	--	--	0	0	0
Unknown	--	--	--	0	--	--	0	--	--	--	--	1	0	1
Held	--	--	--	30	--	--	45	--	--	--	--	29	15	119
Alive - 48 h	--	--	--	29	--	--	45	--	--	--	--	29	15	118
<i>Spillbay 2 (12/72 kcfs) Shallow Release</i>														
Released	--	--	--	30	45	--	--	--	--	--	--	30	15	120
Recovered alive	--	--	--	30	42	--	--	--	--	--	--	30	15	117
Recovered dead	--	--	--	0	1 (1)	--	--	--	--	--	--	0	0	1(1)
Assigned dead*	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Dislodged tags	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Stationary radio signals	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Unknown	--	--	--	0	2	--	--	--	--	--	--	0	0	2
Held	--	--	--	30	42	--	--	--	--	--	--	30	15	117
Alive - 48 h	--	--	--	30	38	--	--	--	--	--	--	30	15	113
<i>Spillbay 4 (4.5/33 kcfs) Deep Release</i>														
Released	45	60	45	--	--	--	--	45	60	45	45	--	--	345
Recovered alive	44	57	44	--	--	--	--	44	59	45	45	--	--	338
Recovered dead	0	1 (1)	0	--	--	--	--	0	0	0	0	--	--	1(1)
Assigned dead*	1	2	1	--	--	--	--	0	1	0	0	--	--	5
Dislodged tags	0	0	0	--	--	--	--	0	1	0	0	--	--	1
Stationary radio signals	1	2 (1)	1 (1)	--	--	--	--	0	0	0	0	--	--	4(2)
Unknown	0	0	0	--	--	--	--	1	0	0	0	--	--	1
Held	44	57	44	--	--	--	--	44	59	45	45	--	--	338
Alive - 48 h	41	54	44	--	--	--	--	42	57	45	45	--	--	328

Appendix Table C-1

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 4 (12/72 kcfs) Deep Release</i>														
Released	--	--	--	--	30	--	45	--	--	--	--	30	15	120
Recovered alive	--	--	--	--	29	--	44	--	--	--	--	30	15	118
Recovered dead	--	--	--	--	0	--	0	--	--	--	--	0	0	0
Assigned dead*	--	--	--	--	1	--	1	--	--	--	--	0	0	2
Dislodged tags	--	--	--	--	1	--	1	--	--	--	--	0	0	2
Stationary radio signals	--	--	--	--	0	--	0	--	--	--	--	0	0	0
Unknown	--	--	--	--	0	--	0	--	--	--	--	0	0	0
Held	--	--	--	--	29	--	44	--	--	--	--	30	15	118
Alive - 48 h	--	--	--	--	29	--	44	--	--	--	--	30	15	118
<i>Spillbay 4 (12/72 kcfs) Shallow Release</i>														
Released	--	--	--	45	30	--	--	--	--	--	--	30	15	120
Recovered alive	--	--	--	44	30	--	--	--	--	--	--	30	15	119
Recovered dead	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Assigned dead*	--	--	--	1	0	--	--	--	--	--	--	0	0	1
Dislodged tags	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Stationary radio signals	--	--	--	1 (1)	0	--	--	--	--	--	--	0	0	1(1)
Unknown	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Held	--	--	--	44	30	--	--	--	--	--	--	30	15	119
Alive - 48 h	--	--	--	42	30	--	--	--	--	--	--	30	15	117
<i>Control (4.5/4.5 kcfs)</i>														
Released	--	--	60	--	--	--	--	45	45	--	20	--	--	170
Recovered alive	--	--	57	--	--	--	--	43	45	--	20	--	--	165
Recovered dead	--	--	1	--	--	--	--	0	0	--	0	--	--	1
Assigned dead*	--	--	2	--	--	--	--	2	0	--	0	--	--	4
Dislodged tags	--	--	1 (1)	--	--	--	--	0	0	--	0	--	--	1(1)
Stationary radio signals	--	--	1 (1)	--	--	--	--	2 (2)	0	--	0	--	--	3(3)
Unknown	--	--	0	--	--	--	--	0	0	--	0	--	--	0
Held	--	--	57	--	--	--	--	43	45	--	20	--	--	165
Alive - 48 h	--	--	57	--	--	--	--	43	45	--	20	--	--	165

Appendix Table C-1

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
Control (4.5/33 kcfs)														
Released	45	45	--	--	--	--	--	--	--	60	20	--	--	170
Recovered alive	42 (1)	45	--	--	--	--	--	--	--	60	20	--	--	167(1)
Recovered dead	0	0	--	--	--	--	--	--	--	0	0	--	--	0
Assigned dead*	1	0	--	--	--	--	--	--	--	0	0	--	--	1
Dislodged tags	0	0	--	--	--	--	--	--	--	0	0	--	--	0
Stationary radio signals	1 (1)	0	--	--	--	--	--	--	--	0	0	--	--	1(1)
Unknown	2	0	--	--	--	--	--	--	--	0	0	--	--	2
Held	42	45	--	--	--	--	--	--	--	60	20	--	--	167
Alive - 48 h	42	45	--	--	--	--	--	--	--	60	20	--	--	167
Control (12/72 kcfs)														
Released	--	--	--	45	45	--	60	--	--	--	--	30	10	190
Recovered alive	--	--	--	45	45	--	59	--	--	--	--	29	10	188
Recovered dead	--	--	--	0	0	--	0	--	--	--	--	0	0	0
Assigned dead*	--	--	--	0	0	--	0	--	--	--	--	0	0	0
Dislodged tags	--	--	--	0	0	--	0	--	--	--	--	0	0	0
Stationary radio signals	--	--	--	0	0	--	0	--	--	--	--	0	0	0
Unknown	--	--	--	0	0	--	1	--	--	--	--	1	0	2
Held	--	--	--	45	45	--	59	--	--	--	--	29	10	188
Alive - 48 h	--	--	--	45	45	--	59	--	--	--	--	29	10	188

1 Fish released mid-bay, 4 ft (deep) and 8 ft (shallow) above ogee.

2 Special test, Spillbay 2 only.

* Fish assigned dead in survival estimation.

Appendix Table C-2

Daily tag-recapture data for juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four spill conditions at high tailwater elevation at The Dalles Dam, May-June 2003. Injuries due to predation or unrecovered fish presumed ingested by a predator are shown in parentheses.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (9/113 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	--	--	--	40	40	--	--	30	40	--	40	--	--	--	--	--	--	--	190
Recovered alive	--	--	--	--	--	39	40	--	--	29	39	--	40	--	--	--	--	--	--	--	187
Recovered dead	--	--	--	--	--	0	0	--	--	1	0	--	0	--	--	--	--	--	--	--	1
Assigned dead*	--	--	--	--	--	1	0	--	--	0	1	--	0	--	--	--	--	--	--	--	2
Dislodged tags	--	--	--	--	--	0	0	--	--	0	1	--	0	--	--	--	--	--	--	--	1
Stationary radio signal	--	--	--	--	--	1	0	--	--	0	0	--	0	--	--	--	--	--	--	--	1
Unknown	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Held	--	--	--	--	--	39	40	--	--	29	39	--	40	--	--	--	--	--	--	--	187
Alive - 48 h	--	--	--	--	--	39	40	--	--	28	38	--	38	--	--	--	--	--	--	--	183
<i>Spillbay 2 (9/113 kcfs) Deep Off-center Release</i>																					
Released	--	--	--	--	--	40	40	--	--	30	39	--	40	--	--	--	--	--	--	--	189
Recovered alive	--	--	--	--	--	37 (1)	37	--	--	29	37	--	38	--	--	--	--	--	--	--	178(1)
Recovered dead	--	--	--	--	--	0	1(1)	--	--	0	1	--	1	--	--	--	--	--	--	--	3(1)
Assigned dead*	--	--	--	--	--	2	2	--	--	1	1	--	1	--	--	--	--	--	--	--	7
Dislodged tags	--	--	--	--	--	2	2	--	--	1	1	--	0	--	--	--	--	--	--	--	6
Stationary radio signal	--	--	--	--	--	0	0	--	--	0	0	--	1	--	--	--	--	--	--	--	1
Unknown	--	--	--	--	--	1	0	--	--	0	0	--	0	--	--	--	--	--	--	--	1
Held	--	--	--	--	--	37	37	--	--	29	37	--	38	--	--	--	--	--	--	--	178
Alive - 48 h	--	--	--	--	--	36	37	--	--	29	36	--	35	--	--	--	--	--	--	--	173
<i>Spillbay 2 (12/108 kcfs) Deep Mid-bay Release</i>																					
Released	30	--	--	--	--	--	--	40	40	--	--	--	--	--	--	--	--	--	--	--	110
Recovered alive	30	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	108
Recovered dead	0	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	2
Assigned dead*	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Dislodged tags	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Stationary radio signal	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Unknown	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Held	30	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	108
Alive - 48 h	29	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	107

Appendix Table C-2

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
Spillbay 2 (12/108 kcfs) Deep Off-center Release																					
Released	30	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	108
Recovered alive	29	--	--	--	--	--	--	38	39	--	--	--	--	--	--	--	--	--	--	--	106
Recovered dead	1	--	--	--	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	--	2
Assigned dead*	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Dislodged tags	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Stationary radio signal	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Unknown	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Held	29	--	--	--	--	--	--	38	39	--	--	--	--	--	--	--	--	--	--	--	106
Alive - 48 h	29	--	--	--	--	--	--	38	39	--	--	--	--	--	--	--	--	--	--	--	106
Spillbay 2 (18/102 kcfs) Deep Mid-bay Release																					
Released	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
Recovered alive	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
Recovered dead	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Assigned dead*	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Dislodged tags	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Stationary radio signal	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Unknown	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Held	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
Alive - 48 h	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
Spillbay 2 (18/102 kcfs) Deep Off-center Release																					
Released	--	30	--	40	--	--	--	--	--	--	--	40	--	--	40	--	--	--	--	--	150
Recovered alive	--	30	--	40	--	--	--	--	--	--	--	40	--	--	40	--	--	--	--	--	150
Recovered dead	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Assigned dead*	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Dislodged tags	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Stationary radio signal	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Unknown	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Held	--	30	--	40	--	--	--	--	--	--	--	40	--	--	40	--	--	--	--	--	150
Alive - 48 h	--	29	--	40	--	--	--	--	--	--	--	40	--	--	38	--	--	--	--	--	147
Spillbay 2 (18/102 kcfs) Shallow Mid-bay Release																					
Released	--	39	30	--	--	--	--	--	--	--	--	--	--	40	--	--	--	40	--	--	149
Recovered alive	--	38	30	--	--	--	--	--	--	--	--	--	--	39	--	--	--	40	--	--	147
Recovered dead	--	1	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	1
Assigned dead*	--	0	0	--	--	--	--	--	--	--	--	--	--	1	--	--	--	0	--	--	1
Dislodged tags	--	0	0	--	--	--	--	--	--	--	--	--	--	1	--	--	--	0	--	--	1
Stationary radio signal	--	0	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
Unknown	--	0	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
Held	--	38	30	--	--	--	--	--	--	--	--	--	--	39	--	--	--	40	--	--	147
Alive - 48 h	--	38	30	--	--	--	--	--	--	--	--	--	--	38	--	--	--	40	--	--	146

Appendix Table C-2

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (18/102 kcfs) Shallow Off-center Release</i>																					
Released	--	30	--	--	40	--	--	--	--	--	--	--	--	40	--	--	--	40	--	--	150
Recovered alive	--	30	--	--	37	--	--	--	--	--	--	--	--	39	--	--	--	40	--	--	146
Recovered dead	--	0	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	0	--	--	2
Assigned dead*	--	0	--	--	1(1)	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	1(1)
Dislodged tags	--	0	--	--	0	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
Stationary radio signal	--	0	--	--	1(1)	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	1(1)
Unknown	--	0	--	--	1	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	1
Held	--	30	--	--	37	--	--	--	--	--	--	--	--	39	--	--	--	40	--	--	146
Alive - 48 h	--	30	--	--	37	--	--	--	--	--	--	--	--	39	--	--	--	38	--	--	144
<i>Spillbay 2 (21/98.5 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
Recovered alive	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	48	--	97
Recovered dead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	2	--	3
Assigned dead*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Dislodged tags	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Stationary radio signal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Held	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	48	--	97
Alive - 48 h	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	48	--	97
<i>Spillbay 2 (21/98.5 kcfs) Deep Off-center Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
Recovered alive	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47	--	--	48	--	95
Recovered dead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	2	--	5
Assigned dead*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Dislodged tags	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Stationary radio signal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Held	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47	--	--	48	--	95
Alive - 48 h	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	--	--	46	--	92
<i>Spillbay 2 (21/98.5 kcfs) Shallow Mid-bay Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	100
Recovered alive	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	48	97
Recovered dead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	0	1
Assigned dead*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Dislodged tags	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Stationary radio signal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	2	2
Held	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	48	97
Alive - 48 h	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	--	--	48	94

Appendix Table C-2

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (21/98.5 kcfs) Shallow Off-center Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	100
Recovered alive	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	49	98
Recovered dead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1	2
Assigned dead*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Dislodged tags	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Stationary radio signal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Held	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--	--	49	98
Alive - 48 h	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	48	--	--	49	97
<i>Spillbay 4 (9/113 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	--	--	--	50	51	--	--	50	50	--	40	--	--	--	--	--	--	--	241
Recovered alive	--	--	--	--	--	46	50	--	--	50	47	--	39	--	--	--	--	--	--	--	232
Recovered dead	--	--	--	--	--	3(1)	0	--	--	0	0	--	0	--	--	--	--	--	--	--	3(1)
Assigned dead*	--	--	--	--	--	1	1	--	--	0	3	--	1	--	--	--	--	--	--	--	6
Dislodged tags	--	--	--	--	--	1	1	--	--	0	1	--	0	--	--	--	--	--	--	--	3
Stationary radio signal	--	--	--	--	--	0	0	--	--	0	2(1)	--	1	--	--	--	--	--	--	--	3(1)
Unknown	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Held	--	--	--	--	--	46	50	--	--	50	47	--	39	--	--	--	--	--	--	--	232
Alive - 48 h	--	--	--	--	--	45	50	--	--	50	46	--	39	--	--	--	--	--	--	--	230
<i>Spillbay 4 (12/108 kcfs) Deep Mid-bay Release</i>																					
Released	60	--	--	--	--	--	--	50	50	--	--	--	--	--	--	--	--	--	--	--	160
Recovered alive	59	--	--	--	--	--	--	49	49	--	--	--	--	--	--	--	--	--	--	--	157
Recovered dead	0	--	--	--	--	--	--	0	1	--	--	--	--	--	--	--	--	--	--	--	1
Assigned dead*	0	--	--	--	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	--	1
Dislodged tags	0	--	--	--	--	--	--	1	0	--	--	--	--	--	--	--	--	--	--	--	1
Stationary radio signal	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Unknown	1	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	1
Held	59	--	--	--	--	--	--	49	49	--	--	--	--	--	--	--	--	--	--	--	157
Alive - 48 h	59	--	--	--	--	--	--	49	49	--	--	--	--	--	--	--	--	--	--	--	157
<i>Spillbay 4 (18/102 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	40	40	48	--	--	--	--	--	--	--	--	--	30	--	--	42	--	--	200
Recovered alive	--	--	40	40	47	--	--	--	--	--	--	--	--	--	29	--	--	41	--	--	197
Recovered dead	--	--	0	0	1	--	--	--	--	--	--	--	--	--	1(1)	--	--	1	--	--	3(1)
Assigned dead*	--	--	0	0	0	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	0
Dislodged tags	--	--	0	0	0	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	0
Stationary radio signal	--	--	0	0	0	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	0
Unknown	--	--	0	0	0	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	0
Held	--	--	40	40	47	--	--	--	--	--	--	--	--	--	29	--	--	41	--	--	197
Alive - 48 h	--	--	40	40	47	--	--	--	--	--	--	--	--	--	29	--	--	41	--	--	197

Appendix Table C-2

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 4 (18/102 kcfs) Shallow Mid-bay Release</i>																					
Released	--	--	30	49	50	--	--	--	--	--	--	40	--	40	--	--	--	--	--	--	209
Recovered alive	--	--	30	46	48	--	--	--	--	--	--	40	--	39	--	--	--	--	--	--	203
Recovered dead	--	--	0	0	1	--	--	--	--	--	--	0	--	1 (1)	--	--	--	--	--	--	2(1)
Assigned dead*	--	--	0	3(1)	1(1)	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	4(2)
Dislodged tags	--	--	0	2	0	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	2
Stationary radio signal	--	--	0	1(1)	1(1)	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	2(2)
Unknown	--	--	0	0	0	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	0
Held	--	--	30	46	48	--	--	--	--	--	--	40	--	39	--	--	--	--	--	--	203
Alive - 48 h	--	--	30	46	47	--	--	--	--	--	--	40	--	38	--	--	--	--	--	--	201
<i>Control (9/113 kcfs)</i>																					
Released	--	--	--	--	--	40	40	--	--	30	40	--	30	--	--	--	--	--	--	--	180
Recovered alive	--	--	--	--	--	40(1)	40(1)	--	--	30	40	--	30(1)	--	--	--	--	--	--	--	180(3)
Recovered dead	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Assigned dead*	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Dislodged tags	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Stationary radio signal	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Unknown	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Held	--	--	--	--	--	40	40	--	--	30	40	--	30	--	--	--	--	--	--	--	180
Alive - 48 h	--	--	--	--	--	39	39	--	--	30	40	--	30	--	--	--	--	--	--	--	178
<i>Control (12/108 kcfs)</i>																					
Released	40	--	--	--	--	--	--	40	40	--	--	--	--	--	--	--	--	--	--	--	120
Recovered alive	40	--	--	--	--	--	--	40	39	--	--	--	--	--	--	--	--	--	--	--	119
Recovered dead	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Assigned dead*	0	--	--	--	--	--	--	0	1(1)	--	--	--	--	--	--	--	--	--	--	--	1(1)
Dislodged tags	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Stationary radio signal	0	--	--	--	--	--	--	0	1(1)	--	--	--	--	--	--	--	--	--	--	--	1(1)
Unknown	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Held	40	--	--	--	--	--	--	40	39	--	--	--	--	--	--	--	--	--	--	--	119
Alive - 48 h	40	--	--	--	--	--	--	40	39	--	--	--	--	--	--	--	--	--	--	--	119
<i>Control (18/102 kcfs)</i>																					
Released	--	30	40	40	30	--	--	--	--	--	--	30	--	30	40	--	--	40	--	--	280
Recovered alive	--	30	37	40	29	--	--	--	--	--	--	30	--	30	40	--	--	39	--	--	275
Recovered dead	--	0	0	0	1(1)	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	1(1)
Assigned dead*	--	0	3(3)	0	0	--	--	--	--	--	--	0	--	0	0	--	--	1	--	--	4(3)
Dislodged tags	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Stationary radio signal	--	0	3(3)	0	0	--	--	--	--	--	--	0	--	0	0	--	--	1	--	--	4(3)
Unknown	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Held	--	30	37	40	29	--	--	--	--	--	--	30	--	30	40	--	--	39	--	--	275
Alive - 48 h	--	30	37	40	29	--	--	--	--	--	--	30	--	30	40	--	--	39	--	--	275

Appendix Table C-2

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Control (21/98.5 kcfs)</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	50	20	170
Recovered alive	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	49	20	169
Recovered dead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0
Assigned dead*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	1(1)	0	1(1)
Dislodged tags	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0
Stationary radio signal	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	1(1)	0	1(1)
Unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0
Held	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	49	20	169
Alive - 48 h	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	49	20	169

1 Fish released 10 ft (deep/mid-bay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-bay.

* Fish assigned dead in survival estimation.

Appendix Table C-3

Incidence of injury, scale loss, and temporary loss of equilibrium observed on treatment juvenile salmonids passed through Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation, The Dalles Dam, October-November 2002.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
<i>Spillbay 2 (4.5/4.5 kcfs) Deep Release¹</i>						
22 Oct	FP6	No visible internal or external injuries	Dead 48 h			No
22 Oct	FR5	No visible internal or external injuries	Dead 24 h			No
22 Oct	FS2	No visible internal or external injuries	Dead 24 h			No
22 Oct	FS9	No visible internal or external injuries	Dead 24 h			No
22 Oct	FT1	Loss of equilibrium (LOE)	Alive			No
22 Oct	FU2	No visible internal or external injuries	Dead 24 h			No
22 Oct	FV0	Scale loss left side	Dead 48 h	Contact		No
23 Oct	HS4	Bruise on head, cut left operculum	Alive	Contact	Minor	No
23 Oct	HS6	Scale loss right side	Dead 48 h	Contact		No
23 Oct	HT1	Scrape on head	Alive	Contact	Minor	No
23 Oct	HU3	Bruise left side of head	Dead 24 h	Contact	Major	No
24 Oct	PA5	LOE	Alive			No
24 Oct	PA7	No visible internal or external injuries	Dead 24 h			No
24 Oct	PC8	Hemorrhaged left eye	Alive	Shear	Minor	No
24 Oct	PD3	No visible internal or external injuries	Dead 24 h			No
29 Oct	SC9	Scrape on back behind dorsal	Alive	Contact	Minor	No
29 Oct	SD4	Tear at tag site, LOE*	Alive			No
29 Oct	SD8	LOE	Alive			No
29 Oct	SF0	LOE	Alive			No
29 Oct	SF1	No visible internal or external injuries	Dead 1 h			No
29 Oct	SF2	Hemorrhaged right eye, tear at tag site, LOE	Dead 24 h	Shear	Major	Yes
29 Oct	SH2	LOE	Dead 24 h			No
29 Oct	SH5	Missing right eye, hemorrhaged left eye, LOE	Alive	Shear	Major	Yes
29 Oct	SJ0	Predation marks (fish)*	Dead 1 h	Predation		Yes
29 Oct	SJ3	Tear at tag site, LOE*	Alive			No
29 Oct	SJ6	Hemorrhaged right eye, LOE	Alive	Shear	Major	Yes
29 Oct	SJ7	LOE	Alive			No
29 Oct	SJ9	Hemorrhaged eyes, bulged right eye	Alive	Shear	Major	Yes
30 Oct	TF7	Scrape on head, torn left operculum	Alive	Contact	Major	Yes
30 Oct	TJ2	Damaged-hemorrhaged right eye	Alive	Shear	Major	Yes
30 Oct	TK9	LOE	Alive			No

Appendix Table C-3

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
31 Oct	VF1	Torn right operculum, hemorrhaged right eye	Alive	Contact	Major	Yes
31 Oct	VF3	Torn right operculum, scrape on head, hemorrhaged right eye	Alive	Contact/Shear	Major	No
31 Oct	VH1	Scrape on nose, hemorrhaged right eye	Alive	Contact	Major	Yes
31 Oct	VH8	Hemorrhaged right eye, scale loss right side	Alive	Shear	Major	No
31 Oct	VJ6	Hemorrhaged right eye, scale loss right side	Alive	Shear	Major	Yes
31 Oct	VJ7	Scale loss left side, LOE	Alive	Contact		No
01 Nov	WT3	Torn right operculum, LOE	Alive	Contact	Minor	No
01 Nov	WU2	Bruise on head, LOE	Alive	Contact	Minor	No
01 Nov	WV0	Torn right operculum	Alive	Contact	Major	Yes
01 Nov	WV2	No visible internal or external injuries	Dead 24 h			No
<i>Spillbay 2 (12/12 kcfs²) Deep Release¹</i>						
28 Oct	ZN0	Hemorrhaged right eye	Alive	Shear	Major	Yes
<i>Spillbay 2 (12/72 kcfs) Deep Release¹</i>						
25 Oct	PJ6	Tear at operculum	Alive	Shear	Minor	No
25 Oct	PK0	LOE	Alive			No
25 Oct	PK2	Hemorrhaged left eye, scale loss on right side	Dead 24 h	Shear	Major	yes
25 Oct	PK8	Scrape on left side	Alive	Contact	Minor	No
25 Oct	PL1	LOE	Alive			No
25 Oct	PL4	Scale loss on left side	Alive	Contact		No
25 Oct	PL7	Torn operculum, LOE	Alive	Shear	Minor	No
28 Oct	RV8	Scrape at left operculum	Alive	Contact	Minor	No
28 Oct	RW0	Scrape on left side	Alive	Contact	Minor	No
28 Oct	RW1	Left eye severely bulged and hemorrhaged	Alive	Shear	Major	yes
28 Oct	RW2	Scrape on right mouth	Alive	Contact	Minor	No
02 Nov	XN4	Bruise right side, LOE	Alive	Contact	Minor	No
03 Nov	ZX3	Hemorrhaged left eye	Alive	Shear	Major	Yes
<i>Spillbay 2 (12/72 kcfs) Shallow Release¹</i>						
25 Oct	PF4	LOE	Alive			No
25 Oct	PF9	Tear at tag site*	Alive			No
26 Oct	HX9	No visible internal or external injuries	Dead 24 h			No
26 Oct	RH1	Bruise	Alive	Contact	Minor	No
26 Oct	RH5	Tear at left operculum, LOE	Dead 24 h	Shear		No
26 Oct	RJ2	Hemorrhage at liver attachment	Dead 24 h		Major	No
26 Oct	RJ5	Predation marks (fish)*	Dead 1 h	Predation		Yes
26 Oct	RJ6	No visible internal or external injuries	Dead 48 h			No

Appendix Table C-3

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
<i>Spillbay 4 (4.5/33 kcfs) Deep Release¹</i>						
22 Oct	FV3	No visible internal or external injuries	Dead 24 h			No
22 Oct	FW3	No visible internal or external injuries	Dead 24 h			No
22 Oct	FX2	No visible internal or external injuries	Dead 24 h			No
23 Oct	HF1	No visible internal or external injuries	Dead 24 h			No
23 Oct	HF7	Predation marks (fish)*	Dead 1 h	Predation		Yes
23 Oct	HJ9	No visible internal or external injuries	Dead 24 h			No
23 Oct	HK6	Bruise on head, cut left operculum, LOE	Dead 24 h	Contact/Shear	Major	No
23 Oct	HK7	LOE	Alive			No
23 Oct	HL9	Hemorrhaged eye, enlarged left pupil	Alive	Shear	Major	No
24 Oct	LE0	Hemorrhaged left eye, skin tear on head and nape	Alive	Shear/Contact	Major	Yes
24 Oct	ML3	Scrape on right side	Alive	Contact	Minor	No
29 Oct	SN3	Scale loss on left side	Dead 24 h	Contact		No
29 Oct	ZP0	LOE	Dead 24 h			No
30 Oct	SX2	No visible internal or external injuries	Dead 24 h			No
30 Oct	SY0	Torn operculum	Alive	Shear	Minor	No
30 Oct	SZ2	Scrape on left operculum, scale loss both sides	Dead 24 h	Contact	Major	Yes
<i>Spillbay 4 (12/72 kcfs) Deep Release¹</i>						
28 Oct	HZ7	LOE	Alive			No
03 Nov	HA0	Scrape on left operculum	Alive	Contact	Major	Yes
03 Nov	HA3	Hemorrhaged right eye	Alive	Shear	Major	No
03 Nov	HA7	LOE	Alive			No
03 Nov	HA8	Scratch on operculum	Alive	Contact	Minor	No
<i>Spillbay 4 (12/72 kcfs) Shallow Release¹</i>						
25 Oct	PM7	Scrape on right side	Dead 24 h	Contact	Major	No
25 Oct	PR0	No visible internal or external injuries	Dead 24 h			No
26 Oct	PY5	Torn right operculum, LOE	Alive	Contact	Minor	No
02 Nov	XV6	Bruise behind dorsal area	Alive	Contact	Minor	No
03 Nov	HB8	Bulged and hemorrhaged left eye	Alive	Shear	Major	Yes
03 Nov	HC4	Hemorrhaged right eye	Alive	Shear	Minor	No

Appendix Table C-3

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
<i>Control (4.5/4.5 kcfs)</i>						
24 Oct	MA7	LOE	Dead 1 h			No
24 Oct	ME0	Scrape on right side	Alive	Contact	Minor	No
01 Nov	XB3	Torn edge on left operculum	Alive	Contact	Major	Yes
<i>Control (4.5/33 kcfs)</i>						
22 Oct	HC1	Predation marks (gull)*	Alive	Predation		No
23 Oct	HR7	Scrape on both sides	Alive	Contact	Minor	No
31 Oct	WR1	LOE	Alive			No
31 Oct	WR7	Hemorrhaged base of left pectoral fin	Alive	Contact	Major	Yes
<i>Control (12/72 kcfs)</i>						
26 Oct	HW3	LOE	Alive			No
02 Nov	XS8	LOE	Alive			No
02 Nov	XU9	Bulged left eye	Alive	Shear	Major	Yes

1 Fish released at mid-spillbay, 4 ft (deep) and 8 ft (shallow) above ogee.

2 Special test, Spillbay 2 only.

* not related to passage

Appendix Table C-4

Daily malady data for juvenile chinook salmon passed through deep or shallow release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under different spill conditions at low tailwater elevation at The Dalles Dam, October-November 2002.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 2 (4.5/4.5 kcfs) Deep Release</i>														
Released	60	45	45	--	--	--	--	60	45	45	45	--	--	345
Examined	52	40	43	--	--	--	--	59	44	45	45	--	--	328
With passage related maladie	2	4	2	--	--	--	--	9	3	6	3	--	--	29
Visible injuries	0	3	1	--	--	--	--	5	2	5	3	--	--	19
Scale loss only	1	1	0	--	--	--	--	0	0	1	0	--	--	3
Loss of equilibrium only	1	0	1	--	--	--	--	4	1	0	0	--	--	7
Without maladies	50	36	41	--	--	--	--	50(3*)	41	39	42	--	--	299(3*)
Without maladies that died	5	0	2	--	--	--	--	1	0	0	1	--	--	9
<i>Spillbay 2 (12/12 kcfs²) Deep Release</i>														
Released	--	--	--	--	--	--	15	15	15	--	--	--	--	45
Examined	--	--	--	--	--	--	15	13	15	--	--	--	--	43
With passage related maladie	--	--	--	--	--	--	1	0	0	--	--	--	--	1
Visible injuries	--	--	--	--	--	--	1	0	0	--	--	--	--	1
Scale loss only	--	--	--	--	--	--	0	0	0	--	--	--	--	0
Loss of equilibrium only	--	--	--	--	--	--	0	0	0	--	--	--	--	0
Without maladies	--	--	--	--	--	--	14	13	15	--	--	--	--	42
Without maladies that died	--	--	--	--	--	--	0	0	0	--	--	--	--	0
<i>Spillbay 2 (12/12 kcfs*) Shallow Release</i>														
Released	--	--	--	--	--	--	--	--	--	15	30	--	--	45
Examined	--	--	--	--	--	--	--	--	--	15	30	--	--	45
With passage related maladie	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Visible injuries	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Scale loss only	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	0	0	--	--	0
Without maladies	--	--	--	--	--	--	--	--	--	15	30	--	--	45
Without maladies that died	--	--	--	--	--	--	--	--	--	0	0	--	--	0

Appendix Table C-4

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 2 (12/72 kcfs) Deep Release</i>														
Released	--	--	--	30	--	--	45	--	--	--	--	30	15	120
Examined	--	--	--	30	--	--	45	--	--	--	--	29	15	119
With passage related maladie	--	--	--	7	--	--	4	--	--	--	--	1	1	13
Visible injuries	--	--	--	4	--	--	4	--	--	--	--	1	1	10
Scale loss only	--	--	--	1	--	--	0	--	--	--	--	0	0	1
Loss of equilibrium only	--	--	--	2	--	--	0	--	--	--	--	0	0	2
Without maladies	--	--	--	23	--	--	41	--	--	--	--	28	14	106
Without maladies that died	--	--	--	0	--	--	0	--	--	--	--	0	0	0
<i>Spillbay 2 (12/72 kcfs) Shallow Release</i>														
Released	--	--	--	30	45	--	--	--	--	--	--	30	15	120
Examined	--	--	--	30	43	--	--	--	--	--	--	30	15	118
With passage related maladie	--	--	--	1	3	--	--	--	--	--	--	0	0	4
Visible injuries	--	--	--	0	3	--	--	--	--	--	--	0	0	3
Scale loss only	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Loss of equilibrium only	--	--	--	1	0	--	--	--	--	--	--	0	0	1
Without maladies	--	--	--	29(1*)	40(1*)	--	--	--	--	--	--	30	15	114(2*)
Without maladies that died	--	--	--	0	2	--	--	--	--	--	--	0	0	2
<i>Spillbay 4 (4.5/33 kcfs) Deep Release</i>														
Released	45	60	45	--	--	--	--	45	60	45	45	--	--	345
Examined	44	58	44	--	--	--	--	44	59	45	45	--	--	339
With passage related maladie	0	3	2	--	--	--	--	2	2	0	0	--	--	9
Visible injuries	0	2	2	--	--	--	--	0	2	0	0	--	--	6
Scale loss only	0	0	0	--	--	--	--	1	0	0	0	--	--	1
Loss of equilibrium only	0	1	0	--	--	--	--	1	0	0	0	--	--	2
Without maladies	44	55(1*)	42	--	--	--	--	42	57	45	45	--	--	330(1*)
Without maladies that died	3	2	0	--	--	--	--	0	1	0	0	--	--	6

Appendix Table C-4

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Spillbay 4 (12/72 kcfs) Deep Release</i>														
Released	--	--	--	--	30	--	45	--	--	--	--	30	15	120
Examined	--	--	--	--	29	--	44	--	--	--	--	30	15	118
With passage related maladie	--	--	--	--	0	--	1	--	--	--	--	0	4	5
Visible injuries	--	--	--	--	0	--	0	--	--	--	--	0	3	3
Scale loss only	--	--	--	--	0	--	0	--	--	--	--	0	0	0
Loss of equilibrium only	--	--	--	--	0	--	1	--	--	--	--	0	1	2
Without maladies	--	--	--	--	29	--	43	--	--	--	--	30	11	113
Without maladies that died	--	--	--	--	0	--	0	--	--	--	--	0	0	0
<i>Spillbay 4 (12/72 kcfs) Shallow Release</i>														
Released	--	--	--	45	30	--	--	--	--	--	--	30	15	120
Examined	--	--	--	44	30	--	--	--	--	--	--	30	15	119
With passage related maladie	--	--	--	1	1	--	--	--	--	--	--	1	2	5
Visible injuries	--	--	--	1	1	--	--	--	--	--	--	1	2	5
Scale loss only	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Loss of equilibrium only	--	--	--	0	0	--	--	--	--	--	--	0	0	0
Without maladies	--	--	--	43	29	--	--	--	--	--	--	29	13	114
Without maladies that died	--	--	--	1	0	--	--	--	--	--	--	0	0	1
<i>Control (4.5/4.5 kcfs)</i>														
Released	--	--	60	--	--	--	--	45	45	--	20	--	--	170
Examined	--	--	58	--	--	--	--	43	45	--	20	--	--	166
With passage related maladie	--	--	2	--	--	--	--	0	0	--	1	--	--	3
Visible injuries	--	--	1	--	--	--	--	0	0	--	1	--	--	2
Scale loss only	--	--	0	--	--	--	--	0	0	--	0	--	--	0
Loss of equilibrium only	--	--	1	--	--	--	--	0	0	--	0	--	--	1
Without maladies	--	--	56	--	--	--	--	43	45	--	19	--	--	163
Without maladies that died	--	--	0	--	--	--	--	0	0	--	0	--	--	0

Appendix Table C-4

Continued.

	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/01	11/02	11/03	Total
<i>Control (4.5/33 kcfs)</i>														
Released	45	45	--	--	--	--	--	--	--	60	20	--	--	170
Examined	42	45	--	--	--	--	--	--	--	60	20	--	--	167
With passage related maladie	0	1	--	--	--	--	--	--	--	2	0	--	--	3
Visible injuries	0	1	--	--	--	--	--	--	--	1	0	--	--	2
Scale loss only	0	0	--	--	--	--	--	--	--	0	0	--	--	0
Loss of equilibrium only	0	0	--	--	--	--	--	--	--	1	0	--	--	1
Without maladies	42(1*)	44	--	--	--	--	--	--	--	58	20	--	--	164(1*)
Without maladies that died	0	0	--	--	--	--	--	--	--	0	0	--	--	0
<i>Control (12/72 kcfs)</i>														
Released	--	--	--	45	45	--	60	--	--	--	--	30	10	190
Examined	--	--	--	45	45	--	59	--	--	--	--	29	10	188
With passage related maladie	--	--	--	0	1	--	0	--	--	--	--	2	0	3
Visible injuries	--	--	--	0	0	--	0	--	--	--	--	1	0	1
Scale loss only	--	--	--	0	0	--	0	--	--	--	--	0	0	0
Loss of equilibrium only	--	--	--	0	1	--	0	--	--	--	--	1	0	2
Without maladies	--	--	--	45	44	--	59	--	--	--	--	27	10	185
Without maladies that died	--	--	--	0	0	--	0	--	--	--	--	0	0	0

1 Fish released mid-bay, 4 ft (deep) and 8 ft (shallow) above ogee.

2 Special test, Spillbay 2 only.

* Maladies attributed to predators and/or tags (e.g., tear at tag site).

Appendix Table C-5

Incidence of injury, scale loss, and temporary loss of equilibrium observed on treatment juvenile salmonids passed through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four different spill conditions at high tailwater elevation, The Dalles Dam, May-June 2003.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
<i>Spillbay 2 (9/113 kcfs) Deep Mid-bay Release</i>						
25 May	VB0	Hemorrhaged right eye, slight tear left operculum	Alive	Shear	Major	No
25 May	VD7	Hemorrhaged left eye	Alive	Shear	Minor	No
30 May	B33	Loss of equilibrium (LOE)	Dead 1 h			No
30 May	B63	LOE	Dead 24 h			No
31 May	BC2	LOE	Dead 24 h			No
03 Jun	CF8	Bruised head, tear at operculum, LOE	Alive	Contact/Shear	Major	No
03 Jun	CH5	Tear at dorsal pin site, LOE*	Dead 24 h			No
03 Jun	CJ8	Bruise on right side of head, LOE	Dead 24 h	Contact	Major	No
<i>Spillbay 2 (9/113 kcfs) Deep Off-center Release</i>						
25 May	VF5	Hemorrhaged left eye	Alive	Shear	Minor	No
25 May	VF6	Hemorrhaged right eye, LOE	Alive	Shear	Minor	No
25 May	VH4	Ruptured right pupil	Alive	Shear	Major	No
25 May	VJ1	Bruise on nose, LOE	Alive	Contact	Major	No
25 May	VJ2	Prey marks (gull)*	Alive	Predation		No
25 May	VJ3	Slight tear at left operculum, LOE	Dead 24 h	Shear	Major	No
25 May	VJ8	LOE	Alive			No
26 May	YN3	Prey marks*	Dead 1 h	Predation		Yes
26 May	YN8	Severe tear at tag site*	Alive			No
26 May	YP2	Hemorrhaged left eye	Alive	Shear	Minor	No
26 May	YS3	Crescent shape hemorrhage on right side, LOE	Alive	Shear	Major	Yes
31 May	BH5	LOE	Dead 1 h			No
31 May	BJ8	LOE	Dead 24 h			No
03 Jun	CM4	Bruise on top of head, barely gilling	Dead 1 h	Contact	Major	No
03 Jun	CM5	Bruised head, LOE	Dead 24 h	Contact	Major	No

Appendix Table C-5

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
03 Jun	CN5	LOE	Dead 24 h			No
03 Jun	CT5	LOE	Dead 24 h			No
<i>Spillbay 2 (12/108 kcfs) Deep Mid-bay Release</i>						
20 May	L37	Missing right eye, bruise on head, LOE	Dead 24 h	Shear	Major	Yes
28 May	ZC0	LOE	Dead 1 h			No
28 May	ZD2	LOE	Alive			No
28 May	ZE1	Slight tear right operculum	Alive	Shear	Major	No
29 May	ZX4	Internally hemorrhaged, major scale loss left side, LOE	Dead 1 h	Contact	Major	No
29 May	ZZ1	Bulged left eye, LOE	Alive	Shear	Major	No
29 May	ZZ9	Slightly hemorrhaged and bulged left eye	Alive	Shear	Minor	Yes
<i>Spillbay 2 (12/108 kcfs) Deep Off-center Release</i>						
20 May	L57	Tear at tag site, LOE*	Alive			No
20 May	L78	Hemorrhaged left gill, internal injury, bulged eyes	Dead 1 h	Shear	Major	Yes
28 May	ZJ1	Hemorrhaged kidneys, LOE	Dead 1 h		Major	No
29 May	ZV4	Slightly hemorrhaged left eye	Alive	Shear	Minor	Yes
<i>Spillbay 2 (18/102 kcfs) Deep Mid-bay Release</i>						
21 May	RR6	Bruise on nose	Alive	Contact	Major	No
02 Jun	C00	Tear at tag site, LOE *	Alive			No
02 Jun	C28	Hemorrhaged left eye, LOE	alive 48 h	Shear	Major	Yes
<i>Spillbay 2 (18/102 kcfs) Deep Off-center Release</i>						
21 May	RX3	No visible internal or external injuries	Dead 24 h			No
21 May	RZ6	Tear at caudal pin site, LOE*	Alive			No
23 May	SZ4	Bruise on head, hemorrhaged right eye	Alive	Contact/Shear	Major	No
02 Jun	BW6	Bruised left side, hemorrhaged left eye	alive 48	Contact/Shear	Major	No
02 Jun	BZ4	Both eyes bulged, right eye hemorrhaged	Alive	Shear	Major	Yes
05 Jun	DA0	Internally hemorrhaged, left operculum torn, LOE	Dead 24 h	Shear	Major	No
05 Jun	DA4	Slightly hemorrhaged left eye	Alive	Shear	Minor	Yes
05 Jun	DC0	Hemorrhaged kidney, LOE	Dead 24 h		Major	No

Appendix Table C-5

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
05 Jun	DC3	LOE	Alive			No
05 Jun	DC4	Hemorrhaged right eye	Alive	Shear	Minor	Yes
<i>Spillbay 2 (18/102 kcfs) Shallow Mid-bay Release</i>						
21 May	PW6	Bruised head, hemorrhaged eyes and right gills	Dead 1 h	Contact/Shear	Major	Yes
04 Jun	CW8	LOE	Alive			No
04 Jun	CY2	LOE	Dead 24 h			No
08 Jun	JN3	Tear at dorsal tag site, LOE*	Alive			No
08 Jun	JP0	LOE	Alive			No
<i>Spillbay 2 (18/102 kcfs) Shallow Off-center Release</i>						
21 May	RV4	LOE	Alive			No
24 May	UE5	Hemorrhaged right gills, hemorrhaged internally, damaged vertebrate, LOE	Dead 1 h	Shear/Contact	Major	Yes
04 Jun	CZ0	No visible internal or external injuries	Dead 1 h			No
04 Jun	D11	LOE	Alive			No
08 Jun	JS2	Hemorrhaged kidneys , ruptured swim bladder	Dead 24 h		Major	No
08 Jun	JT3	No visible internal or external injuries	Dead 24 h			No
08 Jun	JU5	LOE	Alive			No
<i>Spillbay 2 (21/98.5 kcfs) Deep Mid-bay Release</i>						
06 Jun	DT4	Tear at caudal tag site, LOE, barely gilling*	Dead 1 h			No
06 Jun	DT5	LOE	Alive			No
06 Jun	DU6	LOE	Alive			No
06 Jun	DU7	Tear at tag site*	Alive			No
06 Jun	DX0	Ruptured and hemorrhaged right eye	Alive	Shear	Major	Yes
09 Jun	S33	Tear at pin site, LOE, acute*	Dead 1 h			No
09 Jun	S36	LOE	Alive			No
09 Jun	S38	LOE, acute	Dead 1 h			No
09 Jun	S46	LOE	Alive			No
09 Jun	S58	LOE	Alive			No
09 Jun	S60	Hemorrhaged right eye	Alive	Shear	Minor	No

Appendix Table C-5

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
09 Jun	S66	Tear at right operculum	Alive	Shear	Major	No
09 Jun	S68	LOE	Alive			No
<i>Spillbay 2 (21/98.5 kcfs) Deep Off-center Release</i>						
06 Jun	DY1	Ruptured right eye	Dead 1 h	Shear	Major	Yes
06 Jun	DY3	Bruised head, caudal tag pulled through, LOE	Alive	Contact	Minor	No
06 Jun	DY4	Ruptured right eye, caudal tag tear	Alive	Shear	Major	No
06 Jun	DZ1	Hemorrhaged right eye, LOE	Alive	Shear	Minor	No
06 Jun	DZ6	Slight bruise right side of head	Alive	Contact	Minor	No
06 Jun	DZ7	Hemorrhaged bottom jaw, LOE	Alive	Contact	Major	No
06 Jun	FM7	Bleeding from gills on left side	Dead 1 h	Shear	Major	Yes
06 Jun	FM9	Tag almost ripped out*	Dead 1 h			No
06 Jun	FN8	LOE	Alive			No
06 Jun	FP2	Bruise on top of head	Dead 24 h	Contact	Major	No
06 Jun	FP8	LOE	Alive			No
09 Jun	RS5	LOE, loss of color	Alive			No
09 Jun	RS9	Bleeding from isthmus, LOE	Alive	Shear	Major	No
09 Jun	RT6	LOE	Dead 24 h			No
09 Jun	RV0	LOE	Alive			No
09 Jun	RV3	Tear at isthmus, hemorrhaged left eye, abrasion on head, tear at dorsal pin site	Dead 1 h	Shear/Contact	Major	Yes
09 Jun	RV5	Hemorrhaged gills both sides, LOE	Dead 1 h	Shear	Major	No
09 Jun	RW1	LOE	Dead 24 h			No
<i>Spillbay 2 (21/98.5 kcfs) Shallow Mid-bay Release</i>						
07 Jun	FW1	LOE	Alive			No
07 Jun	FW3	No visible internal or external injuries	Dead 24 h			No
07 Jun	FZ2	LOE	Alive			No
07 Jun	HM1	Hemorrhaged head and gills, tear at lower jaw	Dead 1 h	Shear	Major	No
07 Jun	HM4	Tear right operculum, hemorrhaged head, LOE	Dead 24 h	Shear	Major	Yes
07 Jun	HM8	No visible internal or external injuries	Dead 24 h			No

Appendix Table C-5

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
10 Jun	SA1	LOE	Alive			No
10 Jun	SB4	Bruise on head, hemorrhaged operculum	Alive	Contact	Major	No
<i>Spillbay 2 (21/98.5 kcfs) Shallow Off-center Release</i>						
07 Jun	HN4	Hemorrhaged right side of head	Alive		Major	No
07 Jun	HS3	Slight tear on left gill cover, hemorrhaged left eye, LOE	Dead 1 h	Shear	Major	No
07 Jun	HS5	LOE	Dead 24 h			No
07 Jun	HT2	Slight tear right operculum	Alive	Shear	Major	No
10 Jun	SD5	Bruise on back, hemorrhaged internally above spine	Dead 1 h	Contact	Major	No
<i>Spillbay 4 (9/113 kcfs) Deep Mid-bay Release</i>						
25 May	VK9	Torn operculum, hemorrhaged right eye, prey marks on tail	Dead 1 h	Shear/Predatio	Major	No
25 May	XM8	Hemorrhaged kidneys, severe LOE	Dead 1 h		Major	No
25 May	XN2	Hemorrhaged right eye	Alive	Shear	Minor	No
25 May	XN5	Hemorrhaged right gill, bruise on back, damaged right operculum	Dead 1 h	Shear/Contact	Major	No
25 May	XP2	Severe tear at tag site*	Dead 24 h			No
26 May	XR1	Hemorrhaged, ruptured right eye, LOE	Alive	Shear	Major	No
30 May	B10	Tear at top of head, LOE,	Alive	Contact	Major	No
31 May	BR2	Ruptured right eye, LOE	alive 48	Shear	Major	Yes
31 May	BR4	Hemorrhaged left eye, split pupil, tear at tag site	Alive	Shear	Major	Yes
31 May	BV1	No visible internal or external injuries	Dead 24 h			No
31 May	BV6	Hemorrhaged left eye, LOE	alive 48	Shear	Minor	Yes
03 Jun	CS4	Bruise on head, hemorrhaged left eye	Alive	Contact/Shear	Major	Yes
<i>Spillbay 4 (12/108 kcfs) Deep Mid-bay Release</i>						
20 May	PR4	Hemorrhaged right eye, enlarged pupil	Alive	Shear	Minor	Yes
28 May	YY6	Tear at tag site, LOE*	Alive			No
28 May	YZ8	Tear at tag site, LOE*	Alive			No
29 May	AS9	Hemorrhaged left eye	Alive	Shear	Minor	No
29 Aug	AW9	Hemorrhaged left and right eye, bulged	Dead 1 h	Shear	Major	No

Appendix Table C-5

Continued.

Date	Fish ID	Malady Description	Status	Probable Cause of Injury	Injury Designation	Photo
<i>Spillbay 4 (18/102 kcfs) Deep Mid-bay Release</i>						
24 May	UN3	No visible internal or external injuries	Dead 1 h			No
24 May	UP4	Half of body hemorrhaged	Dead 1 h		Major	No
05 Jun	DL2	Hemorrhaged right eye, LOE	Alive	Shear	Minor	No
05 Jun	DM4	LOE	Alive			No
05 Jun	DM6	Predation marks*	Dead 1 h	Predation		Yes
08 Jun	JY9	LOE	Alive			No
08 Jun	JZ0	Hemorrhaged right eye, bulging left eye, LOE	Dead 1 h	Shear	Major	Yes
08 Jun	JZ6	LOE	Alive			No
<i>Spillbay 4 (18/102 kcfs) Shallow Mid-bay Release</i>						
22 May	SJ4	Bruise on head	Alive	Contact	Major	No
23 May	TT7	LOE	Alive			No
23 May	TV5	Bruise on head, LOE	Alive	Contact	Major	No
24 May	UH1	Left eye missing, left gill hemorrhaged, LOE	Dead 1 h	Shear	Major	No
24 May	UJ5	Hemorrhaged left eye, and under gill flap behind eye, LOE	Dead 24 h	Shear	Major	No
02 Jun	C51	LOE	alive 48 h			No
04 Jun	D39	LOE	Dead 24 h			No
04 Jun	D58	Hemorrhaged on back, LOE	Alive	Contact	Major	No
04 Jun	D65	Hemorrhaged above right operculum, LOE	Alive	Contact	Major	No
04 Jun	D68	Predation marks*	Dead 1 h	Predation		No
<i>Control</i>						
24 May	UT7	Major scale loss, possible prey, LOE*	Dead 1 h	Predation		No
25 May	UW3	Prey marks, LOE*	Dead 24 h	Predation		No
26 May	YW8	Bruised on top, prey marks, LOE*	Dead 24 h	Predation		No
03 Jun	CD8	Predation marks on both sides, LOE*	Alive	Predation		Yes
07 Jun	HV1	LOE	Alive			No

1 Fish released 10 ft (deep/mid-bay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee.
Off-center releases were offset 8.5 ft from mid-bay.

* not related to passage

Appendix Table C-6

Daily malady data for juvenile chinook salmon passed through shallow/deep and mid-bay/off-center release locations¹ in Spillbays 2 and 4 and downstream of Spillbay 3 (control) under four spill conditions at high tailwater elevation at The Dalles Dam, May-June 2003.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (9/113 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	--	--	--	40	40	--	--	30	40	--	40	--	--	--	--	--	--	--	190
Examined	--	--	--	--	--	39	40	--	--	30	39	--	40	--	--	--	--	--	--	--	188
With passage related maladi	--	--	--	--	--	2	0	--	--	2	1	--	2	--	--	--	--	--	--	--	7
Visible injuries	--	--	--	--	--	2	0	--	--	0	0	--	2	--	--	--	--	--	--	--	4
Scale loss only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Loss of equilibrium only	--	--	--	--	--	0	0	--	--	2	1	--	0	--	--	--	--	--	--	--	3
Without maladies	--	--	--	--	--	37	40	--	--	28	38	--	38/1*	--	--	--	--	--	--	--	181/1*
Without maladies that died	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
<i>Spillbay 2 (9/113 kcfs) Deep Off-center Release</i>																					
Released	--	--	--	--	--	40	40	--	--	30	39	--	40	--	--	--	--	--	--	--	189
Examined	--	--	--	--	--	37	38	--	--	29	38	--	39	--	--	--	--	--	--	--	181
With passage related maladi	--	--	--	--	--	6	2	--	--	0	2	--	4	--	--	--	--	--	--	--	14
Visible injuries	--	--	--	--	--	5	2	--	--	0	0	--	2	--	--	--	--	--	--	--	9
Scale loss only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Loss of equilibrium only	--	--	--	--	--	1	0	--	--	0	2	--	2	--	--	--	--	--	--	--	5
Without maladies	--	--	--	--	--	31/1*	36/2*	--	--	29	36	--	35	--	--	--	--	--	--	--	167/3*
Without maladies that died	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
<i>Spillbay 2 (12/108 kcfs) Deep Mid-bay Release</i>																					
Released	30	--	--	--	--	--	--	40	40	--	--	--	--	--	--	--	--	--	--	--	110
Examined	30	--	--	--	--	--	--	40	40	--	--	--	--	--	--	--	--	--	--	--	110
With passage related maladi	1	--	--	--	--	--	--	3	3	--	--	--	--	--	--	--	--	--	--	--	7
Visible injuries	1	--	--	--	--	--	--	1	3	--	--	--	--	--	--	--	--	--	--	--	5
Scale loss only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Loss of equilibrium only	0	--	--	--	--	--	--	2	0	--	--	--	--	--	--	--	--	--	--	--	2
Without maladies	29	--	--	--	--	--	--	37	37	--	--	--	--	--	--	--	--	--	--	--	103
Without maladies that died	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
<i>Spillbay 2 (12/108 kcfs) Deep Off-center Release</i>																					
Released	30	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	108
Examined	30	--	--	--	--	--	--	39	39	--	--	--	--	--	--	--	--	--	--	--	108
With passage related maladi	1	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	3
Visible injuries	1	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	3
Scale loss only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Loss of equilibrium only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Without maladies	29/1*	--	--	--	--	--	--	38	38	--	--	--	--	--	--	--	--	--	--	--	105/1*
Without maladies that died	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0

Appendix Table C-6

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (18/102 kcfs) Deep Mid-bay Release</i>																					
Released	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
Examined	--	30	29	--	--	--	--	--	--	--	--	50	--	--	40	--	--	--	--	--	149
With passage related maladi	--	1	0	--	--	--	--	--	--	--	--	1	--	--	0	--	--	--	--	--	2
Visible injuries	--	1	0	--	--	--	--	--	--	--	--	1	--	--	0	--	--	--	--	--	2
Scale loss only	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Loss of equilibrium only	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Without maladies	--	29	29	--	--	--	--	--	--	--	--	49/1*	--	--	40	--	--	--	--	--	147/1*
Without maladies that died	--	0	0	--	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
<i>Spillbay 2 (18/102 kcfs) Deep Off-center Release</i>																					
Released	--	30	--	40	--	--	--	--	--	--	--	40	--	--	40	--	--	--	--	--	150
Examined	--	30	--	40	--	--	--	--	--	--	--	40	--	--	40	--	--	--	--	--	150
With passage related maladi	--	0	--	1	--	--	--	--	--	--	--	2	--	--	5	--	--	--	--	--	8
Visible injuries	--	0	--	1	--	--	--	--	--	--	--	2	--	--	4	--	--	--	--	--	7
Scale loss only	--	0	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	0
Loss of equilibrium only	--	0	--	0	--	--	--	--	--	--	--	0	--	--	1	--	--	--	--	--	1
Without maladies	--	30/1*	--	39	--	--	--	--	--	--	--	38	--	--	35	--	--	--	--	--	142/1*
Without maladies that died	--	1	--	0	--	--	--	--	--	--	--	0	--	--	0	--	--	--	--	--	1
<i>Spillbay 2 (18/102 kcfs) Shallow Mid-bay Release</i>																					
Released	--	39	30	--	--	--	--	--	--	--	--	--	--	40	--	--	--	40	--	--	149
Examined	--	39	30	--	--	--	--	--	--	--	--	--	--	39	--	--	--	40	--	--	148
With passage related maladi	--	1	0	--	--	--	--	--	--	--	--	--	--	2	--	--	--	1	--	--	4
Visible injuries	--	1	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	1
Scale loss only	--	0	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
Loss of equilibrium only	--	0	0	--	--	--	--	--	--	--	--	--	--	2	--	--	--	1	--	--	3
Without maladies	--	38	30	--	--	--	--	--	--	--	--	--	--	37	--	--	--	39/1*	--	--	144/1*
Without maladies that died	--	0	0	--	--	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
<i>Spillbay 2 (18/102 kcfs) Shallow Off-center Release</i>																					
Released	--	30	--	--	40	--	--	--	--	--	--	--	--	40	--	--	--	40	--	--	150
Examined	--	30	--	--	38	--	--	--	--	--	--	--	--	40	--	--	--	40	--	--	148
With passage related maladi	--	1	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	2	--	--	5
Visible injuries	--	0	--	--	1	--	--	--	--	--	--	--	--	0	--	--	--	1	--	--	2
Scale loss only	--	0	--	--	0	--	--	--	--	--	--	--	--	0	--	--	--	0	--	--	0
Loss of equilibrium only	--	1	--	--	0	--	--	--	--	--	--	--	--	1	--	--	--	1	--	--	3
Without maladies	--	29	--	--	37	--	--	--	--	--	--	--	--	39	--	--	--	38	--	--	143
Without maladies that died	--	0	--	--	0	--	--	--	--	--	--	--	--	1	--	--	--	1	--	--	2

Appendix Table C-6

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
<i>Spillbay 2 (21/98.5 kcfs) Deep Mid-bay Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
Examined	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
With passage related maladi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	7	--	10
Visible injuries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	2	--	3
Scale loss only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	5	--	7
Without maladies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45/2*	--	--	42/1*	--	90/3*
Without maladies that died	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
<i>Spillbay 2 (21/98.5 kcfs) Deep Off-center Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
Examined	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	--	100
With passage related maladi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	--	--	7	--	17
Visible injuries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	--	--	3	--	11
Scale loss only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	4	--	6
Without maladies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40/1*	--	--	43	--	83/1*
Without maladies that died	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	--	0
<i>Spillbay 2 (21/98.5 kcfs) Shallow Mid-bay Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	100
Examined	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	48	98
With passage related maladi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	2	6
Visible injuries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	1	3
Scale loss only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	1	3
Without maladies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	--	--	46	92
Without maladies that died	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	0	2
<i>Spillbay 2 (21/98.5 kcfs) Shallow Off-center Release</i>																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	100
Examined	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	50	100
With passage related maladi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	1	5
Visible injuries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	1	4
Scale loss only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	0	1
Without maladies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	--	--	49	95
Without maladies that died	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	--	--	0	0

Appendix Table C-6

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
Spillbay 4 (9/113 kcfs) Deep Mid-bay Release																					
Released	--	--	--	--	--	50	51	--	--	50	50	--	40	--	--	--	--	--	--	--	241
Examined	--	--	--	--	--	49	50	--	--	50	47	--	39	--	--	--	--	--	--	--	235
With passage related maladi	--	--	--	--	--	4	1	--	--	1	3	--	1	--	--	--	--	--	--	--	10
Visible injuries	--	--	--	--	--	4	1	--	--	1	3	--	1	--	--	--	--	--	--	--	10
Scale loss only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Loss of equilibrium only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Without maladies	--	--	--	--	--	45/1*	49	--	--	49	44	--	38	--	--	--	--	--	--	--	225/1*
Without maladies that died	--	--	--	--	--	0	0	--	--	0	1	--	0	--	--	--	--	--	--	--	1
Spillbay 4 (12/108 kcfs) Deep Mid-bay Release																					
Released	60	--	--	--	--	--	--	50	50	--	--	--	--	--	--	--	--	--	--	--	160
Examined	59	--	--	--	--	--	--	49	50	--	--	--	--	--	--	--	--	--	--	--	158
With passage related maladi	1	--	--	--	--	--	--	0	2	--	--	--	--	--	--	--	--	--	--	--	3
Visible injuries	1	--	--	--	--	--	--	0	2	--	--	--	--	--	--	--	--	--	--	--	3
Scale loss only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Loss of equilibrium only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Without maladies	58	--	--	--	--	--	--	49/2*	48	--	--	--	--	--	--	--	--	--	--	--	155/2*
Without maladies that died	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Spillbay 4 (18/102 kcfs) Deep Mid-bay Release																					
Released	--	--	40	40	48	--	--	--	--	--	--	--	--	--	30	--	--	42	--	--	200
Examined	--	--	40	40	48	--	--	--	--	--	--	--	--	--	30	--	--	42	--	--	200
With passage related maladi	--	--	0	0	1	--	--	--	--	--	--	--	--	--	2	--	--	3	--	--	6
Visible injuries	--	--	0	0	1	--	--	--	--	--	--	--	--	--	1	--	--	1	--	--	3
Scale loss only	--	--	0	0	0	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	0
Loss of equilibrium only	--	--	0	0	0	--	--	--	--	--	--	--	--	--	1	--	--	2	--	--	3
Without maladies	--	--	40	40	47	--	--	--	--	--	--	--	--	--	28/1*	--	--	39	--	--	194/1*
Without maladies that died	--	--	0	0	1	--	--	--	--	--	--	--	--	--	0	--	--	0	--	--	1
Spillbay 4 (18/102 kcfs) Shallow Mid-bay Release																					
Released	--	--	30	49	50	--	--	--	--	--	--	40	--	40	--	--	--	--	--	--	209
Examined	--	--	30	46	49	--	--	--	--	--	--	40	--	40	--	--	--	--	--	--	205
With passage related maladi	--	--	1	2	2	--	--	--	--	--	--	1	--	3	--	--	--	--	--	--	9
Visible injuries	--	--	1	1	2	--	--	--	--	--	--	0	--	2	--	--	--	--	--	--	6
Scale loss only	--	--	0	0	0	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	0
Loss of equilibrium only	--	--	0	1	0	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	3
Without maladies	--	--	29	44	47	--	--	--	--	--	--	39	--	37/1*	--	--	--	--	--	--	196/1*
Without maladies that died	--	--	0	0	0	--	--	--	--	--	--	0	--	0	--	--	--	--	--	--	0

Appendix Table C-6

Continued.

	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/28	5/29	5/30	5/31	6/02	6/03	6/04	6/05	6/06	6/07	6/08	6/09	6/10	Total
Control (9/113 kcfs)																					
Released	--	--	--	--	--	40	40	--	--	30	40	--	30	--	--	--	--	--	--	--	180
Examined	--	--	--	--	--	40	40	--	--	30	40	--	30	--	--	--	--	--	--	--	180
With passage related maladi	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Visible injuries	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Scale loss only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Loss of equilibrium only	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Without maladies	--	--	--	--	--	40/1*	40/1*	--	--	30	40	--	30/1*	--	--	--	--	--	--	--	180/3*
Without maladies that died	--	--	--	--	--	0	0	--	--	0	0	--	0	--	--	--	--	--	--	--	0
Control (12/108 kcfs)																					
Released	40	--	--	--	--	--	--	40	40	--	--	--	--	--	--	--	--	--	--	--	120
Examined	40	--	--	--	--	--	--	40	39	--	--	--	--	--	--	--	--	--	--	--	119
With passage related maladi	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Visible injuries	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Scale loss only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Loss of equilibrium only	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Without maladies	40	--	--	--	--	--	--	40	39	--	--	--	--	--	--	--	--	--	--	--	119
Without maladies that died	0	--	--	--	--	--	--	0	0	--	--	--	--	--	--	--	--	--	--	--	0
Control (18/102 kcfs)																					
Released	--	30	40	40	30	--	--	--	--	--	--	30	--	30	40	--	--	40	--	--	280
Examined	--	30	37	40	30	--	--	--	--	--	--	30	--	30	40	--	--	39	--	--	276
With passage related maladi	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Visible injuries	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Scale loss only	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Loss of equilibrium only	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Without maladies	--	30	37	40	30/1*	--	--	--	--	--	--	30	--	30	40	--	--	39	--	--	276/1*
Without maladies that died	--	0	0	0	0	--	--	--	--	--	--	0	--	0	0	--	--	0	--	--	0
Control (21/98.5 kcfs)																					
Released	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	50	20	170
Examined	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	50	--	49	20	169
With passage related maladi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	1	--	0	0	1
Visible injuries	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0
Scale loss only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0
Loss of equilibrium only	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	1	--	0	0	1
Without maladies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	49	--	49	20	168
Without maladies that died	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	0

1 Fish released 10 ft (deep/mid-bay and deep/off-center) and 15 ft (shallow/mid-bay and shallow/off-center) above ogee. Off-center releases were offset 8.5 ft from mid-bay.

* Maladies attributed to predators and/or tags (e.g., tear at tag site).

APPENDIX TABLE C-7

Short-term turbine passage survival data on individual chinook salmon released in Spillbays 2 and 4 at The Dalles Dam, October-November 2002. Fish were tagged with Normandeau's HI-Z Turb'N tags. Description of condition codes and details on injured fish are presented in Table 2-6.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
21 October 2002 - Testlot 1 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=59.9F								
FM0	14:08	14:15	7	2	ALIVE	A	172	
FM1	14:07	14:20	13	2	ALIVE	A	175	
FM2	14:06	14:17	11	2	ALIVE	A	168	
FM3	14:08	14:22	14	2	ALIVE	A	181	
FM4	14:06	14:19	13	2	ALIVE	A	178	
21 October 2002 - Testlot 1 : Spillbay 4, pipe 2, 4.5 cfs - Water temp=59.9F								
FM5	14:40	14:44	4	2	ALIVE	A	147	
FM6	14:37	14:46	9	2	ALIVE	A	173	
FM7	14:39	14:47	8	2	ALIVE	HW	172	
FM8	14:38	14:44	6	2	ALIVE	A	172	
FM9	14:40	14:46	6	2	ALIVE	A	178	
21 October 2002 - Testlot 1 : Spillbay 2, pipe 1, 12 cfs - Water temp=59.9F								
FN0	15:06	15:21	15	2	ALIVE	A	160	
FN1	15:07	15:29	22	2	ALIVE	A	181	
FN2	15:12	15:20	8	2	ALIVE	A	164	
FN3	15:12	15:19	7	2	ALIVE	A	169	
FN4	15:13	15:23	10	2	ALIVE	A	175	
21 October 2002 - Testlot 1 : Spillbay 4, pipe 1, 12 cfs - Water temp=59.9F								
FN5	15:54	16:00	6	2	ALIVE	C	175	
FN6	15:54	16:19	25	2	ALIVE	A	176	
FN7	16:00	16:22	22	2	ALIVE	A	181	
FN8	15:59	16:10	11	2	ALIVE	A	172	
FN9	16:00	16:12	12	2	ALIVE	A	182	
21 October 2002 - Testlot 1 : Control 12 cfs - Water temp=59.9F								
LA7	16:32	16:44	12	2	ALIVE	A	176	
LA8	16:32	16:45	13	2	ALIVE	A	154	
LA9	16:33	16:37	4	2	ALIVE	A	170	
LB0	16:33	16:48	15	2	ALIVE	A	164	
LB1	16:32	16:42	10	1	ALIVE	B	179	
22 October 2002 - Testlot 2 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=58.1F								
FP0	8:17	.	.	0	DEAD	Z	174	
FP1	8:16	.	.	0	DEAD	ZL	177	
FP2	8:16	8:31	15	2	ALIVE	A	169	
FP3	8:16	8:39	23	1	ALIVE	B	174	
FP4	8:15	.	.	0	DEAD	ZL	167	
FP5	8:20	8:31	11	2	ALIVE	A	181	
FP6	8:19	8:29	10	2	ALIVE	A	160	
FP7	8:17	8:33	16	2	ALIVE	A	173	
FP8	8:19	8:35	16	2	ALIVE	A	176	
FP9	8:18	.	.	0	TAG & PIN		183	
FR0	8:25	8:41	16	2	ALIVE	A	181	
FR1	8:23	8:37	14	2	ALIVE	A	170	
FR2	8:24	.	.	0	DEAD	ZL	182	
FR3	8:24	8:39	15	2	ALIVE	A	125	
FR4	8:25	8:46	21	2	ALIVE	A	171	
FR5	9:44	10:04	20	2	ALIVE	C	171	
FR6	9:43	9:57	14	2	ALIVE	A	177	
FR7	9:44	10:03	19	2	ALIVE	A	167	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
FR8	9:44	.	.	0	DEAD	Z	159	
FR9	9:45	10:07	22	2	ALIVE	A	179	
FS0	9:46	9:54	8	2	ALIVE	A	146	
FS1	9:47	10:09	22	2	ALIVE	A	175	
FS2	9:46	10:08	22	2	ALIVE	A	176	
FS3	9:46	10:01	15	2	ALIVE	A	179	
FS4	9:46	.	.	0	DEAD	ZL	161	
FS5	9:49	10:06	17	2	ALIVE	A	188	
FS6	9:49	10:06	17	2	ALIVE	A	166	
FS7	9:50	10:08	18	2	ALIVE	A	164	
FS8	9:50	10:00	10	2	ALIVE	A	180	
FS9	9:50	9:58	8	2	ALIVE	A	172	
FT0	10:33	10:44	11	2	ALIVE	A	176	
FT1	10:33	10:43	10	2	ALIVE	H	167	
FT2	10:33	10:40	7	2	ALIVE	A	167	
FT3	10:34	10:41	7	2	ALIVE	A	169	
FT4	10:34	10:46	12	2	ALIVE	A	177	
FT5	10:36	.	.	0	DEAD	ZL	164	
FT6	10:35	10:56	21	2	ALIVE	A	157	
FT7	10:36	10:47	11	2	ALIVE	A	169	
FT8	10:35	10:42	7	2	ALIVE	A	179	
FT9	10:35	10:52	17	2	ALIVE	A	171	
FU0	10:38	10:46	8	2	ALIVE	A	161	
FU1	10:38	10:45	7	2	ALIVE	A	157	
FU2	10:38	10:52	14	2	ALIVE	A	167	
FU3	10:39	11:16	37	2	ALIVE	A	163	
FU4	10:39	10:54	15	2	ALIVE	A	164	
FU5	11:38	11:53	15	2	ALIVE	A	163	
FU6	11:37	11:46	9	2	ALIVE	A	176	
FU7	11:37	11:51	14	2	ALIVE	A	162	
FU8	11:37	11:48	11	2	ALIVE	A	166	
FU9	11:38	11:43	5	2	ALIVE	A	177	
FV0	11:39	11:58	19	2	ALIVE	A	158	
FV1	11:40	11:55	15	2	ALIVE	A	161	
FV2	11:39	11:49	10	2	ALIVE	A	167	
FV3	11:39	11:52	13	2	ALIVE	A	173	
FV4	11:40	11:52	12	2	ALIVE	A	175	
FV5	11:42	11:58	16	2	ALIVE	A	162	
FV6	11:42	11:53	11	2	ALIVE	A	163	
FV7	11:41	11:55	14	2	ALIVE	A	170	
FV8	11:42	11:55	13	1	ALIVE	B	169	
FV9	11:41	11:56	15	2	ALIVE	A	183	

22 October 2002 - Testlot 2 : Spillbay 4, pipe 2, 4.5 cfs - Water temp=58.1F

FW0	12:31	12:57	26	2	ALIVE	A	167	
FW1	12:30	12:41	11	2	ALIVE	A	177	
FW2	12:31	12:44	13	1	ALIVE	B	167	
FW3	12:32	12:56	24	2	ALIVE	A	171	
FW4	12:30	12:43	13	2	ALIVE	A	176	
FW5	12:34	12:57	23	2	ALIVE	A	168	
FW6	12:33	12:48	15	2	ALIVE	A	172	
FW7	12:33	12:46	13	2	ALIVE	A	159	
FW8	12:32	12:46	14	2	ALIVE	A	169	
FW9	12:33	12:49	16	2	ALIVE	A	166	
FX0	12:35	12:46	11	2	ALIVE	A	177	
FX1	12:34	12:51	17	2	ALIVE	A	168	
FX2	12:36	13:09	33	2	ALIVE	A	164	
FX3	12:35	12:44	9	2	ALIVE	A	177	
FX4	12:35	13:00	25	2	ALIVE	A	172	
FX5	13:19	13:30	11	2	ALIVE	A	166	
FX6	13:18	13:29	11	2	ALIVE	A	142	
FX7	13:17	13:41	24	2	ALIVE	A	171	
FX8	13:18	13:40	22	2	ALIVE	A	178	
FX9	13:19	13:29	10	2	ALIVE	A	162	
FY0	13:20	13:28	8	2	ALIVE	A	163	
FY1	13:21	13:34	13	2	ALIVE	A	168	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
FY2	13:20	13:39	19	2	ALIVE	A	169	
FY3	13:21	13:35	14	2	ALIVE	A	176	
FY4	13:20	.	.	0	DEAD	Z	176	
FY5	13:22	13:37	15	2	ALIVE	A	177	
FY6	13:23	13:43	20	2	ALIVE	A	178	
FY7	13:23	13:34	11	2	ALIVE	A	178	
FY8	13:23	13:34	11	2	ALIVE	A	162	
FY9	13:22	13:36	14	2	ALIVE	A	178	
FZ0	14:01	14:11	10	2	ALIVE	A	150	
FZ1	14:00	14:13	13	2	ALIVE	A	180	
FZ2	13:59	14:16	17	2	ALIVE	A	171	
FZ3	13:59	14:16	17	2	ALIVE	A	175	
FZ4	14:00	14:19	19	2	ALIVE	A	185	
FZ5	14:02	14:22	20	2	ALIVE	A	176	
FZ6	14:02	14:11	9	2	ALIVE	A	168	
FZ7	14:02	14:17	15	2	ALIVE	A	184	
FZ8	14:01	14:11	10	2	ALIVE	A	173	
FZ9	14:02	14:17	15	2	ALIVE	A	125	
LB2	14:03	14:15	12	2	ALIVE	A	175	
LB3	14:04	14:21	17	2	ALIVE	A	173	
LB4	14:04	14:21	17	2	ALIVE	A	124	
LB5	14:04	14:27	23	2	ALIVE	A	180	
LB6	14:03	14:22	19	2	ALIVE	A	175	
22 October 2002 - Testlot 2 : Control								- Water temp=58.1F
HA0	14:52	.	.	0	UNKNOWN	X	178	
HA1	14:51	15:05	14	2	ALIVE	A	174	
HA2	14:51	15:04	13	2	ALIVE	A	175	
HA3	14:50	14:59	9	2	ALIVE	A	166	
HA4	14:51	15:02	11	2	ALIVE	A	185	
HA5	14:53	15:09	16	2	ALIVE	A	168	
HA6	14:54	15:10	16	2	ALIVE	A	179	
HA7	14:53	15:04	11	2	ALIVE	A	192	
HA8	14:53	15:08	15	2	ALIVE	A	164	
HA9	14:52	15:06	14	2	ALIVE	A	175	
HB0	14:55	15:07	12	2	ALIVE	A	164	
HB1	14:55	15:07	12	2	ALIVE	A	170	
HB2	14:56	15:11	15	2	ALIVE	A	173	
HB3	14:56	15:05	9	2	ALIVE	A	174	
HB4	14:55	15:14	19	2	ALIVE	A	170	
HB6	15:37	15:57	20	2	ALIVE	A	168	
HB7	15:37	15:53	16	2	ALIVE	A	165	
HB8	15:36	15:56	20	2	ALIVE	A	163	
HB9	15:37	15:49	12	2	ALIVE	A	138	
HC0	15:40	15:54	14	2	ALIVE	A	167	
HC1	15:39	15:48	9	2	DEAD	PW	129	
HC2	15:38	15:48	10	2	ALIVE	A	178	
HC3	15:38	16:10	32	2	ALIVE	A	182	
HC4	15:38	.	.	0	UNKNOWN	X	175	
HC5	15:43	15:53	10	2	ALIVE	A	188	
HC6	15:42	16:08	26	2	ALIVE	A	173	
HC7	15:42	15:52	10	2	ALIVE	A	162	
HC8	15:43	15:53	10	2	ALIVE	A	180	
HC9	15:43	15:57	14	2	ALIVE	A	178	
HD0	16:25	16:38	13	2	ALIVE	A	167	
HD1	16:26	16:35	9	2	ALIVE	A	177	
HD2	16:25	16:41	16	2	ALIVE	A	180	
HD3	16:26	16:48	22	2	ALIVE	A	166	
HD4	16:25	16:37	12	2	ALIVE	A	170	
HD5	16:27	16:38	11	2	ALIVE	A	188	
HD6	16:27	.	.	0	DEAD	ZL	176	
HD7	16:27	16:52	25	2	ALIVE	A	172	
HD8	16:27	16:39	12	2	ALIVE	A	192	
HD9	16:28	16:36	8	2	ALIVE	A	185	
LB7	15:36	15:55	19	2	ALIVE	A	176	
LB8	16:31	16:36	5	2	ALIVE	A	182	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
LB9	16:30	16:45	15	2	ALIVE	A	184	
LC0	16:30	16:43	13	2	ALIVE	A	167	
LC1	16:29	16:47	18	1	ALIVE	B	168	
LC2	16:30	16:54	24	2	ALIVE	A	127	
23 October 2002 - Testlot 3 : Spillbay 2, pipe 2, 4.5 cfs								- Water temp=57.2F
HS0	14:40	14:47	7	2	ALIVE	A	175	
HS1	14:41	15:09	28	2	ALIVE	A	168	
HS2	14:41	15:00	19	2	ALIVE	A	176	
HS3	14:40	.	.	0	UNKNOWN	X	166	
HS4	14:41	14:54	13	2	ALIVE	GV	168	
HS5	14:42	14:57	15	2	ALIVE	A	157	
HS6	14:42	14:51	9	2	ALIVE	A	174	
HS7	14:43	14:55	12	2	ALIVE	A	183	
HS8	14:43	14:57	14	2	ALIVE	A	157	
HS9	14:42	14:53	11	2	ALIVE	A	174	
HT0	14:46	14:57	11	2	ALIVE	A	171	
HT1	14:44	14:56	12	2	ALIVE	W	173	
HT2	14:45	14:58	13	2	ALIVE	A	171	
HT3	14:45	15:05	20	2	ALIVE	A	168	
HT4	14:44	14:51	7	2	ALIVE	A	158	
HT5	15:28	15:42	14	2	ALIVE	A	165	
HT6	15:27	15:44	17	2	ALIVE	A	177	
HT7	15:27	15:35	8	2	ALIVE	A	175	
HT8	15:26	15:34	8	1	ALIVE	B	175	
HT9	15:27	15:52	25	2	ALIVE	A	175	
HU0	15:30	15:43	13	2	ALIVE	A	160	
HU1	15:29	.	.	0	UNKNOWN	X	176	
HU2	15:30	15:38	8	2	ALIVE	A	165	
HU3	15:30	15:54	24	2	ALIVE	G	165	
HU4	15:29	15:40	11	2	ALIVE	A	170	
HU5	15:31	15:40	9	2	ALIVE	A	171	
HU6	15:31	.	.	0	DEAD	ZL	141	
HU7	15:32	15:45	13	2	ALIVE	A	156	
HU8	15:32	15:44	12	2	ALIVE	A	166	
HU9	15:32	15:47	15	2	ALIVE	A	170	
HV0	16:08	16:23	15	2	ALIVE	A	168	
HV1	16:07	16:18	11	2	ALIVE	A	170	
HV2	16:07	16:21	14	2	ALIVE	A	176	
HV3	16:07	.	.	0	DEAD	ZL	165	
HV4	16:06	16:17	11	2	ALIVE	A	168	
HV5	16:09	16:17	8	2	ALIVE	A	167	
HV6	16:09	.	.	0	UNKNOWN	X	168	
HV7	16:08	16:29	21	2	ALIVE	A	164	
HY5	16:10	16:25	15	2	ALIVE	A	166	
HY6	16:09	16:20	11	2	ALIVE	A	175	
LC8	16:10	16:16	6	2	ALIVE	A	172	
LC9	16:11	16:25	14	2	ALIVE	A	173	
LD0	16:12	16:26	14	2	ALIVE	A	165	
LD1	16:11	16:22	11	2	ALIVE	A	166	
LD2	16:12	16:23	11	2	ALIVE	A	166	
23 October 2002 - Testlot 3 : Spillbay 4, pipe 2, 4.5 cfs								- Water temp=57.2F
HE0	8:20	8:39	19	2	ALIVE	A	140	
HE1	8:20	8:35	15	2	ALIVE	A	170	
HE2	8:21	8:31	10	2	ALIVE	A	176	
HE3	8:21	8:39	18	2	ALIVE	A	169	
HE4	8:20	8:46	26	2	ALIVE	A	172	
HE5	8:22	8:41	19	2	ALIVE	A	161	
HE6	8:24	8:36	12	2	ALIVE	A	180	
HE7	8:23	8:32	9	2	ALIVE	A	176	
HE8	8:24	8:42	18	2	ALIVE	A	174	
HE9	8:23	.	.	0	DEAD	ZL	172	
HF0	8:25	8:34	9	2	ALIVE	A	167	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
HF1	8:27	8:45	18	2	ALIVE	C	185	
HF2	8:26	8:35	9	2	ALIVE	A	180	
HF3	8:26	8:44	18	2	ALIVE	A	156	
HF4	8:25	8:40	15	2	ALIVE	A	135	
HF5	9:31	9:47	16	2	ALIVE	A	176	
HF6	9:30	9:40	10	2	ALIVE	A	171	
HF7	9:30	10:09	39	1	DEAD	P	144	
HF8	9:31	9:41	10	2	ALIVE	A	165	
HF9	9:30	9:38	8	2	ALIVE	A	170	
HH0	9:33	9:48	15	2	ALIVE	A	163	
HH1	9:32	9:43	11	2	ALIVE	A	177	
HH2	9:33	9:47	14	2	ALIVE	A	178	
HH3	9:34	9:46	12	2	ALIVE	A	183	
HH4	9:33	9:45	12	2	ALIVE	A	173	
HH5	9:36	9:50	14	2	ALIVE	A	175	
HH6	9:35	9:50	15	2	ALIVE	A	180	
HH7	9:37	9:51	14	2	ALIVE	A	173	
HH8	9:36	9:52	16	2	ALIVE	A	172	
HH9	9:37	9:55	18	2	ALIVE	A	184	
HJ0	10:30	10:41	11	2	ALIVE	A	166	
HJ1	10:31	10:43	12	2	ALIVE	A	160	
HJ2	10:31	11:09	38	2	ALIVE	A	155	
HJ3	10:32	10:40	8	2	ALIVE	A	171	
HJ4	10:31	10:41	10	2	ALIVE	A	175	
HJ5	10:34	10:47	13	2	ALIVE	A	173	
HJ6	10:36	10:47	11	2	ALIVE	A	178	
HJ7	10:33	10:49	16	2	ALIVE	A	162	
HJ8	10:32	10:59	27	2	ALIVE	A	171	
HJ9	10:34	10:42	8	2	ALIVE	C	183	
HK0	10:37	10:49	12	2	ALIVE	A	170	
HK1	10:38	10:50	12	2	ALIVE	A	177	
HK2	10:37	10:50	13	2	ALIVE	A	162	
HK3	10:38	10:56	18	2	ALIVE	A	168	
HK4	10:36	10:53	17	2	ALIVE	A	166	
HK5	11:23	11:36	13	2	ALIVE	A	164	
HK6	11:23	11:33	10	2	ALIVE	GHV	161	
HK7	11:22	11:30	8	2	ALIVE	H	183	
HK8	11:24	.	.	0	DEAD	Z	181	
HK9	11:23	11:44	21	2	ALIVE	A	174	
HL0	11:26	11:39	13	2	ALIVE	A	170	
HL1	11:26	11:36	10	2	ALIVE	A	164	
HL2	11:25	11:34	9	2	ALIVE	A	178	
HL3	11:26	11:35	9	2	ALIVE	A	176	
HL4	11:25	11:37	12	2	ALIVE	A	179	
HL5	11:27	11:38	11	2	ALIVE	A	181	
HL6	11:29	11:39	10	2	ALIVE	A	178	
HL7	11:28	11:41	13	2	ALIVE	A	182	
HL8	11:29	11:57	28	2	ALIVE	A	180	
HL9	11:28	11:40	12	2	ALIVE	A	130	

23 October 2002 - Testlot 3 : Control

- Water temp=57.2F

HM0	12:23	12:33	10	2	ALIVE	A	173	
HM1	12:24	12:35	11	2	ALIVE	A	186	
HM2	12:25	12:39	14	2	ALIVE	A	169	
HM3	12:23	12:34	11	2	ALIVE	A	183	
HM4	12:23	12:29	6	2	ALIVE	A	164	
HM5	12:26	12:41	15	2	ALIVE	A	170	
HM6	12:25	12:36	11	2	ALIVE	A	158	
HM7	12:26	12:36	10	2	ALIVE	A	173	
HM8	12:27	12:35	8	2	ALIVE	A	170	
HM9	12:26	12:37	11	2	ALIVE	A	178	
HN0	12:28	12:37	9	2	ALIVE	A	171	
HN1	12:29	12:38	9	2	ALIVE	A	181	
HN2	12:29	12:41	12	2	ALIVE	A	179	
HN3	12:28	12:41	13	2	ALIVE	A	175	
HN4	12:28	12:39	11	2	ALIVE	A	165	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
HN5	13:09	13:19	10	2	ALIVE	A	175	
HN6	13:08	13:16	8	2	ALIVE	A	177	
HN7	13:09	13:27	18	2	ALIVE	A	163	
HN8	13:09	13:22	13	2	ALIVE	A	174	
HN9	13:08	13:20	12	2	ALIVE	A	173	
HP0	13:12	13:25	13	2	ALIVE	A	190	
HP1	13:10	13:20	10	2	ALIVE	A	188	
HP2	13:11	13:28	17	2	ALIVE	A	150	
HP3	13:11	13:29	18	2	ALIVE	A	183	
HP4	13:11	13:25	14	2	ALIVE	A	166	
HP5	13:13	13:24	11	2	ALIVE	A	173	
HP6	13:13	13:26	13	2	ALIVE	A	160	
HP7	13:12	13:22	10	2	ALIVE	A	173	
HP8	13:14	13:26	12	2	ALIVE	A	168	
HP9	13:13	13:26	13	2	ALIVE	A	174	
HR0	13:53	14:11	18	2	ALIVE	A	187	
HR1	13:54	14:08	14	2	ALIVE	A	185	
HR2	13:55	14:09	14	2	ALIVE	A	165	
HR3	13:54	14:03	9	2	ALIVE	A	185	
HR4	13:54	14:05	11	2	ALIVE	A	171	
HR5	13:57	14:10	13	2	ALIVE	A	182	
HR6	13:56	14:05	9	2	ALIVE	A	169	
HR7	13:55	14:08	13	2	ALIVE	W	172	
HR8	13:56	14:14	18	2	ALIVE	A	178	
HR9	13:56	14:11	15	2	ALIVE	A	181	
LC3	13:59	14:07	8	2	ALIVE	A	162	
LC4	13:58	14:12	14	2	ALIVE	A	168	
LC5	13:59	14:08	9	2	ALIVE	A	171	
LC6	13:57	14:11	14	2	ALIVE	A	174	
LC7	13:58	14:06	8	2	ALIVE	A	169	

24 October 2002 - Testlot 4 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=56.3F

LE1	15:48	.	.	0	DEAD	ZL	180	
LE2	15:48	16:03	15	2	ALIVE	A	172	
LE3	15:47	15:52	5	2	ALIVE	A	172	
LE4	15:47	15:56	9	2	ALIVE	A	181	
LE5	15:47	16:05	18	2	ALIVE	A	156	
PA0	14:25	14:33	8	2	ALIVE	A	168	
PA1	14:24	14:33	9	2	ALIVE	A	179	
PA2	14:25	14:38	13	2	ALIVE	A	179	
PA3	14:24	14:38	14	2	ALIVE	A	182	
PA4	14:24	14:33	9	2	ALIVE	A	143	
PA5	14:26	14:42	16	2	ALIVE	H	178	
PA6	14:26	14:40	14	2	ALIVE	A	170	
PA7	14:27	14:45	18	2	ALIVE	C	174	
PA8	14:27	14:41	14	2	ALIVE	A	169	
PA9	14:26	14:41	15	2	ALIVE	A	170	
PB0	14:28	14:42	14	2	ALIVE	A	168	
PB1	14:29	14:45	16	2	ALIVE	A	177	
PB2	14:28	14:34	6	2	ALIVE	A	175	
PB3	14:28	14:39	11	2	ALIVE	A	174	
PB4	14:29	14:40	11	2	ALIVE	A	184	
PB5	15:01	15:10	9	2	ALIVE	A	166	
PB6	15:01	15:10	9	2	ALIVE	A	180	
PB7	15:02	15:17	15	2	ALIVE	A	182	
PB8	15:02	15:19	17	2	ALIVE	A	166	
PB9	15:03	15:18	15	2	ALIVE	A	171	
PC0	15:03	15:28	25	2	ALIVE	A	177	
PC1	15:01	15:17	16	2	ALIVE	A	166	
PC2	15:05	15:17	12	2	ALIVE	A	158	
PC3	15:04	15:12	8	2	ALIVE	A	174	
PC4	15:05	15:20	15	2	ALIVE	A	177	
PC5	15:05	15:17	12	2	ALIVE	A	170	
PC6	15:07	15:22	15	2	ALIVE	A	176	
PC7	15:05	15:21	16	2	ALIVE	A	175	
PC8	15:06	15:26	20	2	ALIVE	GC	174	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
PC9	15:06	15:11	5	2	ALIVE	A	172	
PD0	15:43	16:01	18	2	ALIVE	A	175	
PD1	15:42	.	.	0	TAG & PIN		165	
PD2	15:43	15:59	16	2	ALIVE	A	177	
PD3	15:42	15:55	13	2	ALIVE	A	181	
PD4	15:43	15:59	16	2	ALIVE	A	180	
PD5	15:44	15:57	13	2	ALIVE	C	177	
PD6	15:44	15:58	14	2	ALIVE	A	175	
PD7	15:46	16:19	33	2	ALIVE	A	183	
PD8	15:45	16:00	15	2	ALIVE	A	182	
PD9	15:45	16:04	19	2	ALIVE	A	171	
24 October 2002 - Testlot 4 : Spillbay 4, pipe 2, 4.5 cfs								- Water temp=56.3F
LD6	13:51	13:59	8	2	ALIVE	A	172	
LD7	13:51	14:01	10	2	ALIVE	A	173	
LD8	13:52	14:03	11	2	ALIVE	A	181	
LD9	13:51	14:01	10	2	ALIVE	A	163	
LE0	13:50	14:01	11	2	ALIVE	A	135	
MH0	11:48	12:10	22	2	ALIVE	A	161	
MH1	11:49	12:00	11	2	ALIVE	A	166	
MH2	11:48	12:00	12	2	ALIVE	A	182	
MH3	11:47	11:57	10	2	ALIVE	A	167	
MH4	11:49	11:58	9	2	ALIVE	A	184	
MH5	11:50	12:02	12	2	ALIVE	A	186	
MH6	11:51	12:13	22	2	ALIVE	A	175	
MH7	11:50	12:01	11	2	ALIVE	A	189	
MH8	11:51	12:06	15	2	ALIVE	A	172	
MH9	11:51	12:05	14	2	ALIVE	A	172	
MJ0	11:52	12:03	11	2	ALIVE	A	178	
MJ1	11:53	12:06	13	2	ALIVE	A	164	
MJ2	11:53	12:10	17	2	ALIVE	A	121	
MJ3	11:52	12:04	12	2	ALIVE	A	172	
MJ4	11:53	12:13	20	2	ALIVE	A	176	
MJ5	12:48	13:12	24	2	ALIVE	A	158	
MJ6	12:47	12:57	10	2	ALIVE	A	165	
MJ7	12:48	13:10	22	2	ALIVE	A	179	
MJ8	12:48	12:59	11	2	ALIVE	A	175	
MJ9	12:47	13:09	22	2	ALIVE	A	177	
MK0	12:49	12:59	10	2	ALIVE	A	187	
MK1	12:49	13:02	13	2	ALIVE	C	179	
MK2	12:50	13:06	16	2	ALIVE	A	190	
MK3	12:50	13:01	11	2	ALIVE	A	166	
MK4	12:51	13:00	9	2	ALIVE	A	188	
MK5	12:52	13:09	17	2	ALIVE	A	176	
MK6	12:52	13:05	13	2	ALIVE	A	175	
MK7	12:51	13:07	16	2	ALIVE	A	155	
MK8	12:52	13:03	11	2	ALIVE	A	178	
MK9	12:51	13:07	16	2	ALIVE	A	177	
ML0	13:47	.	.	0	DEAD	ZL	162	
ML1	13:47	13:56	9	2	ALIVE	A	174	
ML2	13:47	13:56	9	2	ALIVE	A	175	
ML3	13:48	13:58	10	2	ALIVE	W	182	
ML4	13:47	13:58	11	2	ALIVE	A	170	
ML5	13:49	13:59	10	2	ALIVE	A	173	
ML6	13:50	13:58	8	2	ALIVE	A	175	
ML7	13:49	14:08	19	2	ALIVE	A	175	
ML8	13:48	14:00	12	2	ALIVE	A	167	
ML9	13:49	14:00	11	2	ALIVE	A	167	
24 October 2002 - Testlot 4 : Control								- Water temp=56.3F
LC3	9:23	9:29	6	2	ALIVE	A	188	
LC4	9:25	9:40	15	2	ALIVE	A	177	
LD5	10:56	11:14	18	2	ALIVE	A	179	
MA0	8:18	8:36	18	2	ALIVE	A	174	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
MA1	8:18	8:35	17	2	ALIVE	A	170	
MA2	8:19	8:29	10	2	ALIVE	A	176	
MA3	8:20	8:38	18	2	ALIVE	A	165	
MA4	8:20	.	.	0	DEAD	ZL	176	
MA5	8:22	8:43	21	2	ALIVE	A	179	
MA6	8:22	8:34	12	2	ALIVE	A	165	
MA7	8:23	8:35	12	2	DEAD	HJ	167	
MA8	8:21	8:39	18	2	ALIVE	A	167	
MA9	8:21	8:35	14	2	ALIVE	A	178	
MB0	8:25	8:41	16	2	ALIVE	A	170	
MB1	8:24	8:34	10	2	ALIVE	A	160	
MB2	8:23	8:41	18	2	ALIVE	A	192	
MB3	8:24	.	.	0	DEAD	L	177	
MB4	8:24	8:39	15	2	ALIVE	A	180	
MB5	9:19	9:26	7	2	ALIVE	C	166	
MB6	9:20	9:42	22	2	ALIVE	A	180	
MB7	9:20	9:30	10	2	ALIVE	A	171	
MB8	9:19	9:28	9	2	ALIVE	A	190	
MC1	9:20	9:29	9	2	ALIVE	A	169	
MC2	9:22	9:30	8	2	ALIVE	A	184	
MC3	9:26	9:39	13	2	ALIVE	A	182	
MC4	9:22	9:27	5	2	ALIVE	A	147	
MC5	9:23	9:44	21	2	ALIVE	A	180	
MC6	9:24	9:33	9	2	ALIVE	A	182	
MC7	9:23	9:32	9	2	ALIVE	A	181	
MC8	9:21	9:35	14	2	ALIVE	A	139	
MC9	9:25	9:34	9	2	ALIVE	A	184	
MD0	10:10	10:22	12	2	ALIVE	A	125	
MD1	10:09	10:17	8	2	ALIVE	A	178	
MD2	10:09	10:24	15	2	ALIVE	A	189	
MD3	10:09	10:20	11	2	ALIVE	A	189	
MD4	10:10	10:27	17	2	ALIVE	A	176	
MD5	10:12	10:23	11	2	ALIVE	A	168	
MD6	10:12	10:21	9	2	ALIVE	A	182	
MD7	10:13	10:33	20	2	ALIVE	A	183	
MD8	10:13	10:25	12	2	ALIVE	A	175	
MD9	10:11	10:25	14	2	ALIVE	C	173	
ME0	10:15	10:30	15	2	ALIVE	W	166	
ME1	10:16	10:25	9	2	ALIVE	A	179	
ME2	10:15	10:23	8	2	ALIVE	A	185	
ME3	10:15	10:30	15	2	ALIVE	A	169	
ME4	10:14	10:24	10	2	ALIVE	A	150	
ME5	10:54	11:11	17	2	ALIVE	A	156	
ME6	10:52	11:15	23	2	ALIVE	A	188	
ME7	10:54	11:08	14	2	ALIVE	A	187	
ME8	10:53	11:05	12	2	ALIVE	A	173	
ME9	10:53	11:15	22	2	ALIVE	A	162	
MF0	10:56	11:12	16	2	ALIVE	A	174	
MF1	10:55	11:07	12	2	ALIVE	A	169	
MF2	10:58	11:11	13	2	ALIVE	A	192	
MF3	10:59	11:12	13	2	ALIVE	A	160	
MF4	10:56	11:06	10	2	ALIVE	A	181	
MF5	10:57	11:10	13	2	ALIVE	A	175	
MF6	10:58	11:13	15	2	ALIVE	A	168	
MF7	10:57	11:09	12	2	ALIVE	A	140	
MF9	10:59	11:09	10	2	ALIVE	A	185	

25 October 2002 - Testlot 5 : Spillbay 2, pipe 1, 12 cfs - Water temp=55.4F

PE0	8:31	8:50	19	2	ALIVE	A	180	
PE1	8:32	8:45	13	2	ALIVE	A	179	
PE2	8:32	8:52	20	2	ALIVE	A	184	
PE3	8:31	8:44	13	2	ALIVE	A	170	
PE4	8:33	8:48	15	2	ALIVE	A	171	
PE5	8:35	8:56	21	2	ALIVE	A	170	
PE6	8:34	8:52	18	2	ALIVE	A	175	
PE7	8:35	9:02	27	2	ALIVE	A	170	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
PE8	8:35	8:48	13	2	ALIVE	A	176	
PE9	8:34	8:59	25	2	ALIVE	A	105	
PF0	8:36	8:54	18	2	ALIVE	A	171	
PF1	8:36	8:48	12	2	ALIVE	A	172	
PF2	8:37	8:59	22	2	ALIVE	A	186	
PF3	8:37	8:53	16	2	ALIVE	A	170	
PF4	8:36	8:58	22	2	ALIVE	HC	165	
PF5	9:20	9:34	14	2	ALIVE	A	178	
PF6	9:22	9:49	27	2	ALIVE	A	173	
PF7	9:21	9:38	17	2	ALIVE	A	162	
PF8	9:21	9:31	10	2	ALIVE	A	183	
PF9	9:22	9:36	14	2	ALIVE	B	168	
PH0	9:24	9:37	13	2	ALIVE	A	189	
PH1	9:23	9:48	25	2	ALIVE	A	165	
PH2	9:24	9:35	11	2	ALIVE	A	186	
PH3	9:25	9:46	21	2	ALIVE	A	169	
PH4	9:25	9:44	19	2	ALIVE	A	150	
PH5	9:27	9:40	13	2	ALIVE	A	170	
PH6	9:26	9:37	11	2	ALIVE	A	174	
PH7	9:27	10:00	33	2	ALIVE	A	181	
PH8	9:26	9:41	15	2	ALIVE	A	157	
PH9	9:26	9:39	13	2	ALIVE	A	170	

25 October 2002 - Testlot 5 : Spillbay 4, pipe 1, 12 cfs - Water temp=55.4F

HV8	13:42	13:56	14	2	ALIVE	A	170	
LE6	13:43	14:01	18	2	ALIVE	A	164	
LE7	13:42	13:55	13	2	ALIVE	A	182	
LE8	13:42	13:53	11	2	ALIVE	A	178	
LE9	13:43	13:57	14	2	ALIVE	A	145	
PM0	11:37	12:04	27	2	ALIVE	A	180	
PM1	11:37	11:51	14	2	ALIVE	A	160	
PM2	11:37	11:50	13	2	ALIVE	A	171	
PM3	11:36	11:56	20	2	ALIVE	A	170	
PM4	11:38	12:02	24	2	ALIVE	A	173	
PM5	11:40	12:02	22	2	ALIVE	A	179	
PM6	11:39	12:00	21	2	ALIVE	A	181	
PM7	11:40	11:55	15	2	ALIVE	W	178	
PM8	11:40	11:51	11	2	ALIVE	A	180	
PM9	11:39	11:55	16	2	ALIVE	A	168	
PN0	11:42	11:50	8	2	ALIVE	A	173	
PN1	11:42	12:00	18	2	ALIVE	C	164	
PN2	11:42	11:57	15	2	ALIVE	A	180	
PN3	11:41	12:03	22	2	ALIVE	A	176	
PN4	11:41	11:58	17	2	ALIVE	A	137	
PN5	12:33	12:45	12	2	ALIVE	A	170	
PN6	12:33	13:04	31	2	ALIVE	A	181	
PN7	12:34	12:48	14	2	ALIVE	A	141	
PN8	12:35	12:57	22	2	ALIVE	A	158	
PN9	12:34	12:57	23	2	ALIVE	A	180	
PP0	12:36	12:45	9	2	ALIVE	A	172	
PP1	12:35	12:59	24	2	ALIVE	A	170	
PP2	12:35	12:52	17	2	ALIVE	A	180	
PP3	12:36	12:51	15	2	ALIVE	A	168	
PP4	12:37	12:50	13	2	ALIVE	A	173	
PP5	12:39	12:56	17	2	ALIVE	A	170	
PP6	12:38	12:50	12	2	ALIVE	A	192	
PP7	12:39	13:02	23	2	ALIVE	A	182	
PP8	12:38	12:52	14	2	ALIVE	A	155	
PP9	12:37	12:54	17	2	ALIVE	A	165	
PR0	13:37	13:46	9	2	ALIVE	A	177	
PR1	13:38	13:55	17	2	ALIVE	A	180	
PR2	13:38	13:53	15	2	ALIVE	A	168	
PR3	13:39	13:58	19	2	ALIVE	A	165	
PR4	13:38	13:52	14	2	ALIVE	A	169	
PR5	13:41	13:57	16	2	ALIVE	A	174	
PR6	13:40	13:54	14	2	ALIVE	A	178	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
PR7	13:41	14:00	19	2	ALIVE	A	175	
PR8	13:40	13:59	19	2	ALIVE	A	178	
PR9	13:39	.	.	0	DEAD	ZL	176	
25 October 2002 - Testlot 5 : Spillbay 2, pipe 2, 12 cfs								- Water temp=55.4F
PJ0	10:16	10:33	17	2	ALIVE	A	165	
PJ1	10:16	10:32	16	2	ALIVE	A	163	
PJ2	10:17	10:35	18	2	ALIVE	A	178	
PJ3	10:17	10:43	26	2	ALIVE	A	170	
PJ4	10:17	10:33	16	2	ALIVE	A	180	
PJ5	10:19	10:35	16	2	ALIVE	A	165	
PJ6	10:18	10:41	23	2	ALIVE	E	171	
PJ7	10:18	10:24	6	2	ALIVE	A	191	
PJ8	10:19	10:37	18	2	ALIVE	A	175	
PJ9	10:19	10:35	16	2	ALIVE	A	171	
PK0	10:20	10:38	18	2	ALIVE	HC	174	
PK1	10:21	10:31	10	2	ALIVE	A	178	
PK2	10:21	10:37	16	2	ALIVE	GID	189	
PK3	10:21	10:38	17	2	ALIVE	A	195	
PK4	10:20	10:32	12	2	ALIVE	A	186	
PK5	11:02	11:23	21	2	ALIVE	A	146	
PK6	11:03	11:19	16	2	ALIVE	A	166	
PK7	11:01	11:17	16	2	ALIVE	A	166	
PK8	11:02	11:17	15	2	ALIVE	W	162	
PK9	11:02	11:15	13	2	ALIVE	A	163	
PL0	11:05	11:28	23	2	ALIVE	A	171	
PL1	11:03	11:16	13	2	ALIVE	H	154	
PL2	11:05	11:11	6	2	ALIVE	A	169	
PL3	11:04	11:20	16	2	ALIVE	A	168	
PL4	11:04	11:18	14	2	ALIVE	D	163	
PL5	11:06	11:19	13	2	ALIVE	C	180	
PL6	11:07	11:24	17	2	ALIVE	A	172	
PL7	11:05	11:17	12	2	ALIVE	HE	172	
PL8	11:06	11:20	14	2	ALIVE	A	182	
PL9	11:07	11:26	19	2	ALIVE	A	166	
25 October 2002 - Testlot 5 : Control 12 cfs								- Water temp=55.4F
HY7	16:12	16:38	26	2	ALIVE	A	172	
HY8	16:10	16:27	17	2	ALIVE	A	160	
HY9	16:12	16:22	10	2	ALIVE	A	181	
HZ0	16:11	16:29	18	2	ALIVE	A	165	
HZ1	16:11	16:29	18	2	ALIVE	A	170	
PS0	14:34	14:51	17	2	ALIVE	A	160	
PS1	14:34	14:45	11	2	ALIVE	A	170	
PS2	14:34	14:44	10	2	ALIVE	A	163	
PS3	14:36	14:53	17	2	ALIVE	A	172	
PS4	14:35	14:53	18	2	ALIVE	A	178	
PS5	14:36	14:52	16	2	ALIVE	A	176	
PS6	14:38	14:54	16	2	ALIVE	A	177	
PS7	14:38	14:50	12	2	ALIVE	A	177	
PS8	14:37	14:55	18	2	ALIVE	A	168	
PS9	14:37	14:44	7	2	ALIVE	A	175	
PT0	14:39	15:03	24	2	ALIVE	A	169	
PT1	14:43	14:59	16	2	ALIVE	A	180	
PT2	14:42	15:00	18	2	ALIVE	A	166	
PT3	14:43	14:57	14	2	ALIVE	A	189	
PT4	14:39	14:56	17	2	ALIVE	A	175	
PT5	15:25	15:46	21	2	ALIVE	A	152	
PT6	15:25	15:34	9	2	ALIVE	A	170	
PT7	15:26	15:35	9	2	ALIVE	A	189	
PT8	15:28	15:38	10	2	ALIVE	A	140	
PT9	15:26	15:43	17	2	ALIVE	A	165	
PU0	15:27	15:37	10	2	ALIVE	A	166	
PU1	15:28	15:40	12	2	ALIVE	A	172	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
PU2	15:28	15:41	13	2	ALIVE	A	187	
PU3	15:24	15:35	11	2	ALIVE	A	171	
PU4	15:28	15:35	7	2	ALIVE	A	169	
PU5	15:29	15:42	13	2	ALIVE	A	167	
PU6	15:30	15:39	9	2	ALIVE	A	184	
PU7	15:30	15:46	16	2	ALIVE	A	132	
PU8	15:29	15:39	10	2	ALIVE	A	172	
PU9	15:31	15:40	9	2	ALIVE	A	185	
PV0	16:07	16:16	9	2	ALIVE	A	195	
PV1	16:06	16:33	27	2	ALIVE	A	186	
PV2	16:06	16:22	16	2	ALIVE	A	150	
PV3	16:06	16:18	12	2	ALIVE	A	175	
PV4	16:07	16:19	12	2	ALIVE	A	177	
PV5	16:10	16:21	11	2	ALIVE	A	178	
PV6	16:09	16:32	23	2	ALIVE	A	171	
PV7	16:09	16:20	11	2	ALIVE	A	163	
PV8	16:08	16:26	18	2	ALIVE	A	178	
PV9	16:10	16:21	11	2	ALIVE	A	180	
26 October 2002 - Testlot 6 : Spillbay 2, pipe 1, 12 cfs - Water temp=55.4F								
HW9	16:29	16:46	17	2	ALIVE	A	161	
HX0	16:30	16:49	19	2	ALIVE	A	172	
HX1	16:30	16:57	27	2	ALIVE	A	175	
HX2	16:28	16:37	9	2	ALIVE	A	167	
HX3	16:29	16:41	12	2	ALIVE	A	172	
HX4	16:32	16:54	22	2	ALIVE	A	177	
HX5	16:31	16:52	21	2	ALIVE	A	180	
HX6	16:32	16:46	14	2	ALIVE	A	182	
HX7	16:31	16:57	26	2	ALIVE	A	185	
HX8	16:33	16:48	15	2	ALIVE	A	132	
HX9	16:34	16:47	13	2	ALIVE	C	182	
HY0	16:33	.	.	0	UNKNOWN	X	124	
HY1	16:34	16:47	13	2	ALIVE	A	165	
HY2	16:35	17:02	27	2	ALIVE	A	155	
HY3	16:35	16:50	15	2	ALIVE	A	181	
RH0	13:41	13:51	10	2	ALIVE	A	177	
RH1	13:39	13:53	14	2	ALIVE	G	167	
RH2	13:41	14:05	24	2	ALIVE	A	179	
RH3	13:40	13:47	7	2	ALIVE	A	165	
RH4	13:40	13:51	11	2	ALIVE	A	180	
RH5	13:42	13:56	14	2	ALIVE	H	182	
RH6	13:41	13:55	14	2	ALIVE	A	180	
RH7	13:43	14:00	17	2	ALIVE	A	177	
RH8	13:42	13:59	17	2	ALIVE	A	188	
RH9	13:43	.	.	0	UNKNOWN	X	185	
RJ0	13:44	14:02	18	2	ALIVE	A	177	
RJ1	13:44	13:53	9	2	ALIVE	A	178	
RJ2	13:45	13:57	12	2	ALIVE	C	177	
RJ3	13:45	14:00	15	2	ALIVE	A	179	
RJ4	13:44	13:56	12	2	ALIVE	A	172	
RJ5	14:34	14:42	8	2	DEAD	P	170	
RJ6	14:34	14:54	20	2	ALIVE	A	178	
RJ7	14:34	14:54	20	2	ALIVE	A	181	
RJ8	14:33	14:57	24	2	ALIVE	A	204	
RJ9	14:33	14:43	10	2	ALIVE	A	178	
RK0	14:36	14:43	7	2	ALIVE	A	178	
RK1	14:35	14:44	9	2	ALIVE	A	183	
RK2	14:36	14:45	9	2	ALIVE	A	140	
RK3	14:37	14:47	10	2	ALIVE	A	165	
RK4	14:36	14:49	13	2	ALIVE	A	181	
RK5	14:37	14:50	13	2	ALIVE	A	175	
RK6	14:38	14:54	16	2	ALIVE	A	196	
RK7	14:37	14:54	17	2	ALIVE	A	177	
RK8	14:38	14:51	13	2	ALIVE	A	174	
RK9	14:38	14:46	8	2	ALIVE	A	174	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
26 October 2002 - Testlot 6 : Spillbay 4, pipe 1, 12 cfs								- Water temp=55.4F
PW0	8:21	8:33	12	2	ALIVE	A	176	
PW1	8:21	8:38	17	1	ALIVE	B	165	
PW2	8:22	8:44	22	2	ALIVE	A	185	
PW3	8:22	8:40	18	2	ALIVE	A	175	
PW4	8:22	8:40	18	2	ALIVE	A	166	
PW5	8:23	8:40	17	2	ALIVE	A	178	
PW6	8:24	8:35	11	2	ALIVE	A	170	
PW7	8:24	8:31	7	2	ALIVE	A	174	
PW8	8:23	8:38	15	2	ALIVE	A	177	
PW9	8:24	8:45	21	2	ALIVE	A	180	
PX0	8:25	8:45	20	2	ALIVE	A	173	
PX1	8:25	8:32	7	2	ALIVE	A	177	
PX2	8:26	8:46	20	2	ALIVE	A	159	
PX3	8:26	8:32	6	2	ALIVE	A	177	
PX4	8:26	8:41	15	2	ALIVE	A	124	
PX5	9:09	9:35	26	2	ALIVE	A	120	
PX6	9:09	9:22	13	2	ALIVE	C	179	
PX7	9:08	9:15	7	2	ALIVE	C	181	
PX8	9:08	9:17	9	2	ALIVE	A	194	
PX9	9:08	9:24	16	2	ALIVE	A	155	
PY0	9:10	9:29	19	2	ALIVE	C	159	
PY1	9:11	9:32	21	2	ALIVE	A	179	
PY2	9:11	9:35	24	2	ALIVE	A	181	
PY3	9:10	9:20	10	2	ALIVE	A	174	
PY4	9:11	9:24	13	2	ALIVE	A	189	
PY5	9:14	9:27	13	2	ALIVE	HE	177	
PY6	9:13	9:21	8	2	ALIVE	A	178	
PY7	9:13	9:33	20	2	ALIVE	A	153	
PY8	9:12	9:32	20	2	ALIVE	A	180	
PY9	9:12	9:20	8	2	ALIVE	A	172	
26 October 2002 - Testlot 6 : Spillbay 4, pipe 2, 12 cfs								- Water temp=55.4F
PZ0	9:54	10:04	10	2	ALIVE	A	170	
PZ1	9:53	.	.	0	TAG & PIN		172	
PZ2	9:54	10:07	13	2	ALIVE	A	182	
PZ3	9:54	10:10	16	2	ALIVE	A	176	
PZ4	9:53	10:09	16	2	ALIVE	A	173	
PZ5	9:55	10:13	18	2	ALIVE	A	168	
PZ6	9:56	10:08	12	2	ALIVE	A	172	
PZ7	9:56	10:14	18	2	ALIVE	A	164	
PZ8	9:57	10:10	13	2	ALIVE	A	183	
PZ9	9:56	10:01	5	2	ALIVE	A	190	
RA0	9:58	10:19	21	2	ALIVE	A	158	
RA1	9:58	10:16	18	2	ALIVE	A	176	
RA2	9:59	10:09	10	2	ALIVE	A	163	
RA3	9:58	10:08	10	2	ALIVE	A	175	
RA4	9:58	10:03	5	2	ALIVE	A	187	
RA5	10:25	10:32	7	2	ALIVE	A	174	
RA6	10:26	10:41	15	2	ALIVE	A	165	
RA7	10:27	10:34	7	2	ALIVE	A	172	
RA8	10:26	10:45	19	2	ALIVE	A	179	
RA9	10:26	10:34	8	2	ALIVE	A	175	
RB0	10:27	10:43	16	2	ALIVE	C	173	
RB1	10:28	10:46	18	2	ALIVE	A	177	
RB2	10:28	10:42	14	2	ALIVE	A	174	
RB3	10:29	10:44	15	2	ALIVE	A	180	
RB4	10:29	10:42	13	2	ALIVE	A	165	
RB5	10:28	10:39	11	2	ALIVE	A	165	
RB6	10:30	10:42	12	2	ALIVE	A	170	
RB7	10:30	10:34	4	2	ALIVE	A	177	
RB8	10:31	10:40	9	2	ALIVE	A	180	
RB9	10:31	10:45	14	2	ALIVE	A	171	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
26 October 2002 - Testlot 6 : Control 12 cfs - Water temp=55.4F								
HV9	12:59	13:12	13	2	ALIVE	A	191	
HW0	12:59	13:15	16	2	ALIVE	A	125	
HW1	12:59	13:09	10	2	ALIVE	A	177	
HW2	12:58	13:16	18	2	ALIVE	A	166	
HW3	12:58	13:10	12	2	ALIVE	H	154	
RC0	11:27	11:53	26	2	ALIVE	A	177	
RC1	11:26	11:36	10	2	ALIVE	A	186	
RC2	11:27	11:37	10	2	ALIVE	A	131	
RC3	11:27	11:38	11	2	ALIVE	A	167	
RC4	11:28	11:34	6	2	ALIVE	A	173	
RC5	11:30	11:42	12	2	ALIVE	A	167	
RC6	11:29	11:43	14	2	ALIVE	A	166	
RC7	11:29	11:39	10	2	ALIVE	C	175	
RC8	11:30	11:55	25	2	ALIVE	A	131	
RC9	11:28	11:40	12	2	ALIVE	A	171	
RD0	11:31	11:42	11	2	ALIVE	A	184	
RD1	11:32	11:41	9	2	ALIVE	A	190	
RD2	11:32	11:50	18	2	ALIVE	C	172	
RD3	11:31	11:40	9	2	ALIVE	A	157	
RD4	11:32	11:55	23	2	ALIVE	A	163	
RD5	12:11	12:27	16	2	ALIVE	A	192	
RD6	12:10	12:24	14	2	ALIVE	A	121	
RD7	12:13	12:26	13	2	ALIVE	A	167	
RD8	12:12	12:20	8	2	ALIVE	A	169	
RD9	12:13	12:33	20	2	ALIVE	C	164	
RE0	12:13	12:26	13	2	ALIVE	A	131	
RE1	12:10	12:18	8	2	ALIVE	A	120	
RE2	12:11	12:28	17	2	ALIVE	A	200	
RE3	12:10	12:31	21	2	ALIVE	A	121	
RE4	12:12	12:19	7	2	ALIVE	A	184	
RE5	12:15	12:35	20	2	ALIVE	A	132	
RE6	12:15	12:31	16	2	ALIVE	A	175	
RE7	12:16	12:34	18	2	ALIVE	A	182	
RE8	12:15	12:31	16	2	ALIVE	A	170	
RE9	12:14	12:27	13	2	ALIVE	A	156	
RF0	12:54	13:17	23	2	ALIVE	A	183	
RF1	12:53	13:02	9	2	ALIVE	A	185	
RF2	12:54	13:05	11	2	ALIVE	A	183	
RF3	12:53	12:58	5	2	ALIVE	A	177	
RF4	12:54	13:19	25	2	ALIVE	A	180	
RF5	12:57	13:10	13	2	ALIVE	A	178	
RF6	12:57	13:07	10	2	ALIVE	A	168	
RF7	12:55	13:09	14	2	ALIVE	A	176	
RF8	12:56	13:04	8	2	ALIVE	A	129	
RF9	12:56	13:06	10	2	ALIVE	A	180	
28 October 2002 - Testlot 7 : Spillbay 2, pipe 2, 12 cfs - Water temp=55.4F								
HZ2	12:16	12:23	7	2	ALIVE	B	179	
HZ3	12:17	12:34	17	2	ALIVE	A	187	
HZ4	12:17	12:34	17	2	ALIVE	A	172	
HZ5	12:17	12:29	12	2	ALIVE	A	186	
HZ6	12:16	12:28	12	2	ALIVE	A	175	
RU0	10:32	11:11	39	2	ALIVE	A	136	
RU1	10:32	10:44	12	2	ALIVE	A	187	
RU2	10:32	10:47	15	2	ALIVE	A	175	
RU3	10:33	11:03	30	2	ALIVE	A	180	
RU4	10:31	10:50	19	2	ALIVE	A	184	
RU5	10:33	10:46	13	2	ALIVE	A	183	
RU6	10:34	10:47	13	2	ALIVE	A	142	
RU7	10:33	10:46	13	2	ALIVE	A	177	
RU8	10:35	10:56	21	2	ALIVE	A	193	
RU9	10:34	10:46	12	2	ALIVE	A	181	
RV0	10:35	10:55	20	2	ALIVE	A	187	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RV1	10:36	10:43	7	2	ALIVE	A	126	
RV2	10:36	10:51	15	2	ALIVE	A	137	
RV3	10:37	10:48	11	2	ALIVE	A	193	
RV4	10:36	10:48	12	2	ALIVE	A	165	
RV5	11:28	11:37	9	2	ALIVE	A	173	
RV6	11:28	11:54	26	2	ALIVE	A	163	
RV7	11:29	11:40	11	2	ALIVE	A	172	
RV8	11:29	11:54	25	2	ALIVE	G	182	
RV9	11:30	11:42	12	2	ALIVE	A	175	
RW0	11:31	11:46	15	2	ALIVE	W	177	
RW1	11:32	11:43	11	2	ALIVE	A	176	
RW2	11:31	11:52	21	2	ALIVE	W	186	
RW3	11:30	11:42	12	2	ALIVE	A	192	
RW4	11:34	11:44	10	2	ALIVE	A	174	
RW5	11:33	11:56	23	2	ALIVE	A	186	
RW6	11:33	11:42	9	2	ALIVE	A	172	
RW7	11:34	11:46	12	2	ALIVE	A	185	
RW8	11:32	11:44	12	2	ALIVE	A	187	
RW9	11:34	11:50	16	2	ALIVE	A	165	
RX0	12:13	12:37	24	2	ALIVE	A	136	
RX1	12:14	12:33	19	2	ALIVE	A	181	
RX2	12:12	12:25	13	2	ALIVE	A	133	
RX3	12:13	12:28	15	2	ALIVE	A	187	
RX4	12:12	12:24	12	2	ALIVE	A	174	
RX5	12:12	12:31	19	2	ALIVE	A	184	
RX6	12:15	12:24	9	2	ALIVE	A	152	
RX7	12:14	12:31	17	2	ALIVE	A	174	
RX8	12:15	12:26	11	2	ALIVE	A	134	
RX9	12:15	12:22	7	2	ALIVE	A	184	
ZM1	15:20	15:33	13	2	ALIVE	A	172	
ZM2	15:20	15:31	11	2	ALIVE	A	198	
ZM3	15:19	15:28	9	2	ALIVE	A	184	
ZM4	15:19	15:30	11	2	ALIVE	C	181	
ZM5	15:21	15:28	7	2	ALIVE	C	189	
ZM6	15:22	15:35	13	2	ALIVE	A	177	
ZM7	15:23	15:29	6	2	ALIVE	A	124	
ZM8	15:21	15:40	19	2	ALIVE	A	172	
ZM9	15:23	15:36	13	2	ALIVE	A	166	
ZN0	15:22	15:40	18	2	ALIVE	G	189	
ZN1	15:24	15:38	14	2	ALIVE	A	187	
ZN2	15:25	15:32	7	2	ALIVE	A	172	
ZN3	15:24	15:45	21	2	ALIVE	A	179	
ZN4	15:25	15:41	16	2	ALIVE	A	184	
ZN5	15:24	15:43	19	2	ALIVE	A	170	

28 October 2002 - Testlot 7 : Spillbay 4, pipe 2, 12 cfs - Water temp=55.4F

HY4	14:41	14:49	8	2	ALIVE	A	174	
HZ7	14:42	15:03	21	2	ALIVE	H	166	
HZ8	14:41	14:51	10	2	ALIVE	A	177	
HZ9	14:42	14:58	16	2	ALIVE	A	168	
RY0	12:54	13:40	46	2	ALIVE	A	175	
RY1	12:53	13:00	7	2	ALIVE	A	177	
RY2	12:54	13:02	8	2	ALIVE	A	182	
RY3	12:53	13:22	29	2	ALIVE	A	173	
RY4	12:54	13:06	12	2	ALIVE	A	171	
RY5	12:56	13:11	15	2	ALIVE	A	182	
RY6	12:55	13:03	8	2	ALIVE	A	198	
RY7	12:56	13:12	16	2	ALIVE	A	191	
RY8	12:57	13:08	11	2	ALIVE	A	179	
RY9	12:56	13:08	12	2	ALIVE	A	179	
RZ0	12:59	13:14	15	2	ALIVE	A	159	
RZ1	12:58	13:14	16	2	ALIVE	A	181	
RZ2	12:58	13:23	25	2	ALIVE	A	183	
RZ3	12:58	13:09	11	2	ALIVE	A	183	
RZ4	12:57	13:18	21	2	ALIVE	A	177	
RZ5	13:47	13:54	7	2	ALIVE	A	177	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RZ6	13:47	14:03	16	2	ALIVE	A	180	
RZ7	13:46	13:58	12	2	ALIVE	A	189	
RZ8	13:46	13:55	9	2	ALIVE	A	173	
RZ9	13:47	.	.	0	TAG & PIN		193	
SA0	13:49	13:59	10	2	ALIVE	A	183	
SA1	13:48	13:54	6	2	ALIVE	A	175	
SA2	13:48	13:59	11	2	ALIVE	A	189	
SA3	13:50	14:04	14	2	ALIVE	A	186	
SA4	13:49	14:02	13	2	ALIVE	A	182	
SA5	13:51	14:09	18	2	ALIVE	A	181	
SA6	13:52	14:00	8	2	ALIVE	A	176	
SA7	13:51	13:58	7	2	ALIVE	A	184	
SA8	13:51	13:59	8	2	ALIVE	C	178	
SA9	13:52	14:20	28	2	ALIVE	C	179	
SB0	14:38	14:45	7	2	ALIVE	A	157	
SB1	14:37	14:53	16	2	ALIVE	A	180	
SB2	14:38	14:47	9	2	ALIVE	A	186	
SB3	14:37	14:46	9	2	ALIVE	A	176	
SB4	14:38	14:55	17	2	ALIVE	A	178	
SB5	14:40	15:03	23	2	ALIVE	A	176	
SB6	14:40	14:46	6	2	ALIVE	A	178	
SB7	14:39	15:00	21	2	ALIVE	A	191	
SB8	14:43	15:00	17	2	ALIVE	A	174	
SB9	14:39	14:49	10	2	ALIVE	A	186	
ZM0	14:43	14:52	9	2	ALIVE	A	171	

28 October 2002 - Testlot 7 : Control 12 cfs - Water temp=55.4F

RM0	7:20	7:41	21	2	ALIVE	A	174	
RM1	7:19	7:36	17	2	ALIVE	A	184	
RM2	7:21	7:33	12	2	ALIVE	A	173	
RM3	7:19	7:30	11	2	ALIVE	A	184	
RM4	7:20	7:29	9	2	ALIVE	A	170	
RM5	7:23	7:43	20	2	ALIVE	A	175	
RM6	7:20	7:28	8	2	ALIVE	A	178	
RM7	7:22	7:30	8	2	ALIVE	A	187	
RM8	7:22	7:36	14	2	ALIVE	A	182	
RM9	7:22	7:38	16	2	ALIVE	A	159	
RN0	7:24	7:37	13	2	ALIVE	A	185	
RN1	7:25	7:34	9	2	ALIVE	A	182	
RN2	7:24	7:36	12	2	ALIVE	A	174	
RN3	7:25	7:40	15	2	ALIVE	A	181	
RN4	7:24	7:33	9	2	ALIVE	A	177	
RN5	8:05	8:22	17	2	ALIVE	A	187	
RN6	8:04	8:18	14	2	ALIVE	A	164	
RN7	8:03	8:18	15	2	ALIVE	A	176	
RN8	8:05	8:15	10	2	ALIVE	A	177	
RN9	8:05	8:20	15	2	ALIVE	A	175	
RP0	8:04	8:24	20	2	ALIVE	A	182	
RP1	8:03	8:15	12	2	ALIVE	A	185	
RP2	8:06	8:20	14	2	ALIVE	A	177	
RP3	9:34	9:50	16	2	ALIVE	A	177	
RP4	8:03	8:26	23	2	ALIVE	A	190	
RP5	8:08	8:19	11	2	ALIVE	C	186	
RP6	8:08	8:22	14	2	ALIVE	A	170	
RP7	8:07	8:24	17	2	ALIVE	A	180	
RP8	8:07	8:18	11	2	ALIVE	A	150	
RP9	8:07	8:15	8	2	ALIVE	A	127	
RR0	8:51	9:02	11	2	ALIVE	C	184	
RR1	8:52	9:02	10	2	ALIVE	A	176	
RR2	8:51	9:03	12	2	ALIVE	A	171	
RR3	8:50	9:09	19	2	ALIVE	A	171	
RR4	8:50	9:09	19	2	ALIVE	A	180	
RR5	8:53	9:02	9	2	ALIVE	A	166	
RR6	8:52	9:06	14	2	ALIVE	A	177	
RR7	8:54	9:05	11	2	ALIVE	C	169	
RR8	8:54	9:11	17	2	ALIVE	A	183	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RR9	8:53	9:12	19	2	ALIVE	A	187	
RS0	8:56	9:09	13	2	ALIVE	A	188	
RS1	8:56	9:17	21	2	ALIVE	A	177	
RS2	8:56	9:01	5	2	ALIVE	A	179	
RS3	8:55	9:06	11	2	ALIVE	A	173	
RS4	8:55	9:07	12	2	ALIVE	A	197	
RS5	9:32	9:47	15	2	ALIVE	A	166	
RS6	9:30	9:44	14	2	ALIVE	A	177	
RS7	9:32	9:48	16	2	ALIVE	A	177	
RS8	9:30	9:40	10	2	ALIVE	C	172	
RS9	9:29	9:51	22	2	ALIVE	A	179	
RT0	9:51	9:55	4	2	ALIVE	A	180	
RT1	9:28	9:42	14	2	ALIVE	A	174	
RT2	9:31	.	.	0	UNKNOWN	X	158	
RT3	9:33	9:56	23	2	ALIVE	A	177	
RT4	9:29	9:57	28	2	ALIVE	A	168	
RT5	9:36	9:42	6	2	ALIVE	A	168	
RT6	9:34	9:46	12	2	ALIVE	A	187	
RT7	9:34	9:47	13	2	ALIVE	A	169	
RT8	9:35	9:52	17	2	ALIVE	A	190	
RT9	9:35	9:47	12	2	ALIVE	A	177	
29 October 2002 - Testlot 8 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=55.4F								
SC0	7:12	7:33	21	2	ALIVE	A	177	
SC1	7:13	7:36	23	2	ALIVE	A	174	
SC2	7:12	7:23	11	2	ALIVE	A	183	
SC3	7:13	7:31	18	1	ALIVE	B	186	
SC4	7:13	7:22	9	2	ALIVE	A	178	
SC5	7:15	7:24	9	2	ALIVE	A	178	
SC6	7:14	7:26	12	2	ALIVE	A	185	
SC7	7:15	7:28	13	2	ALIVE	A	173	
SC8	7:15	7:20	5	2	ALIVE	A	181	
SC9	7:14	7:37	23	2	ALIVE	W	171	
SD0	7:17	7:23	6	2	ALIVE	A	179	
SD1	7:18	7:44	26	2	ALIVE	A	175	
SD2	7:16	7:21	5	2	ALIVE	A	147	
SD3	7:16	7:27	11	2	ALIVE	A	176	
SD4	7:17	7:33	16	1	ALIVE	HB	186	
SD5	7:54	8:07	13	2	ALIVE	A	184	
SD6	7:54	8:10	16	2	ALIVE	A	182	
SD7	7:53	8:02	9	2	ALIVE	A	187	
SD8	7:53	8:03	10	2	ALIVE	H	172	
SD9	7:53	8:03	10	2	ALIVE	A	192	
SE0	7:54	8:04	10	2	ALIVE	A	177	
SE1	7:56	8:13	17	2	ALIVE	A	153	
SE2	7:55	8:16	21	2	ALIVE	A	178	
SE3	7:56	8:07	11	2	ALIVE	A	171	
SE4	7:56	8:10	14	2	ALIVE	A	178	
SE5	7:57	.	.	0	TAG & PIN		186	
SE6	7:59	8:04	5	2	ALIVE	A	177	
SE7	7:58	8:19	21	2	ALIVE	A	192	
SE9	7:57	8:16	19	2	ALIVE	A	186	
SF0	8:36	8:48	12	2	ALIVE	H	174	
SF1	8:38	8:44	6	2	DEAD		171	
SF2	8:37	8:46	9	1	ALIVE	HBG	131	
SF3	8:37	9:22	45	2	ALIVE	A	179	
SF4	8:38	8:50	12	2	ALIVE	A	184	
SF5	8:39	8:57	18	2	ALIVE	A	171	
SF6	8:40	9:00	20	2	ALIVE	A	180	
SF7	8:40	8:46	6	2	ALIVE	A	172	
SF8	8:39	8:46	7	2	ALIVE	A	170	
SF9	8:39	8:50	11	2	ALIVE	A	183	
SH0	8:41	8:56	15	2	ALIVE	A	185	
SH1	8:41	9:03	22	2	ALIVE	A	183	
SH2	8:42	8:51	9	2	ALIVE	H	188	
SH3	8:42	8:52	10	2	ALIVE	A	154	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
SH4	8:41	8:50	9	2	ALIVE	A	181	
SH5	9:24	9:33	9	2	ALIVE	NH	123	
SH6	9:24	9:32	8	2	ALIVE	A	156	
SH7	9:25	9:37	12	2	ALIVE	A	161	
SH8	9:26	9:40	14	2	ALIVE	A	177	
SH9	9:26	9:34	8	2	ALIVE	A	175	
SJ0	9:26	10:29	63	2	DEAD	P	172	
SJ1	9:25	9:45	20	2	ALIVE	A	185	
SJ2	9:28	9:46	18	2	ALIVE	A	181	
SJ3	9:27	9:42	15	2	ALIVE	HB	186	
SJ4	9:28	9:46	18	2	ALIVE	A	188	
SJ5	9:27	9:38	11	2	ALIVE	A	174	
SJ6	9:28	9:40	12	2	ALIVE	CHG	145	
SJ7	9:30	9:48	18	2	ALIVE	H	193	
SJ8	9:29	10:09	40	2	ALIVE	A	182	
SJ9	9:29	9:54	25	2	ALIVE	NH	139	
ZN6	7:58	8:16	18	2	ALIVE	A	185	

29 October 2002 - Testlot 8 : Spillbay 4, pipe 2, 4.5 cfs - Water temp=55.4F

SK0	10:28	10:43	15	2	ALIVE	A	178	
SK1	10:28	10:49	21	2	ALIVE	A	186	
SK2	10:30	10:50	20	2	ALIVE	A	191	
SK3	10:29	10:55	26	2	ALIVE	A	206	
SK4	10:29	10:45	16	2	ALIVE	A	180	
SK5	10:31	10:53	22	2	ALIVE	A	182	
SK6	10:31	10:44	13	2	ALIVE	A	176	
SK7	10:32	10:45	13	2	ALIVE	A	180	
SK8	10:31	10:48	17	2	ALIVE	A	165	
SK9	10:31	.	.	0	UNKNOWN	X	163	
SL0	10:34	10:52	18	2	ALIVE	A	193	
SL1	10:33	10:45	12	2	ALIVE	A	180	
SL2	10:33	10:51	18	2	ALIVE	A	165	
SL3	10:34	10:53	19	2	ALIVE	A	186	
SL4	10:33	10:57	24	2	ALIVE	A	182	
SL5	11:22	11:36	14	2	ALIVE	A	144	
SL6	11:24	11:50	26	2	ALIVE	A	148	
SL7	11:22	11:36	14	2	ALIVE	A	195	
SL8	11:23	11:58	35	1	ALIVE	B	193	
SL9	11:23	11:40	17	2	ALIVE	A	131	
SM0	11:22	11:41	19	2	ALIVE	A	173	
SM1	11:25	11:42	17	2	ALIVE	A	171	
SM2	11:26	11:59	33	2	ALIVE	A	186	
SM3	11:25	11:53	28	2	ALIVE	A	169	
SM4	11:25	11:45	20	2	ALIVE	A	182	
SM5	11:24	11:42	18	2	ALIVE	A	181	
SM6	11:28	11:48	20	2	ALIVE	A	177	
SM7	11:26	11:46	20	2	ALIVE	A	180	
SM8	11:27	11:50	23	2	ALIVE	A	191	
SM9	11:27	11:45	18	2	ALIVE	A	188	
SN0	12:11	12:25	14	2	ALIVE	A	134	
SN1	12:10	12:25	15	2	ALIVE	A	180	
SN2	12:10	12:23	13	2	ALIVE	A	180	
SN3	12:11	12:20	9	2	ALIVE	D	171	
SN4	12:11	12:32	21	2	ALIVE	A	140	
SN5	12:12	12:31	19	2	ALIVE	A	191	
SN6	12:12	12:25	13	2	ALIVE	A	175	
SN7	12:13	12:23	10	2	ALIVE	A	185	
SN8	12:13	12:46	33	2	ALIVE	A	195	
SN9	12:11	12:45	34	2	ALIVE	A	134	
ZN7	12:14	12:31	17	2	ALIVE	A	195	
ZN8	12:15	12:35	20	2	ALIVE	A	184	
ZN9	12:15	12:35	20	2	ALIVE	A	175	
ZP0	12:14	12:33	19	2	ALIVE	HC	176	
ZP1	12:14	12:32	18	2	ALIVE	A	163	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
29 October 2002 - Testlot 8 : Spillbay 2, pipe 2, 12 cfs								- Water temp=55.4F
SU0	15:06	15:16	10	2	ALIVE	A	174	
SU1	15:05	15:24	19	2	ALIVE	A	174	
SU2	15:06	15:14	8	2	ALIVE	A	175	
SU3	15:05	15:21	16	2	ALIVE	A	164	
SU4	15:04	15:20	16	2	ALIVE	A	171	
SU5	15:04	15:28	24	2	ALIVE	A	179	
SU6	15:07	15:17	10	2	ALIVE	A	182	
SU7	15:07	15:20	13	2	ALIVE	A	145	
SU8	15:07	15:22	15	2	ALIVE	A	182	
SU9	15:08	15:23	15	2	ALIVE	A	169	
ZP7	15:08	15:30	22	2	ALIVE	A	189	
ZP8	15:08	15:21	13	2	ALIVE	A	180	
ZP9	15:09	.	.	0	DEAD	ZL	179	
ZR0	15:10	.	.	0	DEAD	ZL	176	
ZR1	15:09	15:30	21	2	ALIVE	A	185	
29 October 2002 - Testlot 8 : Control								- Water temp=55.4F
SP0	12:52	13:00	8	2	ALIVE	A	177	
SP1	12:52	13:11	19	2	ALIVE	A	190	
SP2	12:55	13:10	15	2	ALIVE	A	188	
SP3	12:52	13:08	16	2	ALIVE	A	139	
SP4	12:54	13:02	8	2	ALIVE	A	179	
SP5	12:53	13:01	8	2	ALIVE	A	182	
SP6	12:54	13:00	6	2	ALIVE	A	179	
SP7	12:52	13:01	9	2	ALIVE	A	179	
SP8	12:51	13:12	21	2	ALIVE	A	185	
SP9	12:53	13:07	14	2	ALIVE	A	177	
SR0	12:56	13:04	8	2	ALIVE	A	179	
SR1	12:56	13:10	14	2	ALIVE	A	179	
SR2	12:55	13:07	12	2	ALIVE	A	185	
SR3	12:55	13:01	6	2	ALIVE	A	163	
SR4	12:57	13:07	10	2	ALIVE	A	186	
SR5	13:31	13:42	11	2	ALIVE	A	185	
SR6	13:31	13:41	10	2	ALIVE	A	180	
SR7	13:31	13:41	10	2	ALIVE	A	166	
SR8	13:30	13:39	9	2	ALIVE	A	165	
SR9	13:32	13:41	9	2	ALIVE	A	176	
SS0	13:33	13:37	4	2	ALIVE	A	177	
SS1	13:34	13:44	10	2	ALIVE	A	182	
SS2	13:33	13:39	6	2	ALIVE	A	177	
SS3	13:34	13:40	6	2	ALIVE	A	190	
SS4	13:33	13:39	6	2	ALIVE	A	175	
SS5	13:35	13:40	5	2	ALIVE	A	180	
SS6	13:36	13:47	11	2	ALIVE	A	191	
SS7	13:35	13:43	8	2	ALIVE	A	179	
SS8	13:37	.	.	0	DEAD	ZL	174	
SS9	13:36	13:43	7	2	ALIVE	A	174	
ST0	14:11	14:23	12	2	ALIVE	A	179	
ST1	14:13	14:26	13	2	ALIVE	A	190	
ST2	14:15	14:23	8	2	ALIVE	A	190	
ST3	14:14	14:23	9	2	ALIVE	A	131	
ST4	14:12	14:18	6	2	ALIVE	A	179	
ST5	14:12	14:17	5	2	ALIVE	A	184	
ST6	14:15	14:20	5	2	ALIVE	A	140	
ST7	14:13	14:18	5	2	ALIVE	A	181	
ST8	14:13	.	.	0	DEAD	ZL	185	
ST9	14:15	14:25	10	2	ALIVE	A	176	
ZP2	14:18	14:24	6	2	ALIVE	A	178	
ZP3	14:17	14:35	18	2	ALIVE	A	179	
ZP4	14:16	14:30	14	2	ALIVE	A	185	
ZP5	14:17	14:30	13	2	ALIVE	A	177	
ZP6	14:16	14:30	14	2	ALIVE	A	179	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
30 October 2002 - Testlot 9 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=52.7F								
TF0	13:16	13:30	14	2	ALIVE	A	184	
TF1	13:17	13:33	16	2	ALIVE	A	178	
TF2	13:17	13:31	14	2	ALIVE	A	187	
TF3	13:16	13:30	14	2	ALIVE	A	182	
TF4	13:17	13:32	15	2	ALIVE	A	179	
TF5	13:18	13:32	14	2	ALIVE	A	172	
TF6	13:19	.	.	0	UNKNOWN	X	177	
TF7	13:20	13:36	16	2	ALIVE	ECW	192	
TF8	13:19	13:29	10	2	ALIVE	A	168	
TF9	13:18	13:28	10	2	ALIVE	A	174	
TH0	13:20	13:42	22	2	ALIVE	A	180	
TH1	13:22	14:02	40	2	ALIVE	A	185	
TH2	13:22	13:40	18	2	ALIVE	A	182	
TH3	13:21	13:37	16	2	ALIVE	A	178	
TH4	13:21	13:38	17	2	ALIVE	A	183	
TH5	14:18	14:44	26	2	ALIVE	A	178	
TH6	14:19	14:40	21	2	ALIVE	A	175	
TH7	14:20	14:36	16	2	ALIVE	A	183	
TH8	14:18	14:39	21	2	ALIVE	A	181	
TH9	14:20	14:41	21	2	ALIVE	A	197	
TJ0	14:19	14:24	5	2	ALIVE	A	156	
TJ1	14:17	14:38	21	2	ALIVE	A	185	
TJ2	14:17	14:38	21	2	ALIVE	N	193	
TJ3	14:17	14:30	13	2	ALIVE	A	190	
TJ6	14:22	14:41	19	2	ALIVE	A	171	
TJ7	14:22	14:37	15	2	ALIVE	A	180	
TJ8	14:21	14:34	13	2	ALIVE	A	190	
TJ9	14:22	14:32	10	2	ALIVE	A	140	
TK0	14:52	14:59	7	2	ALIVE	A	181	
TK1	14:53	15:00	7	2	ALIVE	A	175	
TK2	14:53	14:58	5	2	ALIVE	A	187	
TK3	14:53	15:08	15	2	ALIVE	A	172	
TK4	14:52	14:58	6	2	ALIVE	A	172	
TK5	14:56	15:01	5	2	ALIVE	A	181	
TK6	14:54	15:06	12	2	ALIVE	A	170	
TK7	14:54	15:10	16	2	ALIVE	A	191	
TK8	14:55	15:09	14	1	ALIVE	B	181	
TK9	14:55	15:23	28	1	ALIVE	HB	183	
ZR8	14:20	14:25	5	2	ALIVE	A	132	
ZR9	14:21	14:27	6	2	ALIVE	A	179	
ZS0	14:57	15:14	17	2	ALIVE	A	175	
ZS1	14:57	15:15	18	2	ALIVE	A	186	
ZS2	14:58	15:04	6	2	ALIVE	A	128	
ZS3	14:58	15:03	5	2	ALIVE	A	184	
ZS4	14:56	15:12	16	2	ALIVE	A	174	
30 October 2002 - Testlot 9 : Spillbay 4, pipe 2, 4.5 cfs - Water temp=52.7F								
SV0	7:46	8:05	19	2	ALIVE	A	187	
SV1	7:47	8:00	13	2	ALIVE	A	182	
SV2	7:48	8:05	17	2	ALIVE	A	187	
SV3	7:46	8:01	15	2	ALIVE	A	144	
SV4	7:45	8:08	23	2	ALIVE	A	182	
SV5	7:44	7:58	14	2	ALIVE	A	191	
SV6	7:44	7:59	15	2	ALIVE	A	190	
SV7	7:45	7:58	13	2	ALIVE	A	195	
SV8	7:43	7:59	16	2	ALIVE	A	180	
SV9	7:43	7:57	14	2	ALIVE	A	181	
SW0	7:42	8:00	18	2	ALIVE	A	172	
SW1	7:42	7:56	14	2	ALIVE	A	182	
SW2	7:41	7:55	14	2	ALIVE	A	191	
SW3	7:41	7:50	9	2	ALIVE	A	181	
SW4	9:28	9:46	18	2	ALIVE	A	162	
SW5	9:25	9:37	12	2	ALIVE	A	183	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
SW6	7:42	7:51	9	2	ALIVE	A	192	
SW7	9:27	9:38	11	2	ALIVE	A	182	
SW8	9:24	9:35	11	2	ALIVE	A	185	
SW9	9:26	9:40	14	2	ALIVE	A	179	
SX0	8:31	8:41	10	2	ALIVE	A	201	
SX1	8:31	8:57	26	2	ALIVE	A	186	
SX2	8:32	8:55	23	2	ALIVE	A	195	
SX3	8:32	9:17	45	2	ALIVE	A	134	
SX4	8:31	8:48	17	2	ALIVE	A	192	
SX5	8:33	8:47	14	2	ALIVE	A	186	
SX6	8:34	8:50	16	2	ALIVE	A	180	
SX7	8:33	.	.	0	TAG & PIN		178	
SX8	8:33	8:51	18	2	ALIVE	A	172	
SX9	8:34	8:47	13	2	ALIVE	A	188	
SY0	8:37	8:54	17	2	ALIVE	E	187	
SY1	8:36	8:46	10	2	ALIVE	A	179	
SY2	8:37	8:52	15	2	ALIVE	A	181	
SY3	8:35	8:44	9	2	ALIVE	A	162	
SY5	9:28	9:46	18	2	ALIVE	A	173	
SY6	9:24	9:42	18	2	ALIVE	A	190	
SY7	9:26	9:41	15	2	ALIVE	A	128	
SY8	9:25	9:42	17	2	ALIVE	A	153	
SY9	9:27	9:43	16	2	ALIVE	A	175	
SZ0	9:29	9:45	16	2	ALIVE	A	173	
SZ1	9:30	9:52	22	2	ALIVE	A	178	
SZ2	9:30	9:44	14	2	ALIVE	HG	172	
SZ3	9:29	9:44	15	2	ALIVE	A	168	
SZ4	9:29	10:01	32	2	ALIVE	A	150	
SZ5	10:11	10:21	10	2	ALIVE	A	163	
SZ6	10:12	10:37	25	2	ALIVE	A	177	
SZ7	10:11	10:28	17	2	ALIVE	A	182	
SZ8	10:12	10:33	21	2	ALIVE	A	176	
SZ9	10:11	10:26	15	2	ALIVE	A	127	
TA0	10:15	10:44	29	2	ALIVE	A	181	
TA1	10:13	10:35	22	2	ALIVE	A	142	
TA2	10:14	10:28	14	2	ALIVE	A	172	
TA3	10:13	10:39	26	2	ALIVE	A	185	
TA4	10:14	10:35	21	2	ALIVE	A	188	
TA5	10:16	10:36	20	2	ALIVE	A	165	
TA6	10:16	10:36	20	2	ALIVE		185	
TA7	10:16	10:34	18	2	ALIVE	A	186	
TA8	10:17	10:39	22	2	ALIVE	A	144	
TA9	10:15	10:30	15	2	ALIVE	A	166	
ZR2	8:35	8:44	9	2	ALIVE	A	165	

30 October 2002 - Testlot 9 : Spillbay 2, pipe 2, 12 cfs - Water temp=52.7F

TL0	15:45	16:00	15	2	ALIVE	A	173	
TL1	15:41	16:03	22	2	ALIVE	A	184	
TL2	15:41	16:06	25	2	ALIVE	A	182	
TL3	15:40	16:03	23	2	ALIVE	A	182	
TL4	15:44	15:52	8	2	ALIVE	A	184	
TL5	15:39	15:53	14	2	ALIVE	A	173	
TL6	15:40	16:01	21	2	ALIVE	A	183	
TL7	15:43	15:59	16	2	ALIVE	A	174	
TL8	15:40	15:50	10	2	ALIVE	A	178	
TL9	15:42	16:06	24	2	ALIVE	A	191	
ZS5	15:40	16:05	25	2	ALIVE	A	170	
ZS6	15:45	16:05	20	2	ALIVE	A	179	
ZS7	15:46	16:06	20	2	ALIVE	B	184	
ZS8	15:44	15:54	10	2	ALIVE	A	182	
ZS9	15:45	15:55	10	2	ALIVE	A	142	

30 October 2002 - Testlot 9 : Control - Water temp=52.7F

TB0	11:02	11:15	13	2	ALIVE	A	139	
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APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
TB1	11:03	11:29	26	2	ALIVE	A	181	
TB2	11:03	11:21	18	2	ALIVE	A	172	
TB3	11:05	11:16	11	2	ALIVE	A	190	
TB4	11:05	11:25	20	2	ALIVE	A	158	
TB5	11:04	11:19	15	2	ALIVE	A	176	
TB6	11:05	11:28	23	2	ALIVE	A	127	
TB7	11:02	11:20	18	2	ALIVE	A	164	
TB8	11:02	11:18	16	2	ALIVE	A	180	
TB9	11:04	11:31	27	2	ALIVE	A	186	
TC0	11:07	11:24	17	2	ALIVE	A	182	
TC1	11:07	11:45	38	2	ALIVE	A	183	
TC2	11:08	11:20	12	2	ALIVE	A	180	
TC3	11:06	11:15	9	2	ALIVE	A	159	
TC4	11:06	11:25	19	2	ALIVE	A	185	
TC5	11:54	12:09	15	2	ALIVE	A	150	
TC6	11:55	12:10	15	2	ALIVE	A	187	
TC7	11:55	12:07	12	2	ALIVE	A	126	
TC8	11:54	12:07	13	2	ALIVE	A	175	
TC9	11:53	12:10	17	2	ALIVE	A	167	
TD0	11:57	12:15	18	2	ALIVE	A	178	
TD1	11:56	12:12	16	2	ALIVE	A	194	
TD2	11:57	12:15	18	2	ALIVE	A	181	
TD3	11:55	12:14	19	2	ALIVE	A	182	
TD4	11:56	12:14	18	2	ALIVE	A	180	
TD5	11:58	12:32	34	2	ALIVE	A	185	
TD6	11:57	12:13	16	2	ALIVE	A	174	
TD7	11:59	12:19	20	2	ALIVE	A	165	
TD8	11:59	12:08	9	2	ALIVE	A	180	
TD9	11:59	12:13	14	2	ALIVE	A	174	
TE0	12:32	12:57	25	2	ALIVE	A	176	
TE1	12:32	12:53	21	2	ALIVE	A	190	
TE2	12:35	12:58	23	2	ALIVE	A	181	
TE3	12:33	12:45	12	2	ALIVE	A	190	
TE4	12:35	12:57	22	2	ALIVE	A	191	
TE5	12:34	12:49	15	2	ALIVE	A	182	
TE6	12:35	12:51	16	2	ALIVE	A	181	
TE7	12:33	13:05	32	2	ALIVE	A	187	
TE8	12:33	12:43	10	2	ALIVE	A	170	
TE9	12:34	12:47	13	2	ALIVE	A	159	
ZR3	12:38	12:54	16	2	ALIVE	A	182	
ZR4	12:37	12:53	16	2	ALIVE	A	184	
ZR5	12:37	12:49	12	2	ALIVE	A	173	
ZR6	12:37	12:57	20	2	ALIVE	A	172	
ZR7	12:37	12:50	13	2	ALIVE	A	178	
31 October 2002 - Testlot 10 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=50.9F								
VE0	9:42	9:56	14	2	ALIVE	A	165	
VE1	9:43	9:59	16	2	ALIVE	A	170	
VE2	9:46	10:05	19	2	ALIVE	A	175	
VE3	9:45	10:05	20	2	ALIVE	A	176	
VE4	9:44	10:17	33	2	ALIVE	A	179	
VE5	9:46	10:07	21	2	ALIVE	A	182	
VE6	9:44	10:01	17	2	ALIVE	A	148	
VE7	9:45	10:05	20	2	ALIVE	A	187	
VE8	9:43	10:04	21	2	ALIVE	A	178	
VE9	9:45	10:14	29	2	ALIVE	A	176	
VF0	9:48	10:05	17	2	ALIVE	A	175	
VF1	9:47	10:12	25	2	ALIVE	GHE	177	
VF2	9:47	10:04	17	2	ALIVE	A	170	
VF3	9:48	10:15	27	2	ALIVE	WH	195	
VF4	9:48	9:57	9	2	ALIVE	A	136	
VF5	10:29	10:40	11	2	ALIVE	A	180	
VF6	10:28	10:47	19	2	ALIVE	A	179	
VF7	10:28	10:43	15	2	ALIVE	A	191	
VF8	10:29	10:46	17	2	ALIVE	A	181	
VF9	10:28	10:37	9	2	ALIVE	A	174	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
VH0	10:30	10:50	20	2	ALIVE	A	172	
VH1	10:30	10:41	11	2	ALIVE	W	174	
VH2	10:31	10:43	12	2	ALIVE	A	184	
VH3	10:31	10:40	9	2	ALIVE	A	133	
VH4	10:31	10:48	17	2	ALIVE	A	149	
VH5	10:32	10:50	18	2	ALIVE	A	205	
VH6	10:33	10:50	17	2	ALIVE	A	170	
VH7	10:34	10:52	18	2	ALIVE	A	183	
VH8	10:33	10:47	14	2	ALIVE	A	190	
VH9	10:32	10:39	7	2	ALIVE	A	166	
VJ0	11:17	11:35	18	2	ALIVE	A	190	
VJ1	11:13	11:25	12	2	ALIVE	A	176	
VJ2	11:17	11:25	8	2	ALIVE	A	177	
VJ3	11:16	11:34	18	2	ALIVE	A	184	
VJ4	11:12	11:19	7	2	ALIVE	A	167	
VJ5	11:14	11:21	7	2	ALIVE	A	184	
VJ6	11:13	11:50	37	1	ALIVE	BD	179	
VJ7	11:18	12:03	45	1	ALIVE	HBD	185	
VJ8	11:17	11:35	18	2	ALIVE	A	178	
VJ9	11:15	11:33	18	2	ALIVE	A	177	
ZT5	11:18	11:33	15	2	ALIVE	A	169	
ZT6	11:16	11:38	22	2	ALIVE	A	193	
ZT7	11:15	11:36	21	2	ALIVE	C	181	
ZT8	11:19	11:26	7	2	ALIVE	A	179	
ZT9	11:17	11:30	13	2	ALIVE	A	170	

31 October 2002 - Testlot 10 : Spillbay 4, pipe 2, 4.5 cfs - Water temp=50.9F

VA0	7:38	8:01	23	2	ALIVE	A	192	
VA1	7:37	8:03	26	2	ALIVE	A	182	
VA2	7:39	7:55	16	2	ALIVE	A	173	
VA3	7:38	7:56	18	2	ALIVE	A	179	
VA4	7:37	7:59	22	2	ALIVE	A	183	
VA5	7:39	7:53	14	2	ALIVE	A	190	
VA6	7:40	8:03	23	2	ALIVE	A	177	
VA7	7:40	7:55	15	2	ALIVE	A	172	
VA8	7:41	8:00	19	2	ALIVE	A	175	
VA9	7:40	7:54	14	2	ALIVE	A	177	
VB0	7:43	8:05	22	2	ALIVE	A	180	
VB1	7:42	7:56	14	2	ALIVE	A	172	
VB2	7:43	8:05	22	2	ALIVE	A	192	
VB3	7:42	8:03	21	2	ALIVE	A	178	
VB4	7:42	8:02	20	2	ALIVE	A	172	
VB5	8:23	8:37	14	2	ALIVE	A	190	
VB6	8:22	8:35	13	2	ALIVE	A	181	
VB7	8:21	8:37	16	2	ALIVE	A	180	
VB8	8:24	8:40	16	2	ALIVE	A	149	
VB9	8:22	8:38	16	2	ALIVE	A	190	
VC0	8:21	8:43	22	2	ALIVE	A	180	
VC1	8:20	8:42	22	2	ALIVE	A	181	
VC2	8:23	8:41	18	2	ALIVE	A	150	
VC3	8:20	8:38	18	2	ALIVE	A	178	
VC4	8:20	8:45	25	2	ALIVE	A	173	
VC5	8:26	8:45	19	2	ALIVE	A	190	
VC6	8:26	8:32	6	2	ALIVE	A	190	
VC7	8:24	8:51	27	2	ALIVE	A	190	
VC8	8:25	8:42	17	2	ALIVE	A	176	
VC9	8:25	8:36	11	2	ALIVE	A	184	
VD0	9:03	9:25	22	2	ALIVE	A	179	
VD1	9:01	9:29	28	2	ALIVE	A	172	
VD2	9:02	9:20	18	2	ALIVE	A	180	
VD3	9:01	9:13	12	2	ALIVE	A	168	
VD4	9:02	9:16	14	2	ALIVE	A	172	
VD5	9:05	9:22	17	2	ALIVE	A	140	
VD6	9:04	9:21	17	2	ALIVE	A	173	
VD7	9:04	9:19	15	2	ALIVE	A	172	
VD8	9:03	9:17	14	2	ALIVE	A	178	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
VD9	9:05	9:21	16	2	ALIVE	A	177	
ZT0	9:07	9:21	14	2	ALIVE	A	183	
ZT1	9:06	9:19	13	2	ALIVE	A	180	
ZT2	9:07	9:18	11	2	ALIVE	A	188	
ZT3	9:08	9:19	11	2	ALIVE	A	186	
ZT4	9:06	9:19	13	2	ALIVE	A	167	
31 October 2002 - Testlot 10 : Spillbay 2, pipe 1, 12 cfs								- Water temp=50.9F
WS0	14:36	14:43	7	2	ALIVE	A	188	
WS1	14:38	14:54	16	2	ALIVE	A	185	
WS2	14:37	14:48	11	2	ALIVE	A	184	
WS3	14:38	15:00	22	2	ALIVE	A	190	
WS4	14:38	14:53	15	2	ALIVE	A	159	
WS5	14:37	14:54	17	2	ALIVE	A	130	
WS6	14:40	14:59	19	2	ALIVE	A	175	
WS7	14:39	14:51	12	2	ALIVE	A	190	
WS8	14:40	14:47	7	2	ALIVE	A	164	
WS9	14:39	14:57	18	2	ALIVE	A	185	
ZU1	14:40	14:52	12	2	ALIVE	A	169	
ZU2	14:41	15:00	19	1	ALIVE	B	183	
ZU3	14:42	14:55	13	2	ALIVE	A	171	
ZU4	14:42	14:48	6	2	ALIVE	A	174	
ZU5	14:42	14:47	5	2	ALIVE	A	170	
31 October 2002 - Testlot 10 : Control								- Water temp=50.9F
VK0	12:06	12:35	29	2	ALIVE	A	194	
VK1	12:05	12:16	11	2	ALIVE	A	174	
VK2	12:05	12:14	9	2	ALIVE	A	176	
VK3	12:05	12:21	16	2	ALIVE	A	176	
VK5	12:07	12:28	21	2	ALIVE	A	176	
VK6	12:07	12:30	23	2	ALIVE	A	171	
VK7	12:06	12:25	19	2	ALIVE	A	172	
VK8	12:07	12:23	16	2	ALIVE	A	188	
VK9	12:08	12:28	20	2	ALIVE	A	182	
VL0	12:10	12:21	11	2	ALIVE	A	174	
VL1	12:12	12:25	13	2	ALIVE	A	195	
VL2	12:12	12:19	7	2	ALIVE	A	168	
VL3	12:10	12:23	13	2	ALIVE	A	185	
VL4	12:11	12:29	18	2	ALIVE	A	192	
VL5	12:09	12:27	18	2	ALIVE	A	172	
VL6	12:11	12:32	21	2	ALIVE	A	168	
VL7	12:10	12:26	16	2	ALIVE	A	174	
VL8	12:11	12:21	10	2	ALIVE	A	175	
VL9	12:09	12:42	33	2	ALIVE	A	132	
WM0	12:59	13:12	13	2	ALIVE	A	190	
WM1	13:00	13:27	27	2	ALIVE	A	175	
WM2	12:59	13:07	8	2	ALIVE	A	174	
WM3	13:00	13:19	19	2	ALIVE	A	182	
WM4	12:58	13:21	23	2	ALIVE	A	170	
WM5	13:02	13:21	19	2	ALIVE	A	193	
WM6	13:01	13:12	11	2	ALIVE	A	187	
WM7	13:02	13:10	8	2	ALIVE	A	178	
WM8	13:01	13:10	9	2	ALIVE	A	194	
WM9	13:02	13:21	19	2	ALIVE	A	183	
WN0	13:03	13:09	6	2	ALIVE	A	150	
WN1	13:04	13:18	14	2	ALIVE	A	178	
WN2	13:04	13:18	14	2	ALIVE	A	175	
WN3	13:06	13:17	11	2	ALIVE	A	174	
WN4	13:05	13:20	15	2	ALIVE	A	184	
WN5	13:03	13:22	19	2	ALIVE	A	182	
WN6	13:05	13:17	12	2	ALIVE	A	173	
WN7	13:06	13:23	17	2	ALIVE	A	174	
WN8	13:06	13:18	12	2	ALIVE	A	171	
WN9	13:07	13:25	18	2	ALIVE	A	149	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
WP0	13:50	13:57	7	2	ALIVE	A	140	
WP1	13:50	14:06	16	2	ALIVE	A	192	
WP2	13:51	14:07	16	2	ALIVE	A	187	
WP3	13:49	14:07	18	2	ALIVE	A	180	
WP4	13:50	14:08	18	2	ALIVE	A	172	
WP5	13:52	14:12	20	2	ALIVE	A	165	
WP6	13:52	14:07	15	2	ALIVE	A	168	
WP7	13:51	13:58	7	2	ALIVE	A	199	
WP8	13:52	14:10	18	2	ALIVE	A	191	
WP9	13:53	14:00	7	2	ALIVE	A	119	
WR0	13:58	14:11	13	2	ALIVE	A	180	
WR1	13:54	14:08	14	2	ALIVE	H	177	
WR2	13:56	14:14	18	2	ALIVE	A	180	
WR3	13:54	14:16	22	2	ALIVE	A	175	
WR4	13:55	14:20	25	2	ALIVE	A	182	
WR5	13:55	14:02	7	2	ALIVE	A	201	
WR6	13:56	14:06	10	2	ALIVE	A	170	
WR7	13:55	14:19	24	2	ALIVE	A	125	
WR8	13:58	14:08	10	2	ALIVE	A	186	
WR9	13:57	14:17	20	2	ALIVE	A	182	
ZU0	12:04	12:34	30	2	ALIVE	A	190	
1 November 2002 - Testlot 11 : Spillbay 2, pipe 2, 4.5 cfs - Water temp=49.1F								
WT0	7:31	8:01	30	2	ALIVE	A	177	
WT1	7:32	7:52	20	2	ALIVE	A	176	
WT2	7:32	8:06	34	2	ALIVE	A	190	
WT3	7:33	8:02	29	2	ALIVE	HE	160	
WT4	7:32	7:48	16	2	ALIVE	A	192	
WT5	7:33	7:47	14	2	ALIVE	A	182	
WT6	7:34	7:50	16	2	ALIVE	A	188	
WT7	7:35	7:50	15	2	ALIVE	A	171	
WT8	7:34	7:50	16	2	ALIVE	A	179	
WT9	7:34	7:49	15	2	ALIVE	A	175	
WU0	7:37	7:53	16	2	ALIVE	A	147	
WU1	7:36	7:52	16	2	ALIVE	A	170	
WU2	7:36	8:17	41	2	ALIVE	HG	126	
WU3	7:36	7:54	18	2	ALIVE	A	175	
WU4	7:37	7:52	15	2	ALIVE	A	175	
WU5	8:22	8:53	31	2	ALIVE	A	189	
WU6	8:24	8:42	18	2	ALIVE	A	176	
WU7	8:26	8:41	15	2	ALIVE	A	183	
WU8	8:26	8:33	7	2	ALIVE	A	172	
WU9	8:23	8:36	13	2	ALIVE	A	193	
WV0	8:23	8:54	31	2	ALIVE	A	141	
WV1	8:24	8:50	26	2	ALIVE	A	197	
WV2	8:24	8:46	22	2	ALIVE	A	202	
WV3	8:25	8:49	24	2	ALIVE	A	181	
WV4	8:25	8:48	23	2	ALIVE	A	176	
WV5	8:22	8:35	13	2	ALIVE	A	182	
WV6	8:27	8:45	18	2	ALIVE	A	176	
WV7	8:28	8:48	20	2	ALIVE	A	185	
WV8	8:27	8:50	23	2	ALIVE	A	192	
WV9	8:28	8:48	20	2	ALIVE	A	190	
WW0	9:06	9:17	11	2	ALIVE	A	171	
WW1	9:05	9:26	21	2	ALIVE	A	177	
WW2	9:05	9:22	17	2	ALIVE	A	185	
WW3	9:06	9:24	18	2	ALIVE	A	140	
WW4	9:05	9:16	11	2	ALIVE	A	176	
WW5	9:08	9:17	9	2	ALIVE	A	194	
WW6	9:08	9:21	13	2	ALIVE	A	166	
WW7	9:07	9:19	12	2	ALIVE	A	177	
WW8	9:07	9:21	14	2	ALIVE	A	145	
WW9	9:07	9:23	16	2	ALIVE	A	186	
ZU6	9:10	9:25	15	2	ALIVE	A	179	
ZU7	9:09	9:28	19	2	ALIVE	A	186	
ZU8	9:11	9:30	19	2	ALIVE	A	176	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
ZU9	9:09	9:28	19	2	ALIVE	A	184	
ZV0	9:10	9:29	19	2	ALIVE	A	185	
1 November 2002 - Testlot 11 : Spillbay 4, pipe 2, 4.5 cfs								- Water temp=49.1F
WX0	9:52	10:06	14	2	ALIVE	A	147	
WX1	9:51	10:07	16	2	ALIVE	A	184	
WX2	9:49	10:05	16	2	ALIVE	A	185	
WX3	9:51	10:15	24	2	ALIVE	A	182	
WX4	9:53	10:19	26	2	ALIVE	A	175	
WX5	9:52	10:05	13	2	ALIVE	A	193	
WX6	9:49	10:01	12	2	ALIVE	A	180	
WX7	9:50	10:06	16	2	ALIVE	A	169	
WX8	9:49	10:07	18	2	ALIVE	A	161	
WX9	9:50	10:28	38	2	ALIVE	A	199	
WY0	9:55	10:11	16	2	ALIVE	A	191	
WY1	9:54	10:11	17	2	ALIVE	A	183	
WY2	9:53	10:10	17	2	ALIVE	A	177	
WY3	9:54	10:16	22	2	ALIVE	A	176	
WY4	9:55	10:13	18	2	ALIVE	A	175	
WY5	10:35	11:03	28	2	ALIVE	A	186	
WY6	10:34	10:53	19	2	ALIVE	A	179	
WY7	10:36	10:48	12	2	ALIVE	A	178	
WY8	10:35	11:00	25	2	ALIVE	A	179	
WY9	10:35	10:58	23	2	ALIVE	A	175	
WZ0	10:37	10:55	18	2	ALIVE	A	186	
WZ1	10:38	10:50	12	2	ALIVE	A	181	
WZ2	10:37	10:50	13	2	ALIVE	A	180	
WZ3	10:38	10:52	14	2	ALIVE	A	181	
WZ4	10:36	10:58	22	2	ALIVE	A	190	
WZ5	10:39	10:55	16	2	ALIVE	A	193	
WZ6	10:40	10:57	17	2	ALIVE	A	185	
WZ7	10:40	11:01	21	2	ALIVE	A	200	
WZ8	10:39	10:51	12	2	ALIVE	A	190	
WZ9	10:40	10:56	16	2	ALIVE	A	170	
XA0	11:59	12:27	28	2	ALIVE	A	184	
XA1	11:59	12:17	18	2	ALIVE	A	159	
XA2	11:59	12:33	34	2	ALIVE	A	179	
XA3	12:01	12:29	28	2	ALIVE	A	201	
XA4	12:01	12:30	29	2	ALIVE	A	174	
XA5	12:00	12:18	18	2	ALIVE	A	171	
XA6	12:00	12:14	14	2	ALIVE	A	182	
XA7	12:02	12:17	15	2	ALIVE	A	175	
XA8	12:02	12:20	18	2	ALIVE	A	181	
XA9	12:00	12:16	16	2	ALIVE	A	175	
ZV1	12:03	12:22	19	2	ALIVE	A	194	
ZV2	12:03	12:27	24	2	ALIVE	A	172	
ZV3	12:04	12:36	32	2	ALIVE	A	169	
ZV4	12:03	12:20	17	2	ALIVE	A	175	
ZV5	12:04	12:17	13	2	ALIVE	A	181	
1 November 2002 - Testlot 11 : Spillbay 2, pipe 1, 12 cfs								- Water temp=49.1F
XF0	15:05	15:10	5	2	ALIVE	A	162	
XF1	15:06	15:29	23	2	ALIVE	A	177	
XF2	15:06	15:26	20	2	ALIVE	A	180	
XF3	15:06	15:21	15	2	ALIVE	A	176	
XF4	15:07	15:20	13	2	ALIVE	A	174	
XF5	15:09	15:21	12	2	ALIVE	A	172	
XF6	15:08	15:23	15	2	ALIVE	A	165	
XF7	15:08	15:21	13	2	ALIVE	A	183	
XF8	15:07	15:33	26	2	ALIVE	A	162	
XF9	15:07	15:24	17	2	ALIVE	A	179	
XH0	15:10	15:20	10	2	ALIVE	A	192	
XH1	15:11	15:36	25	2	ALIVE	A	179	
XH2	15:10	15:39	29	2	ALIVE	A	168	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XH3	15:09	15:28	19	2	ALIVE	A	184	
XH4	15:10	15:31	21	2	ALIVE	A	186	
XH5	15:56	16:10	14	2	ALIVE	A	164	
XH6	15:58	16:15	17	2	ALIVE	A	190	
XH7	15:55	16:20	25	2	ALIVE	A	163	
XH8	15:57	16:11	14	2	ALIVE	A	171	
XH9	15:57	16:24	27	2	ALIVE	A	145	
XJ0	15:54	16:18	24	2	ALIVE	A	126	
XJ1	15:55	16:05	10	2	ALIVE	A	182	
XJ2	15:54	16:07	13	2	ALIVE	A	180	
XJ3	15:56	16:09	13	2	ALIVE	A	183	
XJ4	15:53	16:24	31	2	ALIVE	A	181	
XJ5	15:53	16:10	17	2	ALIVE	A	143	
XJ6	15:58	16:13	15	2	ALIVE	A	172	
XJ7	15:59	16:14	15	2	ALIVE	A	167	
XJ8	15:58	16:17	19	2	ALIVE	A	192	
XJ9	15:59	16:23	24	2	ALIVE	A	195	
1 November 2002 - Testlot 11 : Control								- Water temp=49.1F
XB0	13:07	13:30	23	2	ALIVE	A	186	
XB1	13:06	13:17	11	2	ALIVE	A	181	
XB2	13:06	13:23	17	2	ALIVE	A	185	
XB3	13:06	13:21	15	2	ALIVE	A	179	
XB4	13:07	13:15	8	2	ALIVE	A	172	
XB5	13:09	13:24	15	2	ALIVE	A	175	
XB6	13:08	13:23	15	2	ALIVE	A	197	
XB7	13:09	13:25	16	2	ALIVE	A	175	
XB8	13:09	13:23	14	2	ALIVE	A	164	
XB9	13:08	13:20	12	2	ALIVE	A	163	
XC0	13:13	13:24	11	2	ALIVE	A	178	
XC1	13:13	13:23	10	2	ALIVE	A	177	
XC2	13:12	13:30	18	2	ALIVE	A	183	
XC3	13:10	13:36	26	2	ALIVE	A	134	
XC4	13:10	13:27	17	2	ALIVE	A	179	
XC5	13:11	13:27	16	2	ALIVE	A	173	
XC6	13:14	13:37	23	2	ALIVE	A	196	
XC7	13:12	13:27	15	2	ALIVE	A	172	
XC8	13:13	13:24	11	2	ALIVE	A	174	
XC9	13:11	13:26	15	2	ALIVE	A	164	
XD0	14:13	14:36	23	2	ALIVE	A	184	
XD1	14:13	14:31	18	2	ALIVE	A	173	
XD2	14:12	14:25	13	2	ALIVE	A	170	
XD3	14:13	14:22	9	2	ALIVE	A	172	
XD4	14:16	14:30	14	2	ALIVE	A	172	
XD5	14:16	14:28	12	2	ALIVE	A	180	
XD6	14:15	14:30	15	2	ALIVE	A	177	
XD7	14:14	14:41	27	2	ALIVE	A	178	
XD8	14:15	14:34	19	2	ALIVE	A	175	
XD9	14:14	14:40	26	2	ALIVE	A	187	
XE0	14:17	14:38	21	2	ALIVE	A	190	
XE1	14:20	14:36	16	2	ALIVE	A	191	
XE2	14:18	14:36	18	2	ALIVE	A	181	
XE3	14:17	14:35	18	2	ALIVE	A	180	
XE4	14:18	14:36	18	2	ALIVE	A	175	
XE6	14:19	14:38	19	2	ALIVE	A	196	
XE7	14:19	14:47	28	2	ALIVE	A	176	
XE8	14:17	14:33	16	2	ALIVE	A	183	
XE9	14:19	14:33	14	2	ALIVE	A	170	
ZV6	14:20	14:36	16	2	ALIVE	A	172	
2 November 2002 - Testlot 12 : Spillbay 2, pipe 1, 12 cfs								- Water temp=48.2F
XK0	7:24	7:43	19	2	ALIVE	A	179	
XK1	7:24	7:42	18	2	ALIVE	A	184	
XK2	7:24	7:43	19	2	ALIVE	A	191	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XK3	7:23	7:44	21	2	ALIVE	A	195	
XK4	7:23	7:34	11	2	ALIVE	A	175	
XK5	7:26	7:45	19	2	ALIVE	A	180	
XK6	7:25	7:37	12	2	ALIVE	A	170	
XK7	7:26	7:41	15	2	ALIVE	A	172	
XK8	7:25	7:38	13	2	ALIVE	A	171	
XK9	7:27	7:48	21	2	ALIVE	A	182	
XL0	7:27	7:52	25	2	ALIVE	A	177	
XL1	7:27	7:39	12	2	ALIVE	A	182	
XL2	7:28	7:52	24	2	ALIVE	A	185	
XL3	7:28	7:39	11	2	ALIVE	A	180	
XL4	7:28	7:40	12	2	ALIVE	A	134	
XL5	8:16	8:52	36	2	ALIVE	A	182	
XL6	8:15	8:39	24	2	ALIVE	A	179	
XL7	8:16	8:31	15	2	ALIVE	A	183	
XL8	8:14	8:28	14	2	ALIVE	A	170	
XL9	8:13	8:29	16	2	ALIVE	A	189	
XM0	8:15	8:38	23	2	ALIVE	A	189	
XM1	8:13	8:32	19	2	ALIVE	A	180	
XM2	8:13	8:27	14	2	ALIVE	A	173	
XM3	8:15	8:29	14	2	ALIVE	A	183	
XM4	8:14	8:30	16	2	ALIVE	A	172	
XM5	8:17	8:45	28	2	ALIVE	A	182	
XM6	8:19	8:34	15	2	ALIVE	A	172	
XM7	8:18	8:37	19	2	ALIVE	A	182	
XM8	8:17	8:35	18	2	ALIVE	A	184	
XM9	8:18	8:35	17	2	ALIVE	A	186	
2 November 2002 - Testlot 12 : Spillbay 4, pipe 1, 12 cfs - Water temp=48.2F								
XV0	13:05	13:39	34	2	ALIVE	A	192	
XV1	13:07	13:27	20	2	ALIVE	A	181	
XV2	13:06	13:23	17	2	ALIVE	A	173	
XV3	13:07	13:26	19	2	ALIVE	A	172	
XV4	13:06	13:20	14	2	ALIVE	A	191	
XV5	13:08	13:29	21	2	ALIVE	A	185	
XV6	13:08	13:26	18	2	ALIVE	G	145	
XV7	13:08	13:43	35	2	ALIVE	A	129	
XV8	13:09	13:27	18	2	ALIVE	A	168	
XV9	13:11	13:30	19	2	ALIVE	A	185	
XW0	13:11	13:43	32	2	ALIVE	A	172	
XW1	13:10	13:35	25	2	ALIVE	A	173	
XW2	13:10	13:33	23	2	ALIVE	A	180	
XW3	13:10	13:23	13	2	ALIVE	A	183	
XW5	14:02	14:35	33	2	ALIVE	A	183	
XW6	14:00	14:28	28	2	ALIVE	A	185	
XW7	14:01	14:20	19	2	ALIVE	A	176	
XW8	13:59	14:19	20	2	ALIVE	A	180	
XW9	13:58	14:26	28	2	ALIVE	A	187	
XX0	14:01	14:20	19	2	ALIVE	A	183	
XX1	14:00	14:17	17	2	ALIVE	A	182	
XX2	14:02	14:25	23	2	ALIVE	A	185	
XX3	14:00	14:21	21	2	ALIVE	A	181	
XX4	14:01	14:33	32	2	ALIVE	A	177	
XX5	14:04	14:25	21	2	ALIVE	A	169	
XX6	14:03	14:23	20	2	ALIVE	A	170	
XX7	14:03	14:29	26	2	ALIVE	A	192	
XX8	14:03	14:22	19	2	ALIVE	A	182	
XX9	14:04	14:23	19	2	ALIVE	A	196	
ZV7	13:09	13:30	21	2	ALIVE	A	191	
2 November 2002 - Testlot 12 : Spillbay 2, pipe 2, 12 cfs - Water temp=48.2F								
XN0	9:09	9:26	17	2	ALIVE	A	186	
XN1	9:09	9:23	14	2	ALIVE	A	182	
XN2	9:09	9:37	28	1	ALIVE	C	190	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XN3	9:08	9:24	16	2	ALIVE	A	176	
XN4	9:08	9:35	27	2	ALIVE	HG	197	
XN5	9:11	9:18	7	2	ALIVE	A	182	
XN6	9:10	9:32	22	2	ALIVE	A	182	
XN7	9:11	9:32	21	2	ALIVE	A	178	
XN8	9:10	9:31	21	2	ALIVE	A	188	
XN9	9:11	9:30	19	2	ALIVE	A	184	
XP0	9:14	9:23	9	2	ALIVE	A	187	
XP1	9:12	9:20	8	2	ALIVE	A	170	
XP2	9:14	9:28	14	2	ALIVE	A	171	
XP3	9:13	9:26	13	2	ALIVE	A	182	
XP4	9:12	9:32	20	2	ALIVE	A	178	
XP5	9:54	10:16	22	2	ALIVE	A	176	
XP6	9:53	10:11	18	2	ALIVE	A	189	
XP7	9:56	10:08	12	2	ALIVE	A	185	
XP8	9:57	10:19	22	2	ALIVE	A	181	
XP9	9:53	10:19	26	2	ALIVE	A	180	
XR0	9:55	10:12	17	2	ALIVE	A	192	
XR1	9:55	10:05	10	2	ALIVE	A	160	
XR2	9:54	10:08	14	2	ALIVE	A	181	
XR3	9:57	10:13	16	2	ALIVE	A	189	
XR4	9:56	10:06	10	2	ALIVE	A	175	
XR5	9:58	10:16	18	2	ALIVE	A	178	
XR6	9:59	.	.	0	UNKNOWN	X	177	
XR7	9:59	10:16	17	2	ALIVE	A	151	
XR8	10:00	10:16	16	2	ALIVE	A	184	
XR9	9:58	10:10	12	2	ALIVE	A	176	
2 November 2002 - Testlot 12 : Spillbay 4, pipe 2, 12 cfs - Water temp=48.2F								
XY0	14:54	15:13	19	2	ALIVE	A	185	
XY1	14:51	15:08	17	2	ALIVE	A	191	
XY2	14:52	15:21	29	2	ALIVE	A	183	
XY3	14:51	15:15	24	2	ALIVE	A	186	
XY4	14:53	15:36	43	2	ALIVE	A	176	
XY5	14:52	15:08	16	2	ALIVE	A	172	
XY6	14:00	15:03	63	2	ALIVE	A	173	
XY7	14:53	15:09	16	2	ALIVE	A	166	
XY8	14:53	15:14	21	2	ALIVE	A	177	
XY9	14:50	15:33	43	2	ALIVE	A	183	
XZ0	14:54	15:13	19	2	ALIVE	A	181	
XZ1	14:56	15:24	28	2	ALIVE	A	178	
XZ2	14:55	15:09	14	2	ALIVE	A	194	
XZ3	14:56	15:17	21	2	ALIVE	A	177	
XZ4	14:55	15:15	20	2	ALIVE	A	177	
XZ5	15:52	16:04	12	2	ALIVE	A	195	
XZ6	15:51	16:08	17	2	ALIVE	A	174	
XZ7	15:51	15:58	7	2	ALIVE	A	139	
XZ8	15:53	16:17	24	2	ALIVE	A	164	
XZ9	15:52	16:20	28	2	ALIVE	A	182	
ZW0	15:53	16:02	9	2	ALIVE	A	177	
ZW1	15:54	16:03	9	2	ALIVE	A	180	
ZW2	15:54	16:09	15	2	ALIVE	A	186	
ZW3	15:55	16:15	20	2	ALIVE	A	188	
ZW4	15:55	16:04	9	2	ALIVE	A	195	
ZW5	15:56	16:09	13	2	ALIVE	A	187	
ZW6	15:57	16:13	16	2	ALIVE	A	191	
ZW7	15:56	16:12	16	2	ALIVE	A	200	
ZW8	15:56	16:13	17	2	ALIVE	A	175	
ZW9	15:57	16:16	19	2	ALIVE	A	180	
2 November 2002 - Testlot 12 : Control 12 cfs - Water temp=48.2F								
XS0	10:47	11:06	19	2	ALIVE	A	184	
XS1	10:47	11:01	14	2	ALIVE	A	175	
XS2	10:47	10:55	8	2	ALIVE	A	170	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XS3	10:48	10:56	8	2	ALIVE	A	187	
XS4	10:48	10:57	9	2	ALIVE	A	181	
XS5	10:49	11:02	13	2	ALIVE	A	129	
XS6	10:50	11:03	13	2	ALIVE	A	125	
XS7	10:49	11:05	16	2	ALIVE	A	179	
XS8	10:50	11:18	28	2	ALIVE	H	194	
XS9	10:50	11:11	21	2	ALIVE	A	201	
XT0	10:52	11:11	19	2	ALIVE	A	173	
XT1	10:51	11:08	17	2	ALIVE	A	158	
XT2	10:52	11:06	14	2	ALIVE	A	202	
XT3	10:53	11:10	17	2	ALIVE	A	182	
XT4	10:53	11:03	10	2	ALIVE	A	179	
XT5	12:04	12:22	18	2	ALIVE	A	187	
XT6	12:03	12:17	14	2	ALIVE	A	184	
XT7	12:00	12:10	10	2	ALIVE	A	189	
XT8	12:02	12:17	15	2	ALIVE	A	178	
XT9	12:01	12:29	28	2	ALIVE	A	187	
XU0	12:02	.	.	0	UNKNOWN	X	168	
XU1	12:03	12:20	17	2	ALIVE	A	186	
XU2	12:02	12:24	22	2	ALIVE	C	184	
XU3	12:04	12:26	22	2	ALIVE	A	173	
XU4	12:01	12:08	7	2	ALIVE	A	177	
XU5	12:07	12:20	13	2	ALIVE	A	178	
XU6	12:05	12:27	22	2	ALIVE	A	177	
XU7	12:05	12:19	14	2	ALIVE	A	171	
XU8	12:06	12:24	18	2	ALIVE	A	175	
XU9	12:06	12:18	12	2	ALIVE	A	142	

3 November 2002 - Testlot 13 : Spillbay 2, pipe 1, 12 cfs - Water temp=48.2F

ZY2	11:41	11:56	15	2	ALIVE	A	179	
ZY3	11:41	12:00	19	2	ALIVE	A	188	
ZY4	11:41	11:51	10	2	ALIVE	A	181	
ZY5	11:40	12:06	26	2	ALIVE	A	199	
ZY6	11:10	12:02	52	2	ALIVE	A	176	
ZY7	11:43	12:00	17	2	ALIVE	A	179	
ZY8	11:44	12:05	21	2	ALIVE	A	170	
ZY9	11:42	11:57	15	2	ALIVE	A	166	
ZZ0	11:43	11:52	9	2	ALIVE	A	183	
ZZ1	11:42	11:56	14	2	ALIVE	A	185	
ZZ2	11:44	11:55	11	2	ALIVE	A	190	
ZZ3	11:45	11:58	13	2	ALIVE	A	180	
ZZ4	11:46	12:04	18	2	ALIVE	A	183	
ZZ5	11:45	12:03	18	2	ALIVE	A	180	
ZZ6	11:45	11:59	14	2	ALIVE	A	170	

3 November 2002 - Testlot 13 : Spillbay 4, pipe 1, 12 cfs - Water temp=48.2F

HB5	9:24	9:50	26	2	ALIVE	A	185	
HB6	9:26	9:39	13	2	ALIVE	A	183	
HB7	9:24	9:37	13	2	ALIVE	A	202	
HB8	9:24	9:43	19	2	ALIVE	A	190	
HB9	9:23	9:56	33	2	ALIVE	A	189	
HC0	9:22	9:41	19	2	ALIVE	A	189	
HC1	9:25	9:42	17	2	ALIVE	A	188	
HC2	9:25	9:43	18	2	ALIVE	A	177	
HC3	9:22	9:27	5	2	ALIVE	A	184	
HC4	9:23	9:41	18	2	ALIVE	A	175	
HC5	9:28	9:44	16	2	ALIVE	A	186	
HC6	9:26	9:37	11	2	ALIVE	A	194	
HC7	9:27	9:50	23	2	ALIVE	A	183	
HC8	9:27	9:50	23	2	ALIVE	A	187	
HC9	9:27	9:42	15	2	ALIVE	A	183	

APPENDIX TABLE C-7

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
3 November 2002 - Testlot 13 : Spillbay 2, pipe 2, 12 cfs - Water temp=48.2F								
VH1	10:51	11:07	16	2	ALIVE	A	186	
ZV8	10:52	11:10	18	2	ALIVE	A	181	
ZV9	10:51	11:19	28	2	ALIVE	A	181	
ZX0	10:51	11:18	27	2	ALIVE	A	191	
ZX1	10:57	11:11	14	2	ALIVE	A	188	
ZX2	10:53	11:16	23	2	ALIVE	A	184	
ZX3	10:54	11:02	8	2	ALIVE	A	178	
ZX4	10:56	11:08	12	2	ALIVE	A	134	
ZX5	10:53	11:19	26	2	ALIVE	A	175	
ZX6	10:56	11:17	21	2	ALIVE	A	189	
ZX7	10:53	11:05	12	2	ALIVE	A	186	
ZX8	10:55	11:15	20	2	ALIVE	A	166	
ZX9	10:55	11:17	22	2	ALIVE	A	184	
ZY0	10:54	11:14	20	2	ALIVE	A	174	
ZY1	10:55	11:11	16	2	ALIVE	A	134	
3 November 2002 - Testlot 13 : Spillbay 4, pipe 2, 12 cfs - Water temp=48.2F								
HA0	8:19	8:41	22	2	ALIVE	A	191	
HA1	8:18	8:32	14	2	ALIVE	A	193	
HA2	8:17	9:02	45	2	ALIVE	A	184	
HA3	8:19	8:37	18	2	ALIVE	A	183	
HA4	8:18	8:52	34	2	ALIVE	A	182	
HA5	8:20	8:38	18	2	ALIVE	A	180	
HA6	8:20	8:31	11	2	ALIVE	A	140	
HA7	8:21	8:33	12	2	ALIVE	HB	185	
HA8	8:21	8:43	22	2	ALIVE	A	173	
HA9	8:21	8:50	29	2	ALIVE	A	139	
HB0	8:23	8:47	24	2	ALIVE	A	146	
HB1	8:23	8:36	13	2	ALIVE	A	181	
HB2	8:22	8:38	16	2	ALIVE	A	186	
HB3	8:24	8:38	14	2	ALIVE	A	150	
HB4	8:22	8:41	19	2	ALIVE	A	183	
3 November 2002 - Testlot 13 : Control 12 cfs - Water temp=48.2F								
HD0	10:12	10:24	12	2	ALIVE	A	185	
HD1	10:13	10:22	9	2	ALIVE	A	177	
HD2	10:12	10:31	19	2	ALIVE	A	186	
HD3	10:13	10:21	8	2	ALIVE	A	188	
HD4	10:14	10:29	15	2	ALIVE	A	173	
HD5	10:14	10:33	19	2	ALIVE	A	180	
HD6	10:16	10:32	16	2	ALIVE	A	180	
HD7	10:15	10:28	13	2	ALIVE	A	150	
HD8	10:14	10:24	10	2	ALIVE	A	166	
HD9	10:16	10:29	13	2	ALIVE	A	175	

APPENDIX TABLE C-8

Short-term turbine passage survival data on individual chinook salmon released in Spillbays 2 and 4 at The Dalles Dam, May-June 2003. Fish were tagged with Normandeau's HI-Z Turb'N tags. Description of condition codes and details on injured fish are presented in Table 2-6.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data					
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	Comments		
20 May 2003				-	Testlot 2 : Control			-	Water temp=54.5F	
PS0	13:55	14:03	8	2	ALIVE	A	147			
PS1	13:57	14:07	10	2	ALIVE	A	162			
PS2	13:56	14:10	14	2	ALIVE	A	158			
PS3	13:56	14:08	12	2	ALIVE	A	135			
PS4	13:58	14:09	11	2	ALIVE	A	143			
PS5	14:04	14:18	14	2	ALIVE	A	156			
PS6	14:03	14:16	13	2	ALIVE	A	152			
PS7	14:01	14:12	11	2	ALIVE	A	136			
PS8	14:02	14:15	13	2	ALIVE	A	147			
PS9	14:03	14:13	10	2	ALIVE	A	145			
PT0	14:26	14:31	5	2	ALIVE	A	155			
PT1	14:25	14:31	6	2	ALIVE	A	138			
PT2	14:27	14:32	5	2	ALIVE	A	138			
PT3	14:28	14:41	13	2	ALIVE	A	147			
PT4	14:27	14:36	9	2	ALIVE	A	140			
PT5	14:32	14:40	8	2	ALIVE	A	152			
PT6	14:32	14:40	8	2	ALIVE	A	143			
PT7	14:31	14:43	12	2	ALIVE	A	146			
PT8	14:29	14:35	6	2	ALIVE	A	130			
PT9	14:29	14:37	8	2	ALIVE	A	141			
PU0	15:00	15:06	6	2	ALIVE	A	130			
PU1	14:58	15:19	21	2	ALIVE	A	145			
PU2	14:59	15:07	8	2	ALIVE	A	142			
PU3	14:58	15:05	7	2	ALIVE	A	160			
PU4	14:59	15:05	6	2	ALIVE	A	157			
PU5	14:54	14:59	5	2	ALIVE	A	147			
PU6	14:57	15:02	5	2	ALIVE	A	142			
PU7	14:54	15:00	6	2	ALIVE	A	144			
PU8	14:55	15:04	9	2	ALIVE	A	142			
PU9	14:56	15:01	5	2	ALIVE	A	140			
PV0	15:23	15:28	5	2	ALIVE	A	157			
PV1	15:24	15:30	6	2	ALIVE	A	130			
PV2	15:23	15:29	6	2	ALIVE	A	146			
PV3	15:25	15:33	8	2	ALIVE	A	147			
PV4	15:24	15:33	9	2	ALIVE	A	156			
PV5	15:19	15:28	9	2	ALIVE	A	133			
PV6	15:21	15:28	7	2	ALIVE	A	143			
PV7	15:17	15:24	7	2	ALIVE	A	138			
PV8	15:19	15:26	7	2	ALIVE	A	144			
PV9	15:20	15:26	6	2	ALIVE	A	145			
20 May 2003				-	Testlot 2 :			21	-	Water temp=54.5F
L14	8:31	8:38	7	2	ALIVE	A	148			
L20	8:24	8:45	21	2	ALIVE	A	151			
L21	8:23	8:42	19	2	ALIVE	A	143			
L22	8:25	8:40	15	2	ALIVE	A	134			
L23	8:26	8:45	19	2	ALIVE	A	157			
L24	8:27	8:32	5	2	ALIVE	A	171			
L26	8:32	8:34	2	2	ALIVE	A	147			
L27	8:29	8:38	9	2	ALIVE	A	143			
L28	8:28	8:36	8	2	ALIVE	A	152			
L29	8:30	8:38	8	2	ALIVE	A	145			
L30	8:56	9:01	5	2	ALIVE	A	152			
L31	8:57	9:07	10	2	ALIVE	A	146			
L32	8:58	9:05	7	2	ALIVE	A	145			
L33	8:59	9:03	4	2	ALIVE	A	156			
L34	8:55	9:01	6	2	ALIVE	A	152			
L35	9:03	9:09	6	2	ALIVE	A	136			
L36	9:01	9:07	6	2	ALIVE	A	141			
L37	9:00	9:06	6	2	ALIVE	GHN	141			
L38	9:02	9:07	5	2	ALIVE	A	132			

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
L39	9:00	9:05	5	2	ALIVE	A	148	
L40	9:16	9:21	5	2	ALIVE	A	135	
L41	9:13	9:19	6	2	ALIVE	A	132	
L42	9:14	9:24	10	2	ALIVE	A	160	
L43	9:12	9:18	6	2	ALIVE	A	148	
L44	9:15	9:24	9	2	ALIVE	A	157	
L45	9:18	9:24	6	2	ALIVE	A	149	
L46	9:19	9:28	9	2	ALIVE	A	150	
L47	9:21	9:28	7	2	ALIVE	A	140	
L48	9:17	9:28	11	2	ALIVE	A	137	
L49	9:20	9:26	6	2	ALIVE	A	145	
20 May 2003 - Testlot 2 :								23 - Water temp=54.5F
L50	9:40	9:48	8	2	ALIVE	A	140	
L51	9:38	9:43	5	2	ALIVE	A	135	
L52	9:39	9:49	10	2	ALIVE	A	131	
L53	9:37	9:42	5	2	ALIVE	A	159	
L54	9:41	9:50	9	2	ALIVE	A	167	
L55	9:47	9:52	5	2	ALIVE	A	145	
L56	9:43	9:50	7	2	ALIVE	A	150	
L57	9:45	9:48	3	2	ALIVE	BH	142	
L58	9:48	9:53	5	2	ALIVE	A	143	
L59	9:46	9:51	5	2	ALIVE	A	133	
L60	10:02	10:06	4	2	ALIVE	A	138	
L61	10:03	10:10	7	2	ALIVE	A	145	
L62	10:04	10:09	5	2	ALIVE	A	147	
L63	10:05	10:14	9	2	ALIVE	A	162	
L64	10:01	10:15	14	2	ALIVE	A	158	
L65	10:08	10:15	7	2	ALIVE	A	143	
L66	10:07	10:15	8	2	ALIVE	A	144	
L67	10:09	10:16	7	2	ALIVE	A	144	
L68	10:10	10:16	6	2	ALIVE	A	162	
L69	10:07	10:13	6	2	ALIVE	A	151	
L70	10:22	10:27	5	2	ALIVE	A	147	
L71	10:22	10:29	7	2	ALIVE	A	156	
L72	10:23	10:28	5	2	ALIVE	A	128	
L73	10:25	10:30	5	2	ALIVE	A	139	
L74	10:24	10:28	4	2	ALIVE	A	148	
L75	10:27	10:32	5	2	ALIVE	A	158	
L76	10:28	10:32	4	2	ALIVE	A	140	
L77	10:29	10:34	5	2	ALIVE	A	147	
L78	10:26	10:41	15	2	DEAD	NJ	156	
L79	10:27	10:31	4	2	ALIVE	A	133	
20 May 2003 - Testlot 2 :								41 - Water temp=54.5F
L80	11:21	11:30	9	2	ALIVE	A	147	
L81	11:24	11:29	5	2	ALIVE	A	152	
L82	11:25	11:33	8	2	ALIVE	A	150	
L83	11:22	11:28	6	2	ALIVE	A	153	
L84	11:23	11:30	7	2	ALIVE	A	148	
L85	11:28	11:36	8	2	ALIVE	A	140	
L86	11:28	11:35	7	2	ALIVE	A	158	
L87	11:27	11:33	6	2	ALIVE	A	141	
L88	11:30	11:35	5	2	ALIVE	A	149	
L89	11:27	11:35	8	2	ALIVE	A	146	
L90	11:40	11:47	7	2	ALIVE	A	152	
L91	11:43	11:50	7	2	ALIVE	A	165	
L92	11:40	11:46	6	2	ALIVE	A	143	
L93	11:42	11:48	6	2	ALIVE	A	152	
L94	11:41	11:48	7	2	ALIVE	A	150	
L95	11:44	.	.	0	UNKNOWN	X	143	
L96	11:45	11:51	6	2	ALIVE	A	152	
L97	11:48	11:54	6	2	ALIVE	A	138	
L98	11:47	11:53	6	2	ALIVE	A	146	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
L99	11:46	11:54	8	2	ALIVE	A	154	
PM0	12:13	12:20	7	2	ALIVE	A	147	
PM1	12:14	12:23	9	2	ALIVE	A	130	
PM2	12:11	12:16	5	2	ALIVE	A	156	
PM3	12:12	12:17	5	2	ALIVE	A	156	
PM4	12:10	12:17	7	2	ALIVE	A	132	
PM5	12:18	12:24	6	2	ALIVE	A	138	
PM6	12:19	12:30	11	2	ALIVE	A	146	
PM7	12:17	12:29	12	2	ALIVE	A	145	
PM8	12:16	12:25	9	2	ALIVE	A	142	
PM9	12:16	12:22	6	2	ALIVE	A	146	
PN0	12:43	12:49	6	2	ALIVE	A	138	
PN1	12:42	12:48	6	2	ALIVE	A	146	
PN2	12:40	12:47	7	2	ALIVE	A	153	
PN3	12:41	12:50	9	2	ALIVE	A	158	
PN4	12:40	12:46	6	2	ALIVE	A	152	
PN5	12:46	12:51	5	2	ALIVE	A	145	
PN6	12:45	12:51	6	2	ALIVE	A	147	
PN7	12:50	12:55	5	2	ALIVE	A	153	
PN8	12:49	12:56	7	2	ALIVE	A	147	
PN9	12:48	12:54	6	2	ALIVE	A	132	
PP0	13:05	13:16	11	2	ALIVE	A	136	
PP1	13:04	13:08	4	2	ALIVE	A	153	
PP2	13:03	13:19	16	2	ALIVE	A	137	
PP3	13:07	13:11	4	2	ALIVE	A	148	
PP4	13:06	13:10	4	2	ALIVE	A	167	
PP5	13:13	13:19	6	2	ALIVE	A	137	
PP6	13:09	13:14	5	2	ALIVE	A	147	
PP7	13:12	13:17	5	2	ALIVE	A	147	
PP8	13:10	13:15	5	2	ALIVE	A	154	
PP9	13:12	13:20	8	2	ALIVE	A	151	
PR0	13:29	13:42	13	2	ALIVE	A	146	
PR1	13:30	13:46	16	2	ALIVE	A	143	
PR2	13:28	13:34	6	2	ALIVE	A	145	
PR3	13:27	13:37	10	2	ALIVE	A	156	
PR4	13:28	13:33	5	2	ALIVE	A	143	
PR5	13:34	13:42	8	2	ALIVE	A	132	
PR6	13:33	13:39	6	2	ALIVE	A	132	
PR7	13:35	13:41	6	2	ALIVE	A	137	
PR8	13:32	13:38	6	2	ALIVE	A	141	
PR9	13:32	13:47	15	2	ALIVE	A	145	
21 May 2003 - Testlot 3 : Control								- Water temp=55.4F
RM0	10:44	10:51	7	2	ALIVE	A	146	
RM1	10:44	10:59	15	2	ALIVE	A	146	
RM2	10:43	10:58	15	2	ALIVE	A	168	
RM3	10:42	10:57	15	2	ALIVE	A	141	
RM4	10:45	10:54	9	2	ALIVE	A	141	
RM5	10:39	10:59	20	2	ALIVE	A	137	
RM6	10:39	10:46	7	2	ALIVE	A	143	
RM7	10:41	10:48	7	2	ALIVE	A	146	
RM8	10:38	10:47	9	2	ALIVE	A	137	
RM9	10:40	10:53	13	2	ALIVE	A	142	
RN0	11:09	11:14	5	2	ALIVE	A	153	
RN1	11:08	11:15	7	2	ALIVE	A	143	
RN2	11:10	11:19	9	2	ALIVE	A	137	
RN3	11:07	11:19	12	2	ALIVE	A	140	
RN4	11:08	11:31	23	2	ALIVE	A	140	
RN5	11:14	11:25	11	2	ALIVE	A	146	
RN6	11:11	11:22	11	2	ALIVE	A	148	
RN7	11:11	11:25	14	2	ALIVE	A	148	
RN8	11:12	11:25	13	2	ALIVE	A	154	
RN9	11:13	11:29	16	2	ALIVE	A	143	
RP0	11:40	11:44	4	2	ALIVE	A	142	
RP1	11:39	11:49	10	2	ALIVE	A	152	
RP2	11:38	11:45	7	2	ALIVE	A	158	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RP3	11:40	11:52	12	2	ALIVE	A	142	
RP4	11:39	11:52	13	2	ALIVE	A	143	
RP5	11:42	11:48	6	2	ALIVE	A	142	
RP6	11:43	11:53	10	2	ALIVE	A	154	
RP7	11:43	11:51	8	2	ALIVE	A	143	
RP8	11:41	11:48	7	2	ALIVE	A	133	
RP9	11:44	11:55	11	2	ALIVE	A	134	
21 May 2003 - Testlot 3 :					21 - Water temp=55.4F			
RR0	12:13	12:19	6	2	ALIVE	A	128	
RR1	12:14	12:25	11	2	ALIVE	A	141	
RR2	12:13	12:18	5	2	ALIVE	A	147	
RR3	12:12	12:17	5	2	ALIVE	A	153	
RR4	12:15	12:23	8	2	ALIVE	A	133	
RR5	12:16	12:22	6	2	ALIVE	A	142	
RR6	12:10	12:24	14	2	ALIVE	G	145	
RR7	12:17	12:22	5	2	ALIVE	A	142	
RR8	12:20	12:27	7	2	ALIVE	A	135	
RR9	12:18	12:27	9	2	ALIVE	A	157	
RS0	12:41	12:47	6	2	ALIVE	A	132	
RS1	12:43	12:49	6	2	ALIVE	A	133	
RS2	12:44	12:49	5	2	ALIVE	A	145	
RS3	12:43	12:48	5	2	ALIVE	A	145	
RS4	12:40	12:45	5	2	ALIVE	A	157	
RS5	12:35	12:40	5	2	ALIVE	A	139	
RS6	12:34	12:40	6	2	ALIVE	A	156	
RS7	12:37	12:45	8	2	ALIVE	A	148	
RS8	12:38	12:43	5	2	ALIVE	A	154	
RS9	12:36	12:41	5	2	ALIVE	A	147	
RT0	13:07	13:14	7	2	ALIVE	A	146	
RT1	13:07	13:13	6	2	ALIVE	A	153	
RT2	13:00	13:06	6	2	ALIVE	A	137	
RT3	13:05	13:09	4	2	ALIVE	A	135	
RT4	13:06	13:11	5	2	ALIVE	A	151	
RT5	12:58	13:01	3	2	ALIVE	A	151	
RT6	12:58	13:02	4	2	ALIVE	A	150	
RT7	12:58	13:02	4	2	ALIVE	A	153	
RT8	12:56	13:00	4	2	ALIVE	A	142	
RT9	12:57	13:03	6	2	ALIVE	A	168	
21 May 2003 - Testlot 3 :					22 - Water temp=55.4F			
PW0	8:41	8:48	7	2	ALIVE	A	137	
PW1	8:42	8:47	5	2	ALIVE	A	131	
PW2	8:39	8:45	6	2	ALIVE	A	137	
PW3	8:40	8:47	7	2	ALIVE	A	156	
PW4	8:38	8:44	6	2	ALIVE	A	147	
PW5	8:46	8:52	6	2	ALIVE	A	143	
PW6	8:43	8:55	12	2	DEAD	GJH	138	
PW7	8:44	8:49	5	2	ALIVE	A	141	
PW8	8:46	8:51	5	2	ALIVE	A	145	
PW9	8:45	8:57	12	2	ALIVE	A	150	
PX0	9:02	9:08	6	2	ALIVE	A	146	
PX1	9:05	9:11	6	2	ALIVE	A	136	
PX2	9:01	9:07	6	2	ALIVE	A	146	
PX3	9:03	9:09	6	2	ALIVE	A	142	
PX4	9:04	9:18	14	2	ALIVE	A	140	
PX5	9:11	9:16	5	2	ALIVE	A	143	
PX6	9:12	9:19	7	2	ALIVE	A	156	
PX7	9:08	9:12	4	2	ALIVE	A	147	
PX8	9:10	9:19	9	2	ALIVE	A	148	
PX9	9:09	9:14	5	2	ALIVE	A	150	
PY0	9:29	9:35	6	2	ALIVE	A	137	
PY1	9:30	9:34	4	2	ALIVE	A	136	
PY2	9:31	9:37	6	2	ALIVE	A	136	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
PY3	9:28	9:33	5	2	ALIVE	A	143	
PY4	9:30	9:37	7	2	ALIVE	A	154	
PY5	9:35	9:38	3	2	ALIVE	A	141	
PY7	9:34	9:40	6	2	ALIVE	A	142	
PY8	9:33	9:38	5	2	ALIVE	A	137	
PY9	9:32	9:36	4	2	ALIVE	A	138	
PZ0	10:03	10:10	7	2	ALIVE	A	136	
PZ1	10:04	10:10	6	2	ALIVE	A	150	
PZ2	10:01	10:07	6	2	ALIVE	A	151	
PZ3	10:05	10:11	6	2	ALIVE	A	138	
PZ4	10:04	10:13	9	2	ALIVE	A	140	
PZ5	10:12	10:20	8	2	ALIVE	A	146	
PZ6	10:10	10:17	7	2	ALIVE	A	136	
PZ7	10:09	10:21	12	2	ALIVE	A	149	
PZ8	10:11	10:20	9	2	ALIVE	A	138	
PZ9	10:08	10:18	10	2	ALIVE	A	136	
21 May 2003 - Testlot 3 :								23 - Water temp=55.4F
RX0	15:12	15:25	13	2	ALIVE	A	132	
RX1	15:13	15:21	8	2	ALIVE	A	144	
RX2	15:14	15:21	7	2	ALIVE	A	138	
RX3	15:12	15:15	3	2	ALIVE	A	147	
RX4	15:13	15:20	7	2	ALIVE	A	150	
RX5	15:09	15:14	5	2	ALIVE	A	148	
RX6	15:10	15:18	8	2	ALIVE	A	143	
RX7	15:10	15:16	6	2	ALIVE	A	126	
RX8	15:08	15:12	4	2	ALIVE	A	140	
RX9	15:08	15:13	5	2	ALIVE	A	141	
RY0	15:36	15:43	7	2	ALIVE	A	142	
RY1	15:33	15:37	4	2	ALIVE	A	151	
RY3	15:35	15:43	8	2	ALIVE	A	137	
RY4	15:34	15:38	4	2	ALIVE	A	153	
RY5	15:34	15:38	4	2	ALIVE	A	163	
RY6	15:30	15:36	6	2	ALIVE	A	156	
RY7	15:31	15:35	4	2	ALIVE	A	145	
RY8	15:31	15:35	4	2	ALIVE	A	136	
RY9	15:31	15:36	5	2	ALIVE	A	150	
RZ0	15:54	16:05	11	2	ALIVE	A	135	
RZ1	15:55	16:00	5	2	ALIVE	A	154	
RZ2	15:56	16:01	5	2	ALIVE	A	148	
RZ3	15:56	16:01	5	2	ALIVE	A	146	
RZ4	15:54	15:58	4	2	ALIVE	A	140	
RZ5	15:50	15:56	6	2	ALIVE	A	152	
RZ6	15:51	15:55	4	1	ALIVE	BH	150	
RZ7	15:51	15:57	6	2	ALIVE	A	128	
RZ8	15:52	15:57	5	2	ALIVE	A	138	
RZ9	15:52	15:57	5	2	ALIVE	A	146	
ZZ7	15:32	15:36	4	2	ALIVE	A	150	
21 May 2003 - Testlot 3 :								24 - Water temp=55.4F
RU0	13:53	13:59	6	2	ALIVE	A	142	
RU1	13:55	14:02	7	2	ALIVE	A	152	
RU2	13:56	14:02	6	2	ALIVE	A	147	
RU3	13:54	14:01	7	2	ALIVE	A	173	
RU4	13:52	13:57	5	2	ALIVE	A	143	
RU5	14:01	14:06	5	2	ALIVE	A	150	
RU6	13:59	14:08	9	2	ALIVE	A	146	
RU7	13:57	14:07	10	2	ALIVE	A	148	
RU8	14:00	14:08	8	2	ALIVE	A	139	
RU9	13:58	14:04	6	2	ALIVE	A	137	
RV0	14:17	14:22	5	2	ALIVE	A	142	
RV1	14:17	14:23	6	2	ALIVE	A	147	
RV2	14:14	14:19	5	2	ALIVE	A	137	
RV3	14:15	14:23	8	2	ALIVE	A	157	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RV4	14:16	14:27	11	2	ALIVE	CH	146	
RV5	14:20	14:27	7	2	ALIVE	A	148	
RV6	14:21	14:27	6	2	ALIVE	A	147	
RV7	14:22	14:30	8	2	ALIVE	A	150	
RV8	14:19	14:25	6	2	ALIVE	A	155	
RV9	14:19	14:33	14	2	ALIVE	A	138	
RW0	14:39	14:44	5	2	ALIVE	A	133	
RW1	14:38	14:42	4	2	ALIVE	A	135	
RW2	14:39	14:43	4	2	ALIVE	A	132	
RW3	14:40	14:45	5	2	ALIVE	A	139	
RW4	14:37	14:46	9	2	ALIVE	A	145	
RW5	14:42	14:52	10	2	ALIVE	A	151	
RW6	14:44	14:52	8	2	ALIVE	A	140	
RW7	14:44	14:52	8	2	ALIVE	A	135	
RW8	14:43	14:49	6	2	ALIVE	A	144	
RW9	14:41	14:51	10	2	ALIVE	A	158	
22 May 2003 - Testlot 4 : Control								- Water temp=55.4F
SA0	8:23	8:43	20	2	ALIVE	A	146	
SA1	8:18	8:38	20	2	ALIVE	A	151	
SA2	8:20	8:39	19	2	ALIVE	A	146	
SA3	8:21	8:41	20	2	ALIVE	A	153	
SA4	8:18	8:34	16	2	ALIVE	A	145	
SA5	8:33	8:49	16	2	ALIVE	A	146	
SA6	8:35	8:54	19	2	ALIVE	A	146	
SA7	8:34	8:52	18	2	ALIVE	A	138	
SA8	8:34	8:50	16	2	ALIVE	A	138	
SA9	8:36	8:49	13	2	ALIVE	A	138	
SB0	9:01	9:19	18	2	ALIVE	A	143	
SB1	9:00	9:28	28	2	ALIVE	A	132	
SB2	9:01	9:16	15	2	ALIVE	A	134	
SB3	9:02	9:23	21	2	ALIVE	A	156	
SB4	8:59	9:09	10	2	ALIVE	A	137	
SB5	9:05	9:24	19	2	ALIVE	A	147	
SB6	9:06	9:21	15	2	ALIVE	A	152	
SB7	9:06	9:26	20	2	ALIVE	A	143	
SB8	9:05	.	.	0	DEAD	ZL	144	
SB9	9:04	9:20	16	2	ALIVE	A	145	
SC0	9:52	10:09	17	2	ALIVE	A	150	
SC1	9:51	.	.	0	DEAD	ZL	143	
SC2	9:51	.	.	0	DEAD	ZL	146	
SC3	9:50	10:00	10	2	ALIVE	A	146	
SC4	9:53	10:01	8	2	ALIVE	A	135	
SC5	9:55	10:03	8	2	ALIVE	A	153	
SC6	9:56	10:06	10	2	ALIVE	A	145	
SC7	9:54	10:09	15	2	ALIVE	A	151	
SC8	9:54	10:02	8	2	ALIVE	A	153	
SC9	9:56	10:12	16	2	ALIVE	A	149	
SD0	10:43	10:50	7	2	ALIVE	A	150	
SD1	10:45	10:52	7	2	ALIVE	A	148	
SD2	10:44	10:50	6	2	ALIVE	A	138	
SD3	10:44	10:51	7	2	ALIVE	A	150	
SD4	10:42	10:48	6	2	ALIVE	A	152	
SD5	10:38	10:45	7	2	ALIVE	A	136	
SD6	10:39	10:44	5	2	ALIVE	A	142	
SD7	10:40	10:45	5	2	ALIVE	A	166	
SD8	10:37	10:45	8	2	ALIVE	A	140	
SD9	10:41	10:47	6	2	ALIVE	A	153	
22 May 2003 - Testlot 4 :								21 - Water temp=55.4F
SS0	16:00	16:04	4	2	ALIVE	A	150	
SS1	16:01	16:08	7	2	ALIVE	A	143	
SS2	16:03	16:11	8	2	ALIVE	A	144	
SS3	16:03	16:14	11	2	ALIVE	A	148	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
SS4	16:02	16:08	6	2	ALIVE	A	155	
SS5	16:21	16:33	12	2	ALIVE	A	158	
SS6	16:20	16:26	6	2	ALIVE	A	153	
SS7	16:23	16:30	7	2	ALIVE	A	153	
SS8	16:22	16:28	6	2	ALIVE	A	149	
SS9	16:23	16:27	4	2	ALIVE	A	147	
ST0	15:57	16:02	5	2	ALIVE	A	140	
ST1	15:55	16:04	9	2	ALIVE	A	138	
ST2	15:58	16:06	8	2	ALIVE	A	130	
ST3	15:57	16:02	5	2	ALIVE	A	147	
ST4	15:56	16:00	4	2	ALIVE	A	135	
ST5	16:27	16:33	6	2	ALIVE	A	146	
ST6	16:26	16:36	10	2	ALIVE	A	143	
ST7	16:28	16:35	7	2	ALIVE	A	142	
ST8	16:29	16:33	4	2	ALIVE	A	143	
ST9	16:25	16:30	5	2	ALIVE	A	162	
SU0	16:40	16:46	6	2	ALIVE	A	134	
SU1	16:42	16:47	5	2	ALIVE	A	141	
SU2	16:42	16:49	7	2	ALIVE	A	131	
SU3	16:41	16:46	5	2	ALIVE	A	147	
SU4	16:41	16:47	6	2	ALIVE	A	151	
SU5	16:47	16:53	6	2	ALIVE	A	163	
SU6	16:45	16:51	6	2	ALIVE	A	136	
SU8	16:44	16:54	10	2	ALIVE	A	150	
SU9	16:46	16:51	5	2	ALIVE	A	146	

22 May 2003 - Testlot 4 :

22 - Water temp=55.4F

SE0	11:08	11:14	6	2	ALIVE	A	145	
SE1	11:05	11:11	6	2	ALIVE	A	147	
SE2	11:06	11:12	6	2	ALIVE	A	148	
SE4	11:07	11:14	7	2	ALIVE	A	145	
SE5	11:12	11:17	5	2	ALIVE	A	153	
SE6	11:13	11:18	5	2	ALIVE	A	140	
SE7	11:10	11:15	5	2	ALIVE	A	159	
SE8	11:11	11:17	6	2	ALIVE	A	159	
SE9	11:14	11:19	5	2	ALIVE	A	140	
SF0	11:26	11:34	8	2	ALIVE	A	141	
SF1	11:25	11:33	8	2	ALIVE	A	148	
SF2	11:25	11:31	6	2	ALIVE	A	161	
SF3	11:27	11:32	5	2	ALIVE	A	142	
SF4	11:28	11:34	6	2	ALIVE	A	143	
SF5	11:30	11:39	9	2	ALIVE	A	154	
SF6	11:29	11:36	7	2	ALIVE	A	151	
SF7	11:31	11:36	5	2	ALIVE	A	153	
SF8	11:30	11:36	6	2	ALIVE	A	160	
SF9	11:32	11:38	6	2	ALIVE	A	145	
SH0	11:46	11:51	5	2	ALIVE	A	138	
SH1	11:45	11:53	8	2	ALIVE	A	153	
SH2	11:43	11:50	7	2	ALIVE	A	147	
SH3	11:45	11:51	6	2	ALIVE	A	143	
SH4	11:44	11:51	7	2	ALIVE	A	166	
SH5	11:49	12:01	12	2	ALIVE	A	138	
SH6	11:50	11:57	7	2	ALIVE	A	140	
SH7	11:50	11:58	8	2	ALIVE	A	127	
SH8	11:47	11:54	7	2	ALIVE	A	131	
SH9	11:48	11:56	8	2	ALIVE	A	142	
ZZ8	11:09	11:14	5	2	ALIVE	A	142	

22 May 2003 - Testlot 4 :

41 - Water temp=55.4F

SM0	13:48	13:53	5	2	ALIVE	A	140	
SM1	13:46	13:57	11	2	ALIVE	A	138	
SM2	13:45	13:52	7	2	ALIVE	A	138	
SM3	13:47	14:05	18	2	ALIVE	A	150	
SM4	13:49	13:59	10	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
SM5	13:51	14:00	9	2	ALIVE	A	145	
SM6	13:50	14:03	13	2	ALIVE	A	142	
SM7	13:54	14:00	6	2	ALIVE	A	147	
SM8	13:53	14:08	15	2	ALIVE	A	138	
SM9	13:52	14:03	11	2	ALIVE	A	146	
SN0	14:22	14:29	7	2	ALIVE	A	135	
SN1	14:20	14:31	11	2	ALIVE	A	130	
SN2	14:23	14:31	8	2	ALIVE	A	145	
SN3	14:23	14:43	20	2	ALIVE	A	148	
SN4	14:21	14:27	6	2	ALIVE	A	147	
SN5	14:27	14:34	7	2	ALIVE	A	146	
SN6	14:25	14:37	12	2	ALIVE	A	145	
SN7	14:28	14:40	12	2	ALIVE	A	141	
SN8	14:27	14:40	13	2	ALIVE	A	133	
SN9	14:26	14:32	6	2	ALIVE	A	143	
SP0	14:54	15:01	7	2	ALIVE	A	150	
SP1	14:52	14:58	6	2	ALIVE	A	146	
SP2	14:51	15:00	9	2	ALIVE	A	140	
SP3	14:54	15:01	7	2	ALIVE	A	150	
SP4	14:50	15:00	10	2	ALIVE	A	147	
SP5	14:59	15:07	8	2	ALIVE	A	144	
SP6	14:57	15:05	8	2	ALIVE	A	136	
SP7	14:56	15:02	6	2	ALIVE	A	174	
SP8	15:00	15:12	12	2	ALIVE	A	152	
SP9	14:57	15:04	7	2	ALIVE	A	138	
SR0	15:17	15:22	5	2	ALIVE	A	143	
SR1	15:18	15:25	7	2	ALIVE	A	135	
SR2	15:20	15:28	8	2	ALIVE	A	133	
SR3	15:19	15:25	6	2	ALIVE	A	144	
SR4	15:27	15:34	7	2	ALIVE	A	142	
SR5	15:25	15:31	6	2	ALIVE	A	146	
SR6	15:22	15:31	9	2	ALIVE	A	138	
SR7	15:23	15:34	11	2	ALIVE	A	162	
SR8	15:24	15:41	17	2	ALIVE	A	144	
SR9	15:21	15:29	8	2	ALIVE	A	149	
22 May 2003 - Testlot 4 :								42 - Water temp=55.4F
SJ0	12:22	12:27	5	2	ALIVE	A	142	
SJ1	12:19	12:31	12	2	ALIVE	A	140	
SJ2	12:19	12:24	5	2	ALIVE	A	158	
SJ3	12:20	12:26	6	2	ALIVE	A	143	
SJ4	12:21	12:26	5	2	ALIVE	G	148	
SJ5	12:25	12:30	5	2	ALIVE	A	152	
SJ6	12:24	12:34	10	2	ALIVE	A	145	
SJ7	12:24	12:32	8	2	ALIVE	A	145	
SJ8	12:23	12:30	7	2	ALIVE	A	155	
SJ9	12:26	12:35	9	2	ALIVE	A	168	
SK0	12:47	12:52	5	2	ALIVE	A	148	
SK1	12:45	12:54	9	2	ALIVE	A	137	
SK2	12:44	12:56	12	2	ALIVE	A	147	
SK3	12:45	12:55	10	2	ALIVE	A	140	
SK4	12:46	12:56	10	2	ALIVE	A	147	
SK5	12:49	12:55	6	2	ALIVE	A	140	
SK6	12:51	13:02	11	2	ALIVE	A	155	
SK7	12:50	12:56	6	2	ALIVE	A	147	
SK8	12:50	12:58	8	2	ALIVE	A	156	
SK9	12:52	12:58	6	2	ALIVE	A	165	
SL0	13:13	13:22	9	2	ALIVE	A	156	
SL1	13:13	13:21	8	2	ALIVE	A	140	
SL2	13:11	13:19	8	2	ALIVE	A	144	
SL3	13:10	13:24	14	2	ALIVE	A	148	
SL4	13:11	13:26	15	2	ALIVE	A	163	
SL5	13:16	13:27	11	2	ALIVE	A	152	
SL6	13:17	13:29	12	2	ALIVE	A	137	
SL7	13:18	13:26	8	2	ALIVE	A	149	
SL8	13:16	13:33	17	2	ALIVE	A	151	
SL9	13:15	13:26	11	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
23 May 2003 - Testlot 5 :								- Water temp=
TV5	.	14:45	.	2	ALIVE	G	.	
23 May 2003 - Testlot 5 : Control								- Water temp=56.3F
TX0	15:47	15:56	9	2	ALIVE	A	138	
TX1	15:46	15:59	13	2	ALIVE	A	148	
TX2	15:48	15:54	6	2	ALIVE	A	143	
TX3	15:47	15:52	5	2	ALIVE	A	150	
TX4	15:48	15:53	5	2	ALIVE	A	143	
TX5	15:50	15:56	6	2	ALIVE	A	141	
TX6	15:51	15:59	8	2	ALIVE	A	145	
TX7	15:53	16:00	7	2	ALIVE	A	152	
TX8	15:52	15:58	6	2	ALIVE	A	161	
TX9	15:49	15:55	6	2	ALIVE	A	143	
TY0	16:08	16:23	15	2	ALIVE	A	135	
TY1	16:07	16:13	6	2	ALIVE	A	150	
TY2	16:09	16:16	7	2	ALIVE	A	147	
TY3	16:09	16:15	6	2	ALIVE	A	131	
TY4	16:10	16:19	9	2	ALIVE	A	135	
TY5	16:10	16:16	6	2	ALIVE	A	142	
TY6	16:13	16:20	7	2	ALIVE	A	140	
TY7	16:12	16:16	4	2	ALIVE	A	145	
TY8	16:11	16:17	6	2	ALIVE	A	137	
TY9	16:12	16:18	6	2	ALIVE	A	152	
TZ0	16:36	16:43	7	2	ALIVE	A	148	
TZ1	16:39	16:44	5	2	ALIVE	A	132	
TZ2	16:38	16:45	7	2	ALIVE	A	149	
TZ3	16:36	16:41	5	2	ALIVE	A	139	
TZ4	16:38	16:44	6	2	ALIVE	A	140	
TZ5	16:41	16:50	9	2	ALIVE	A	136	
TZ6	16:42	16:51	9	2	ALIVE	A	145	
TZ7	16:41	16:46	5	2	ALIVE	A	141	
TZ8	16:40	16:48	8	2	ALIVE	A	157	
TZ9	16:43	16:47	4	2	ALIVE	A	139	
UA0	17:04	17:09	5	2	ALIVE	A	145	
UA1	17:03	17:08	5	2	ALIVE	A	137	
UA2	17:03	17:09	6	2	ALIVE	A	138	
UA3	17:02	17:10	8	2	ALIVE	A	135	
UA4	17:05	17:09	4	2	ALIVE	A	144	
UA5	17:08	17:13	5	2	ALIVE	A	140	
UA6	17:08	17:14	6	2	ALIVE	A	165	
UA7	17:06	17:10	4	2	ALIVE	A	150	
UA8	17:07	17:14	7	2	ALIVE	A	141	
UA9	17:06	17:13	7	2	ALIVE	A	147	
23 May 2003 - Testlot 5 :								23 - Water temp=56.3F
SZ0	10:30	10:42	12	2	ALIVE	A	134	
SZ1	10:28	10:38	10	2	ALIVE	A	137	
SZ2	10:28	10:35	7	2	ALIVE	A	148	
SZ3	10:30	10:39	9	2	ALIVE	A	151	
SZ4	10:29	10:45	16	2	ALIVE	GH	167	
SZ5	10:32	10:42	10	2	ALIVE	A	148	
SZ6	10:31	10:44	13	2	ALIVE	A	150	
SZ7	10:33	10:46	13	2	ALIVE	A	146	
SZ8	10:33	10:48	15	2	ALIVE	A	155	
SZ9	10:34	10:43	9	2	ALIVE	A	143	
TN0	10:54	10:59	5	2	ALIVE	A	142	
TN1	10:51	11:00	9	2	ALIVE	A	148	
TN2	10:53	11:02	9	2	ALIVE	A	130	
TN3	10:54	11:03	9	2	ALIVE	A	143	
TN4	10:52	11:03	11	2	ALIVE	A	137	
TN5	10:57	11:04	7	2	ALIVE	A	143	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
TN6	10:57	11:07	10	2	ALIVE	A	138	
TN7	10:56	11:04	8	2	ALIVE	A	146	
TN8	10:59	11:05	6	2	ALIVE	A	152	
TN9	10:55	11:03	8	2	ALIVE	A	138	
TP0	11:24	11:31	7	2	ALIVE	A	137	
TP1	11:25	11:31	6	2	ALIVE	A	143	
TP2	11:23	11:31	8	2	ALIVE	A	145	
TP3	11:26	11:35	9	2	ALIVE	A	145	
TP4	11:26	11:32	6	2	ALIVE	A	146	
TP5	11:30	11:39	9	2	ALIVE	A	152	
TP6	11:31	11:34	3	2	ALIVE	A	138	
TP7	11:27	11:38	11	2	ALIVE	A	141	
TP8	11:31	11:39	8	2	ALIVE	A	145	
TP9	11:29	11:35	6	2	ALIVE	A	157	
TR0	11:47	11:57	10	2	ALIVE	A	143	
TR1	11:48	11:53	5	2	ALIVE	A	132	
TR2	11:46	11:51	5	2	ALIVE	A	136	
TR3	11:44	11:51	7	2	ALIVE	A	155	
TR4	11:45	11:57	12	2	ALIVE	A	153	
TR5	11:49	11:58	9	2	ALIVE	A	157	
TR6	11:48	11:58	10	2	ALIVE	A	145	
TR7	11:50	11:58	8	2	ALIVE	A	140	
TR8	11:49	11:59	10	2	ALIVE	A	143	
TR9	11:51	11:59	8	2	ALIVE	A	148	

23 May 2003 - Testlot 5 :

41 - Water temp=56.3F

SV0	8:21	8:32	11	2	ALIVE	A	136	
SV1	8:21	8:25	4	2	ALIVE	A	140	
SV2	8:22	8:35	13	2	ALIVE	A	152	
SV3	8:22	8:36	14	2	ALIVE	A	153	
SV4	8:23	8:30	7	2	ALIVE	A	152	
SV5	8:26	8:50	24	2	ALIVE	A	140	
SV6	8:26	8:39	13	2	ALIVE	A	153	
SV7	8:24	8:37	13	2	ALIVE	A	146	
SV8	8:27	8:39	12	2	ALIVE	A	160	
SV9	8:25	8:33	8	2	ALIVE	A	148	
SW0	8:53	9:04	11	2	ALIVE	A	132	
SW1	8:54	9:03	9	2	ALIVE	A	150	
SW2	8:52	9:04	12	2	ALIVE	A	157	
SW3	8:54	9:08	14	2	ALIVE	A	152	
SW4	8:55	9:01	6	2	ALIVE	A	132	
SW5	8:58	9:06	8	2	ALIVE	A	160	
SW6	8:57	9:09	12	2	ALIVE	A	138	
SW7	8:56	9:10	14	2	ALIVE	A	155	
SW8	8:57	9:04	7	2	ALIVE	A	142	
SW9	8:59	9:11	12	2	ALIVE	A	145	
SX0	9:20	9:31	11	2	ALIVE	A	131	
SX1	9:20	9:28	8	2	ALIVE	A	140	
SX2	9:18	9:27	9	2	ALIVE	A	136	
SX3	9:19	9:29	10	2	ALIVE	A	138	
SX4	9:21	9:33	12	2	ALIVE	A	142	
SX5	9:25	9:33	8	2	ALIVE	A	135	
SX6	9:24	9:39	15	2	ALIVE	A	140	
SX7	9:25	9:38	13	2	ALIVE	A	165	
SX8	9:23	9:29	6	2	ALIVE	A	168	
SX9	9:22	9:32	10	2	ALIVE	A	148	
SY0	9:47	10:00	13	2	ALIVE	A	134	
SY1	9:48	10:01	13	2	ALIVE	A	151	
SY2	9:49	9:55	6	2	ALIVE	A	143	
SY3	9:46	11:22	96	2	ALIVE	A	148	
SY4	9:47	9:54	7	2	ALIVE	A	160	
SY5	9:52	10:09	17	2	ALIVE	A	137	
SY6	9:50	9:57	7	2	ALIVE	A	157	
SY7	9:54	10:09	15	2	ALIVE	A	141	
SY8	9:51	9:58	7	2	ALIVE	A	142	
SY9	9:53	10:07	14	2	ALIVE	A	167	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
23 May 2003 - Testlot 5 :				42 - Water temp=56.3F				
TS0	12:15	12:21	6	2	ALIVE	A	156	
TS2	12:15	12:20	5	2	ALIVE	A	137	
TS3	12:17	12:22	5	2	ALIVE	A	151	
TS4	12:16	12:21	5	2	ALIVE	A	151	
TS5	12:20	12:25	5	2	ALIVE	A	153	
TS6	12:21	12:27	6	2	ALIVE	A	156	
TS7	12:20	12:26	6	2	ALIVE	A	160	
TS8	12:19	12:36	17	2	ALIVE	A	156	
TS9	12:18	12:25	7	2	ALIVE	A	148	
TT0	13:00	13:13	13	2	ALIVE	A	150	
TT1	13:01	13:07	6	2	ALIVE	A	147	
TT2	13:02	13:21	19	2	ALIVE	A	151	
TT3	13:00	13:18	18	2	ALIVE	A	153	
TT4	12:59	13:10	11	2	ALIVE	A	144	
TT5	13:06	13:14	8	2	ALIVE	A	151	
TT6	13:08	13:17	9	2	ALIVE	A	140	
TT7	13:06	13:20	14	2	ALIVE	H	130	
TT8	13:09	13:17	8	2	ALIVE	A	147	
TT9	13:07	13:12	5	2	ALIVE	A	153	
TU0	13:34	13:41	7	2	ALIVE	A	156	
TU1	13:36	13:42	6	2	ALIVE	A	151	
TU2	13:33	13:40	7	2	ALIVE	A	141	
TU3	13:35	13:46	11	1	ALIVE	B	145	
TU4	13:37	13:44	7	2	ALIVE	A	168	
TU5	13:38	13:46	8	2	ALIVE	A	148	
TU6	13:40	13:49	9	2	ALIVE	A	151	
TU7	13:41	13:46	5	2	ALIVE	A	132	
TU8	13:39	13:44	5	2	ALIVE	A	153	
TU9	13:39	.	.	0	DEAD	ZL	145	
TV0	14:10	14:18	8	2	ALIVE	A	145	
TV1	14:10	14:17	7	2	ALIVE	A	138	
TV2	14:11	14:18	7	2	ALIVE	A	138	
TV3	14:08	14:14	6	2	ALIVE	A	154	
TV4	14:09	14:21	12	2	ALIVE	A	158	
TV5	14:25	.	.	.	UNKNOWN		145	
TV6	14:27	.	.	0	TAG & PIN		146	
TV7	14:25	14:32	7	2	ALIVE	A	147	
TV8	14:26	14:32	6	2	ALIVE	A	156	
TV9	14:24	14:30	6	2	ALIVE	A	150	
TW0	14:55	15:07	12	2	ALIVE	A	148	
TW1	14:54	15:05	11	2	ALIVE	A	161	
TW2	14:52	15:01	9	2	ALIVE	A	149	
TW3	14:53	15:06	13	2	ALIVE	A	166	
TW4	14:54	.	.	0	TAG & PIN		148	
TW5	15:10	15:17	7	2	ALIVE	A	157	
TW6	15:09	15:15	6	2	ALIVE	A	160	
TW7	15:13	15:19	6	2	ALIVE	A	157	
TW8	15:11	15:23	12	2	ALIVE	A	160	
TW9	15:12	15:21	9	2	ALIVE	A	143	
24 May 2003 - Testlot 6 : Control				- Water temp=57.2F				
UT0	15:47	15:57	10	2	ALIVE	A	143	
UT1	15:49	15:55	6	2	ALIVE	A	142	
UT2	15:49	15:56	7	2	ALIVE	A	137	
UT3	15:47	15:52	5	2	ALIVE	A	138	
UT4	15:48	15:53	5	2	ALIVE	A	142	
UT5	15:45	15:54	9	2	ALIVE	A	143	
UT6	15:44	15:49	5	2	ALIVE	A	145	
UT7	15:45	15:50	5	2	DEAD	JHP	145	
UT8	15:44	15:52	8	2	ALIVE	A	156	
UT9	15:33	15:42	9	2	ALIVE	A	153	
UU0	16:05	16:10	5	2	ALIVE	A	143	
UU1	16:06	16:11	5	2	ALIVE	A	146	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
UU2	16:05	16:09	4	2	ALIVE	A	145	
UU3	16:04	16:08	4	2	ALIVE	A	152	
UU4	16:04	16:10	6	2	ALIVE	A	154	
UU5	16:13	16:18	5	2	ALIVE	A	160	
UU6	16:12	16:20	8	2	ALIVE	A	142	
UU7	16:12	16:22	10	2	ALIVE	A	152	
UU8	16:14	16:18	4	2	ALIVE	A	153	
UU9	16:13	16:23	10	2	ALIVE	A	151	
UV0	16:28	16:32	4	2	ALIVE	A	148	
UV1	16:28	16:34	6	2	ALIVE	A	145	
UV2	16:29	16:34	5	2	ALIVE	A	147	
UV3	16:27	16:31	4	2	ALIVE	A	147	
UV4	16:30	16:35	5	2	ALIVE	A	135	
UV5	16:31	16:35	4	2	ALIVE	A	162	
UV6	16:32	16:42	10	2	ALIVE	A	134	
UV7	16:32	16:36	4	2	ALIVE	A	143	
UV8	16:33	16:39	6	2	ALIVE	A	150	
UV9	16:31	16:36	5	2	ALIVE	A	141	
24 May 2003 - Testlot 6 :					24 - Water temp=57.2F			
UB0	8:10	8:18	8	2	ALIVE	A	142	
UB1	8:09	8:15	6	2	ALIVE	A	151	
UB2	8:10	8:21	11	2	ALIVE	A	156	
UB3	8:11	8:22	11	2	ALIVE	A	143	
UB4	8:09	8:14	5	2	ALIVE	A	140	
UB5	8:12	8:19	7	2	ALIVE	A	163	
UB6	8:13	8:21	8	2	ALIVE	A	154	
UB7	8:14	8:23	9	2	ALIVE	A	162	
UB8	8:13	8:18	5	2	ALIVE	A	143	
UB9	8:14	8:21	7	2	ALIVE	A	145	
UC0	8:28	8:34	6	2	ALIVE	A	146	
UC1	8:30	8:37	7	2	ALIVE	A	146	
UC2	8:28	8:35	7	2	ALIVE	A	148	
UC3	8:29	8:36	7	2	ALIVE	A	150	
UC4	8:29	8:35	6	2	ALIVE	A	141	
UC5	8:31	8:42	11	2	ALIVE	A	145	
UC6	8:34	8:40	6	2	ALIVE	A	142	
UC7	8:33	8:38	5	2	ALIVE	A	153	
UC8	8:33	.	.	0	DEAD	ZL	153	
UC9	8:32	8:37	5	2	ALIVE	A	150	
UD0	9:00	9:06	6	2	ALIVE	A	146	
UD1	9:00	9:06	6	2	ALIVE	A	154	
UD2	8:59	9:05	6	2	ALIVE	A	142	
UD3	9:01	9:11	10	2	ALIVE	A	160	
UD4	9:01	9:08	7	2	ALIVE	A	153	
UD5	9:03	9:09	6	2	ALIVE	A	148	
UD6	9:05	9:15	10	2	ALIVE	A	142	
UD7	9:03	9:09	6	2	ALIVE	A	148	
UD8	9:05	9:12	7	2	ALIVE	A	140	
UD9	9:04	9:10	6	2	ALIVE	A	145	
UE0	9:26	9:33	7	2	ALIVE	A	148	
UE1	9:27	9:35	8	2	ALIVE	A	149	
UE2	9:27	9:32	5	2	ALIVE	A	147	
UE3	9:25	9:31	6	2	ALIVE	A	153	
UE4	9:26	9:31	5	2	ALIVE	A	148	
UE5	9:22	9:29	7	2	DEAD	JHE	142	
UE6	9:23	9:35	12	2	ALIVE	A	152	
UE7	9:24	9:32	8	2	ALIVE	A	147	
UE8	9:23	.	.	0	UNKNOWN	X	128	
UE9	9:21	9:27	6	2	ALIVE	A	137	
24 May 2003 - Testlot 6 :					41 - Water temp=57.2F			
UM0	12:28	12:35	7	2	ALIVE	A	142	
UM1	12:26	12:33	7	2	ALIVE	A	147	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
UM4	12:29	12:48	19	2	ALIVE	A	152	
UM5	12:31	12:58	27	2	ALIVE	A	145	
UM6	12:31	12:44	13	2	ALIVE	A	148	
UM7	12:32	12:40	8	2	ALIVE	A	137	
UM8	12:32	12:38	6	2	ALIVE	A	132	
UM9	12:30	12:36	6	2	ALIVE	A	138	
UN0	13:41	13:46	5	2	ALIVE	A	156	
UN1	13:42	13:50	8	2	ALIVE	A	146	
UN2	13:40	13:53	13	2	ALIVE	A	133	
UN3	13:43	13:48	5	2	ALIVE	A	151	
UN4	13:40	13:48	8	2	ALIVE	A	148	
UN5	13:46	13:56	10	2	ALIVE	A	147	
UN6	13:44	13:58	14	2	ALIVE	A	152	
UN7	13:45	13:56	11	2	ALIVE	A	132	
UN8	13:45	13:53	8	2	ALIVE	A	145	
UN9	13:46	13:52	6	2	ALIVE	A	146	
UP0	14:10	14:16	6	2	ALIVE	A	139	
UP1	14:12	14:18	6	2	ALIVE	A	150	
UP2	14:11	14:18	7	2	ALIVE	A	142	
UP3	14:12	14:23	11	2	ALIVE	A	146	
UP4	14:11	14:19	8	2	DEAD	GJ	161	
UP5	14:14	14:20	6	2	ALIVE	A	135	
UP6	14:16	14:22	6	2	ALIVE	A	142	
UP7	14:14	14:20	6	2	ALIVE	A	145	
UP8	14:15	14:28	13	2	ALIVE	A	152	
UP9	14:17	14:22	5	2	ALIVE	A	135	
UR0	14:37	14:43	6	2	ALIVE	A	156	
UR1	14:39	14:45	6	2	ALIVE	A	148	
UR2	14:36	14:51	15	2	ALIVE	A	138	
UR3	14:38	14:56	18	2	ALIVE	A	136	
UR4	14:37	14:45	8	2	ALIVE	A	152	
UR5	14:42	14:51	9	2	ALIVE	A	156	
UR6	14:41	14:57	16	2	ALIVE	A	151	
UR7	14:40	14:46	6	2	ALIVE	A	151	
UR8	14:40	14:46	6	2	ALIVE	A	142	
UR9	14:42	14:48	6	2	ALIVE	A	146	
US0	15:04	15:13	9	2	ALIVE	A	160	
US1	15:03	15:07	4	2	ALIVE	A	156	
US2	15:04	15:11	7	2	ALIVE	A	162	
US3	15:03	15:09	6	2	ALIVE	A	147	
US4	15:05	15:11	6	2	ALIVE	A	148	
US5	15:09	15:20	11	2	ALIVE	A	166	
US6	15:08	15:13	5	2	ALIVE	A	147	
US7	15:06	15:15	9	2	ALIVE	A	143	
US8	15:07	15:16	9	2	ALIVE	A	144	
US9	15:07	15:15	8	2	ALIVE	A	145	

24 May 2003 - Testlot 6 :

42 - Water temp=57.2F

UF0	9:59	10:06	7	2	ALIVE	A	139	
UF1	9:59	10:06	7	2	ALIVE	A	147	
UF2	10:01	10:10	9	2	ALIVE	A	147	
UF3	10:00	10:05	5	2	ALIVE	A	145	
UF4	10:01	10:10	9	2	ALIVE	A	143	
UF5	9:56	10:00	4	2	ALIVE	A	135	
UF6	9:55	10:04	9	2	ALIVE	A	138	
UF7	9:54	9:58	4	2	ALIVE	A	150	
UF8	9:56	10:03	7	2	ALIVE	A	128	
UF9	9:57	10:06	9	2	ALIVE	A	138	
UH0	10:41	10:47	6	2	ALIVE	A	143	
UH1	10:41	10:49	8	2	DEAD	JNH	156	
UH2	10:40	10:44	4	2	ALIVE	A	143	
UH3	10:42	10:54	12	2	ALIVE	A	156	
UH4	10:42	10:46	4	2	ALIVE	A	155	
UH5	10:44	10:49	5	2	ALIVE	A	150	
UH6	10:46	10:50	4	2	ALIVE	A	145	
UH7	10:45	10:58	13	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
UH8	10:46	10:57	11	2	ALIVE	A	151	
UH9	10:43	10:49	6	2	ALIVE	A	158	
UJ0	11:11	11:16	5	2	ALIVE	A	146	
UJ1	11:11	11:18	7	2	ALIVE	A	143	
UJ2	11:10	11:20	10	2	ALIVE	A	143	
UJ3	11:10	11:16	6	2	ALIVE	A	144	
UJ4	11:12	11:22	10	2	ALIVE	A	143	
UJ5	11:15	11:21	6	2	ALIVE	GH	142	
UJ6	11:16	11:21	5	2	ALIVE	A	137	
UJ8	11:13	11:19	6	2	ALIVE	A	142	
UJ9	11:16	11:21	5	2	ALIVE	A	147	
UK0	11:31	11:46	15	2	ALIVE	A	143	
UK1	11:33	11:46	13	2	ALIVE	A	142	
UK2	11:32	11:37	5	2	ALIVE	A	143	
UK3	11:33	11:40	7	2	ALIVE	A	147	
UK4	11:31	11:42	11	2	ALIVE	A	142	
UK5	11:37	11:47	10	2	ALIVE	A	163	
UK6	11:35	11:41	6	2	ALIVE	A	142	
UK7	11:36	11:47	11	2	ALIVE	A	143	
UK8	11:36	11:42	6	2	ALIVE	A	145	
UK9	11:34	.	.	0	DEAD	ZL	147	
UL0	11:59	12:04	5	2	ALIVE	A	136	
UL1	11:57	12:02	5	2	ALIVE	A	144	
UL2	11:59	12:15	16	2	ALIVE	A	152	
UL3	11:58	12:04	6	2	ALIVE	A	147	
UL4	12:00	12:06	6	2	ALIVE	A	147	
UL5	12:03	12:11	8	2	ALIVE	A	143	
UL6	12:04	12:09	5	2	ALIVE	A	162	
UL7	12:01	12:20	19	2	ALIVE	A	188	
UL8	12:02	12:09	7	2	ALIVE	A	166	
UL9	12:02	12:08	6	2	ALIVE	A	161	
ZZ9	11:14	11:23	9	2	ALIVE	A	137	

25 May 2003 - Testlot 7 : Control

- Water temp=57.2F

UW0	8:27	8:33	6	2	ALIVE	A	152	
UW1	8:24	8:41	17	2	ALIVE	A	156	
UW2	8:23	8:28	5	2	ALIVE	A	147	
UW3	8:26	8:35	9	2	DEAD	HP	152	
UW4	8:25	8:41	16	2	ALIVE	A	150	
UW5	8:29	8:35	6	2	ALIVE	A	148	
UW6	8:30	8:36	6	2	ALIVE	A	143	
UW7	8:28	8:36	8	2	ALIVE	A	138	
UW8	8:30	8:37	7	2	ALIVE	A	161	
UW9	8:31	8:36	5	2	ALIVE	A	156	
UX0	8:51	9:07	16	2	ALIVE	A	150	
UX1	8:53	8:59	6	2	ALIVE	A	142	
UX2	8:52	9:03	11	2	ALIVE	A	137	
UX3	8:54	9:03	9	2	ALIVE	A	162	
UX4	8:55	9:01	6	2	ALIVE	A	143	
UX5	8:59	9:05	6	2	ALIVE	A	156	
UX6	8:56	9:02	6	2	ALIVE	A	148	
UX7	8:56	9:01	5	2	ALIVE	A	146	
UX8	8:59	9:03	4	2	ALIVE	A	147	
UX9	8:57	9:07	10	2	ALIVE	A	156	
UY0	9:23	9:28	5	2	ALIVE	A	132	
UY1	9:23	9:28	5	2	ALIVE	A	152	
UY2	9:24	9:31	7	2	ALIVE	A	140	
UY3	9:24	9:29	5	2	ALIVE	A	142	
UY4	9:22	9:28	6	2	ALIVE	A	152	
UY5	9:26	9:33	7	2	ALIVE	A	144	
UY6	9:26	9:32	6	2	ALIVE	A	148	
UY7	9:28	9:32	4	2	ALIVE	A	142	
UY8	9:27	9:33	6	2	ALIVE	A	147	
UY9	9:25	9:31	6	2	ALIVE	A	143	
UZ0	9:44	9:49	5	2	ALIVE	A	141	
UZ1	9:43	9:49	6	2	ALIVE	A	134	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
UZ2	9:44	9:49	5	2	ALIVE	A	146	
UZ3	9:46	10:00	14	2	ALIVE	A	152	
UZ4	9:45	9:49	4	2	ALIVE	A	145	
UZ5	9:49	9:50	1	2	ALIVE	A	135	
UZ6	9:46	10:02	16	2	ALIVE	A	136	
UZ7	9:48	9:53	5	2	ALIVE	A	151	
UZ8	9:47	9:55	8	2	ALIVE	A	156	
UZ9	9:40	9:54	14	2	ALIVE	A	150	
25 May 2003 - Testlot 7 :								21 - Water temp=57.2F
VA0	10:11	.	.	0	DEAD	Z	141	
VA1	10:13	10:18	5	2	ALIVE	A	144	
VA2	10:12	10:18	6	2	ALIVE	A	148	
VA3	10:13	10:20	7	2	ALIVE	A	152	
VA4	10:11	10:17	6	2	ALIVE	A	133	
VA5	10:14	10:21	7	2	ALIVE	A	166	
VA6	10:17	10:23	6	2	ALIVE	A	161	
VA7	10:15	10:20	5	2	ALIVE	A	137	
VA8	10:15	10:21	6	2	ALIVE	A	151	
VA9	10:16	10:22	6	2	ALIVE	A	143	
VB0	10:40	10:47	7	2	ALIVE	CGE	135	
VB1	10:37	10:42	5	2	ALIVE	A	143	
VB2	10:39	10:47	8	2	ALIVE	A	140	
VB3	10:38	10:44	6	2	ALIVE	A	143	
VB4	10:38	10:44	6	2	ALIVE	A	141	
VB5	10:43	10:48	5	2	ALIVE	A	153	
VB6	10:41	10:48	7	2	ALIVE	A	142	
VB7	10:43	10:49	6	2	ALIVE	A	144	
VB8	10:41	10:46	5	2	ALIVE	A	145	
VB9	10:42	10:49	7	2	ALIVE	A	146	
VC0	11:01	11:06	5	2	ALIVE	A	138	
VC1	11:00	11:06	6	2	ALIVE	A	142	
VC2	11:02	11:06	4	2	ALIVE	A	150	
VC3	11:01	11:13	12	2	ALIVE	A	137	
VC4	11:00	11:07	7	2	ALIVE	A	167	
VC5	11:04	11:08	4	2	ALIVE	A	142	
VC6	11:03	11:08	5	2	ALIVE	A	138	
VC7	11:05	11:09	4	2	ALIVE	A	150	
VC8	11:05	11:11	6	2	ALIVE	A	138	
VC9	11:03	11:11	8	2	ALIVE	A	146	
VD0	11:26	11:31	5	2	ALIVE	A	133	
VD1	11:25	11:29	4	2	ALIVE	A	137	
VD2	11:27	11:32	5	2	ALIVE	A	151	
VD3	11:25	11:33	8	2	ALIVE	A	148	
VD4	11:26	11:30	4	2	ALIVE	A	146	
VD5	11:29	11:34	5	2	ALIVE	A	142	
VD6	11:31	11:37	6	2	ALIVE	A	156	
VD7	11:31	11:36	5	2	ALIVE	A	148	
VD8	11:30	11:34	4	2	ALIVE	A	155	
VD9	11:30	11:38	8	2	ALIVE	A	154	
25 May 2003 - Testlot 7 :								23 - Water temp=57.2F
KR8	13:59	14:06	7	2	ALIVE	A	153	
VE0	11:57	12:02	5	2	ALIVE	A	140	
VE1	11:59	12:06	7	2	ALIVE	A	137	
VE2	11:58	12:04	6	2	ALIVE	A	144	
VE4	11:58	12:10	12	2	ALIVE	A	142	
VE5	12:03	12:08	5	2	ALIVE	A	150	
VE6	12:01	12:10	9	2	ALIVE	A	142	
VE7	12:02	12:06	4	2	ALIVE	A	148	
VE8	12:00	12:17	17	2	ALIVE	A	140	
VE9	12:01	12:06	5	2	ALIVE	A	146	
VF0	12:48	12:53	5	2	ALIVE	A	137	
VF1	12:48	12:52	4	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
VF2	12:47	12:54	7	2	ALIVE	A	146	
VF3	12:50	12:59	9	2	ALIVE	A	143	
VF4	12:50	12:56	6	2	ALIVE	A	148	
VF5	12:52	12:58	6	2	ALIVE	A	157	
VF6	12:53	13:02	9	2	ALIVE	GH	140	
VF7	12:52	12:58	6	2	ALIVE	A	145	
VF8	12:53	12:59	6	2	ALIVE	A	133	
VF9	12:55	.	.	0	TAG & PIN		137	
VH0	13:11	13:18	7	2	ALIVE	A	146	
VH1	13:12	13:17	5	2	ALIVE	A	146	
VH2	13:11	13:17	6	2	ALIVE	A	142	
VH3	13:10	.	.	0	TAG & PIN		133	
VH4	13:09	13:17	8	2	ALIVE	A	128	
VH5	13:14	13:26	12	2	ALIVE	A	147	
VH6	13:15	13:19	4	2	ALIVE	A	166	
VH7	13:14	13:23	9	2	ALIVE	A	136	
VH8	13:16	13:20	4	2	ALIVE	A	150	
VH9	13:17	13:18	1	2	ALIVE	A	138	
VJ0	13:53	14:00	7	2	ALIVE	A	151	
VJ1	13:55	14:01	6	2	ALIVE	GH	147	
VJ2	13:51	14:06	15	2	DEAD	P	145	
VJ3	13:53	13:58	5	2	ALIVE	H	157	
VJ4	13:54	14:07	13	2	ALIVE	A	143	
VJ5	13:57	14:03	6	2	ALIVE	A	170	
VJ6	13:56	14:01	5	2	ALIVE	A	145	
VJ7	13:58	.	.	0	UNKNOWN	X	130	
VJ8	13:59	14:05	6	1	ALIVE	H	170	
VJ9	14:00	14:05	5	2	ALIVE	A	163	

25 May 2003 - Testlot 7 :

41 - Water temp=57.2F

KR9	14:29	14:35	6	2	ALIVE	A	146	
VK0	14:26	14:34	8	2	ALIVE	A	152	
VK1	14:26	14:32	6	2	ALIVE	A	135	
VK2	14:25	14:29	4	2	ALIVE	A	152	
VK3	14:27	14:34	7	2	ALIVE	A	152	
VK4	14:26	14:32	6	2	ALIVE	A	148	
VK5	14:33	14:39	6	2	ALIVE	A	145	
VK7	14:29	14:33	4	2	ALIVE	A	147	
VK8	14:29	14:35	6	2	ALIVE	A	147	
VK9	14:30	14:38	8	2	DEAD	GFP	145	
VL0	14:55	15:07	12	2	ALIVE	A	145	
VL1	14:53	14:57	4	2	ALIVE	A	146	
VL2	14:54	14:58	4	2	ALIVE	A	146	
VL3	14:54	15:00	6	2	ALIVE	A	157	
VL4	14:59	15:01	2	2	ALIVE	A	141	
VL5	14:57	15:05	8	2	ALIVE	A	152	
VL6	14:59	15:05	6	2	ALIVE	A	146	
VL7	14:56	15:01	5	2	ALIVE	A	153	
VL8	14:57	15:04	7	2	ALIVE	A	138	
VL9	14:58	15:06	8	2	ALIVE	A	138	
XM0	15:27	15:33	6	2	ALIVE	A	157	
XM1	15:29	15:39	10	2	ALIVE	A	149	
XM2	15:29	15:35	6	2	ALIVE	A	153	
XM3	15:26	15:33	7	2	ALIVE	A	155	
XM4	15:28	15:45	17	2	ALIVE	A	138	
XM5	15:32	15:45	13	2	ALIVE	A	142	
XM6	15:33	15:43	10	2	ALIVE	A	141	
XM7	15:31	15:36	5	2	ALIVE	A	146	
XM8	15:31	15:42	11	2	DEAD	JH	152	
XM9	15:30	15:39	9	2	ALIVE	A	149	
XN1	16:01	16:17	16	2	ALIVE	A	159	
XN2	16:01	16:08	7	2	ALIVE	A	141	
XN3	16:02	16:09	7	2	ALIVE	A	148	
XN4	16:00	16:05	5	2	ALIVE	A	170	
XN5	16:05	16:12	7	2	DEAD		180	
XN6	16:04	16:13	9	2	ALIVE	A	137	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XN7	16:05	16:15	10	2	ALIVE	A	145	
XN8	16:03	16:09	6	2	ALIVE	A	134	
XN9	16:06	16:10	4	2	ALIVE	A	146	
XP0	16:26	16:34	8	2	ALIVE	A	147	
XP1	16:27	16:32	5	2	ALIVE	A	152	
XP2	16:27	16:32	5	2	ALIVE	HB	150	
XP3	16:28	16:34	6	2	ALIVE	A	143	
XP4	16:28	16:35	7	2	ALIVE	A	147	
XP5	16:33	16:40	7	2	ALIVE	A	142	
XP6	16:29	16:35	6	2	ALIVE	A	142	
XP7	16:30	16:35	5	2	ALIVE	A	148	
XP8	16:31	.	.	0	TAG &	PIN	147	
XP9	16:31	16:36	5	2	ALIVE	A	162	
XZ0	16:02	16:08	6	2	ALIVE	A	151	

26 May 2003 - Testlot 8 : Control - Water temp=56.3F

YT0	14:09	14:16	7	2	ALIVE	A	142	
YT1	14:07	14:11	4	2	ALIVE	A	147	
YT2	14:08	14:13	5	2	ALIVE	A	154	
YT3	14:09	14:18	9	2	ALIVE	A	141	
YT4	14:08	14:13	5	2	ALIVE	A	139	
YT5	14:11	14:14	3	2	ALIVE	A	139	
YT6	14:11	14:19	8	2	ALIVE	A	147	
YT7	14:11	14:14	3	2	ALIVE	A	165	
YT8	14:13	14:15	2	2	ALIVE	A	143	
YT9	14:12	14:18	6	2	ALIVE	A	154	
YU0	14:33	14:38	5	2	ALIVE	A	143	
YU1	14:32	14:42	10	2	ALIVE	A	148	
YU2	14:33	14:37	4	2	ALIVE	A	152	
YU3	14:31	14:38	7	2	ALIVE	A	149	
YU4	14:31	14:38	7	2	ALIVE	A	166	
YU5	14:37	14:43	6	2	ALIVE	A	163	
YU6	14:35	14:38	3	2	ALIVE	A	141	
YU7	14:36	14:40	4	2	ALIVE	A	145	
YU8	14:34	14:42	8	2	ALIVE	A	141	
YU9	14:36	14:40	4	2	ALIVE	A	152	
YV0	15:07	15:23	16	2	ALIVE	A	170	
YV1	15:09	15:15	6	2	ALIVE	A	149	
YV2	15:10	15:15	5	2	ALIVE	A	142	
YV3	15:09	15:15	6	2	ALIVE	A	141	
YV4	15:08	15:14	6	2	ALIVE	A	166	
YV5	15:13	15:18	5	2	ALIVE	A	144	
YV6	15:14	15:19	5	2	ALIVE	A	138	
YV7	15:13	15:23	10	2	ALIVE	A	140	
YV8	15:11	15:21	10	2	ALIVE	A	151	
YV9	15:11	15:16	5	2	ALIVE	A	154	
YW0	15:37	15:42	5	2	ALIVE	A	140	
YW1	15:34	15:44	10	2	ALIVE	A	137	
YW2	15:34	15:39	5	2	ALIVE	A	158	
YW3	15:33	15:40	7	2	ALIVE	A	147	
YW4	15:36	15:41	5	2	ALIVE	A	142	
YW5	15:38	15:41	3	2	ALIVE	A	152	
YW6	15:39	15:47	8	2	ALIVE	A	159	
YW7	15:39	15:47	8	2	ALIVE	A	143	
YW8	15:40	15:45	5	2	DEAD	GHP	137	
YW9	15:38	15:46	8	2	ALIVE	A	167	

26 May 2003 - Testlot 8 : 21 - Water temp=56.3F

XW0	10:32	10:44	12	2	ALIVE		156	
XW1	10:33	10:40	7	2	ALIVE	A	153	
XW2	10:33	10:40	7	2	ALIVE	A	146	
XW3	10:30	10:38	8	2	ALIVE	A	137	
XW4	10:31	10:36	5	2	ALIVE	A	158	
XW5	10:34	10:45	11	2	ALIVE	A	169	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
XW6	10:35	10:45	10	2	ALIVE	A	147	
XW7	10:36	10:41	5	2	ALIVE	A	140	
XW8	10:36	10:42	6	2	ALIVE	A	156	
XW9	10:37	10:45	8	2	ALIVE	A	147	
XX0	10:55	11:00	5	2	ALIVE	A	136	
XX1	10:54	11:07	13	2	ALIVE	A	148	
XX2	10:56	11:05	9	2	ALIVE	A	137	
XX3	10:56	11:01	5	2	ALIVE	A	142	
XX4	10:57	11:05	8	2	ALIVE	A	162	
XX5	10:59	11:06	7	2	ALIVE	A	143	
XX6	11:00	11:07	7	2	ALIVE	A	147	
XX7	10:58	11:03	5	2	ALIVE	A	145	
XX8	11:01	11:08	7	2	ALIVE	A	148	
XX9	10:59	11:04	5	2	ALIVE	A	128	
XY0	11:16	11:22	6	2	ALIVE	A	146	
XY1	11:15	11:21	6	2	ALIVE	A	142	
XY2	11:16	11:22	6	2	ALIVE	A	152	
XY3	11:18	11:28	10	2	ALIVE	A	141	
XY4	11:17	11:22	5	2	ALIVE	A	152	
XY5	11:21	11:27	6	2	ALIVE	A	145	
XY6	11:19	11:24	5	2	ALIVE	A	134	
XY7	11:20	11:25	5	2	ALIVE	A	155	
XY8	11:20	11:27	7	2	ALIVE	A	158	
XY9	11:19	11:24	5	2	ALIVE	A	161	
YM0	11:35	11:40	5	2	ALIVE	A	136	
YM1	11:38	11:46	8	2	ALIVE	A	135	
YM2	11:35	11:43	8	2	ALIVE	A	143	
YM3	11:37	11:47	10	2	ALIVE	A	141	
YM4	11:37	11:42	5	2	ALIVE	A	154	
YM5	11:40	11:48	8	2	ALIVE	A	137	
YM6	11:41	11:46	5	2	ALIVE	A	152	
YM7	11:40	11:46	6	2	ALIVE	A	142	
YM8	11:39	11:43	4	2	ALIVE	A	148	
YM9	11:41	11:45	4	2	ALIVE	A	148	
26 May 2003 - Testlot 8 :					23 - Water temp=56.3F			
YN0	12:07	12:21	14	2	ALIVE	A	131	
YN1	12:05	12:10	5	2	ALIVE	A	161	
YN2	12:07	12:14	7	2	ALIVE	A	158	
YN3	12:06	12:19	13	2	DEAD	JHP	162	
YN4	12:06	.	.	0	TAG & PIN		143	
YN5	12:11	12:19	8	2	ALIVE	A	143	
YN6	12:09	12:20	11	2	ALIVE	A	142	
YN7	12:08	12:13	5	2	ALIVE	A	138	
YN8	12:10	12:17	7	2	ALIVE	B	145	
YN9	12:09	12:14	5	2	ALIVE	A	165	
YP0	12:37	12:42	5	2	ALIVE	A	151	
YP1	12:37	12:42	5	2	ALIVE	A	138	
YP2	12:36	12:43	7	2	ALIVE	G	156	
YP3	12:35	12:40	5	2	ALIVE	A	145	
YP4	12:37	12:49	12	2	ALIVE	A	152	
YP5	12:41	12:46	5	2	ALIVE	A	145	
YP6	12:40	12:47	7	2	ALIVE	A	152	
YP7	12:40	12:47	7	2	ALIVE	A	145	
YP8	12:38	12:43	5	2	ALIVE	A	152	
YP9	12:39	12:46	7	1	ALIVE	A	147	
YR0	13:11	13:20	9	2	ALIVE	A	152	
YR1	13:01	13:16	15	2	ALIVE	A	133	
YR2	12:58	13:03	5	2	ALIVE	A	145	
YR3	13:00	13:09	9	2	ALIVE	A	145	
YR4	12:58	13:05	7	2	ALIVE	A	133	
YR5	13:05	.	.	0	TAG & PIN		128	
YR6	13:02	13:10	8	2	ALIVE	A	132	
YR7	13:04	13:10	6	2	ALIVE	A	146	
YR8	13:03	13:11	8	2	ALIVE	A	148	
YR9	13:05	13:10	5	2	ALIVE	A	147	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
YS0	13:32	13:38	6	2	ALIVE	A	141	
YS1	13:29	13:36	7	2	ALIVE	A	154	
YS2	13:30	13:38	8	2	ALIVE	A	147	
YS3	13:31	13:41	10	2	ALIVE	HG	152	
YS4	13:28	13:33	5	2	ALIVE	A	160	
YS5	13:34	13:41	7	2	ALIVE	A	162	
YS6	13:34	13:40	6	2	ALIVE	A	156	
YS7	13:33	13:39	6	2	ALIVE	A	153	
YS8	13:36	13:44	8	2	ALIVE	A	158	
YS9	13:35	13:43	8	2	ALIVE	A	140	
26 May 2003 - Testlot 8 :					41 - Water temp=56.3F			
XR0	8:07	8:14	7	2	ALIVE	A	148	
XR1	8:06	8:13	7	2	ALIVE	GH	160	
XR2	8:07	8:12	5	2	ALIVE	A	159	
XR3	8:07	8:15	8	2	ALIVE	A	155	
XR4	8:08	8:16	8	2	ALIVE	A	162	
XR5	8:09	8:15	6	2	ALIVE	A	149	
XR6	8:11	8:19	8	2	ALIVE	A	146	
XR7	8:10	8:18	8	2	ALIVE	A	147	
XR8	8:11	8:20	9	2	ALIVE	A	157	
XR9	8:10	8:15	5	2	ALIVE	A	148	
XS0	8:28	8:33	5	2	ALIVE	A	150	
XS1	8:30	8:38	8	2	ALIVE	A	147	
XS2	8:29	8:35	6	2	ALIVE	A	146	
XS3	8:28	8:34	6	2	ALIVE	A	155	
XS4	8:30	8:38	8	2	ALIVE	A	146	
XS5	8:33	8:39	6	2	ALIVE	A	138	
XS6	8:32	8:38	6	2	ALIVE	A	156	
XS7	8:31	8:36	5	2	ALIVE	A	138	
XS8	8:32	8:42	10	2	ALIVE	A	152	
XS9	8:34	8:41	7	2	ALIVE	A	163	
XT0	8:49	.	.	0	TAG & PIN		164	
XT1	8:50	8:55	5	2	ALIVE	A	146	
XT2	8:50	9:00	10	2	ALIVE	A	156	
XT3	8:51	8:56	5	2	ALIVE	A	141	
XT4	8:48	9:03	15	2	ALIVE	A	167	
XT5	8:53	8:59	6	2	ALIVE	A	140	
XT6	8:53	8:59	6	2	ALIVE	A	153	
XT7	8:52	9:03	11	2	ALIVE	A	168	
XT8	8:54	9:05	11	2	ALIVE	A	152	
XT9	8:54	9:00	6	2	ALIVE	A	147	
XU0	9:25	9:32	7	2	ALIVE	A	133	
XU1	9:26	9:31	5	2	ALIVE	A	162	
XU2	9:28	9:34	6	2	ALIVE	A	182	
XU4	9:26	9:31	5	2	ALIVE	A	153	
XU5	9:32	9:40	8	2	ALIVE	A	151	
XU6	9:31	9:36	5	2	ALIVE	A	148	
XU7	9:30	9:34	4	2	ALIVE	A	175	
XU8	9:30	9:36	6	2	ALIVE	A	137	
XU9	9:31	10:02	31	2	ALIVE	A	132	
XV0	9:52	9:57	5	2	ALIVE	A	152	
XV1	9:53	10:07	14	2	ALIVE	A	138	
XV2	9:55	10:04	9	2	ALIVE	A	156	
XV3	9:52	10:01	9	2	ALIVE	A	153	
XV4	9:55	10:00	5	2	ALIVE	A	160	
XV5	9:57	10:06	9	2	ALIVE	A	153	
XV6	9:56	10:04	8	2	ALIVE	A	150	
XV7	9:59	10:08	9	2	ALIVE	A	149	
XV8	9:59	10:06	7	2	ALIVE	A	166	
XV9	9:58	10:04	6	2	ALIVE	A	143	
XZ1	9:27	9:35	8	2	ALIVE	A	169	
XZ2	10:00	10:10	10	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
28 May 2003 - Testlot 9 : Control				- Water temp=57.2F				
ZM0	14:05	14:11	6	2	ALIVE	A	150	
ZM1	14:07	14:14	7	2	ALIVE	A	140	
ZM2	14:06	14:10	4	2	ALIVE	A	162	
ZM3	14:08	14:13	5	2	ALIVE	A	157	
ZM4	14:08	14:15	7	2	ALIVE	A	155	
ZM5	14:03	14:09	6	2	ALIVE	A	144	
ZM6	14:04	14:10	6	2	ALIVE	A	134	
ZM7	14:02	14:07	5	2	ALIVE	A	144	
ZM8	14:02	14:07	5	2	ALIVE	A	148	
ZM9	14:03	14:08	5	2	ALIVE	A	145	
ZN0	14:24	14:34	10	2	ALIVE	A	148	
ZN1	14:24	14:30	6	2	ALIVE	A	153	
ZN2	14:23	14:27	4	2	ALIVE	A	158	
ZN3	14:25	14:31	6	2	ALIVE	A	147	
ZN4	14:22	14:41	19	2	ALIVE	A	142	
ZN5	14:27	14:36	9	2	ALIVE	A	163	
ZN6	14:26	14:32	6	2	ALIVE	A	148	
ZN7	14:26	14:31	5	2	ALIVE	A	140	
ZN8	14:28	14:33	5	2	ALIVE	A	144	
ZN9	14:26	14:32	6	2	ALIVE	A	150	
ZP0	15:02	15:06	4	2	ALIVE	A	151	
ZP1	14:59	15:04	5	2	ALIVE	A	142	
ZP2	15:03	15:07	4	2	ALIVE	A	144	
ZP3	15:01	15:05	4	2	ALIVE	A	145	
ZP4	15:00	15:08	8	2	ALIVE	A	157	
ZP5	15:06	15:11	5	2	ALIVE	A	135	
ZP6	15:04	15:14	10	2	ALIVE	A	143	
ZP7	15:04	15:09	5	2	ALIVE	A	147	
ZP8	15:05	15:11	6	2	ALIVE	A	147	
ZP9	15:07	15:13	6	2	ALIVE	A	158	
ZR0	15:24	15:30	6	2	ALIVE	A	138	
ZR1	15:23	15:27	4	2	ALIVE	A	151	
ZR2	15:22	15:26	4	2	ALIVE	A	148	
ZR3	15:24	15:28	4	2	ALIVE	A	141	
ZR4	15:25	15:31	6	2	ALIVE	A	150	
ZR5	15:29	15:34	5	2	ALIVE	A	146	
ZR6	15:28	15:36	8	2	ALIVE	A	154	
ZR7	15:27	15:32	5	2	ALIVE	A	142	
ZR8	15:27	15:33	6	2	ALIVE	A	139	
ZR9	15:26	15:33	7	2	ALIVE	A	150	
28 May 2003 - Testlot 9 :				21 - Water temp=57.2F				
ZC0	10:34	10:41	7	2	DEAD	HJ	145	
ZC1	10:35	10:43	8	2	ALIVE	A	135	
ZC2	10:34	10:40	6	2	ALIVE	A	142	
ZC3	10:33	10:38	5	2	ALIVE	A	142	
ZC4	10:32	10:38	6	2	ALIVE	A	166	
ZC5	10:38	10:47	9	2	ALIVE	A	145	
ZC6	10:39	10:44	5	2	ALIVE	A	149	
ZC7	10:39	10:48	9	2	ALIVE	A	140	
ZC8	10:36	10:44	8	2	ALIVE	A	148	
ZC9	10:37	10:42	5	2	ALIVE	A	155	
ZD0	10:55	11:03	8	2	ALIVE	A	136	
ZD1	10:55	11:00	5	2	ALIVE	A	148	
ZD2	10:56	11:04	8	2	ALIVE	H	137	
ZD3	10:57	11:03	6	2	ALIVE	A	156	
ZD4	10:57	11:02	5	2	ALIVE	A	148	
ZD5	11:00	11:09	9	2	ALIVE	A	155	
ZD6	10:59	11:00	1	2	ALIVE	A	142	
ZD7	11:00	11:11	11	2	ALIVE	A	148	
ZD8	11:01	11:07	6	2	ALIVE	A	160	
ZD9	10:58	11:05	7	2	ALIVE	A	153	
ZE0	11:23	11:29	6	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
ZE1	11:22	11:27	5	2	ALIVE	E	147	
ZE2	11:21	11:25	4	2	ALIVE	A	138	
ZE3	11:20	11:25	5	2	ALIVE	A	166	
ZE4	11:21	11:26	5	2	ALIVE	A	152	
ZE5	11:26	11:31	5	2	ALIVE	A	147	
ZE6	11:25	11:30	5	2	ALIVE	A	152	
ZE7	11:24	11:29	5	2	ALIVE	A	153	
ZE8	11:24	11:35	11	2	ALIVE	A	175	
ZE9	11:26	11:34	8	2	ALIVE	A	136	
ZF0	11:44	11:53	9	2	ALIVE	A	151	
ZF1	11:45	11:51	6	2	ALIVE	A	149	
ZF2	11:44	11:51	7	2	ALIVE	A	141	
ZF3	11:43	11:49	6	2	ALIVE	A	142	
ZF4	11:48	11:57	9	2	ALIVE	A	168	
ZF5	11:47	11:55	8	2	ALIVE	A	151	
ZF6	11:46	11:52	6	2	ALIVE	A	151	
ZF7	11:49	11:55	6	2	ALIVE	A	139	
ZF8	11:49	11:54	5	2	ALIVE	A	143	
ZF9	11:46	11:55	9	2	ALIVE	A	150	
28 May 2003 - Testlot 9 :					23 - Water temp=57.2F			
ZH0	12:13	12:18	5	2	ALIVE	A	147	
ZH1	12:13	12:18	5	2	ALIVE	A	135	
ZH2	12:11	12:16	5	2	ALIVE	A	144	
ZH3	12:14	12:21	7	2	ALIVE	A	155	
ZH4	12:12	12:25	13	2	ALIVE	A	140	
ZH5	12:17	12:23	6	2	ALIVE	A	160	
ZH6	12:16	12:24	8	2	ALIVE	A	140	
ZH7	12:18	.	.	.	UNKNOWN		132	
ZH8	12:15	12:20	5	2	ALIVE	A	135	
ZH9	12:16	12:25	9	2	ALIVE	A	137	
ZJ0	12:44	12:51	7	2	ALIVE	A	133	
ZJ1	12:43	12:48	5	2	DEAD	HJ	141	
ZJ2	12:45	12:53	8	2	ALIVE	A	143	
ZJ3	12:45	12:54	9	2	ALIVE	A	142	
ZJ4	12:44	12:50	6	2	ALIVE	A	153	
ZJ5	12:47	12:55	8	2	ALIVE	A	137	
ZJ6	12:48	12:55	7	2	ALIVE	A	147	
ZJ7	12:49	12:58	9	2	ALIVE	A	157	
ZJ8	12:47	12:57	10	2	ALIVE	A	150	
ZJ9	12:49	13:00	11	2	ALIVE	A	143	
ZK0	13:18	13:23	5	2	ALIVE	A	137	
ZK1	13:10	13:14	4	2	ALIVE	A	153	
ZK2	13:16	13:22	6	2	ALIVE	A	144	
ZK3	13:17	13:22	5	2	ALIVE	A	146	
ZK4	13:10	13:24	14	2	ALIVE	A	142	
ZK5	13:21	13:27	6	2	ALIVE	A	136	
ZK6	13:22	13:28	6	2	ALIVE	A	141	
ZK7	13:19	13:24	5	2	ALIVE	A	155	
ZK8	13:20	13:25	5	2	ALIVE	A	150	
ZK9	13:21	13:28	7	2	ALIVE	A	151	
ZL0	13:42	13:46	4	2	ALIVE	A	153	
ZL1	13:40	13:46	6	2	ALIVE	A	160	
ZL2	13:39	13:44	5	2	ALIVE	A	143	
ZL3	13:39	13:44	5	2	ALIVE	A	143	
ZL4	13:41	13:49	8	2	ALIVE	A	146	
ZL5	13:43	13:48	5	2	ALIVE	A	140	
ZL6	13:42	13:48	6	2	ALIVE	A	145	
ZL7	13:44	13:50	6	2	ALIVE	A	160	
ZL8	13:44	13:49	5	2	ALIVE	A	146	
ZL9	13:45	13:50	5	2	ALIVE	A	141	
28 May 2003 - Testlot 9 :					41 - Water temp=57.2F			
XZ3	10:05	10:12	7	2	ALIVE	A	158	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
YX0	8:12	.	.	0	TAG & PIN		138	
YX1	8:13	8:20	7	2	ALIVE	A	146	
YX2	8:14	8:20	6	2	ALIVE	A	150	
YX3	8:11	8:16	5	2	ALIVE	A	152	
YX4	8:14	8:17	3	2	ALIVE	A	160	
YX5	8:17	8:25	8	2	ALIVE	A	146	
YX6	8:17	8:25	8	2	ALIVE	A	143	
YX7	8:16	8:21	5	2	ALIVE	A	145	
YX8	8:16	8:23	7	2	ALIVE	A	144	
YX9	8:15	8:21	6	2	ALIVE	A	160	
YY0	8:34	8:41	7	2	ALIVE	A	140	
YY1	8:35	8:43	8	2	ALIVE	A	147	
YY2	8:36	8:42	6	2	ALIVE	A	153	
YY3	8:37	8:45	8	2	ALIVE	A	147	
YY4	8:33	8:42	9	2	ALIVE	A	139	
YY5	8:39	8:49	10	2	ALIVE	A	152	
YY6	8:41	8:58	17	1	ALIVE	HB	138	
YY7	8:38	8:52	14	2	ALIVE	A	150	
YY9	8:40	8:49	9	2	ALIVE	A	145	
YZ0	9:08	9:16	8	2	ALIVE	A	149	
YZ1	9:07	9:13	6	2	ALIVE	A	133	
YZ2	9:06	9:13	7	2	ALIVE	A	153	
YZ3	9:09	9:16	7	2	ALIVE	A	143	
YZ4	9:09	9:22	13	2	ALIVE	A	146	
YZ5	9:12	9:17	5	2	ALIVE	A	143	
YZ6	9:13	9:25	12	2	ALIVE	A	146	
YZ7	9:14	9:20	6	2	ALIVE	A	149	
YZ8	9:11	9:24	13	2	ALIVE	H	140	
YZ9	9:14	9:21	7	2	ALIVE	A	153	
ZA0	9:35	9:45	10	2	ALIVE	A	138	
ZA1	9:37	9:43	6	2	ALIVE	A	140	
ZA2	9:38	9:44	6	2	ALIVE	A	137	
ZA3	9:38	9:54	16	2	ALIVE	A	140	
ZA4	9:36	9:43	7	2	ALIVE	A	147	
ZA5	9:40	9:45	5	2	ALIVE	A	156	
ZA6	9:42	9:51	9	2	ALIVE	A	158	
ZA7	9:41	9:49	8	2	ALIVE	A	157	
ZA8	9:39	9:48	9	2	ALIVE	A	148	
ZA9	9:40	9:47	7	2	ALIVE	A	140	
ZB0	10:03	10:12	9	2	ALIVE	A	156	
ZB1	10:01	10:08	7	2	ALIVE	A	149	
ZB2	10:02	10:09	7	2	ALIVE	A	148	
ZB3	10:01	10:06	5	2	ALIVE	A	148	
ZB4	10:03	10:10	7	2	ALIVE	A	155	
ZB5	10:08	10:16	8	2	ALIVE	A	147	
ZB6	10:07	10:14	7	2	ALIVE	A	147	
ZB7	10:06	10:16	10	2	ALIVE	A	158	
ZB8	10:08	10:14	6	2	ALIVE	A	157	
ZB9	10:05	10:13	8	2	ALIVE	A	158	

29 May 2003 - Testlot 10 : Control

- Water temp=58.1F

AM0	12:55	13:02	7	2	ALIVE	A	157	
AM1	12:57	13:05	8	2	ALIVE	A	151	
AM2	12:55	13:00	5	2	ALIVE	A	149	
AM3	12:54	13:00	6	2	ALIVE	A	161	
AM4	12:56	13:02	6	2	ALIVE	A	137	
AM5	12:52	12:57	5	2	ALIVE	A	144	
AM6	12:50	12:55	5	2	ALIVE	A	158	
AM7	12:50	12:56	6	2	ALIVE	A	154	
AM8	12:52	12:58	6	2	ALIVE	A	152	
AM9	12:53	12:58	5	2	ALIVE	A	174	
AN0	13:31	13:37	6	2	ALIVE	A	145	
AN1	13:30	13:35	5	2	ALIVE	A	139	
AN2	13:31	13:39	8	2	ALIVE	A	168	
AN3	13:29	13:39	10	2	ALIVE	A	156	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
AN4	13:29	13:35	6	2	ALIVE	A	151	
AN5	13:27	13:32	5	2	ALIVE	A	147	
AN6	13:27	13:33	6	2	ALIVE	A	155	
AN7	13:26	13:30	4	2	ALIVE	A	142	
AN8	13:26	13:32	6	2	ALIVE	A	178	
AN9	13:28	13:34	6	2	ALIVE	A	150	
AP0	13:54	14:05	11	2	ALIVE	A	152	
AP1	13:53	13:58	5	2	ALIVE	A	148	
AP2	13:52	14:01	9	2	ALIVE	A	151	
AP3	13:51	13:59	8	2	ALIVE	A	149	
AP4	13:52	13:57	5	2	ALIVE	A	161	
AP5	13:49	13:59	10	2	ALIVE	A	137	
AP6	13:49	13:54	5	2	ALIVE	A	146	
AP7	13:48	13:54	6	2	ALIVE	A	140	
AR0	14:18	14:23	5	2	ALIVE	A	142	
AR1	14:18	14:23	5	2	ALIVE	A	148	
AR3	14:19	14:30	11	2	ALIVE	A	140	
AR4	14:17	14:23	6	2	ALIVE	A	162	
AR5	14:21	.	.	0	DEAD	L	125	
AR6	14:23	14:31	8	2	ALIVE	A	151	
AR7	14:20	14:26	6	2	ALIVE	A	152	
AR8	14:22	14:30	8	2	ALIVE	A	143	
AR9	14:21	14:28	7	2	ALIVE	A	132	
XZ6	13:50	13:55	5	2	ALIVE	A	144	
XZ7	14:16	14:28	12	2	ALIVE	A	150	
XZ8	14:24	14:30	6	2	ALIVE	A	153	

29 May 2003 - Testlot 10 :

21 - Water temp=58.1F

ZW0	10:39	10:45	6	2	ALIVE	A	146	
ZW1	10:41	10:48	7	2	ALIVE	A	158	
ZW2	10:40	10:46	6	2	ALIVE	A	145	
ZW3	10:40	10:48	8	2	ALIVE	A	148	
ZW4	10:42	10:55	13	2	ALIVE	A	149	
ZW5	10:43	10:51	8	2	ALIVE	A	148	
ZW6	10:44	10:51	7	2	ALIVE	A	138	
ZW7	10:45	10:57	12	2	ALIVE	A	146	
ZW8	10:47	10:55	8	2	ALIVE	A	141	
ZW9	10:46	10:53	7	2	ALIVE	A	160	
ZX0	11:08	11:13	5	2	ALIVE	A	146	
ZX1	11:10	11:16	6	2	ALIVE	A	141	
ZX2	11:09	11:22	13	2	ALIVE	A	147	
ZX3	11:06	11:14	8	2	ALIVE	A	149	
ZX4	11:07	11:20	13	2	DEAD	JHD	144	
ZX5	11:15	11:21	6	2	ALIVE	A	155	
ZX6	11:13	11:23	10	2	ALIVE	A	149	
ZX7	11:12	11:33	21	2	ALIVE	A	142	
ZX8	11:14	11:20	6	2	ALIVE	A	145	
ZX9	11:11	11:18	7	2	ALIVE	A	145	
ZY0	11:45	11:51	6	2	ALIVE	A	148	
ZY1	11:43	11:49	6	2	ALIVE	A	162	
ZY2	11:45	11:53	8	2	ALIVE	A	161	
ZY3	11:42	11:57	15	2	ALIVE	A	143	
ZY4	11:44	11:50	6	2	ALIVE	A	158	
ZY5	11:50	11:59	9	2	ALIVE	A	137	
ZY6	11:48	11:56	8	2	ALIVE	A	136	
ZY7	11:49	12:04	15	2	ALIVE	A	142	
ZY8	11:47	11:52	5	2	ALIVE	A	143	
ZY9	11:47	12:00	13	2	ALIVE	A	147	
ZZ0	12:14	12:19	5	2	ALIVE	A	149	
ZZ1	12:16	12:22	6	2	ALIVE		150	
ZZ2	12:13	12:22	9	2	ALIVE	A	147	
ZZ3	12:14	12:30	16	2	ALIVE	A	139	
ZZ4	12:15	12:22	7	2	ALIVE	A	138	
ZZ5	12:18	12:25	7	2	ALIVE	A	142	
ZZ6	12:19	12:26	7	2	ALIVE	A	140	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
ZZ7	12:21	12:26	5	2	ALIVE	A	146	
ZZ8	12:17	12:24	7	2	ALIVE	A	152	
ZZ9	12:20	12:27	7	2	ALIVE	A	162	
29 May 2003 - Testlot 10 :					23 - Water temp=58.1F			
XZ4	8:38	8:46	8	2	ALIVE	A	127	
XZ5	9:37	9:47	10	2	ALIVE	A	155	
ZS0	8:15	8:22	7	2	ALIVE	A	145	
ZS1	8:16	8:23	7	2	ALIVE	A	142	
ZS2	8:14	8:25	11	2	ALIVE	A	157	
ZS3	8:13	8:20	7	2	ALIVE	A	163	
ZS4	8:16	8:22	6	2	ALIVE	A	142	
ZS5	8:18	8:27	9	2	ALIVE	A	151	
ZS6	8:20	8:30	10	2	ALIVE	A	147	
ZS7	8:19	8:26	7	2	ALIVE	A	150	
ZS8	8:20	8:30	10	2	ALIVE	A	147	
ZS9	8:18	8:25	7	2	ALIVE	A	141	
ZT0	8:39	8:51	12	2	ALIVE	A	138	
ZT1	8:37	8:43	6	2	ALIVE	A	163	
ZT2	8:38	8:44	6	2	ALIVE	A	156	
ZT3	8:39	8:50	11	2	ALIVE	A	150	
ZT5	8:43	8:50	7	2	ALIVE	A	140	
ZT6	8:42	8:50	8	2	ALIVE	A	152	
ZT7	8:44	8:52	8	2	ALIVE	A	142	
ZT8	8:42	8:47	5	2	ALIVE	A	167	
ZT9	8:40	8:55	15	2	ALIVE	A	156	
ZU0	9:30	9:46	16	2	ALIVE	A	142	
ZU1	9:31	9:39	8	2	ALIVE	A	142	
ZU2	9:29	9:35	6	2	ALIVE	A	146	
ZU3	9:32	9:40	8	2	ALIVE	A	156	
ZU4	9:31	9:42	11	2	ALIVE	A	138	
ZU5	9:35	9:49	14	2	ALIVE	A	148	
ZU6	9:35	9:46	11	2	ALIVE	A	140	
ZU8	9:36	9:44	8	2	ALIVE	A	148	
ZU9	9:34	9:45	11	2	ALIVE	A	147	
ZV0	10:03	10:08	5	2	ALIVE	A	153	
ZV1	10:02	10:11	9	2	ALIVE	A	144	
ZV2	10:06	10:12	6	2	ALIVE	A	145	
ZV3	10:05	10:16	11	2	ALIVE	A	145	
ZV4	10:04	10:09	5	2	ALIVE	A	140	
ZV6	9:58	10:11	13	2	ALIVE	A	150	
ZV7	10:00	10:06	6	2	ALIVE	A	143	
ZV8	9:59	10:04	5	2	ALIVE	A	146	
ZV9	10:00	10:05	5	2	ALIVE	A	147	
29 May 2003 - Testlot 10 :					41 - Water temp=58.1F			
AS0	15:06	15:11	5	2	ALIVE	A	151	
AS1	15:07	15:12	5	2	ALIVE	A	157	
AS2	15:05	15:10	5	2	ALIVE	A	143	
AS3	15:04	15:13	9	2	ALIVE	A	154	
AS4	15:07	15:22	15	2	ALIVE	A	157	
AS5	15:11	15:16	5	2	ALIVE	A	158	
AS6	15:10	15:18	8	2	ALIVE	A	167	
AS7	15:10	15:15	5	2	ALIVE	A	152	
AS8	15:09	15:16	7	2	ALIVE	A	145	
AS9	15:12	15:19	7	2	ALIVE	G	166	
AT0	15:36	15:43	7	2	ALIVE	A	157	
AT1	15:36	15:41	5	2	ALIVE	A	143	
AT2	15:37	15:45	8	2	ALIVE	A	143	
AT3	15:34	15:40	6	2	ALIVE	A	135	
AT4	15:35	15:40	5	2	ALIVE	A	143	
AT5	15:32	15:37	5	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
AT6	15:33	15:39	6	2	ALIVE	A	146	
AT7	15:30	15:35	5	2	ALIVE	A	143	
AT8	15:32	15:38	6	2	ALIVE	A	153	
AT9	15:31	15:37	6	2	ALIVE	A	147	
AU0	15:52	15:57	5	2	ALIVE	A	162	
AU1	15:51	15:56	5	2	ALIVE	A	152	
AU2	15:52	15:58	6	2	ALIVE	A	151	
AU3	15:54	15:59	5	2	ALIVE	A	144	
AU4	15:53	15:58	5	2	ALIVE	A	162	
AU5	15:58	16:04	6	2	ALIVE	A	152	
AU6	15:57	16:07	10	2	ALIVE	A	151	
AU7	15:55	16:01	6	2	ALIVE	A	156	
AU8	15:56	16:03	7	2	ALIVE	A	138	
AU9	15:56	16:01	5	2	ALIVE	A	154	
AV0	16:13	16:22	9	2	ALIVE	A	153	
AV1	16:15	16:19	4	2	ALIVE	A	143	
AV2	16:13	16:20	7	2	ALIVE	A	146	
AV3	16:16	16:20	4	2	ALIVE	A	148	
AV4	16:14	16:19	5	2	ALIVE	A	147	
AV5	16:20	16:23	3	2	ALIVE	A	147	
AV6	16:18	16:22	4	2	ALIVE	A	157	
AV7	16:19	16:25	6	2	ALIVE	A	153	
AV8	16:17	16:24	7	2	ALIVE	A	164	
AV9	16:17	16:24	7	2	ALIVE	A	157	
AW0	16:40	16:45	5	2	ALIVE	A	142	
AW1	16:39	16:46	7	2	ALIVE	A	135	
AW2	16:38	16:43	5	2	ALIVE	A	139	
AW3	16:37	16:43	6	2	ALIVE	A	141	
AW5	16:42	16:47	5	2	ALIVE	A	147	
AW6	16:43	16:49	6	2	ALIVE	A	143	
AW7	16:45	16:49	4	2	ALIVE	A	150	
AW8	16:42	16:47	5	2	ALIVE	A	150	
AW9	16:44	16:51	7	2	DEAD	G	134	
XZ9	16:39	16:45	6	2	ALIVE	A	157	

30 May 2003 - Testlot 11 : Control

- Water temp=58.1F

B80	16:45	16:50	5	2	ALIVE	A	147	
B81	16:46	16:53	7	2	ALIVE	A	142	
B82	16:45	16:51	6	2	ALIVE	A	141	
B83	16:46	16:51	5	2	ALIVE	A	138	
B84	16:47	16:54	7	2	ALIVE	A	146	
B85	16:51	16:56	5	2	ALIVE	A	143	
B86	16:50	16:59	9	2	ALIVE	A	148	
B87	16:52	17:01	9	2	ALIVE	A	152	
B88	16:49	16:55	6	2	ALIVE	A	161	
B89	16:49	16:58	9	2	ALIVE	A	157	
B90	17:12	17:17	5	2	ALIVE	A	148	
B91	17:12	17:19	7	2	ALIVE	A	143	
B92	17:10	17:17	7	2	ALIVE	A	146	
B93	17:11	17:22	11	2	ALIVE	A	143	
B94	17:11	17:18	7	2	ALIVE	A	148	
B95	17:14	17:20	6	2	ALIVE	A	145	
B96	17:16	17:24	8	2	ALIVE	A	154	
B97	17:15	17:21	6	2	ALIVE	A	148	
B98	17:17	17:26	9	2	ALIVE	A	143	
B99	17:15	17:23	8	2	ALIVE	A	137	
BA0	17:34	17:39	5	2	ALIVE	A	167	
BA1	17:33	17:39	6	2	ALIVE	A	147	
BA2	17:32	17:39	7	2	ALIVE	A	148	
BA3	17:35	17:44	9	2	ALIVE	A	144	
BA4	17:34	17:42	8	2	ALIVE	A	163	
BA5	17:37	17:44	7	2	ALIVE	A	153	
BA6	17:39	17:45	6	2	ALIVE	A	140	
BA7	17:39	17:47	8	2	ALIVE	A	140	
BA8	17:38	17:45	7	2	ALIVE	A	165	
BA9	17:36	17:45	9	2	ALIVE	A	147	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
30 May 2003 - Testlot 11 :				21 - Water temp=58.1F				
B20	14:11	14:18	7	2	ALIVE	A	143	
B21	14:12	14:20	8	2	ALIVE	A	141	
B22	14:10	14:25	15	2	ALIVE	A	145	
B23	14:12	14:21	9	2	ALIVE	A	152	
B24	14:11	14:16	5	2	ALIVE	A	155	
B25	14:15	14:20	5	2	ALIVE	A	150	
B26	14:14	14:19	5	2	ALIVE	A	148	
B27	14:14	14:26	12	2	ALIVE	A	159	
B28	14:15	14:22	7	2	ALIVE	A	147	
B29	14:14	14:23	9	2	ALIVE	A	158	
B30	14:34	14:42	8	2	ALIVE	A	142	
B31	14:36	14:41	5	2	ALIVE	A	142	
B32	14:34	14:42	8	2	ALIVE	A	145	
B33	14:36	14:49	13	2	DEAD	HJ	154	
B34	14:35	14:40	5	2	ALIVE	A	157	
B35	14:40	14:46	6	2	ALIVE	A	147	
B36	14:38	14:45	7	2	ALIVE	A	148	
B37	14:39	14:45	6	2	ALIVE	A	148	
B38	14:39	14:44	5	2	ALIVE	A	167	
B39	14:41	14:53	12	2	ALIVE	A	153	
B40	15:00	15:05	5	2	ALIVE	A	157	
B41	14:59	15:07	8	2	ALIVE	A	142	
B42	14:59	15:12	13	2	ALIVE	A	147	
B43	14:58	15:05	7	2	ALIVE	A	158	
B44	14:58	15:04	6	2	ALIVE	A	154	
B45	15:04	15:13	9	2	ALIVE	A	164	
B46	15:04	15:11	7	2	ALIVE	A	150	
B47	15:03	15:08	5	2	ALIVE	A	169	
B48	15:03	15:12	9	2	ALIVE	A	146	
B49	15:02	15:09	7	2	ALIVE	A	153	
30 May 2003 - Testlot 11 :				23 - Water temp=58.1F				
B50	15:25	15:31	6	2	ALIVE	A	145	
B51	15:24	15:33	9	2	ALIVE	A	160	
B52	15:26	15:32	6	2	ALIVE	A	140	
B53	15:25	15:33	8	2	ALIVE	A	132	
B54	15:23	15:30	7	2	ALIVE	A	145	
B55	15:29	15:36	7	2	ALIVE	A	153	
B56	15:29	15:35	6	2	ALIVE	A	147	
B57	15:27	15:34	7	2	ALIVE	A	148	
B58	15:28	15:36	8	2	ALIVE	A	146	
B59	15:30	15:36	6	2	ALIVE	A	155	
B60	15:43	15:52	9	2	ALIVE	A	142	
B61	15:42	15:48	6	2	ALIVE	A	133	
B62	15:42	15:49	7	2	ALIVE	A	142	
B63	15:41	15:50	9	2	ALIVE	H	151	
B64	15:44	.	.	1	TAG & PIN		154	
B65	15:45	15:55	10	2	ALIVE	A	148	
B66	15:47	15:53	6	2	ALIVE	A	158	
B67	15:45	15:54	9	2	ALIVE	A	146	
B68	15:47	15:55	8	2	ALIVE	A	138	
B69	15:46	15:51	5	2	ALIVE	A	157	
B70	16:06	16:14	8	2	ALIVE	A	143	
B71	16:07	16:16	9	2	ALIVE	A	142	
B72	16:08	16:15	7	2	ALIVE	A	144	
B73	16:06	16:11	5	2	ALIVE	A	147	
B74	16:07	16:15	8	2	ALIVE	A	145	
B75	16:12	16:18	6	2	ALIVE	A	140	
B76	16:10	16:20	10	2	ALIVE	A	142	
B77	16:10	16:18	8	2	ALIVE	A	153	
B78	16:09	16:15	6	2	ALIVE	A	155	
B79	16:11	16:18	7	2	ALIVE	A	147	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Alive/Dead	Condition Codes	Total Length (mm)	Comments
	Re-leased	Re-covered	At Large (min.)					
30 May 2003 - Testlot 11 :					41 - Water temp=58.1F			
AX0	12:04	12:09	5	2	ALIVE	A	143	
AX1	12:03	12:09	6	2	ALIVE	A	150	
AX2	12:02	12:19	17	2	ALIVE	A	138	
AX3	12:03	12:09	6	2	ALIVE	A	158	
AX4	12:02	12:07	5	2	ALIVE	A	147	
AX5	12:07	12:13	6	2	ALIVE	A	142	
AX6	12:06	12:11	5	2	ALIVE	A	176	
AX7	12:06	12:12	6	2	ALIVE	A	152	
AX8	12:05	12:11	6	2	ALIVE	A	149	
AX9	12:07	12:12	5	2	ALIVE	A	157	
AY0	12:25	12:30	5	2	ALIVE	A	138	
AY1	12:27	12:34	7	2	ALIVE	A	152	
AY2	12:25	12:30	5	2	ALIVE	A	147	
AY3	12:26	12:35	9	2	ALIVE	A	160	
AY4	12:26	12:33	7	2	ALIVE	A	140	
AY5	12:30	12:38	8	2	ALIVE	A	141	
AY6	12:28	12:36	8	2	ALIVE	A	156	
AY7	12:28	12:35	7	2	ALIVE	A	147	
AY8	12:29	12:42	13	2	ALIVE	A	147	
AY9	12:29	13:04	35	1	ALIVE	B	145	
AZ0	12:52	13:05	13	2	ALIVE	A	146	
AZ1	12:53	13:20	27	1	ALIVE	B	155	
AZ2	12:54	13:01	7	2	ALIVE	A	147	
AZ3	12:55	13:02	7	2	ALIVE	A	144	
AZ4	12:54	13:00	6	2	ALIVE	A	165	
AZ5	12:51	12:57	6	2	ALIVE	A	158	
AZ6	12:51	12:56	5	2	ALIVE	A	146	
AZ7	12:50	13:00	10	2	ALIVE	A	143	
AZ8	12:49	12:56	7	2	ALIVE	A	167	
AZ9	12:49	12:54	5	2	ALIVE	A	140	
B00	13:15	13:23	8	2	ALIVE	A	148	
B01	13:16	13:23	7	2	ALIVE	A	147	
B02	13:17	13:24	7	2	ALIVE	A	146	
B03	13:16	13:21	5	2	ALIVE	A	163	
B04	13:17	13:26	9	2	ALIVE	A	173	
B05	13:20	13:31	11	2	ALIVE	A	155	
B06	13:19	13:26	7	2	ALIVE	A	147	
B07	13:22	13:27	5	2	ALIVE	A	143	
B08	13:21	13:33	12	2	ALIVE	A	149	
B09	13:22	13:29	7	2	ALIVE	A	152	
B10	13:43	13:52	9	2	ALIVE	HE	145	
B11	13:42	13:48	6	2	ALIVE	A	147	
B12	13:40	13:57	17	2	ALIVE	A	146	
B13	13:41	13:47	6	2	ALIVE	A	149	
B14	13:42	13:56	14	1	ALIVE	A	138	
B15	13:44	13:53	9	2	ALIVE	A	137	
B16	13:44	13:49	5	2	ALIVE	A	153	
B17	13:45	13:50	5	2	ALIVE	A	157	
B18	13:45	13:50	5	2	ALIVE	A	159	
B19	13:46	13:58	12	2	ALIVE	A	150	
31 May 2003 - Testlot 12 : Control					- Water temp=58.1F			
BL0	12:06	12:12	6	2	ALIVE	A	148	
BL1	12:08	12:13	5	2	ALIVE	A	152	
BL2	12:07	12:12	5	2	ALIVE	A	157	
BL3	12:07	12:15	8	2	ALIVE	A	138	
BL4	12:05	12:12	7	2	ALIVE	A	148	
BL5	12:10	12:16	6	2	ALIVE	A	168	
BL6	12:10	12:23	13	2	ALIVE	A	145	
BL7	12:09	12:16	7	2	ALIVE	A	175	
BL8	12:09	12:14	5	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
BL9	12:11	12:17	6	2	ALIVE	A	151	
BM0	12:28	12:44	16	2	ALIVE	A	148	
BM1	12:28	12:32	4	2	ALIVE	A	142	
BM2	12:29	12:35	6	2	ALIVE	A	153	
BM3	12:27	12:39	12	2	ALIVE	A	137	
BM4	12:27	12:35	8	2	ALIVE	A	149	
BM5	12:32	12:42	10	2	ALIVE	A	136	
BM6	12:30	12:41	11	2	ALIVE	A	167	
BM7	12:32	12:38	6	2	ALIVE	A	168	
BM8	12:31	12:37	6	2	ALIVE	A	170	
BM9	12:30	12:35	5	2	ALIVE	A	158	
BN0	12:51	12:57	6	2	ALIVE	A	143	
BN1	12:52	12:57	5	2	ALIVE	A	145	
BN2	12:53	12:59	6	2	ALIVE	A	143	
BN3	12:51	12:59	8	2	ALIVE	A	147	
BN4	12:53	12:58	5	2	ALIVE	A	147	
BN5	12:56	13:01	5	2	ALIVE	A	147	
BN6	12:55	13:00	5	2	ALIVE	A	152	
BN7	12:55	13:03	8	2	ALIVE	A	155	
BN8	12:54	13:00	6	2	ALIVE	A	142	
BN9	12:54	13:01	7	2	ALIVE	A	133	
BP0	13:13	13:21	8	2	ALIVE	A	146	
BP1	13:15	13:22	7	2	ALIVE	A	147	
BP2	13:14	13:23	9	2	ALIVE	A	140	
BP3	13:12	13:19	7	2	ALIVE	A	153	
BP4	13:14	13:19	5	2	ALIVE	A	153	
BP5	13:16	13:21	5	2	ALIVE	A	140	
BP6	13:17	13:25	8	2	ALIVE	A	158	
BP7	13:18	13:23	5	2	ALIVE	A	143	
BP8	13:17	13:25	8	2	ALIVE	A	150	
BP9	13:16	13:25	9	2	ALIVE	A	136	
31 May 2003 - Testlot 12 :							21 - Water temp=58.1F	
BB0	8:15	8:26	11	2	ALIVE	A	137	
BB1	8:16	8:21	5	2	ALIVE	A	157	
BB2	8:14	8:21	7	2	ALIVE	A	157	
BB3	8:15	8:23	8	2	ALIVE	A	137	
BB4	8:17	8:24	7	2	ALIVE	A	154	
BB5	8:20	8:27	7	2	ALIVE	A	148	
BB6	8:21	8:28	7	2	ALIVE	A	159	
BB7	8:21	8:29	8	2	ALIVE	A	144	
BB8	8:18	8:26	8	2	ALIVE	A	142	
BB9	8:20	8:26	6	2	ALIVE	A	150	
BC0	8:36	8:42	6	2	ALIVE	A	151	
BC1	8:34	8:39	5	2	ALIVE	A	145	
BC2	8:37	8:44	7	2	ALIVE	H	155	
BC3	8:35	8:40	5	2	ALIVE	A	154	
BC4	8:36	8:43	7	2	ALIVE	A	153	
BC5	8:38	8:46	8	2	ALIVE	A	152	
BC6	8:39	8:48	9	2	ALIVE	A	140	
BC7	8:40	8:48	8	2	ALIVE	A	133	
BC8	8:41	8:47	6	2	ALIVE	A	141	
BC9	8:39	8:46	7	2	ALIVE	A	156	
BD0	8:55	9:01	6	2	ALIVE	A	136	
BD1	8:54	9:00	6	2	ALIVE	A	142	
BD2	8:53	9:02	9	2	ALIVE	A	161	
BD3	8:56	9:02	6	2	ALIVE	A	150	
BD4	8:55	9:02	7	2	ALIVE	A	133	
BD5	8:59	9:08	9	2	ALIVE	A	152	
BD6	8:59	9:05	6	2	ALIVE	A	162	
BD7	8:57	9:03	6	2	ALIVE	A	143	
BD8	8:58	9:06	8	2	ALIVE	A	140	
BD9	8:58	9:04	6	2	ALIVE	A	127	
BE0	9:18	9:24	6	2	ALIVE	A	143	
BE1	9:16	9:23	7	2	ALIVE	A	151	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
BE2	9:17	9:32	15	2	ALIVE	A	141	
BE3	9:15	9:24	9	2	ALIVE	A	153	
BE4	9:16	.	.	1	TAG & PIN		160	
BE5	9:21	9:27	6	2	ALIVE	A	153	
BE6	9:19	9:25	6	2	ALIVE	A	156	
BE7	9:20	9:27	7	2	ALIVE	A	165	
BE8	9:20	9:27	7	2	ALIVE	A	136	
BE9	9:21	9:26	5	2	ALIVE	A	155	
31 May 2003 - Testlot 12 :					23 - Water temp=58.1F			
BF0	10:11	10:18	7	2	ALIVE	A	137	
BF1	10:11	10:18	7	2	ALIVE	A	143	
BF2	10:10	10:20	10	2	ALIVE	A	145	
BF3	10:10	10:15	5	2	ALIVE	A	143	
BF4	10:09	10:17	8	2	ALIVE	A	148	
BF5	10:13	10:19	6	2	ALIVE	A	152	
BF6	10:13	10:22	9	2	ALIVE	A	175	
BF7	10:14	10:21	7	2	ALIVE	A	153	
BF8	10:14	10:23	9	2	ALIVE	A	158	
BF9	10:12	10:21	9	2	ALIVE	A	150	
BH0	10:29	10:35	6	2	ALIVE	A	147	
BH1	10:28	10:37	9	2	ALIVE	A	141	
BH2	10:28	10:40	12	2	ALIVE	A	147	
BH3	10:27	10:34	7	2	ALIVE	A	156	
BH4	10:27	10:33	6	2	ALIVE	A	152	
BH5	10:32	10:37	5	2	DEAD	HJ	158	
BH6	10:30	10:41	11	2	ALIVE	A	147	
BH7	10:31	10:36	5	2	ALIVE	A	151	
BH8	10:31	10:42	11	2	ALIVE	A	172	
BH9	10:29	10:36	7	2	ALIVE	A	144	
BJ0	10:52	10:58	6	2	ALIVE	A	147	
BJ1	10:51	10:56	5	2	ALIVE	A	154	
BJ2	10:52	11:00	8	2	ALIVE	A	146	
BJ3	10:54	10:59	5	2	ALIVE	A	156	
BJ4	10:53	10:59	6	2	ALIVE	A	142	
BJ5	10:57	11:04	7	2	ALIVE	A	142	
BJ6	10:56	11:11	15	2	ALIVE	A	142	
BJ7	10:57	11:04	7	2	ALIVE	A	164	
BJ8	10:55	11:03	8	2	ALIVE	H	143	
BJ9	10:54	11:06	12	2	ALIVE	A	156	
BK0	11:18	11:23	5	2	ALIVE	A	140	
BK1	11:18	11:31	13	2	ALIVE	A	145	
BK2	11:17	11:23	6	2	ALIVE	A	150	
BK3	11:16	.	.	1	TAG & PIN		145	
BK4	11:17	11:23	6	2	ALIVE	A	146	
BK5	11:20	11:31	11	2	ALIVE	A	150	
BK6	11:21	11:28	7	2	ALIVE	A	157	
BK7	11:21	11:27	6	2	ALIVE	A	142	
BK8	11:19	11:25	6	2	ALIVE	A	164	
31 May 2003 - Testlot 12 :					41 - Water temp=58.1F			
BR0	13:59	14:06	7	2	ALIVE	A	150	
BR1	13:59	14:07	8	2	ALIVE	A	147	
BR2	13:58	14:05	7	2	ALIVE	HN	147	
BR3	13:57	14:02	5	2	ALIVE	A	155	
BR4	13:58	14:26	28	1	ALIVE	B	150	
BR5	13:56	14:02	6	2	ALIVE	A	155	
BR6	13:54	14:01	7	2	ALIVE	A	137	
BR7	13:55	14:02	7	2	ALIVE	A	140	
BR8	13:54	14:00	6	2	ALIVE	A	152	
BR9	13:55	14:01	6	2	ALIVE	A	171	
BS0	14:29	14:37	8	2	ALIVE	A	142	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
BS1	14:29	14:34	5	2	ALIVE	A	145	
BS2	14:27	14:32	5	2	ALIVE	A	160	
BS3	14:30	14:47	17	1	ALIVE	B	153	
BS4	14:28	14:34	6	2	ALIVE	A	163	
BS5	14:32	14:37	5	2	ALIVE	A	162	
BS6	14:32	14:38	6	2	ALIVE	A	137	
BS7	14:33	14:39	6	2	ALIVE	A	135	
BS8	14:31	.	.	2	UNKNOWN		153	
BS9	14:33	14:39	6	2	ALIVE	A	140	
BT0	14:59	15:07	8	2	ALIVE	A	150	
BT1	14:59	15:04	5	2	ALIVE	A	148	
BT2	14:58	15:03	5	2	ALIVE	A	157	
BT3	15:00	15:13	13	2	ALIVE	A	153	
BT4	15:02	15:08	6	2	ALIVE	A	143	
BT5	15:02	15:07	5	2	ALIVE	A	151	
BT6	15:04	15:09	5	2	ALIVE	A	143	
BT7	15:01	15:06	5	2	ALIVE	A	171	
BT8	15:01	.	.	1	TAG & PIN		148	
BT9	15:03	15:09	6	2	ALIVE	A	165	
BU0	15:28	15:33	5	2	ALIVE	A	136	
BU1	15:26	15:33	7	2	ALIVE	A	147	
BU2	15:27	15:37	10	2	ALIVE	A	152	
BU3	15:25	15:32	7	2	ALIVE	A	152	
BU4	15:26	15:36	10	2	ALIVE	A	161	
BU5	15:29	15:37	8	2	ALIVE	A	150	
BU6	15:30	15:39	9	2	ALIVE	A	160	
BU7	15:30	15:50	20	2	ALIVE	A	157	
BU8	15:28	15:39	11	1	ALIVE	B	156	
BU9	15:31	15:40	9	2	ALIVE	A	175	
BV0	15:56	16:03	7	2	ALIVE	A	148	
BV1	15:57	16:03	6	2	ALIVE	A	153	
BV2	15:58	16:05	7	2	ALIVE	A	156	
BV3	15:55	16:01	6	2	ALIVE	A	148	
BV4	15:57	16:02	5	2	ALIVE	A	141	
BV5	16:00	16:09	9	2	ALIVE	A	158	
BV6	16:01	16:16	15	2	ALIVE	GH	158	
BV7	16:01	16:07	6	2	ALIVE	A	153	
BV8	16:00	.	.	2	DEAD	Z	154	
BV9	15:59	16:05	6	2	ALIVE	A	157	
2 June 2003 - Testlot 13 : Control								- Water temp=58.1F
C90	14:23	14:29	6	2	ALIVE	A	147	
C91	14:22	14:29	7	2	ALIVE	A	143	
C92	14:21	14:28	7	2	ALIVE	A	151	
C93	14:24	14:28	4	2	ALIVE	A	147	
C94	14:22	14:30	8	2	ALIVE	A	153	
C95	14:25	14:29	4	2	ALIVE	A	144	
C96	14:27	14:32	5	2	ALIVE	A	137	
C97	14:27	14:34	7	2	ALIVE	A	140	
C98	14:25	14:32	7	2	ALIVE	A	140	
C99	14:26	14:33	7	2	ALIVE	A	168	
CA0	14:46	14:51	5	2	ALIVE	A	148	
CA1	14:44	14:54	10	2	ALIVE	A	150	
CA2	14:44	14:50	6	2	ALIVE	A	144	
CA3	14:45	14:51	6	2	ALIVE	A	135	
CA4	14:45	14:51	6	2	ALIVE	A	149	
CA5	14:48	14:54	6	2	ALIVE	A	150	
CA6	14:48	14:55	7	2	ALIVE	A	135	
CA7	14:49	14:56	7	2	ALIVE	A	153	
CA8	14:47	14:52	5	2	ALIVE	A	151	
CA9	14:49	14:55	6	2	ALIVE	A	150	
CB0	15:09	15:15	6	2	ALIVE	A	147	
CB1	15:07	15:12	5	2	ALIVE	A	145	
CB2	15:07	15:14	7	2	ALIVE	A	148	
CB3	15:09	15:14	5	2	ALIVE	A	152	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
CB4	15:08	15:14	6	2	ALIVE	A	147	
CB5	15:11	15:23	12	2	ALIVE	A	149	
CB6	15:11	15:21	10	2	ALIVE	A	156	
CB7	15:12	15:18	6	2	ALIVE	A	138	
CB8	15:10	15:17	7	2	ALIVE	A	148	
CB9	15:12	15:20	8	2	ALIVE	A	133	
2 June 2003 - Testlot 13 :					21 - Water temp=58.1F			
C00	9:52	9:57	5	2	ALIVE	HB	150	
C01	9:52	9:57	5	2	ALIVE	A	137	
C02	9:51	9:58	7	2	ALIVE	A	150	
C03	9:51	9:55	4	2	ALIVE	A	138	
C04	9:53	9:58	5	2	ALIVE	A	144	
C05	9:54	10:01	7	2	ALIVE	A	156	
C06	9:56	10:03	7	2	ALIVE	A	166	
C07	9:56	10:01	5	2	ALIVE	A	148	
C08	9:54	9:59	5	2	ALIVE	A	143	
C09	9:55	10:02	7	2	ALIVE	A	158	
C10	10:15	10:22	7	2	ALIVE	A	144	
C11	10:13	10:21	8	2	ALIVE	A	133	
C12	10:14	10:21	7	2	ALIVE	A	143	
C13	10:12	10:17	5	2	ALIVE	A	140	
C14	10:14	10:20	6	2	ALIVE	A	141	
C15	10:18	10:23	5	2	ALIVE	A	151	
C16	10:17	10:23	6	2	ALIVE	A	145	
C17	10:16	10:22	6	2	ALIVE	A	147	
C18	10:16	10:20	4	2	ALIVE	A	150	
C19	10:17	10:24	7	2	ALIVE	A	147	
C20	10:39	10:44	5	2	ALIVE	A	151	
C21	10:40	10:45	5	2	ALIVE	A	145	
C22	10:40	10:48	8	2	ALIVE	A	150	
C23	10:41	10:45	4	2	ALIVE	A	146	
C24	10:41	10:48	7	2	ALIVE	A	146	
C25	10:44	10:50	6	2	ALIVE	A	144	
C26	10:43	10:50	7	2	ALIVE	A	153	
C27	10:42	10:47	5	2	ALIVE	A	135	
C28	10:44	10:49	5	2	ALIVE	H	137	
C29	10:43	10:47	4	2	ALIVE	A	147	
C30	11:02	11:07	5	2	ALIVE	A	145	
C31	11:04	11:08	4	2	ALIVE	A	147	
C32	11:03	11:08	5	2	ALIVE	A	143	
C33	11:02	11:09	7	2	ALIVE	A	146	
C34	11:04	11:09	5	2	ALIVE	A	156	
C35	11:05	11:10	5	2	ALIVE	A	150	
C36	11:08	11:17	9	2	ALIVE	A	148	
C37	11:06	11:13	7	2	ALIVE	A	151	
C38	11:07	11:12	5	2	ALIVE	A	145	
C39	11:06	11:58	52	2	ALIVE	A	152	
C40	11:39	11:45	6	2	ALIVE	A	152	
C41	11:40	11:50	10	2	ALIVE	A	148	
C42	11:41	11:48	7	2	ALIVE	A	155	
C43	11:39	11:43	4	2	ALIVE	A	161	
C44	11:40	11:47	7	2	ALIVE	A	157	
C45	11:42	11:49	7	2	ALIVE	A	143	
C46	11:44	11:49	5	2	ALIVE	A	156	
C47	11:43	11:52	9	2	ALIVE	A	162	
C48	11:44	11:50	6	2	ALIVE	A	163	
C49	11:43	11:55	12	2	ALIVE	A	127	
2 June 2003 - Testlot 13 :					23 - Water temp=58.1F			
BW0	8:11	8:17	6	2	ALIVE	A	140	
BW1	8:10	8:14	4	2	ALIVE	A	158	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
BW2	8:09	8:16	7	2	ALIVE	A	160	
BW3	8:10	8:18	8	2	ALIVE	A	151	
BW4	8:12	8:19	7	2	ALIVE	A	147	
BW5	8:16	8:21	5	2	ALIVE	A	155	
BW6	8:13	8:21	8	2	ALIVE	G	151	
BW7	8:14	8:20	6	2	ALIVE	A	157	
BW8	8:14	8:22	8	2	ALIVE	A	156	
BW9	8:15	8:24	9	2	ALIVE	A	158	
BX0	8:33	8:38	5	2	ALIVE	A	136	
BX1	8:32	8:36	4	2	ALIVE	A	147	
BX2	8:33	8:41	8	2	ALIVE	A	158	
BX3	8:32	8:39	7	2	ALIVE	A	142	
BX4	8:31	8:36	5	2	ALIVE	A	148	
BX5	8:37	8:43	6	2	ALIVE	A	149	
BX6	8:42	8:47	5	2	ALIVE	A	161	
BX7	8:35	8:41	6	2	ALIVE	A	152	
BX8	8:37	8:44	7	2	ALIVE	A	152	
BX9	8:35	8:39	4	2	ALIVE	A	152	
BY0	8:55	9:01	6	2	ALIVE	A	142	
BY1	8:57	9:04	7	2	ALIVE	A	143	
BY2	8:55	9:02	7	2	ALIVE	A	137	
BY3	8:56	9:04	8	2	ALIVE	A	150	
BY4	8:57	9:02	5	2	ALIVE	A	146	
BY5	8:59	9:05	6	2	ALIVE	A	155	
BY6	9:00	9:05	5	2	ALIVE	A	158	
BY7	8:58	9:03	5	2	ALIVE	A	161	
BY8	8:59	9:08	9	2	ALIVE	A	145	
BY9	9:01	9:08	7	2	ALIVE	A	152	
BZ0	9:17	9:23	6	2	ALIVE	A	142	
BZ1	9:18	9:24	6	2	ALIVE	A	155	
BZ2	9:24	9:31	7	2	ALIVE	A	132	
BZ3	9:18	9:24	6	2	ALIVE	A	142	
BZ4	9:16	9:23	7	2	ALIVE	A	143	
BZ5	9:22	9:35	13	2	ALIVE	A	149	
BZ6	9:21	9:27	6	2	ALIVE	A	147	
BZ7	9:21	9:25	4	2	ALIVE	A	142	
BZ8	9:22	9:27	5	2	ALIVE	A	157	
BZ9	9:23	9:28	5	2	ALIVE	A	140	
2 June 2003 - Testlot 13 :								42 - Water temp=58.1F
C50	12:10	12:21	11	2	ALIVE	A	147	
C51	12:11	12:25	14	2	ALIVE	H	147	
C52	12:10	12:20	10	2	ALIVE	A	152	
C53	12:12	12:17	5	2	ALIVE	A	138	
C54	12:12	12:21	9	2	ALIVE	A	137	
C55	12:15	12:22	7	2	ALIVE	A	150	
C56	12:13	12:19	6	2	ALIVE	A	139	
C57	12:14	12:28	14	2	ALIVE	A	146	
C58	12:14	12:19	5	2	ALIVE	A	157	
C59	12:16	12:25	9	2	ALIVE	A	161	
C60	12:54	13:02	8	2	ALIVE	A	154	
C61	12:56	13:01	5	2	ALIVE	A	148	
C62	12:54	12:59	5	2	ALIVE	A	147	
C63	12:55	13:01	6	2	ALIVE	A	140	
C64	12:53	13:01	8	2	ALIVE	A	158	
C65	12:59	13:07	8	2	ALIVE	A	149	
C66	12:59	13:03	4	2	ALIVE	A	156	
C67	12:58	13:07	9	2	ALIVE	A	140	
C68	12:57	13:05	8	2	ALIVE	A	137	
C69	12:58	13:05	7	2	ALIVE	A	150	
C70	13:17	13:22	5	2	ALIVE	A	158	
C71	13:16	13:22	6	2	ALIVE	A	147	
C72	13:15	13:22	7	2	ALIVE	A	150	
C73	13:17	13:28	11	2	ALIVE	A	157	
C74	13:15	13:24	9	2	ALIVE	A	144	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
C75	13:19	13:27	8	2	ALIVE	A	144	
C76	13:18	13:24	6	2	ALIVE	A	148	
C77	13:20	13:25	5	2	ALIVE	A	163	
C78	13:19	13:28	9	2	ALIVE	A	152	
C79	13:20	13:30	10	2	ALIVE	A	167	
C80	13:39	13:44	5	2	ALIVE	A	148	
C81	13:39	13:44	5	2	ALIVE	A	146	
C82	13:38	13:42	4	2	ALIVE	A	158	
C83	13:41	13:48	7	2	ALIVE	A	153	
C84	13:40	13:49	9	2	ALIVE	A	151	
C85	13:43	13:58	15	2	ALIVE	A	150	
C86	13:43	13:48	5	2	ALIVE	A	155	
C87	13:43	13:59	16	2	ALIVE	A	172	
C88	13:42	13:58	16	2	ALIVE	A	152	
C89	13:44	13:58	14	2	ALIVE	A	157	
3 June 2003 - Testlot 14 : Control								- Water temp=58.1F
CC0	10:20	10:28	8	2	ALIVE	A	141	
CC1	10:20	10:27	7	2	ALIVE	A	140	
CC2	10:21	10:27	6	2	ALIVE	A	158	
CC3	10:23	10:29	6	2	ALIVE	A	150	
CC4	10:24	10:31	7	2	ALIVE	A	157	
CC5	10:16	10:21	5	2	ALIVE	A	156	
CC6	10:13	10:22	9	2	ALIVE	A	149	
CC7	10:16	10:29	13	2	ALIVE	A	142	
CC8	10:18	10:23	5	2	ALIVE	A	148	
CC9	10:18	10:30	12	2	ALIVE	A	155	
CD0	10:42	10:49	7	2	ALIVE	A	147	
CD1	10:43	10:51	8	2	ALIVE	A	133	
CD2	10:40	10:45	5	2	ALIVE	A	148	
CD3	10:39	10:44	5	2	ALIVE	A	142	
CD4	10:41	10:49	8	2	ALIVE	A	134	
CD5	10:46	10:53	7	2	ALIVE	A	143	
CD6	10:45	10:51	6	2	ALIVE	A	151	
CD7	10:48	10:54	6	2	ALIVE	A	146	
CD8	10:48	10:53	5	2	DEAD	HP	145	
CD9	11:13	11:19	6	2	ALIVE	A	141	
CE0	11:08	11:14	6	2	ALIVE	A	157	
CE1	11:07	11:16	9	2	ALIVE	A	136	
CE2	11:06	11:12	6	2	ALIVE	A	135	
CE3	11:09	11:13	4	2	ALIVE	A	159	
CE4	11:05	11:10	5	2	ALIVE	A	150	
CE5	11:11	11:19	8	2	ALIVE	A	161	
CE6	11:13	11:20	7	2	ALIVE	A	145	
CE7	11:14	11:22	8	2	ALIVE	A	136	
CE8	11:12	11:23	11	2	ALIVE	A	147	
CE9	11:10	11:21	11	2	ALIVE	A	145	
3 June 2003 - Testlot 14 :								21 - Water temp=58.1F
CF0	11:44	11:49	5	2	ALIVE	A	151	
CF1	11:43	11:49	6	2	ALIVE	A	145	
CF2	11:41	11:47	6	2	ALIVE	A	153	
CF3	11:39	11:44	5	2	ALIVE	A	154	
CF4	11:40	11:46	6	2	ALIVE	A	140	
CF5	11:45	11:51	6	2	ALIVE	A	142	
CF6	11:49	11:56	7	2	ALIVE	A	152	
CF7	11:46	11:53	7	2	ALIVE	A	145	
CF8	11:48	11:54	6	2	ALIVE	HGE	154	
CF9	11:50	11:58	8	2	ALIVE	A	136	
CH0	12:06	12:12	6	2	ALIVE	A	147	
CH1	12:07	12:13	6	2	ALIVE	A	151	
CH2	12:04	12:10	6	2	ALIVE	A	142	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
CH3	12:09	12:15	6	2	ALIVE	A	155	
CH4	12:08	12:14	6	2	ALIVE	A	149	
CH5	12:16	12:35	19	1	ALIVE	HB	153	
CH6	12:13	12:20	7	2	ALIVE	A	144	
CH7	12:12	12:17	5	2	ALIVE	A	155	
CH8	12:15	12:22	7	2	ALIVE	A	149	
CH9	12:11	12:16	5	2	ALIVE	A	152	
CJ0	12:54	12:59	5	2	ALIVE	A	159	
CJ1	12:56	13:02	6	2	ALIVE	A	147	
CJ2	12:55	13:02	7	2	ALIVE	A	167	
CJ3	12:52	12:57	5	2	ALIVE	A	156	
CJ4	12:57	13:03	6	2	ALIVE	A	152	
CJ5	13:03	13:09	6	2	ALIVE	A	152	
CJ6	13:02	13:08	6	2	ALIVE	A	152	
CJ7	13:00	13:09	9	2	ALIVE	A	155	
CJ8	13:01	13:05	4	2	ALIVE	HG	136	
CJ9	13:01	13:08	7	2	ALIVE	A	138	
CK0	13:20	13:24	4	2	ALIVE	A	140	
CK1	13:21	13:27	6	2	ALIVE	A	144	
CK2	13:12	13:26	14	2	ALIVE	A	144	
CK3	13:18	13:23	5	2	ALIVE	A	157	
CK4	13:22	13:28	6	2	ALIVE	A	142	
CK5	13:28	13:34	6	2	ALIVE	A	150	
CK6	13:24	13:29	5	2	ALIVE	A	145	
CK7	13:26	13:32	6	2	ALIVE	A	147	
CK8	13:25	13:32	7	2	ALIVE	A	146	
CK9	13:29	13:36	7	2	ALIVE	A	138	

3 June 2003 - Testlot 14 :

23 - Water temp=58.1F

CL0	13:54	13:59	5	2	ALIVE	A	140	
CL1	13:53	13:58	5	2	ALIVE	A	140	
CL2	13:55	14:00	5	2	ALIVE	A	155	
CL3	13:52	13:56	4	2	ALIVE	A	139	
CL4	13:52	13:58	6	2	ALIVE	A	145	
CL5	13:59	14:05	6	2	ALIVE	A	145	
CL6	13:59	14:07	8	2	ALIVE	A	148	
CL7	13:57	14:02	5	2	ALIVE	A	149	
CL8	14:07	14:08	1	2	ALIVE	A	141	
CL9	14:01	14:07	6	2	ALIVE	A	145	
CM0	14:20	14:28	8	2	ALIVE	A	158	
CM1	14:17	.	.	0	DEAD	Z	145	
CM2	14:18	14:23	5	2	ALIVE	A	153	
CM3	14:19	14:24	5	2	ALIVE	A	154	
CM4	14:21	14:29	8	2	DEAD	GJ	137	
CM5	14:27	14:31	4	2	ALIVE	HG	159	
CM6	14:24	14:34	10	2	ALIVE	A	167	
CM7	14:25	14:30	5	2	ALIVE	A	142	
CM8	14:28	14:34	6	2	ALIVE	A	148	
CM9	14:26	14:31	5	2	ALIVE	A	150	
CN0	15:23	15:31	8	2	ALIVE	A	146	
CN1	15:22	15:29	7	2	ALIVE	A	148	
CN2	15:24	15:28	4	2	ALIVE	A	148	
CN3	15:22	15:27	5	2	ALIVE	A	142	
CN4	15:25	15:29	4	2	ALIVE	A	166	
CN5	15:19	15:26	7	2	ALIVE	H	140	
CN6	15:18	15:24	6	2	ALIVE	A	147	
CN7	15:16	15:21	5	2	ALIVE	A	155	
CN8	15:18	15:23	5	2	ALIVE	A	147	
CN9	15:17	15:22	5	2	ALIVE	A	155	
CT0	14:50	14:59	9	2	ALIVE	A	156	
CT1	14:49	14:54	5	2	ALIVE	A	155	
CT2	14:51	14:59	8	2	ALIVE	A	148	
CT3	14:53	15:02	9	2	ALIVE	A	143	
CT4	14:52	14:57	5	2	ALIVE	A	147	
CT5	14:55	15:00	5	2	ALIVE	H	151	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
CT6	14:56	15:01	5	2	ALIVE	A	153	
CT7	14:57	15:07	10	2	ALIVE	A	141	
CT8	14:58	15:09	11	2	ALIVE	A	158	
CT9	14:54	14:59	5	2	ALIVE	A	150	
3 June 2003 - Testlot 14 :					41 - Water temp=58.1F			
CP0	15:48	15:57	9	2	ALIVE	A	155	
CP1	15:47	15:53	6	2	ALIVE	A	134	
CP2	15:44	15:53	9	2	ALIVE	A	151	
CP3	15:43	15:53	10	2	ALIVE	A	149	
CP4	15:46	15:51	5	2	ALIVE	A	152	
CP5	15:49	15:55	6	2	ALIVE	A	148	
CP6	15:53	15:58	5	2	ALIVE	A	153	
CP7	15:50	15:58	8	2	ALIVE	A	160	
CP8	15:52	15:58	6	2	ALIVE	A	145	
CP9	15:51	15:58	7	2	ALIVE	A	149	
CR0	16:10	16:16	6	2	ALIVE	A	157	
CR1	16:10	16:16	6	2	ALIVE	A	143	
CR2	16:11	16:17	6	2	ALIVE	A	146	
CR3	16:08	16:14	6	2	ALIVE	A	145	
CR4	16:09	16:15	6	2	ALIVE	A	145	
CR5	16:14	16:20	6	2	ALIVE	A	142	
CR6	16:13	16:21	8	2	ALIVE	A	143	
CR7	16:15	.	.	0	DEAD	Z	142	
CR8	16:17	16:23	6	2	ALIVE	A	150	
CR9	16:16	16:22	6	2	ALIVE	A	157	
CS0	16:48	16:52	4	2	ALIVE	A	150	
CS1	16:50	17:05	15	2	ALIVE	A	155	
CS2	16:51	16:59	8	2	ALIVE	B	160	
CS3	16:49	16:54	5	2	ALIVE	A	161	
CS4	16:52	16:57	5	2	ALIVE	GH	150	
CS5	16:53	17:03	10	2	ALIVE	A	145	
CS6	16:55	17:00	5	2	ALIVE	A	144	
CS7	16:55	17:02	7	2	ALIVE	A	153	
CS8	16:56	17:03	7	2	ALIVE	A	140	
CS9	16:54	17:00	6	2	ALIVE	A	150	
CU0	17:11	17:16	5	2	ALIVE	A	145	
CU1	17:12	17:18	6	2	ALIVE	A	140	
CU2	17:09	17:15	6	2	ALIVE	A	153	
CU3	17:10	17:16	6	2	ALIVE	A	141	
CU4	17:09	17:19	10	2	ALIVE	A	143	
CU5	17:15	17:20	5	2	ALIVE	A	151	
CU6	17:14	17:19	5	2	ALIVE	A	150	
CU7	17:18	17:25	7	2	ALIVE	A	150	
CU8	17:17	17:22	5	2	ALIVE	A	142	
CU9	17:16	17:20	4	2	ALIVE	A	152	
4 June 2003 - Testlot 15 : Control					- Water temp=58.1F			
D70	14:36	14:49	13	2	ALIVE	A	141	
D71	14:35	14:40	5	2	ALIVE	A	147	
D72	14:38	14:44	6	2	ALIVE	A	152	
D73	14:36	14:42	6	2	ALIVE	A	141	
D74	14:37	14:43	6	2	ALIVE	A	150	
D75	14:42	14:48	6	2	ALIVE	A	136	
D76	14:41	14:49	8	2	ALIVE	A	146	
D77	14:39	14:45	6	2	ALIVE	A	148	
D78	14:40	14:47	7	2	ALIVE	A	150	
D79	14:40	14:47	7	2	ALIVE	A	151	
D80	15:02	15:08	6	2	ALIVE	A	140	
D81	15:02	15:08	6	2	ALIVE	A	135	
D82	15:00	15:05	5	2	ALIVE	A	140	
D83	15:01	15:06	5	2	ALIVE	A	150	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
D84	15:01	15:06	5	2	ALIVE	A	151	
D85	15:04	15:10	6	2	ALIVE	A	141	
D86	15:03	15:09	6	2	ALIVE	A	143	
D87	15:06	15:12	6	2	ALIVE	A	153	
D88	15:04	15:10	6	2	ALIVE	A	143	
D89	15:05	15:12	7	2	ALIVE	A	138	
D90	15:31	15:36	5	2	ALIVE	A	147	
D91	15:31	15:36	5	2	ALIVE	A	158	
D92	15:32	15:35	3	2	ALIVE	A	156	
D93	15:33	15:37	4	2	ALIVE	A	148	
D94	15:32	15:36	4	2	ALIVE	A	139	
D95	15:27	15:35	8	2	ALIVE	A	147	
D96	15:27	15:38	11	2	ALIVE	A	146	
D97	15:29	15:38	9	2	ALIVE	A	134	
D98	15:29	15:36	7	2	ALIVE	A	129	
D99	15:28	15:34	6	2	ALIVE	A	150	
4 June 2003 - Testlot 15 :								22 - Water temp=58.1F
CV0	8:12	8:17	5	2	ALIVE	A	158	
CV1	8:12	8:16	4	2	ALIVE	A	165	
CV2	8:11	8:19	8	2	ALIVE	A	147	
CV3	8:13	8:21	8	2	ALIVE	A	165	
CV4	8:14	8:21	7	2	ALIVE	A	150	
CV5	8:18	8:24	6	2	ALIVE	A	148	
CV6	8:16	8:22	6	2	ALIVE	A	145	
CV7	8:17	8:23	6	2	ALIVE	A	158	
CV8	8:15	8:20	5	2	ALIVE	A	155	
CV9	8:15	8:26	11	2	ALIVE	A	150	
CW0	8:33	8:47	14	2	ALIVE	A	150	
CW1	8:32	8:39	7	2	ALIVE	A	155	
CW2	8:34	8:44	10	2	ALIVE	A	144	
CW3	8:32	8:38	6	2	ALIVE	A	144	
CW4	8:31	8:36	5	2	ALIVE	A	144	
CW5	8:37	8:45	8	2	ALIVE	A	148	
CW6	8:35	8:40	5	2	ALIVE	A	149	
CW7	8:36	8:43	7	2	ALIVE	A	158	
CW8	8:38	8:44	6	2	ALIVE	H	152	
CW9	8:37	8:43	6	2	ALIVE	A	160	
CX0	9:13	9:20	7	2	ALIVE	A	150	
CX1	9:14	9:20	6	2	ALIVE	A	152	
CX2	9:15	9:22	7	2	ALIVE	A	155	
CX3	9:16	9:25	9	2	ALIVE	A	143	
CX4	9:14	9:20	6	2	ALIVE	A	145	
CX5	9:18	.	.	0	TAG & PIN		142	
CX6	9:19	9:26	7	2	ALIVE	A	153	
CX7	9:19	9:24	5	2	ALIVE	A	147	
CX8	9:17	9:22	5	2	ALIVE	A	147	
CX9	9:17	9:23	6	2	ALIVE	A	145	
CY0	9:45	9:55	10	2	ALIVE	A	139	
CY1	9:44	9:51	7	2	ALIVE	A	136	
CY2	9:43	9:49	6	2	ALIVE	H	142	
CY3	9:42	9:48	6	2	ALIVE	A	133	
CY4	9:43	9:51	8	2	ALIVE	A	144	
CY5	9:48	9:57	9	2	ALIVE	A	146	
CY6	9:47	9:52	5	2	ALIVE	A	148	
CY7	9:47	9:54	7	2	ALIVE	A	145	
CY8	9:46	9:53	7	2	ALIVE	A	150	
CY9	9:48	9:56	8	2	ALIVE	A	149	
4 June 2003 - Testlot 15 :								24 - Water temp=58.1F
CZ0	10:17	10:28	11	2	ALIVE		149	
CZ1	10:18	10:22	4	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
CZ2	10:21	10:26	5	2	ALIVE	A	160	
CZ3	10:20	10:26	6	2	ALIVE	A	156	
CZ4	10:19	10:24	5	2	ALIVE	A	145	
CZ5	10:22	10:27	5	2	ALIVE	A	163	
CZ6	10:23	10:30	7	2	ALIVE	A	139	
CZ7	10:25	10:32	7	2	ALIVE	A	145	
CZ8	10:24	10:30	6	2	ALIVE	A	144	
CZ9	10:23	10:29	6	2	ALIVE	A	140	
D01	10:39	10:45	6	2	ALIVE	A	141	
D02	10:38	10:46	8	2	ALIVE	A	143	
D03	10:40	10:46	6	2	ALIVE	A	156	
D04	10:38	10:45	7	2	ALIVE	A	149	
D05	10:44	10:49	5	2	ALIVE	A	143	
D06	10:43	10:48	5	2	ALIVE	A	151	
D07	10:43	10:49	6	2	ALIVE	A	145	
D08	10:41	10:48	7	2	ALIVE	A	143	
D09	10:42	10:51	9	2	ALIVE	A	142	
D10	11:27	11:31	4	2	ALIVE	A	145	
D11	11:28	11:40	12	2	ALIVE	H	139	
D12	11:27	11:33	6	2	ALIVE	A	142	
D13	11:28	11:32	4	2	ALIVE	A	145	
D14	11:29	11:33	4	2	ALIVE	A	146	
D15	11:32	11:39	7	2	ALIVE	A	150	
D16	11:32	11:36	4	2	ALIVE	A	138	
D17	11:30	11:37	7	2	ALIVE	A	147	
D18	11:31	11:45	14	2	ALIVE	A	145	
D19	11:31	11:35	4	2	ALIVE	A	150	
D20	11:54	12:06	12	2	ALIVE	A	142	
D21	11:58	12:02	4	2	ALIVE	A	144	
D22	11:53	11:58	5	2	ALIVE	A	142	
D23	11:56	12:00	4	2	ALIVE	A	147	
D24	11:55	12:06	11	2	ALIVE	A	169	
D25	11:54	12:02	8	2	ALIVE	A	141	
D26	11:58	12:05	7	2	ALIVE	A	141	
D28	11:57	12:01	4	2	ALIVE	A	152	
D29	12:00	12:05	5	2	ALIVE	A	156	
L15	12:00	12:07	7	2	ALIVE	A	154	
L16	11:59	12:04	5	2	ALIVE	A	144	
4 June 2003 - Testlot 15 :								42 - Water temp=58.1F
D30	12:38	12:43	5	2	ALIVE	A	155	
D31	12:37	12:43	6	2	ALIVE	A	146	
D32	12:36	12:45	9	2	ALIVE	A	142	
D33	12:35	12:46	11	2	ALIVE	A	143	
D34	12:36	12:42	6	2	ALIVE	A	155	
D35	12:34	12:40	6	2	ALIVE	A	153	
D37	12:33	12:41	8	2	ALIVE	A	145	
D38	12:31	12:37	6	2	ALIVE	A	151	
D39	12:33	12:39	6	2	ALIVE	H	150	
D40	13:00	13:05	5	2	ALIVE	A	160	
D41	12:59	13:05	6	2	ALIVE	A	141	
D42	12:58	13:03	5	2	ALIVE	A	155	
D43	12:58	13:03	5	2	ALIVE	A	139	
D44	12:59	13:06	7	2	ALIVE	A	146	
D45	13:02	13:10	8	2	ALIVE	A	148	
D46	13:02	13:09	7	2	ALIVE	A	140	
D47	13:05	13:09	4	2	ALIVE	A	154	
D48	13:01	13:07	6	2	ALIVE	A	131	
D49	13:03	13:09	6	2	ALIVE	A	148	
D50	13:18	13:26	8	2	ALIVE	A	142	
D51	13:17	13:22	5	2	ALIVE	A	164	
D52	13:19	13:25	6	2	ALIVE	A	158	
D53	13:19	13:24	5	2	ALIVE	A	157	
D54	13:18	13:23	5	2	ALIVE	A	146	
D55	13:23	13:29	6	2	ALIVE	A	150	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
D56	13:22	13:32	10	2	ALIVE	A	142	
D57	13:23	13:29	6	2	ALIVE	A	141	
D58	13:21	13:30	9	2	ALIVE	HG	158	
D59	13:21	13:26	5	2	ALIVE	A	146	
D60	13:52	13:59	7	2	ALIVE	A	144	
D61	13:52	13:56	4	2	ALIVE	A	144	
D62	13:53	14:03	10	2	ALIVE	A	162	
D63	13:54	14:01	7	2	ALIVE	A	150	
D64	13:53	13:58	5	2	ALIVE	A	148	
D65	13:55	14:00	5	2	ALIVE	HG	145	
D66	14:08	14:19	11	2	ALIVE	A	150	
D67	13:56	14:07	11	2	ALIVE	A	154	
D68	13:57	14:14	17	1	DEAD	P	150	
D69	13:57	14:03	6	2	ALIVE	A	153	
L17	13:55	14:01	6	2	ALIVE	A	138	
5 June 2003 - Testlot 16 : Control								- Water temp=58.1f
DN0	13:17	13:26	9	2	ALIVE	A	145	
DN1	13:14	13:19	5	2	ALIVE	A	146	
DN2	13:16	13:20	4	2	ALIVE	A	153	
DN3	13:15	13:22	7	2	ALIVE	A	137	
DN4	13:16	13:23	7	2	ALIVE	A	150	
DN5	13:18	13:22	4	2	ALIVE	A	148	
DN6	13:19	13:24	5	2	ALIVE	A	146	
DN7	13:18	13:24	6	2	ALIVE	A	162	
DN8	13:17	13:22	5	2	ALIVE	A	156	
DN9	13:19	13:27	8	2	ALIVE	A	143	
DP0	13:35	13:40	5	2	ALIVE	A	145	
DP1	13:35	13:45	10	2	ALIVE	A	147	
DP2	13:36	13:41	5	2	ALIVE	A	153	
DP3	13:36	13:41	5	2	ALIVE	A	149	
DP4	13:37	13:47	10	2	ALIVE	A	152	
DP5	13:39	13:50	11	2	ALIVE	A	147	
DP6	13:37	13:42	5	2	ALIVE	A	142	
DP7	13:38	13:46	8	2	ALIVE	A	143	
DP8	13:39	13:49	10	2	ALIVE	A	163	
DP9	13:38	13:43	5	2	ALIVE	A	163	
DR0	14:00	14:05	5	2	ALIVE	A	156	
DR1	13:58	14:02	4	2	ALIVE	A	151	
DR2	14:00	14:08	8	2	ALIVE	A	153	
DR3	13:59	14:07	8	2	ALIVE	A	151	
DR4	13:59	14:03	4	2	ALIVE	A	160	
DR5	14:02	14:06	4	2	ALIVE	A	137	
DR6	14:01	14:08	7	2	ALIVE	A	145	
DR7	14:03	14:12	9	2	ALIVE	A	148	
DR8	14:02	14:07	5	2	ALIVE	A	154	
DR9	14:01	14:08	7	2	ALIVE	A	146	
DS0	14:25	14:30	5	2	ALIVE	A	143	
DS1	14:22	14:26	4	2	ALIVE	A	152	
DS2	14:22	14:28	6	2	ALIVE	A	149	
DS3	14:24	14:29	5	2	ALIVE	A	148	
DS4	14:26	14:31	5	2	ALIVE	A	130	
DS5	14:26	14:30	4	2	ALIVE	A	157	
DS6	14:25	14:30	5	2	ALIVE	A	156	
DS7	14:23	14:29	6	2	ALIVE	A	150	
DS8	14:24	14:27	3	2	ALIVE	A	143	
DS9	14:23	14:28	5	2	ALIVE	A	159	
5 June 2003 - Testlot 16 :								21 - Water temp=58.1F
DE0	9:50	9:55	5	2	ALIVE	A	143	
DE1	9:50	9:54	4	2	ALIVE	A	146	
DE2	9:50	10:02	12	2	ALIVE	A	147	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
DE3	9:51	9:56	5	2	ALIVE	A	150	
DE4	9:52	10:01	9	2	ALIVE	A	157	
DE5	9:53	9:58	5	2	ALIVE	A	156	
DE6	9:53	9:57	4	2	ALIVE	A	155	
DE7	9:55	10:02	7	2	ALIVE	A	147	
DE8	9:54	10:00	6	2	ALIVE	A	160	
DE9	9:54	10:04	10	2	ALIVE	A	182	
DF0	10:14	10:20	6	2	ALIVE	A	145	
DF1	10:13	10:19	6	2	ALIVE	A	137	
DF2	10:15	10:21	6	2	ALIVE	A	147	
DF3	10:14	10:21	7	2	ALIVE	A	148	
DF4	10:15	10:21	6	2	ALIVE	A	143	
DF5	10:16	10:24	8	2	ALIVE	A	133	
DF6	10:18	10:27	9	2	ALIVE	A	157	
DF7	10:16	10:24	8	2	ALIVE	A	143	
DF8	10:17	10:23	6	2	ALIVE	A	152	
DF9	10:17	10:25	8	2	ALIVE	A	163	
DH0	10:35	10:40	5	2	ALIVE	A	152	
DH1	10:35	10:39	4	2	ALIVE	A	146	
DH2	10:36	10:42	6	2	ALIVE	A	148	
DH3	10:35	10:42	7	2	ALIVE	A	147	
DH4	10:36	10:40	4	2	ALIVE	A	150	
DH5	10:37	10:42	5	2	ALIVE	A	152	
DH6	10:39	10:47	8	2	ALIVE	A	158	
DH7	10:39	10:46	7	2	ALIVE	A	144	
DH8	10:38	10:42	4	2	ALIVE	A	152	
DH9	10:38	10:44	6	2	ALIVE	A	141	
DJ0	10:54	11:00	6	2	ALIVE	A	149	
DJ1	10:53	10:57	4	2	ALIVE	A	147	
DJ2	10:54	11:01	7	2	ALIVE	A	148	
DJ3	10:55	11:06	11	2	ALIVE	A	151	
DJ4	10:52	10:59	7	2	ALIVE	A	156	
DJ5	10:55	11:04	9	2	ALIVE	A	144	
DJ6	10:56	11:01	5	2	ALIVE	A	166	
DJ7	10:57	11:03	6	2	ALIVE	A	141	
DJ8	10:57	11:02	5	2	ALIVE	A	130	
DJ9	10:56	11:01	5	2	ALIVE	A	168	

5 June 2003 - Testlot 16 :

23 - Water temp=58.1F

DA0	8:19	8:24	5	2	ALIVE	H	147	
DA1	8:21	8:31	10	2	ALIVE	A	156	
DA2	8:22	8:27	5	2	ALIVE	A	156	
DA3	8:20	8:26	6	2	ALIVE	A	151	
DA4	8:20	8:25	5	2	ALIVE	G	154	
DA5	8:23	8:34	11	2	ALIVE	A	157	
DA6	8:24	8:33	9	2	ALIVE	A	162	
DA7	8:23	8:31	8	2	ALIVE	A	154	
DA8	8:24	8:29	5	2	ALIVE	A	176	
DA9	8:22	8:28	6	2	ALIVE	A	145	
DB0	8:42	8:47	5	2	ALIVE	A	143	
DB1	8:40	8:45	5	2	ALIVE	A	148	
DB2	8:42	8:47	5	2	ALIVE	A	157	
DB3	8:41	8:47	6	2	ALIVE	A	146	
DB4	8:41	8:46	5	2	ALIVE	A	146	
DB5	8:45	8:53	8	2	ALIVE	A	153	
DB6	8:44	8:50	6	2	ALIVE	A	146	
DB7	8:43	8:48	5	2	ALIVE	A	152	
DB8	8:45	8:50	5	2	ALIVE	A	157	
DB9	8:44	8:50	6	2	ALIVE	A	160	
DC0	9:02	9:07	5	2	ALIVE	H	152	
DC1	9:00	9:05	5	2	ALIVE	A	148	
DC2	9:00	9:11	11	2	ALIVE	A	153	
DC3	9:01	9:06	5	2	ALIVE	H	145	
DC4	9:01	9:07	6	2	ALIVE	A	148	
DC5	9:04	9:13	9	2	ALIVE	A	156	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
DC6	9:03	9:09	6	2	ALIVE	A	157	
DC7	9:02	9:08	6	2	ALIVE	A	155	
DC8	9:03	9:10	7	2	ALIVE	A	142	
DC9	9:04	9:13	9	2	ALIVE	A	136	
DD0	9:26	9:33	7	2	ALIVE	A	140	
DD1	9:24	9:30	6	2	ALIVE	A	146	
DD2	9:24	9:32	8	2	ALIVE	A	147	
DD3	9:25	9:35	10	2	ALIVE	A	152	
DD4	9:25	9:33	8	2	ALIVE	A	170	
DD5	9:29	9:36	7	2	ALIVE	A	164	
DD6	9:27	9:31	4	2	ALIVE	A	166	
DD7	9:28	9:33	5	2	ALIVE	A	149	
DD8	9:27	9:35	8	2	ALIVE	A	158	
DD9	9:28	9:35	7	2	ALIVE	A	175	
5 June 2003 - Testlot 16 :								41 - Water temp=58.1F
DK0	11:27	11:35	8	2	ALIVE	A	151	
DK1	11:28	11:33	5	2	ALIVE	A	161	
DK2	11:27	11:32	5	2	ALIVE	A	148	
DK3	11:29	11:33	4	2	ALIVE	A	148	
DK4	11:28	11:34	6	2	ALIVE	A	147	
DK5	11:30	11:35	5	2	ALIVE	A	142	
DK6	11:31	11:36	5	2	ALIVE	A	163	
DK7	11:30	11:36	6	2	ALIVE	A	151	
DK8	11:32	11:38	6	2	ALIVE	A	158	
DK9	11:31	11:37	6	2	ALIVE	A	146	
DL0	11:47	11:54	7	2	ALIVE	A	155	
DL1	11:48	12:00	12	2	ALIVE	A	157	
DL2	11:49	11:56	7	2	ALIVE	GH	163	
DL3	11:47	11:55	8	2	ALIVE	A	163	
DL4	11:48	11:58	10	2	ALIVE	A	154	
DL5	11:50	11:54	4	2	ALIVE	A	161	
DL6	11:51	11:56	5	2	ALIVE	A	162	
DL7	11:50	12:02	12	2	ALIVE	A	134	
DL8	11:49	12:02	13	2	ALIVE	A	161	
DL9	11:51	11:56	5	2	ALIVE	A	138	
DM0	12:14	12:26	12	2	ALIVE	A	153	
DM1	12:15	12:25	10	2	ALIVE	A	152	
DM2	12:15	12:20	5	2	ALIVE	A	152	
DM3	12:14	12:19	5	2	ALIVE	A	153	
DM4	12:16	12:20	4	2	ALIVE	H	152	
DM5	12:18	12:22	4	2	ALIVE	A	147	
DM6	12:16	12:36	20	1	DEAD	P	147	
DM7	12:17	12:29	12	2	ALIVE	A	146	
DM8	12:16	12:21	5	2	ALIVE	A	145	
DM9	12:18	12:22	4	2	ALIVE	A	154	
6 June 2003 - Testlot 17 : Control								- Water temp=59.0F
FR0	12:29	12:34	5	2	ALIVE	A	147	
FR1	12:28	12:37	9	2	ALIVE	A	148	
FR2	12:30	12:37	7	2	ALIVE	A	160	
FR3	12:28	12:35	7	2	ALIVE	A	148	
FR4	12:29	12:33	4	2	ALIVE	A	148	
FR5	12:31	12:40	9	2	ALIVE	A	147	
FR6	12:31	12:37	6	2	ALIVE	A	141	
FR7	12:30	12:34	4	2	ALIVE	A	148	
FR8	12:32	12:38	6	2	ALIVE	A	145	
FR9	12:32	12:38	6	2	ALIVE	A	167	
FS0	12:53	12:59	6	2	ALIVE	A	150	
FS1	12:53	12:57	4	2	ALIVE	A	155	
FS2	12:53	12:57	4	2	ALIVE	A	147	
FS3	12:54	12:58	4	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
FS4	12:54	13:05	11	2	ALIVE	A	149	
FS5	12:55	13:00	5	2	ALIVE	A	148	
FS6	12:56	13:03	7	2	ALIVE	A	168	
FS7	12:55	13:01	6	2	ALIVE	A	146	
FS8	12:56	13:06	10	2	ALIVE	A	138	
FS9	12:56	13:10	14	2	ALIVE	A	152	
FT0	13:16	13:22	6	2	ALIVE	A	152	
FT1	13:16	13:29	13	2	ALIVE	A	155	
FT2	13:17	13:24	7	2	ALIVE	A	137	
FT3	13:15	13:25	10	2	ALIVE	A	151	
FT4	13:17	13:21	4	2	ALIVE	A	158	
FT5	13:18	13:26	8	2	ALIVE	A	149	
FT6	13:19	13:28	9	2	ALIVE	A	153	
FT7	13:19	13:30	11	2	ALIVE	A	148	
FT8	13:18	13:22	4	2	ALIVE	A	155	
FT9	13:19	13:25	6	2	ALIVE	A	152	
FU0	13:37	13:43	6	2	ALIVE	A	157	
FU1	13:38	13:43	5	2	ALIVE	A	153	
FU2	13:39	13:46	7	2	ALIVE	A	149	
FU3	13:39	13:44	5	2	ALIVE	A	159	
FU4	13:37	13:51	14	2	ALIVE	A	151	
FU5	13:41	13:46	5	2	ALIVE	A	162	
FU6	13:40	13:45	5	2	ALIVE	A	176	
FU7	13:42	13:48	6	2	ALIVE	A	140	
FU8	13:40	13:47	7	2	ALIVE	A	140	
FU9	13:41	13:47	6	2	ALIVE	A	156	
FV0	14:01	14:06	5	2	ALIVE	A	153	
FV1	14:03	14:10	7	2	ALIVE	A	165	
FV2	14:02	14:07	5	2	ALIVE	A	147	
FV3	14:04	14:10	6	2	ALIVE	A	153	
FV4	14:02	14:08	6	2	ALIVE	A	138	
FV5	14:07	14:13	6	2	ALIVE	A	155	
FV6	14:06	14:11	5	2	ALIVE	A	146	
FV7	14:05	14:12	7	2	ALIVE	A	168	
FV8	14:05	14:10	5	2	ALIVE	A	167	
FV9	14:06	14:13	7	2	ALIVE	A	145	

6 June 2003 - Testlot 17 :

21 - Water temp=59.0F

DT0	8:19	8:26	7	2	ALIVE	A	137	
DT1	8:18	8:22	4	2	ALIVE	A	160	
DT2	8:18	8:26	8	2	ALIVE	A	161	
DT3	8:17	8:24	7	2	ALIVE	A	149	
DT4	8:17	8:38	21	1	DEAD	JHB	150	
DT5	8:20	8:32	12	2	ALIVE	H	152	
DT6	8:20	8:28	8	2	ALIVE	A	171	
DT7	8:21	8:32	11	2	ALIVE	A	146	
DT8	8:19	8:25	6	2	ALIVE	A	163	
DT9	8:21	8:28	7	2	ALIVE	A	167	
DU0	8:45	8:50	5	2	ALIVE	A	153	
DU1	8:45	8:56	11	2	ALIVE	A	154	
DU2	8:46	8:51	5	2	ALIVE	A	142	
DU3	8:44	8:53	9	2	ALIVE	A	157	
DU4	8:46	8:52	6	2	ALIVE	A	143	
DU5	8:48	8:57	9	2	ALIVE	A	152	
DU6	8:49	8:55	6	2	ALIVE	H	148	
DU7	8:47	8:58	11	1	ALIVE	B	143	
DU8	8:50	8:54	4	2	ALIVE	A	161	
DU9	8:49	8:55	6	2	ALIVE	A	158	
DV0	9:08	9:13	5	2	ALIVE	A	148	
DV1	9:08	9:16	8	2	ALIVE	A	147	
DV2	9:09	9:13	4	2	ALIVE	A	150	
DV3	9:07	9:14	7	2	ALIVE	A	151	
DV4	9:07	9:12	5	2	ALIVE	A	137	
DV5	9:10	9:16	6	2	ALIVE	A	136	
DV6	9:11	9:15	4	2	ALIVE	A	150	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
DV7	9:11	9:17	6	2	ALIVE	A	138	
DV8	9:10	9:18	8	2	ALIVE	A	152	
DV9	9:10	9:17	7	2	ALIVE	A	161	
DW0	9:28	9:35	7	2	ALIVE	A	153	
DW1	9:27	9:32	5	2	ALIVE	A	148	
DW2	9:28	9:33	5	2	ALIVE	A	162	
DW3	9:27	9:31	4	2	ALIVE	A	158	
DW4	9:28	9:34	6	2	ALIVE	A	148	
DW5	9:31	9:37	6	2	ALIVE	A	139	
DW6	9:30	9:37	7	2	ALIVE	A	136	
DW7	9:29	9:36	7	2	ALIVE	A	142	
DW8	9:30	9:35	5	2	ALIVE	A	158	
DW9	9:31	9:39	8	2	ALIVE	A	167	
DX0	9:51	9:55	4	2	ALIVE	G	145	
DX1	9:50	9:59	9	2	ALIVE	A	147	
DX2	9:50	9:54	4	2	ALIVE	A	138	
DX3	9:52	9:57	5	2	ALIVE	A	143	
DX4	9:51	9:57	6	2	ALIVE	A	150	
DX5	9:53	9:59	6	2	ALIVE	A	145	
DX6	9:55	10:01	6	2	ALIVE	A	151	
DX7	9:54	9:59	5	2	ALIVE	A	144	
DX8	9:54	10:01	7	2	ALIVE	A	157	
DX9	9:53	9:58	5	2	ALIVE	A	146	
6 June 2003 - Testlot 17 :								23 - Water temp=59.0F
DY0	10:22	10:27	5	2	ALIVE	A	138	
DY1	10:23	10:27	4	2	DEAD	N	147	
DY2	10:21	10:26	5	2	ALIVE	A	146	
DY3	10:23	10:30	7	2	ALIVE	BGH	158	
DY4	10:22	10:27	5	1	ALIVE	BN	141	
DY5	10:25	10:32	7	2	ALIVE	A	151	
DY6	10:24	10:29	5	2	ALIVE	A	167	
DY7	10:26	10:32	6	2	ALIVE	A	156	
DY8	10:24	10:30	6	2	ALIVE	A	172	
DY9	10:25	10:30	5	2	ALIVE	A	166	
DZ0	10:46	10:51	5	2	ALIVE	A	145	
DZ1	10:44	10:49	5	2	ALIVE	HG	143	
DZ2	10:45	10:50	5	2	ALIVE	A	145	
DZ3	10:44	10:56	12	2	ALIVE	A	153	
DZ4	10:44	10:51	7	2	ALIVE	A	167	
DZ5	10:48	10:53	5	2	ALIVE	A	142	
DZ6	10:46	10:51	5	2	ALIVE	G	150	
DZ7	10:47	10:52	5	2	ALIVE	GH	153	
DZ8	10:47	10:53	6	2	ALIVE	A	158	
DZ9	10:48	10:55	7	2	ALIVE	A	153	
FM0	11:11	11:20	9	2	ALIVE	A	131	
FM1	11:10	11:17	7	2	ALIVE	A	144	
FM2	11:12	11:17	5	2	ALIVE	A	138	
FM3	11:11	11:15	4	2	ALIVE	A	140	
FM4	11:10	11:14	4	2	ALIVE	A	148	
FM5	11:14	11:22	8	2	ALIVE	A	156	
FM6	11:13	11:19	6	2	ALIVE	A	135	
FM7	11:14	11:23	9	2	DEAD	G	148	
FM9	11:13	11:20	7	2	DEAD	B	130	
FN0	11:32	11:37	5	2	ALIVE	A	143	
FN1	11:31	11:44	13	2	ALIVE	A	150	
FN2	11:32	11:40	8	2	ALIVE	A	143	
FN3	11:31	11:35	4	2	ALIVE	A	148	
FN4	11:33	11:37	4	2	ALIVE	A	146	
FN5	11:35	11:41	6	2	ALIVE	A	154	
FN6	11:35	11:42	7	2	ALIVE	A	159	
FN7	11:34	11:39	5	2	ALIVE	A	133	
FN8	11:36	11:41	5	2	ALIVE	H	137	
FN9	11:34	11:39	5	2	ALIVE	A	149	
FP0	11:59	12:04	5	2	ALIVE	A	138	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
FP2	12:01	12:06	5	2	ALIVE	A	153	
FP3	12:00	12:04	4	2	ALIVE	A	158	
FP4	11:59	12:05	6	2	ALIVE	A	151	
FP5	12:01	12:06	5	2	ALIVE	A	135	
FP6	12:03	12:09	6	2	ALIVE	A	150	
FP7	12:02	12:07	5	2	ALIVE	A	135	
FP8	12:00	12:08	8	2	ALIVE	H	147	
FP9	12:03	12:07	4	2	ALIVE	A	145	
L18	11:12	11:18	6	2	ALIVE	A	159	
L19	12:00	12:12	12	2	ALIVE	A	163	
7 June 2003 - Testlot 18 : Control								- Water temp=59.0F
HU0	12:23	12:32	9	2	ALIVE	A	160	
HU1	12:24	12:30	6	2	ALIVE	A	149	
HU2	12:23	12:32	9	2	ALIVE	A	155	
HU3	12:22	12:28	6	2	ALIVE	A	154	
HU4	12:22	12:29	7	2	ALIVE	A	145	
HU5	12:19	12:24	5	2	ALIVE	A	155	
HU6	12:20	12:26	6	2	ALIVE	A	159	
HU7	12:20	12:29	9	2	ALIVE	A	157	
HU8	12:19	12:24	5	2	ALIVE	A	157	
HU9	12:21	12:29	8	2	ALIVE	A	160	
HV0	12:47	12:52	5	2	ALIVE	A	162	
HV1	12:48	12:53	5	2	ALIVE	H	145	
HV2	12:49	12:57	8	2	ALIVE	A	151	
HV3	12:48	12:53	5	2	ALIVE	A	148	
HV4	12:49	12:55	6	2	ALIVE	A	170	
HV5	12:46	12:52	6	2	ALIVE	A	155	
HV6	12:44	12:48	4	2	ALIVE	A	143	
HV7	12:45	12:51	6	2	ALIVE	A	146	
HV8	12:46	12:58	12	2	ALIVE	A	150	
HV9	12:45	12:50	5	2	ALIVE	A	150	
HW0	13:11	13:18	7	2	ALIVE	A	155	
HW1	13:13	13:17	4	2	ALIVE	A	155	
HW2	13:13	13:23	10	2	ALIVE	A	149	
HW3	13:12	13:17	5	2	ALIVE	A	153	
HW4	13:11	13:15	4	2	ALIVE	A	138	
HW5	13:08	13:17	9	2	ALIVE	A	157	
HW6	13:10	13:14	4	2	ALIVE	A	146	
HW7	13:09	13:14	5	2	ALIVE	A	140	
HW8	13:09	13:20	11	2	ALIVE	A	156	
HW9	13:10	13:17	7	2	ALIVE	A	145	
HX0	13:34	13:41	7	2	ALIVE	A	156	
HX1	13:36	13:40	4	2	ALIVE	A	152	
HX2	13:35	13:40	5	2	ALIVE	A	148	
HX3	13:34	13:39	5	2	ALIVE	A	155	
HX4	13:36	13:41	5	2	ALIVE	A	145	
HX5	13:31	13:35	4	2	ALIVE	A	164	
HX6	13:32	13:37	5	2	ALIVE	A	141	
HX7	13:32	13:37	5	2	ALIVE	A	148	
HX8	13:33	13:38	5	2	ALIVE	A	147	
HX9	13:31	13:36	5	2	ALIVE	A	142	
HY0	13:59	14:05	6	2	ALIVE	A	147	
HY1	13:59	14:03	4	2	ALIVE	A	147	
HY2	14:05	14:09	4	2	ALIVE	A	159	
HY3	14:00	14:05	5	2	ALIVE	A	146	
HY4	13:59	14:03	4	2	ALIVE	A	152	
HY5	14:02	14:07	5	2	ALIVE	A	154	
HY6	14:02	14:11	9	2	ALIVE	A	145	
HY7	14:01	14:06	5	2	ALIVE	A	145	
HY8	14:03	14:08	5	2	ALIVE	A	152	
HY9	14:01	14:08	7	2	ALIVE	A	165	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
7 June 2003 - Testlot 18 :					22	- Water temp=59.0F		
FW0	8:08	8:15	7	2	ALIVE	A	137	
FW1	8:09	8:14	5	2	ALIVE	H	162	
FW2	8:08	8:14	6	2	ALIVE	A	141	
FW3	8:10	8:17	7	2	ALIVE	A	137	
FW4	8:10	8:14	4	2	ALIVE	A	145	
FW5	8:13	8:20	7	2	ALIVE	A	148	
FW6	8:11	8:16	5	2	ALIVE	A	146	
FW7	8:12	8:18	6	2	ALIVE	A	165	
FW8	8:12	8:18	6	2	ALIVE	A	153	
FW9	8:13	8:21	8	2	ALIVE	A	152	
FX0	8:25	8:32	7	2	ALIVE	A	151	
FX1	8:27	8:31	4	2	ALIVE	A	149	
FX2	8:26	8:32	6	2	ALIVE	A	146	
FX3	8:25	8:31	6	2	ALIVE	A	151	
FX4	8:26	8:31	5	2	ALIVE	A	139	
FX5	8:29	8:34	5	2	ALIVE	A	145	
FX6	8:29	8:34	5	2	ALIVE	A	149	
FX7	8:28	8:33	5	2	ALIVE	A	142	
FX8	8:27	8:32	5	2	ALIVE	A	150	
FX9	8:30	8:36	6	2	ALIVE	A	156	
FY0	8:42	8:47	5	2	ALIVE	A	157	
FY1	8:41	8:46	5	2	ALIVE	A	145	
FY2	8:42	8:47	5	2	ALIVE	A	154	
FY3	8:43	8:48	5	2	ALIVE	A	139	
FY4	8:41	8:50	9	2	ALIVE	A	156	
FY5	8:45	8:51	6	2	ALIVE	A	158	
FY6	8:44	8:50	6	2	ALIVE	A	140	
FY7	8:45	8:50	5	2	ALIVE	A	154	
FY8	8:46	8:54	8	2	ALIVE	A	143	
FY9	8:44	8:52	8	2	ALIVE	A	145	
FZ0	9:04	9:12	8	2	ALIVE	A	151	
FZ1	9:05	9:11	6	2	ALIVE	A	148	
FZ2	9:03	9:16	13	2	ALIVE	H	130	
FZ3	9:04	9:18	14	2	ALIVE	A	167	
FZ4	9:03	9:07	4	2	ALIVE	A	150	
FZ5	9:06	9:17	11	2	ALIVE	A	139	
FZ6	9:07	9:13	6	2	ALIVE	A	148	
FZ7	9:06	9:17	11	2	ALIVE	A	148	
FZ8	9:08	9:15	7	2	ALIVE	A	154	
FZ9	9:08	9:16	8	2	ALIVE	A	136	
HM0	9:25	9:33	8	2	ALIVE	A	154	
HM1	9:24	9:30	6	2	ALIVE	GH	153	
HM2	9:26	9:33	7	2	ALIVE	A	140	
HM3	9:27	9:35	8	2	ALIVE	A	137	
HM4	9:26	9:31	5	2	DEAD	JHG	137	
HM5	9:28	9:34	6	2	ALIVE	A	143	
HM6	9:28	9:33	5	2	ALIVE	A	170	
HM7	9:29	9:34	5	2	ALIVE	A	141	
HM8	9:31	9:39	8	2	ALIVE	A	146	
HM9	9:30	9:37	7	2	ALIVE	A	155	
7 June 2003 - Testlot 18 :					24	- Water temp=59.0F		
HN0	10:08	10:13	5	2	ALIVE	A	144	
HN1	10:07	10:14	7	2	ALIVE	A	141	
HN2	10:06	10:14	8	2	ALIVE	A	138	
HN3	10:07	10:12	5	2	ALIVE	A	155	
HN4	10:06	10:11	5	2	ALIVE	G	152	
HN5	10:09	10:15	6	2	ALIVE	A	140	
HN6	10:11	10:18	7	2	ALIVE	A	153	
HN7	10:11	10:19	8	2	ALIVE	A	153	
HN8	10:09	10:15	6	2	ALIVE	A	142	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
HN9	10:10	10:16	6	2	ALIVE	A	148	
HP0	10:24	10:28	4	2	ALIVE	A	159	
HP1	10:25	10:30	5	2	ALIVE	A	147	
HP2	10:25	10:29	4	2	ALIVE	A	145	
HP3	10:25	10:34	9	2	ALIVE	A	145	
HP4	10:24	10:29	5	2	ALIVE	A	145	
HP5	10:26	10:32	6	2	ALIVE	A	157	
HP6	10:26	10:31	5	2	ALIVE	A	147	
HP7	10:27	10:32	5	2	ALIVE	A	147	
HP8	10:28	10:38	10	2	ALIVE	A	141	
HP9	10:27	10:32	5	2	ALIVE	A	149	
HR0	10:47	10:53	6	2	ALIVE	A	146	
HR1	10:46	10:56	10	2	ALIVE	A	142	
HR2	10:45	10:50	5	2	ALIVE	A	149	
HR3	10:44	10:49	5	2	ALIVE	A	169	
HR4	10:46	10:52	6	2	ALIVE	A	139	
HR5	10:48	10:54	6	2	ALIVE	A	170	
HR6	10:49	10:55	6	2	ALIVE	A	147	
HR7	10:49	10:53	4	2	ALIVE	A	149	
HR8	10:48	10:59	11	2	ALIVE	A	155	
HR9	10:49	10:59	10	2	ALIVE	A	159	
HS0	11:12	11:19	7	2	ALIVE	A	154	
HS1	11:11	11:17	6	2	ALIVE	A	143	
HS2	11:11	11:17	6	2	ALIVE	A	154	
HS3	11:13	11:18	5	2	DEAD	GH	145	
HS4	11:12	11:17	5	2	ALIVE	A	142	
HS5	11:15	11:20	5	2	ALIVE	H	148	
HS6	11:14	11:20	6	2	ALIVE	A	152	
HS7	11:16	11:23	7	2	ALIVE	A	143	
HS8	11:15	11:21	6	2	ALIVE	A	168	
HS9	11:14	11:21	7	2	ALIVE	A	164	
HT0	11:29	11:33	4	2	ALIVE	A	165	
HT1	11:30	11:35	5	2	ALIVE	A	148	
HT2	11:29	11:35	6	2	ALIVE	E	148	
HT3	11:28	11:57	29	2	ALIVE	A	156	
HT4	11:31	11:35	4	2	ALIVE	A	163	
HT5	11:34	11:38	4	2	ALIVE	A	156	
HT6	11:33	11:38	5	2	ALIVE	A	154	
HT7	11:31	11:37	6	2	ALIVE	A	158	
HT8	11:34	11:42	8	2	ALIVE	A	147	
HT9	11:32	11:38	6	2	ALIVE	A	159	
8 June 2003 - Testlot 19 : Control								- Water temp=59.0F
HZ2	13:24	13:42	18	2	ALIVE	A	144	
RM0	12:37	12:42	5	2	ALIVE	A	146	
RM1	12:39	12:46	7	2	ALIVE	A	151	
RM2	12:38	12:44	6	2	ALIVE	A	155	
RM3	12:38	12:44	6	2	ALIVE	A	147	
RM4	12:39	12:44	5	2	ALIVE	A	149	
RM5	12:40	12:44	4	2	ALIVE	A	161	
RM6	12:42	12:48	6	2	ALIVE	A	150	
RM7	12:41	12:48	7	2	ALIVE	A	148	
RM8	12:41	12:48	7	2	ALIVE	A	147	
RM9	12:41	12:46	5	2	ALIVE	A	149	
RN0	12:58	13:03	5	2	ALIVE	A	145	
RN1	13:00	13:08	8	2	ALIVE	A	139	
RN2	13:00	13:05	5	2	ALIVE	A	149	
RN3	12:59	13:04	5	2	ALIVE	A	146	
RN4	12:59	13:03	4	2	ALIVE	A	146	
RN5	13:03	13:10	7	2	ALIVE	A	147	
RN6	13:02	13:08	6	2	ALIVE	A	147	
RN7	13:02	13:11	9	2	ALIVE	A	153	
RN8	13:01	13:06	5	2	ALIVE	A	153	
RN9	13:03	13:07	4	2	ALIVE	A	156	
RP0	13:25	13:34	9	2	ALIVE	A	160	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
RP2	13:23	13:28	5	2	ALIVE	A	170	
RP3	13:26	13:32	6	2	ALIVE	A	150	
RP4	13:23	13:31	8	2	ALIVE	A	170	
RP5	13:29	13:39	10	2	ALIVE	A	158	
RP6	13:27	13:37	10	2	ALIVE	A	156	
RP7	13:27	13:44	17	2	ALIVE	A	151	
RP8	13:28	13:47	19	2	ALIVE	A	169	
RP9	13:26	.	.	2	DEAD	Z	162	
RR0	14:09	14:12	3	2	ALIVE	A	145	
RR1	14:09	14:14	5	2	ALIVE	A	150	
RR2	14:08	14:13	5	2	ALIVE	A	155	
RR3	14:07	14:11	4	2	ALIVE	A	146	
RR4	14:07	14:13	6	2	ALIVE	A	158	
RR5	14:10	14:12	2	2	ALIVE	A	163	
RR6	14:11	14:17	6	2	ALIVE	A	162	
RR7	14:10	14:14	4	2	ALIVE	A	144	
RR8	14:11	14:16	5	2	ALIVE	A	144	
RR9	14:12	14:17	5	2	ALIVE	A	145	
8 June 2003 - Testlot 19 :							22 - Water temp=59.0F	
JM0	8:11	8:17	6	2	ALIVE	A	165	
JM1	8:10	8:16	6	2	ALIVE	A	140	
JM2	8:12	8:18	6	2	ALIVE	A	148	
JM3	8:09	8:16	7	2	ALIVE	A	153	
JM4	8:12	8:20	8	2	ALIVE	A	160	
JM5	8:14	8:20	6	2	ALIVE	A	172	
JM6	8:14	8:21	7	2	ALIVE	A	150	
JM7	8:13	8:18	5	2	ALIVE	A	161	
JM8	8:15	8:19	4	2	ALIVE	A	149	
JM9	8:15	8:22	7	2	ALIVE	A	158	
JN0	8:31	8:36	5	2	ALIVE	A	153	
JN1	8:29	8:36	7	2	ALIVE	A	143	
JN2	8:31	8:38	7	2	ALIVE	A	150	
JN3	8:28	8:35	7	1	ALIVE	BH	145	
JN4	8:30	8:36	6	2	ALIVE	A	135	
JN5	8:34	8:39	5	2	ALIVE	A	147	
JN6	8:33	8:38	5	2	ALIVE	A	167	
JN7	8:32	8:37	5	2	ALIVE	A	157	
JN8	8:34	8:43	9	2	ALIVE	A	160	
JN9	8:33	8:40	7	2	ALIVE	A	174	
JP0	8:51	8:55	4	2	ALIVE	H	139	
JP1	8:49	8:55	6	2	ALIVE	A	138	
JP2	8:52	8:59	7	2	ALIVE	A	156	
JP3	8:51	8:56	5	2	ALIVE	A	143	
JP4	8:50	8:57	7	2	ALIVE	A	135	
JP5	8:54	8:59	5	2	ALIVE	A	157	
JP6	8:52	8:57	5	2	ALIVE	A	135	
JP7	8:54	8:59	5	2	ALIVE	A	154	
JP8	8:55	8:59	4	2	ALIVE	A	142	
JP9	8:53	8:58	5	2	ALIVE	A	159	
JR0	9:07	9:13	6	2	ALIVE	A	144	
JR1	9:05	9:12	7	2	ALIVE	A	148	
JR2	9:06	9:12	6	2	ALIVE	A	144	
JR3	9:07	9:14	7	2	ALIVE	A	152	
JR4	9:08	9:13	5	2	ALIVE	A	138	
JR5	9:09	9:15	6	2	ALIVE	A	164	
JR6	9:11	9:16	5	2	ALIVE	A	142	
JR7	9:09	9:15	6	2	ALIVE	A	146	
JR8	9:11	9:17	6	2	ALIVE	A	153	
JR9	9:10	9:15	5	2	ALIVE	A	166	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
8 June 2003 - Testlot 19 :				24 - Water temp=59.0F				
JS0	9:37	9:41	4	2	ALIVE	A	151	
JS1	9:37	9:44	7	2	ALIVE	A	149	
JS2	9:36	9:40	4	2	ALIVE	A	142	
JS3	9:36	9:43	7	2	ALIVE	A	155	
JS4	9:35	9:40	5	2	ALIVE	A	167	
JS5	9:39	9:44	5	2	ALIVE	A	144	
JS6	9:40	9:45	5	2	ALIVE	A	136	
JS7	9:40	9:47	7	2	ALIVE	A	146	
JS8	9:38	9:47	9	2	ALIVE	A	140	
JS9	9:39	9:43	4	2	ALIVE	A	153	
JT0	9:54	10:01	7	2	ALIVE	A	147	
JT1	9:53	9:58	5	2	ALIVE	A	150	
JT2	9:54	10:00	6	2	ALIVE	A	150	
JT3	9:54	9:59	5	2	ALIVE	A	149	
JT4	9:52	9:58	6	2	ALIVE	A	175	
JT5	9:56	10:03	7	2	ALIVE	A	135	
JT6	9:57	10:05	8	2	ALIVE	A	157	
JT7	9:55	10:01	6	2	ALIVE	A	153	
JT8	9:58	10:02	4	2	ALIVE	A	156	
JT9	9:57	10:02	5	2	ALIVE	A	154	
JU0	10:12	10:17	5	2	ALIVE	A	160	
JU1	10:10	10:15	5	2	ALIVE	A	152	
JU2	10:11	10:17	6	2	ALIVE	A	141	
JU3	10:12	10:20	8	2	ALIVE	A	154	
JU4	10:10	10:15	5	2	ALIVE	A	143	
JU5	10:15	10:20	5	2	ALIVE	H	148	
JU6	10:14	10:18	4	2	ALIVE	A	149	
JU7	10:15	10:21	6	2	ALIVE	A	153	
JU8	10:16	10:22	6	2	ALIVE	A	154	
JU9	10:13	10:19	6	2	ALIVE	A	159	
JV0	10:29	10:35	6	2	ALIVE	A	152	
JV1	10:30	10:37	7	2	ALIVE	A	147	
JV2	10:30	10:38	8	2	ALIVE	A	144	
JV3	10:29	10:35	6	2	ALIVE	A	144	
JV4	10:29	10:33	4	2	ALIVE	A	155	
JV5	10:31	10:36	5	2	ALIVE	A	144	
JV6	10:33	10:38	5	2	ALIVE	A	152	
JV7	10:33	10:39	6	2	ALIVE	A	155	
JV8	10:32	10:39	7	2	ALIVE	A	160	
JV9	10:32	10:36	4	2	ALIVE	A	165	
8 June 2003 - Testlot 19 :				41 - Water temp=59.0F				
HZ0	12:05	12:11	6	2	ALIVE	A	153	
HZ1	12:08	12:14	6	2	ALIVE	A	149	
JW0	10:59	11:08	9	2	ALIVE	A	148	
JW1	11:02	11:07	5	2	ALIVE	A	156	
JW2	11:00	11:06	6	2	ALIVE	A	139	
JW3	11:00	11:12	12	2	ALIVE	A	148	
JW4	10:59	11:05	6	2	ALIVE	A	140	
JW5	11:04	11:10	6	2	ALIVE	A	158	
JW6	11:04	11:12	8	2	ALIVE	A	171	
JW7	11:02	11:09	7	2	ALIVE	A	175	
JW8	11:03	11:09	6	2	ALIVE	A	152	
JW9	11:03	11:15	12	2	ALIVE	A	142	
JX0	11:23	11:33	10	2	ALIVE	A	144	
JX1	11:22	11:29	7	2	ALIVE	A	144	
JX2	11:23	11:28	5	2	ALIVE	A	151	
JX3	11:21	11:26	5	2	ALIVE	A	144	
JX4	11:21	11:30	9	2	ALIVE	A	147	
JX5	11:25	11:31	6	2	ALIVE	A	144	
JX6	11:26	11:31	5	2	ALIVE	A	167	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
JX7	11:27	11:35	8	2	ALIVE	A	156	
JX8	11:24	11:32	8	2	ALIVE	A	160	
JX9	11:26	11:34	8	2	ALIVE	A	171	
JY0	11:42	11:51	9	2	ALIVE	A	145	
JY1	11:44	11:49	5	2	ALIVE	A	141	
JY2	11:44	11:49	5	2	ALIVE	A	154	
JY3	11:42	11:47	5	2	ALIVE	A	152	
JY4	11:43	11:47	4	2	ALIVE	A	159	
JY5	11:46	11:51	5	2	ALIVE	A	150	
JY6	11:45	11:50	5	2	ALIVE	A	150	
JY7	11:46	11:52	6	2	ALIVE	A	141	
JY8	11:47	11:53	6	2	ALIVE	A	163	
JY9	11:47	11:53	6	2	ALIVE	H	150	
JZ0	12:03	12:10	7	2	DEAD	GNJ	151	
JZ1	12:01	12:08	7	2	ALIVE	A	146	
JZ2	12:04	12:08	4	2	ALIVE	A	153	
JZ3	12:02	12:07	5	2	ALIVE	A	155	
JZ4	12:03	12:08	5	2	ALIVE	A	153	
JZ5	12:04	12:10	6	2	ALIVE	A	135	
JZ6	12:06	12:10	4	2	ALIVE	H	135	
JZ7	12:07	12:12	5	2	ALIVE	A	155	
JZ8	12:09	12:14	5	2	ALIVE	A	150	
JZ9	12:08	12:15	7	2	ALIVE	A	147	
9 June 2003 - Testlot 20 : Control								- Water temp=59.9F
HZ3	11:17	11:23	6	2	ALIVE	A	145	
RX0	10:09	10:15	6	2	ALIVE	A	160	
RX1	10:10	.	.	2	DEAD	ZL	142	
RX2	10:08	10:14	6	2	ALIVE	A	161	
RX3	10:10	10:17	7	2	ALIVE	A	151	
RX4	10:09	10:17	8	2	ALIVE	A	143	
RX5	10:13	10:17	4	2	ALIVE	A	158	
RX6	10:11	10:16	5	2	ALIVE	A	145	
RX7	10:11	10:17	6	2	ALIVE	A	146	
RX8	10:12	10:20	8	2	ALIVE	A	143	
RX9	10:12	10:18	6	2	ALIVE	A	148	
RY0	10:39	10:46	7	2	ALIVE	A	152	
RY1	10:38	10:43	5	2	ALIVE	A	158	
RY2	10:37	10:42	5	2	ALIVE	A	138	
RY3	10:38	10:45	7	2	ALIVE	A	157	
RY4	10:37	10:43	6	2	ALIVE	A	145	
RY5	10:41	10:47	6	2	ALIVE	A	147	
RY6	10:42	10:48	6	2	ALIVE	A	156	
RY7	10:40	10:44	4	2	ALIVE	A	145	
RY8	10:41	10:49	8	2	ALIVE	A	147	
RY9	10:40	10:46	6	2	ALIVE	A	159	
RZ0	10:56	11:01	5	2	ALIVE	A	145	
RZ1	10:57	11:04	7	2	ALIVE	A	142	
RZ2	10:58	11:02	4	2	ALIVE	A	143	
RZ3	10:57	11:07	10	2	ALIVE	A	142	
RZ4	10:56	11:01	5	2	ALIVE	A	155	
RZ5	10:59	11:04	5	2	ALIVE	A	158	
RZ6	11:01	11:06	5	2	ALIVE	A	153	
RZ7	10:59	11:08	9	2	ALIVE	A	135	
RZ8	11:00	11:06	6	2	ALIVE	A	135	
RZ9	10:58	11:05	7	2	ALIVE	A	147	
S00	11:16	11:21	5	2	ALIVE	A	152	
S01	11:16	11:21	5	2	ALIVE	A	140	
S02	11:15	11:20	5	2	ALIVE	A	149	
S03	11:14	11:19	5	2	ALIVE	A	144	
S05	11:15	11:20	5	2	ALIVE	A	145	
S06	11:19	11:24	5	2	ALIVE	A	159	
S07	11:41	11:49	8	2	ALIVE	A	147	
S08	11:18	11:26	8	2	ALIVE	A	146	
S09	11:19	11:24	5	2	ALIVE	A	150	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
S10	11:35	11:42	7	2	ALIVE	A	161	
S11	11:37	11:42	5	2	ALIVE	A	145	
S12	11:34	11:40	6	2	ALIVE	A	160	
S13	11:36	11:43	7	2	ALIVE	A	148	
S14	11:35	11:42	7	2	ALIVE	A	161	
S15	11:39	11:45	6	2	ALIVE	A	140	
S16	11:38	11:44	6	2	ALIVE	A	163	
S17	11:39	11:46	7	2	ALIVE	A	145	
S18	11:37	11:46	9	2	ALIVE	A	157	
S19	11:40	11:46	6	2	ALIVE	A	135	
9 June 2003 - Testlot 20 :								21 - Water temp=59.9F
HZ4	14:10	14:15	5	2	ALIVE	A	140	
HZ5	14:11	14:17	6	2	ALIVE	A	140	
S20	12:29	12:33	4	2	ALIVE	A	157	
S21	12:27	12:33	6	2	ALIVE	A	151	
S22	12:28	12:32	4	2	ALIVE	A	169	
S23	12:27	12:32	5	2	ALIVE	A	170	
S24	12:28	12:42	14	2	ALIVE	A	160	
S25	12:32	12:40	8	2	ALIVE	A	157	
S26	12:32	12:37	5	2	ALIVE	A	148	
S27	12:30	12:35	5	2	ALIVE	A	136	
S28	12:30	12:38	8	2	ALIVE	A	161	
S29	12:31	12:35	4	2	ALIVE	A	155	
S30	12:53	12:57	4	2	ALIVE	A	140	
S31	12:54	12:58	4	2	ALIVE	A	140	
S32	12:53	12:59	6	2	ALIVE	A	142	
S33	12:55	13:00	5	2	DEAD	JB	149	
S34	12:54	12:59	5	2	ALIVE	A	137	
S35	12:56	13:04	8	2	ALIVE	A	136	
S36	12:56	13:00	4	2	ALIVE	H	140	
S38	12:57	13:02	5	2	DEAD	JH	145	
S39	12:57	13:01	4	2	ALIVE	A	156	
S40	13:23	13:28	5	2	ALIVE	A	155	
S41	13:24	13:29	5	2	ALIVE	A	132	
S42	13:25	13:29	4	2	ALIVE	A	151	
S43	13:25	13:31	6	2	ALIVE	A	150	
S44	13:24	13:28	4	2	ALIVE	A	144	
S45	13:28	13:33	5	2	ALIVE	A	152	
S46	13:26	13:30	4	2	ALIVE	H	146	
S47	13:29	13:33	4	2	ALIVE	A	149	
S48	13:27	13:32	5	2	ALIVE	A	163	
S49	13:27	13:33	6	2	ALIVE	A	152	
S50	13:45	13:50	5	2	ALIVE	A	145	
S51	13:46	13:51	5	2	ALIVE	A	151	
S53	13:44	13:48	4	2	ALIVE	A	149	
S54	13:44	13:48	4	2	ALIVE	A	145	
S55	13:47	13:52	5	2	ALIVE	A	135	
S56	13:48	13:52	4	2	ALIVE	A	158	
S57	13:49	13:53	4	2	ALIVE	A	150	
S58	13:47	13:51	4	2	ALIVE	H	148	
S59	13:47	13:52	5	2	ALIVE	A	159	
S60	14:07	14:12	5	2	ALIVE	G	143	
S61	14:05	14:11	6	2	ALIVE	A	152	
S62	14:06	14:10	4	2	ALIVE	A	167	
S63	14:04	14:10	6	2	ALIVE	A	145	
S64	14:05	14:10	5	2	ALIVE	A	141	
S65	14:08	14:16	8	2	ALIVE	A	134	
S66	14:09	14:27	18	1	ALIVE	BE	150	
S67	14:09	14:15	6	2	ALIVE	A	154	
S68	14:08	14:13	5	2	ALIVE	H	151	
S69	14:07	14:11	4	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
9 June 2003 - Testlot 20 :				23 - Water temp=59.9F				
RS0	8:04	8:11	7	2	ALIVE	A	148	
RS1	8:04	8:09	5	2	ALIVE	A	139	
RS2	8:05	8:10	5	2	ALIVE	A	158	
RS3	8:06	8:11	5	2	ALIVE	A	165	
RS4	8:06	8:12	6	2	ALIVE	A	169	
RS5	8:09	8:15	6	2	ALIVE	H	161	
RS6	8:09	8:15	6	2	ALIVE	A	153	
RS7	8:08	8:13	5	2	ALIVE	A	149	
RS8	8:08	8:14	6	2	ALIVE	A	148	
RS9	8:07	8:17	10	2	ALIVE	HE	143	
RT0	8:23	8:28	5	2	ALIVE	A	146	
RT1	8:24	8:34	10	2	ALIVE	A	158	
RT2	8:25	8:29	4	2	ALIVE	A	144	
RT3	8:25	8:31	6	2	ALIVE	A	153	
RT4	8:24	8:29	5	2	ALIVE	A	148	
RT5	8:26	8:31	5	2	ALIVE	A	149	
RT6	8:27	8:34	7	2	ALIVE	H	154	
RT7	8:28	8:34	6	2	ALIVE	A	149	
RT8	8:27	8:37	10	2	ALIVE	A	146	
RT9	8:28	8:33	5	2	ALIVE	A	147	
RU0	8:46	8:59	13	2	ALIVE	A	149	
RU1	8:45	8:54	9	2	ALIVE	A	157	
RU2	8:46	8:51	5	2	ALIVE	A	155	
RU3	8:47	8:58	11	2	ALIVE	A	154	
RU4	8:45	8:50	5	2	ALIVE	A	147	
RU5	8:48	8:53	5	2	ALIVE	A	148	
RU6	8:49	8:56	7	2	ALIVE	A	147	
RU7	8:49	8:55	6	2	ALIVE	A	147	
RU8	8:48	8:53	5	2	ALIVE	A	144	
RU9	8:47	8:58	11	2	ALIVE	A	138	
RV0	9:06	9:15	9	2	ALIVE	H	157	
RV1	9:04	9:13	9	2	ALIVE	A	138	
RV2	9:05	9:12	7	2	ALIVE	A	159	
RV3	9:06	9:13	7	2	DEAD	CGB	161	
RV4	9:05	9:10	5	2	ALIVE	A	130	
RV5	9:09	9:14	5	2	DEAD	H	144	
RV6	9:09	9:20	11	2	ALIVE	A	153	
RV7	9:07	9:14	7	2	ALIVE	A	143	
RV8	9:08	9:15	7	2	ALIVE	A	150	
RV9	9:08	9:17	9	2	ALIVE	A	156	
RW0	9:33	9:40	7	2	ALIVE	A	145	
RW1	9:34	9:39	5	2	ALIVE	H	157	
RW2	9:33	9:39	6	2	ALIVE	A	155	
RW3	9:33	9:37	4	2	ALIVE	A	151	
RW4	9:34	9:39	5	2	ALIVE	A	152	
RW5	9:37	9:41	4	2	ALIVE	A	133	
RW6	9:35	9:44	9	2	ALIVE	A	154	
RW7	9:37	9:43	6	2	ALIVE	A	150	
RW8	9:38	9:42	4	2	ALIVE	A	152	
RW9	9:36	9:44	8	2	ALIVE	A	145	
10 June 2003 - Testlot 21 : Control				- Water temp=59.9F				
SJ0	12:31	12:37	6	2	ALIVE	A	148	
SJ1	12:33	12:38	5	2	ALIVE	A	149	
SJ2	12:33	12:41	8	2	ALIVE	A	154	
SJ3	12:32	12:44	12	2	ALIVE	A	151	
SJ4	12:34	12:40	6	2	ALIVE	A	157	
SJ5	12:35	12:39	4	2	ALIVE	A	147	
SJ6	12:36	12:43	7	2	ALIVE	A	150	
SJ7	12:36	12:43	7	2	ALIVE	A	155	
SJ8	12:37	12:42	5	2	ALIVE	A	145	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
SJ9	12:35	12:40	5	2	ALIVE	A	138	
SK0	12:52	12:58	6	2	ALIVE	A	139	
SK1	12:52	12:57	5	2	ALIVE	A	136	
SK2	12:51	12:56	5	2	ALIVE	A	159	
SK3	12:53	13:02	9	2	ALIVE	A	154	
SK4	12:53	13:00	7	2	ALIVE	A	161	
SK5	12:57	13:03	6	2	ALIVE	A	149	
SK6	12:56	13:02	6	2	ALIVE	A	154	
SK7	12:54	13:00	6	2	ALIVE	A	139	
SK8	12:55	13:02	7	2	ALIVE	A	149	
SK9	12:55	13:01	6	2	ALIVE	A	160	
10 June 2003 - Testlot 21 :					22 - Water temp=59.9F			
S70	8:06	8:11	5	2	ALIVE	A	151	
S71	8:07	8:14	7	2	ALIVE	A	150	
S72	8:07	8:31	24	2	ALIVE	A	166	
S73	8:05	8:11	6	2	ALIVE	A	165	
S74	8:06	8:17	11	2	ALIVE	A	167	
S75	8:08	8:19	11	2	ALIVE	A	155	
S76	8:09	8:15	6	2	ALIVE	A	174	
S77	8:10	8:17	7	2	ALIVE	A	152	
S78	8:09	8:13	4	2	ALIVE	A	152	
S79	8:10	8:16	6	2	ALIVE	A	151	
S80	8:23	8:30	7	2	ALIVE	A	151	
S81	8:26	8:32	6	2	ALIVE	A	151	
S82	8:24	8:32	8	2	ALIVE	A	140	
S83	8:24	8:29	5	2	ALIVE	A	149	
S84	8:25	8:30	5	2	ALIVE	A	138	
S85	8:29	8:37	8	2	ALIVE	A	148	
S86	8:29	8:37	8	2	ALIVE	A	154	
S87	8:27	8:34	7	2	ALIVE	A	154	
S88	8:28	8:36	8	2	ALIVE	A	155	
S89	8:27	8:32	5	2	ALIVE	A	157	
S90	8:45	8:53	8	2	ALIVE	A	159	
S91	8:45	.	.	2	UNKNOWN	X	156	
S92	8:44	8:49	5	2	ALIVE	A	149	
S93	8:56	9:01	5	2	ALIVE	A	160	
S94	8:46	8:50	4	2	ALIVE	A	149	
S95	8:49	8:55	6	2	ALIVE	A	154	
S96	8:47	.	.	2	UNKNOWN	X	152	
S97	8:47	8:56	9	2	ALIVE	A	142	
S98	8:48	8:55	7	2	ALIVE	A	158	
S99	8:48	8:55	7	2	ALIVE	A	150	
SA0	9:26	9:33	7	2	ALIVE	A	156	
SA1	9:25	9:35	10	2	ALIVE	H	167	
SA2	9:24	9:32	8	2	ALIVE	A	163	
SA3	9:25	9:32	7	2	ALIVE	A	133	
SA4	9:24	9:30	6	2	ALIVE	A	148	
SA5	9:27	9:35	8	2	ALIVE	A	177	
SA6	9:28	9:35	7	2	ALIVE	A	143	
SA7	9:27	9:33	6	2	ALIVE	A	162	
SA8	9:28	9:39	11	2	ALIVE	A	179	
SA9	9:29	9:35	6	2	ALIVE	A	155	
SB0	9:50	10:00	10	2	ALIVE	A	167	
SB1	9:48	9:53	5	2	ALIVE	A	147	
SB2	9:50	9:55	5	2	ALIVE	A	148	
SB3	9:49	9:57	8	2	ALIVE	A	145	
SB4	9:49	9:56	7	2	ALIVE	G	158	
SB5	9:52	9:58	6	2	ALIVE	A	145	
SB6	9:52	10:00	8	2	ALIVE	A	145	
SB7	9:53	10:00	7	2	ALIVE	A	155	
SB8	9:53	9:58	5	2	ALIVE	A	164	
SB9	9:51	10:02	11	2	ALIVE	A	178	

APPENDIX TABLE C-8

Continued.

Fish No.	Time			No. of Turb-N Tags recovered	Fish Data			Comments
	Re-leased	Re-covered	At Large (min.)		Alive/Dead	Condition Codes	Total Length (mm)	
10 June 2003 - Testlot 21 :				24 - Water temp=				
SC0	10:25	10:32	7	2	ALIVE	A	151	
SC1	10:24	10:30	6	2	ALIVE	A	152	
SC2	10:23	10:29	6	2	ALIVE	A	149	
SC3	10:25	10:31	6	2	ALIVE	A	148	
SC4	10:26	10:31	5	2	ALIVE	A	147	
SC5	10:29	10:41	12	2	ALIVE	A	143	
SC6	10:27	10:35	8	2	ALIVE	A	161	
SC7	10:28	10:44	16	1	ALIVE	B	147	
SC8	10:28	10:36	8	2	ALIVE	A	142	
SC9	10:29	10:36	7	2	ALIVE	A	159	
SD0	10:53	10:59	6	2	ALIVE	A	151	
SD1	10:51	10:57	6	2	ALIVE	A	157	
SD2	10:52	10:59	7	2	ALIVE	A	150	
SD3	10:52	11:04	12	2	ALIVE	A	147	
SD4	10:53	10:59	6	2	ALIVE	A	151	
SD5	10:56	11:09	13	1	DEAD	BJG	156	
SD6	10:54	11:07	13	2	ALIVE	A	149	
SD7	10:55	11:01	6	2	ALIVE	A	144	
SD8	10:56	11:03	7	2	ALIVE	A	157	
SD9	10:55	11:02	7	2	ALIVE	A	150	
SE0	11:15	11:23	8	2	ALIVE	A	155	
SE1	11:15	11:20	5	2	ALIVE	A	143	
SE2	11:17	11:23	6	2	ALIVE	A	151	
SE3	11:17	11:22	5	2	ALIVE	A	139	
SE4	11:16	11:23	7	2	ALIVE	A	136	
SE5	11:20	11:27	7	2	ALIVE	A	144	
SE6	11:18	11:27	9	2	ALIVE	A	141	
SE7	11:18	11:24	6	2	ALIVE	A	151	
SE8	11:20	11:26	6	2	ALIVE	A	156	
SE9	11:19	11:27	8	2	ALIVE	A	154	
SF0	11:41	11:47	6	2	ALIVE	A	169	
SF1	11:40	11:45	5	2	ALIVE	A	146	
SF2	11:40	11:44	4	2	ALIVE	A	145	
SF3	11:41	11:48	7	2	ALIVE	A	148	
SF4	11:42	11:48	6	2	ALIVE	A	146	
SF5	11:44	11:50	6	2	ALIVE	A	163	
SF6	11:43	11:51	8	1	ALIVE	B	162	
SF7	11:46	11:55	9	2	ALIVE	A	140	
SF8	11:44	11:56	12	2	ALIVE	A	142	
SF9	11:45	11:53	8	2	ALIVE	A	143	
SH0	12:04	12:11	7	2	ALIVE	A	169	
SH1	12:05	12:12	7	2	ALIVE	A	152	
SH2	12:06	12:12	6	2	ALIVE	A	153	
SH3	12:06	12:12	6	2	ALIVE	A	150	
SH4	12:05	12:13	8	2	ALIVE	A	150	
SH5	12:07	12:13	6	2	ALIVE	A	161	
SH6	12:08	12:13	5	2	ALIVE	A	173	
SH7	12:08	12:14	6	2	ALIVE	A	149	
SH8	12:09	12:15	6	2	ALIVE	A	146	
SH9	12:09	12:15	6	2	ALIVE	A	152	

APPENDIX D

DERIVATION OF PRECISION, SAMPLE SIZE, AND MAXIMUM LIKELIHOOD PARAMETERS, AND STATISTICAL OUTPUTS

DERIVATION OF PRECISION, SAMPLE SIZE, AND MAXIMUM LIKELIHOOD PARAMETERS

The statistical description below is excerpted from Normandeau Associates and Skalski (2000a). For the sake of brevity, references within the text have been removed. However, interested readers can look up these citations in the report prepared by Normandeau Associates and Skalski (2000a).

The estimation for the likelihood model parameters and sample size requirements discussed in the text are given herein. Additionally, the results of statistical analyses for evaluating homogeneity in recapture and survival probabilities, and in testing hypotheses of equality in parameter estimates under the simplified ($H_0:P_A=P_D$) versus the most generalized model ($H_A:P_A \neq P_D$) are given.

The following terms are defined for the equations and likelihood functions which follow:

R_C	=	Number of control fish released
R_T	=	Number of treatment fish released
R	=	$R_C=R_T$
n	=	Number of replicate estimates $\hat{\tau}_i$ ($i=1, \dots, n$)
a_C	=	Number of control fish recaptured alive
d_C	=	Number of control fish recaptured dead
a_T	=	Number of treatment fish recaptured alive
d_T	=	Number of treatment fish recaptured dead
S	=	Probability fish survive from the release point of the controls to recapture
P_A	=	Probability an alive fish is recaptured
P_D	=	Probability a dead fish is recaptured
τ	=	Probability a treatment fish survives to the point of the control releases (<i>i.e.</i> , passage survival)
$1-\tau$	=	Passage-related mortality.

The precision of the estimate was defined as:

$$P(-\varepsilon < \hat{\tau} - \tau < \varepsilon) = 1 - \alpha$$

or equivalently

$$P(-\varepsilon < |\hat{\tau} - \tau| < \varepsilon) = 1 - \alpha$$

where the absolute errors in estimation, *i.e.*, $|\hat{\tau} - \tau|$, is $< \varepsilon (1-\alpha) 100\%$ of the time, $\hat{\tau}$ is the estimated passage survival, and ε is the half-width of a $(1-\alpha) 100\%$ confidence interval for $\hat{\tau}$ or $1-\hat{\tau}$. A precision of $\pm 5\%$, 90% of the time is expressed as $P(|\hat{\tau} - \tau| < 0.05) = 0.90$.

Using the above precision definition and assuming normality of $\hat{\tau} - \tau$, the required total sample size (R) is as follows:

$$P\left(\frac{-\varepsilon}{\sqrt{Var(\hat{\tau})}} < Z < \frac{\varepsilon}{\sqrt{Var(\hat{\tau})}}\right) = 1 - \alpha$$

$$P\left(Z < \frac{-\varepsilon}{\sqrt{\text{Var}(\hat{\tau})}}\right) = \alpha/2$$

$$\Phi\left(\frac{-\varepsilon}{\sqrt{\text{Var}(\hat{\tau})}}\right) = \alpha/2$$

$$\frac{-\varepsilon}{\sqrt{\text{Var}(\hat{\tau})}} = Z_{\alpha/2}$$

$$\text{Var}(\hat{\tau}) = \frac{\varepsilon^2}{Z_{1-\frac{\alpha}{2}}^2}$$

$$\frac{\tau}{SP_A} \left[\frac{(1 - S\tau P_A)}{R_T} + \frac{(1 - SP_A)\tau}{R_C} \right] = \frac{\varepsilon^2}{Z_{1-\frac{\alpha}{2}}^2} .$$

where Z is a standard normal deviate satisfying the relationship $P(Z > Z_{1-\alpha/2}) = \alpha/2$, and Φ is the cumulative distribution function for a standard normal deviate.

If data can be pooled across trials and letting $R_C = R_T = R$, the sample size for each release is

$$R = \frac{\tau}{SP_A} \left[1 + \tau - 2S\tau P_A \right] \frac{Z_{1-\alpha/2}^2}{\varepsilon^2} .$$

By rearranging, this equation can be solved to predetermine the anticipated precision given the available number of fish for a study. In most previous investigations (Normandeau Associates and Skalski 2000a) this equation has been used to calculate sample sizes because of homogeneity between trials; in the present investigation sample size was predetermined using this equation.

If data cannot be pooled across trials the precision is based on

$$\sum_{i=1}^n (1 - \hat{\tau}_i) / n = 1 - \sum_{i=1}^n \hat{\tau}_i / n = 1 - \bar{\hat{\tau}} .$$

Precision is defined as

$$P(|\bar{\hat{\tau}} - \bar{\tau}| < \varepsilon) = 1 - \alpha$$

$$P(-\varepsilon < \bar{\hat{\tau}} - \bar{\tau} < \varepsilon) = 1 - \alpha$$

$$P\left(\frac{-\varepsilon}{\sqrt{\text{Var}(\bar{\hat{\tau}})}} < t_{n-1} < \frac{\varepsilon}{\sqrt{\text{Var}(\bar{\hat{\tau}})}}\right) = 1 - \alpha$$

$$P\left(t_{n-1} < \frac{-\varepsilon}{\sqrt{\text{Var}(\bar{\hat{\tau}})}}\right) = \alpha/2$$

$$\Phi\left(\frac{-\varepsilon}{\sqrt{\text{Var}(\bar{\hat{\tau}})}}\right) = \alpha/2$$

$$\frac{-\varepsilon}{\sqrt{\text{Var}(\bar{\hat{\tau}})}} = t_{\alpha/2, n-1}$$

$$\text{Var}(\bar{\hat{\tau}}) = \frac{\varepsilon^2}{t_{1-\alpha/2, n-1}^2}$$

$$\frac{\sigma_\tau^2 + \frac{\tau}{SP_A} \left[\frac{(1 - S\tau P_A)}{R_T} + \frac{(1 - SP_A)\tau}{R_C} \right]}{n} = \frac{\varepsilon^2}{t_{1-\alpha/2, n-1}^2}$$

where σ_τ^2 = natural variation in passage-related mortality.

Now letting $R_T = R_C$

$$\frac{\sigma_\tau^2 + \frac{\tau}{SP_A} \left[\frac{(1 - S\tau P_A)}{R} + \frac{(1 - SP_A)\tau}{R} \right]}{n} = \frac{\varepsilon^2}{t_{1-\alpha/2, n-1}^2}$$

which must be iteratively solved for n given R. Or R given n where

$$R = \frac{\frac{\tau}{SP_A} [(1 - S\tau P_A) + (1 - SP_A)\tau]}{\left[\frac{n\varepsilon^2}{t_{1-\alpha/2, n-1}^2} - \sigma_\tau^2 \right]}$$

$$R = \frac{\frac{\tau(1+\tau)}{SP_A}}{\left[\frac{n\varepsilon^2}{t_{1-\alpha/2, n-1}^2} - \sigma_\tau^2 \right]}$$

$$R = \frac{\tau(1+\tau)}{SP_A} \left[\frac{t_{1-\alpha/2, n-1}^2}{n\varepsilon^2 - \sigma_\tau^2 t_{1-\alpha/2, n-1}^2} \right].$$

The joint likelihood for the passage-related mortality is:

$$L(S, \tau, P_A, P_D | R_C, R_T, a_C, a_T, d_C, d_T) = \\ \binom{R_C}{a_C d_C} (SP_A)^{a_C} ((1-S)P_D)^{d_C} (1-SP_A - (1-S)P_D)^{R_C - a_C - d_C} \\ \times \binom{R_T}{a_T d_T} (S\tau P_A)^{a_T} ((1-S\tau)P_D)^{d_T} (1-S\tau P_A - (1-S\tau)P_D)^{R_T - a_T - d_T} .$$

The likelihood model is based on the following assumptions: (1) fate of each fish is independent, (2) the control and treatment fish come from the same population of inference and share that same survival probability, (3) all alive fish have the same probability, P_A , of recapture, (4) all dead fish have the same probability, P_D , of recapture, and (5) passage survival (τ) and survival (S) to the recapture point are conditionally independent. The likelihood model has four parameters (P_A , P_D , S , τ) and four minimum sufficient statistics (a_C , d_C , a_T , d_T).

Because any two treatment releases were made concurrently with a single shared control group we used the likelihood model which took into account dependencies within the study design (Normandeau Associates *et al.* 1995). For any two treatment groups (denoted T_1 and T_2), the likelihood model is as follows:

$$L(S, \tau_1, \tau_2, P_A, P_D | R_C, R_{T_1}, R_{T_2}, a_C, d_C, a_{T_1}, d_{T_1}, a_{T_2}, d_{T_2}) = \\ \binom{R_C}{a_C d_C} (SP_A)^{a_C} ((1-S)P_D)^{d_C} (1-SP_A - (1-S)P_D)^{R_C - a_C - d_C} \\ \times \binom{R_{T_1}}{a_{T_1} d_{T_1}} (S\tau_1 P_A)^{a_{T_1}} ((1-S\tau_1)P_D)^{d_{T_1}} (1-S\tau_1 P_A - (1-S\tau_1)P_D)^{R_{T_1} - a_{T_1} - d_{T_1}} \\ \times \binom{R_{T_2}}{a_{T_2} d_{T_2}} (S\tau_2 P_A)^{a_{T_2}} ((1-S\tau_2)P_D)^{d_{T_2}} (1-S\tau_2 P_A - (1-S\tau_2)P_D)^{R_{T_2} - a_{T_2} - d_{T_2}} .$$

This likelihood model has the same assumptions as stated in Normandeau Associates and Skalski (2000a) but has five estimable parameters (S , τ_1 , τ_2 , P_A , and P_D). The survival rate for treatment T_1 is estimated by τ_1 and for treatment T_2 , by τ_2 . A likelihood ratio test with 1 degree of freedom was used to test for equality in survival rates between treatments τ_1 and τ_2 based on the hypothesis $H_0: \tau_1 = \tau_2$ versus $H_a: \tau_1 \neq \tau_2$.

Likelihood models are based on the following assumptions: (a) the fate of each fish is independent; (b) the control and treatment fish come from the same population of inference and share the same natural survival probability, S ; (c) all alive fish have the same probability, P_A , of recapture; (d) all dead fish have the same probability, P_D , of recapture; and (e) passage survival (τ) and natural survival (S) to the recapture point are conditionally independent.

The estimators associated with the likelihood model are:

$$\hat{\tau} = \frac{a_T R_C}{R_T a_C}$$

$$\hat{S} = \frac{R_T d_C a_C - R_C d_T a_C}{R_C d_C a_T - R_C d_T a_C}$$

$$\hat{P}_A = \frac{d_C a_T - d_T a_C}{R_T d_C - R_C d_T}$$

$$\hat{P}_D = \frac{d_C a_T - d_T a_C}{R_C a_T - R_T a_C} .$$

The variance (Var) and standard error (SE) of the estimated passage mortality ($1 - \hat{\tau}$) or survival ($\hat{\tau}$) are:

$$Var(1 - \hat{\tau}) = Var(\hat{\tau}) = \frac{\tau}{SP_A} \left[\frac{(1 - S\tau P_A)}{R_T} + \frac{(1 - SP_A)\tau}{R_C} \right]$$

$$SE(1 - \hat{\tau}) = SE(\hat{\tau}) = \sqrt{Var(1 - \hat{\tau})} .$$

DERIVATION OF VARIANCE FOR WEIGHTED AVERAGE SURVIVAL ESTIMATE

The variance of a weighted average is estimated by the formula

$$\hat{\theta}_w = \frac{\sum_{i=1}^n W_i \hat{\theta}_i}{\sum_{i=1}^n W_i}$$

with

$$\widehat{\text{Var}}(\hat{\theta}_w) = \frac{\sum_{i=1}^n W_i (\hat{\theta}_i - \hat{\theta}_w)^2}{(n-1) \sum_{i=1}^n W_i}$$

where $\hat{\theta}_w$ = the weighted average,

$\hat{\theta}_i$ = the parameter estimate for the i th replicate,

W_i = weight.

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=CTL flow=_45 position=c -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
c1_45	42	1	2	45
	43.941	0.7941	0.2647	
	0.0858	0.0534	11.376	
c2_45	45	0	0	45
	43.941	0.7941	0.2647	
	0.0255	0.7941	0.2647	
c3_45	57	3	0	60
	58.588	1.0588	0.3529	
	0.0431	3.5588	0.3529	
c4_45	43	2	0	45
	43.941	0.7941	0.2647	
	0.0202	1.8312	0.2647	
c5_45	45	0	0	45
	43.941	0.7941	0.2647	
	0.0255	0.7941	0.2647	
c6_45	20	0	0	20
	19.529	0.3529	0.1176	
	0.0113	0.3529	0.1176	
c7_45	60	0	0	60
	58.588	1.0588	0.3529	
	0.034	1.0588	0.3529	
c8_45	20	0	0	20
	19.529	0.3529	0.1176	
	0.0113	0.3529	0.1176	
Total	332	6	2	340

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	14	22.1641	0.0753
Likelihood Ratio Chi-Square	14	18.7513	0.1747
Mantel-Haenszel Chi-Square	1	5.9665	0.0146
Phi Coefficient		0.2553	
Contingency Coefficient		0.2474	
Cramer's V		0.1805	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 340

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB2 flow=_45 position=d -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
d1_45	52	8	0	60
	56.696	2.6087	0.6957	
	0.3889	11.142	0.6957	
d2_45	40	2	3	45
	42.522	1.9565	0.5217	
	0.1496	0.001	11.772	
d3_45	43	2	0	45
	42.522	1.9565	0.5217	
	0.0054	0.001	0.5217	
d4_45	57	3	0	60
	56.696	2.6087	0.6957	
	0.0016	0.0587	0.6957	
d5_45	44	0	1	45
	42.522	1.9565	0.5217	
	0.0514	1.9565	0.4384	
d6_45	45	0	0	45
	42.522	1.9565	0.5217	
	0.1444	1.9565	0.5217	
d7_45	45	0	0	45
	42.522	1.9565	0.5217	
	0.1444	1.9565	0.5217	
Total	326	15	4	345

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	12	33.1246	0.0009
Likelihood Ratio Chi-Square	12	31.6342	0.0016
Mantel-Haenszel Chi-Square	1	11.5050	0.0007
Phi Coefficient		0.3099	
Contingency Coefficient		0.2960	
Cramer's V		0.2191	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 345

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB4 flow=_45 position=d -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
d1_45	44	1	0	45
	44.087	0.7826	0.1304	
	0.0002	0.0604	0.1304	
d2_45	57	3	0	60
	58.783	1.0435	0.1739	
	0.0541	3.6685	0.1739	
d3_45	44	1	0	45
	44.087	0.7826	0.1304	
	0.0002	0.0604	0.1304	
d4_45	44	0	1	45
	44.087	0.7826	0.1304	
	0.0002	0.7826	5.7971	
d5_45	59	1	0	60
	58.783	1.0435	0.1739	
	0.0008	0.0018	0.1739	
d6_45	45	0	0	45
	44.087	0.7826	0.1304	
	0.0189	0.7826	0.1304	
d7_45	45	0	0	45
	44.087	0.7826	0.1304	
	0.0189	0.7826	0.1304	
Total	338	6	1	345

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	12	12.8988	0.3764
Likelihood Ratio Chi-Square	12	11.3989	0.4951
Mantel-Haenszel Chi-Square	1	1.9664	0.1608
Phi Coefficient		0.1934	
Contingency Coefficient		0.1898	
Cramer's V		0.1367	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 345

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB2 flow=_12 position=d -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency			
Expected			
Cell Chi-Square	alive	unkn	
d1_12	30	0	30
	29.75	0.25	
	0.0021	0.25	
d2_12	45	0	45
	44.625	0.375	
	0.0032	0.375	
d3_12	29	1	30
	29.75	0.25	
	0.0189	2.25	
d4_12	15	0	15
	14.875	0.125	
	0.0011	0.125	
Total	119	1	120

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	3	3.0252	0.3878
Likelihood Ratio Chi-Square	3	2.7979	0.4238
Mantel-Haenszel Chi-Square	1	0.6000	0.4386
Phi Coefficient		0.1588	
Contingency Coefficient		0.1568	
Cramer's V		0.1588	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 120

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB2 flow=_12 position=s -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
s1_12	30	0	0	30
	29.25	0.25	0.5	
	0.0192	0.25	0.5	
s2_12	42	1	2	45
	43.875	0.375	0.75	
	0.0801	1.0417	2.0833	
s3_12	30	0	0	30
	29.25	0.25	0.5	
	0.0192	0.25	0.5	
s4_12	15	0	0	15
	14.625	0.125	0.25	
	0.0096	0.125	0.25	
Total	117	1	2	120

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	6	5.1282	0.5275
Likelihood Ratio Chi-Square	6	6.0139	0.4216
Mantel-Haenszel Chi-Square	1	0.1880	0.6646
Phi Coefficient		0.2067	
Contingency Coefficient		0.2024	
Cramer's V		0.1462	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 120

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB4 flow=_12 position=d -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	dead	
Expected			
Cell Chi-Square			
d1_12	29	1	30
	29.5	0.5	
	0.0085	0.5	
d2_12	44	1	45
	44.25	0.75	
	0.0014	0.0833	
d3_12	30	0	30
	29.5	0.5	
	0.0085	0.5	
d4_12	15	0	15
	14.75	0.25	
	0.0042	0.25	
Total	118	2	120

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	3	1.3559	0.7159
Likelihood Ratio Chi-Square	3	1.9842	0.5757
Mantel-Haenszel Chi-Square	1	1.2102	0.2713
Phi Coefficient		0.1063	
Contingency Coefficient		0.1057	
Cramer's V		0.1063	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 120

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB4 flow=_12 position=s -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	dead	
s1_12	44	1	45
Expected	44.625	0.375	
Cell Chi-Square	0.0088	1.0417	
s2_12	30	0	30
Expected	29.75	0.25	
Cell Chi-Square	0.0021	0.25	
s3_12	30	0	30
Expected	29.75	0.25	
Cell Chi-Square	0.0021	0.25	
s4_12	15	0	15
Expected	14.875	0.125	
Cell Chi-Square	0.0011	0.125	
Total	119	1	120

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	3	1.6807	0.6412
Likelihood Ratio Chi-Square	3	1.9757	0.5775
Mantel-Haenszel Chi-Square	1	1.1408	0.2855
Phi Coefficient		0.1183	
Contingency Coefficient		0.1175	
Cramer's V		0.1183	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 120

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=CTL -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
c1_12	45	0	0	45
	44.151	0.5094	0.3396	
	0.0163	0.5094	0.3396	
c1_45	42	1	2	45
	44.151	0.5094	0.3396	
	0.1048	0.4724	8.1174	
c2_12	45	0	0	45
	44.151	0.5094	0.3396	
	0.0163	0.5094	0.3396	
c2_45	45	0	0	45
	44.151	0.5094	0.3396	
	0.0163	0.5094	0.3396	
c3_12	59	0	1	60
	58.868	0.6792	0.4528	
	0.0003	0.6792	0.6612	
c3_45	57	3	0	60
	58.868	0.6792	0.4528	
	0.0593	7.9292	0.4528	
c4_12	29	0	1	30
	29.434	0.3396	0.2264	
	0.0064	0.3396	2.6431	
Total	520	6	4	530

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=CTL -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
c4_45	43	2	0	45
	44.151	0.5094	0.3396	
	0.03	4.3613	0.3396	
c5_12	10	0	0	10
	9.8113	0.1132	0.0755	
	0.0036	0.1132	0.0755	
c5_45	45	0	0	45
	44.151	0.5094	0.3396	
	0.0163	0.5094	0.3396	
c6_45	20	0	0	20
	19.623	0.2264	0.1509	
	0.0073	0.2264	0.1509	
c7_45	60	0	0	60
	58.868	0.6792	0.4528	
	0.0218	0.6792	0.4528	
c8_45	20	0	0	20
	19.623	0.2264	0.1509	
	0.0073	0.2264	0.1509	
Total	520	6	4	530

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	24	31.7736	0.1327
Likelihood Ratio Chi-Square	24	27.6871	0.2735
Mantel-Haenszel Chi-Square	1	1.7334	0.1880
Phi Coefficient		0.2448	
Contingency Coefficient		0.2378	
Cramer's V		0.1731	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 530

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=CTL -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	unkn	
Expected			
Cell Chi-Square			
c1_12	45	0	45
	44.526	0.4737	
	0.005	0.4737	
c2_12	45	0	45
	44.526	0.4737	
	0.005	0.4737	
c3_12	59	1	60
	59.368	0.6316	
	0.0023	0.2149	
c4_12	29	1	30
	29.684	0.3158	
	0.0158	1.4825	
c5_12	10	0	10
	9.8947	0.1053	
	0.0011	0.1053	
Total	188	2	190

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	4	2.7793	0.5954
Likelihood Ratio Chi-Square	4	3.2538	0.5163
Mantel-Haenszel Chi-Square	1	1.3342	0.2481
Phi Coefficient		0.1209	
Contingency Coefficient		0.1201	
Cramer's V		0.1209	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Fisher's Exact Test

Table Probability (P)	0.1003
Pr <= P	0.5865
Sample Size =	190

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB2 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
d1_12	30	0	0	30
	29.5	0.125	0.375	
	0.0085	0.125	0.375	
d2_12	45	0	0	45
	44.25	0.1875	0.5625	
	0.0127	0.1875	0.5625	
d3_12	29	0	1	30
	29.5	0.125	0.375	
	0.0085	0.125	1.0417	
d4_12	15	0	0	15
	14.75	0.0625	0.1875	
	0.0042	0.0625	0.1875	
s1_12	30	0	0	30
	29.5	0.125	0.375	
	0.0085	0.125	0.375	
s2_12	42	1	2	45
	44.25	0.1875	0.5625	
	0.1144	3.5208	3.6736	
s3_12	30	0	0	30
	29.5	0.125	0.375	
	0.0085	0.125	0.375	
s4_12	15	0	0	15
	14.75	0.0625	0.1875	
	0.0042	0.0625	0.1875	
Total	236	1	3	240

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	14	11.2806	0.6639
Likelihood Ratio Chi-Square	14	10.5549	0.7206
Mantel-Haenszel Chi-Square	1	0.6157	0.4326
Phi Coefficient		0.2168	
Contingency Coefficient		0.2119	
Cramer's V		0.1533	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

The FREQ Procedure
Statistics for Table of desc by cond
Fisher's Exact Test

Table Probability (P)	0.0024
Pr <= P	0.7626

Sample Size = 240

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, October 2002.

----- sbay=SB4 -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	dead	
d1_12	29	1	30
	29.625	0.375	
	0.0132	1.0417	
d2_12	44	1	45
	44.438	0.5625	
	0.0043	0.3403	
d3_12	30	0	30
	29.625	0.375	
	0.0047	0.375	
d4_12	15	0	15
	14.813	0.1875	
	0.0024	0.1875	
s1_12	44	1	45
	44.438	0.5625	
	0.0043	0.3403	
s2_12	30	0	30
	29.625	0.375	
	0.0047	0.375	
s3_12	30	0	30
	29.625	0.375	
	0.0047	0.375	
s4_12	15	0	15
	14.813	0.1875	
	0.0024	0.1875	
Total	237	3	240

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	7	3.2630	0.8597
Likelihood Ratio Chi-Square	7	4.3039	0.7442
Mantel-Haenszel Chi-Square	1	1.4647	0.2262
Phi Coefficient		0.1166	
Contingency Coefficient		0.1158	
Cramer's V		0.1166	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

The FREQ Procedure
Statistics for Table of desc by cond
Fisher's Exact Test

Table Probability (P)	0.0267
Pr <= P	1.0000

Sample Size = 240

Appendix D

One hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 2 at 4.5 kcfs through the spillbay and 4.5 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 345 released, 326 alive, 15 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9872	(0.0059)	Control group survival
Pa =	0.9939	(0.0056)	Live recovery probability
Pd =	0.8828	(0.1684)	Dead recovery probability
Tau =	0.9631	(0.0138)	Spillbay 2 survival
1-Tau =	0.0369	(0.0138)	Spillbay 2 mortality

log-likelihood : -139.666444

Variance-Covariance matrix for estimated probabilities:

0.00004	-0.00002	0.00049	-0.00001
-0.00002	0.00003	-0.00076	-0.00002
0.00049	-0.00076	0.02836	0.00067
-0.00001	-0.00002	0.00067	0.00019

Profile likelihood intervals:

	Spillbay 2 survival	Spillbay 2 mortality
90 percent:	(0.9386, 0.9843)	(0.0157, 0.0614)
95 percent:	(0.9335, 0.9879)	(0.0121, 0.0665)
99 percent:	(0.9230, 0.9946)	(0.0054, 0.0770)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9886	(0.0046)	Control group survival
Pa = Pd	0.9909	(0.0032)	Recovery probability
Tau =	0.9670	(0.0121)	Spillbay 2 survival
1-Tau =	0.0330	(0.0121)	Spillbay 2 mortality

log-likelihood : -139.851100

Variance-Covariance matrix for estimated probabilities:

0.00002	0.00000	-0.00002
0.00000	0.00001	0.00000
-0.00002	0.00000	0.00015

Profile likelihood intervals:

	Spillbay 2 survival	Spillbay 2 mortality
90 percent:	(0.9451, 0.9855)	(0.0145, 0.0549)
95 percent:	(0.9404, 0.9888)	(0.0112, 0.0596)
99 percent:	(0.9307, 0.9953)	(0.0047, 0.0693)

Likelihood ratio statistic for equality of recovery probabilities: 0.369311

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 2 at 4.5 kcfs through the spillbay and 4.5 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 345 released, 313 alive, 28 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9879	(0.0051)	Control group survival
Pa =	0.9931	(0.0045)	Live recovery probability
Pd =	0.9387	(0.0855)	Dead recovery probability
Tau =	0.9247	(0.0169)	Spillbay 2 survival
1-Tau =	0.0753	(0.0169)	Spillbay 2 mortality

log-likelihood : -174.952419

Variance-Covariance matrix for estimated probabilities:

0.00003	-0.00001	0.00011	-0.00002
-0.00001	0.00002	-0.00026	-0.00002
0.00011	-0.00026	0.00731	0.00037
-0.00002	-0.00002	0.00037	0.00028

Profile likelihood intervals:

	Spillbay 2 survival	Spillbay 2 mortality
90 percent:	(0.8952, 0.9509)	(0.0491, 0.1048)
95 percent:	(0.8891, 0.9555)	(0.0445, 0.1109)
99 percent:	(0.8769, 0.9640)	(0.0360, 0.1231)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9886	(0.0046)	Control group survival
Pa = Pd	0.9909	(0.0032)	Recovery probability
Tau =	0.9285	(0.0157)	Spillbay 2 survival
1-Tau =	0.0715	(0.0157)	Spillbay 2 mortality

log-likelihood : -175.137074

Variance-Covariance matrix for estimated probabilities:

0.00002	0.00000	-0.00002
0.00000	0.00001	0.00000
-0.00002	0.00000	0.00025

Profile likelihood intervals:

	Spillbay 2 survival	Spillbay 2 mortality
90 percent:	(0.9008, 0.9525)	(0.0475, 0.0992)
95 percent:	(0.8950, 0.9567)	(0.0433, 0.1050)
99 percent:	(0.8833, 0.9648)	(0.0352, 0.1167)

Likelihood ratio statistic for equality of recovery probabilities: 0.369311

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 2 at 4.5 and 12 kcfs with total spill through the spillbay at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2, 4.5 kcfs release: 345 released, 313 alive, 28 dead.

Spillbay 2, 12 kcfs release: 45 released, 43 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0051) Control group survival
Pa = 0.9934 (0.0043) Live recovery probability
Pd = 0.9427 (0.0819) Dead recovery probability
S2 = 0.9136 (0.0165) Spillbay 2, 4.5/4.5 survival
S3 = 0.9556 (0.0307) Spillbay 2, deep, 12/12 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -183.5472

Tau = 0.9247 (0.0169) Spillbay 2, 4.5 kcfs/Control ratio
Tau = 0.9672 (0.0315) Spillbay 2, deep, 12/12/Control ratio

Z statistic for the equality of equal turbine survivals: 1.1883

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002555	-0.00000485	0.00010623	0.00000772	0.00000000
-0.00000485	0.00001844	-0.00024126	-0.00002088	0.00000000
0.00010623	-0.00024126	0.00670086	0.00045755	0.00000000
0.00000772	-0.00002088	0.00045755	0.00027064	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00094376

Confidence intervals:

Spillbay 2, deep, 4.5/4.5 Tau	Spillbay 2, deep, 12/12 Tau
90 percent: (0.8970, 0.9525)	(0.9154, 1.0190)
95 percent: (0.8917, 0.9578)	(0.9055, 1.0289)
99 percent: (0.8813, 0.9682)	(0.8861, 1.0483)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 2 at 4.5 and 12 kcfs with total spill through the spillbay at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2, 4.5 kcfs release: 345 released, 313 alive, 28 dead.

Spillbay 2, 12 kcfs release: 45 released, 43 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

 estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9913 (0.0031) Recovery probability
S2 = 0.9179 (0.0149) Spillbay 2, 4.5 kcfs survival
S3 = 0.9556 (0.0307) Spillbay 2, deep, 12/12 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -183.7220

Tau = 0.9285 (0.0157) Spillbay 2, 4.5/4.5 /Control ratio
Tau = 0.9666 (0.0314) Spillbay 2, deep, 12/12 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.0859

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144	0.00000000	0.00000000	0.00000000
0.00000000	0.00000937	0.00000000	0.00000000
0.00000000	0.00000000	0.00022102	0.00000000
0.00000000	0.00000000	0.00000000	0.00094376

Confidence intervals:

Spillbay 2, deep, 4.5/4.5 Tau	Spillbay 2, deep, 12/12 Tau
90 percent: (0.9027, 0.9542)	(0.9149, 1.0182)
95 percent: (0.8978, 0.9592)	(0.9050, 1.0281)
99 percent: (0.8882, 0.9688)	(0.8857, 1.0474)

Likelihood ratio statistic for equality of recovery probabilities: 0.3495

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at shallow and deep release sites through Spillbay 2 at 12 kcfs spill and 12 total spill at the Dalles Dam, October-November 2002.

Control fish: 530 released, 520 alive, 6 dead. Spillbay 2 shallow: 45 released, 45 alive, 0 dead.

Spillbay 2 deep: 45 released, 43 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S1 =	0.9887	(+NAN)	Control group survival
Pa =	0.9935	(+NAN)	Live recovery probability
Pd =	1.0	N/A	Dead recovery probability*
S2 =	1.0	N/A	Spillbay 2, shallow, 12/12 kcfs survival*
S3 =	0.9556	(0.0307)	Spillbay 2, deep, 12/12 kcfs survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -65.1432

Tau = 1.0115 (+NAN) Spillbay 2, shallow, 12/12 kcfs/Control ratio

Tau = 0.9665 (0.0291) Spillbay 2, deep, 12/12 kcfs/Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00012527	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	-0.00004216	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00094376

Confidence intervals:

	Spillbay 2, shallow, 12/12 kcfs Tau	Spillbay 2, deep, 12/12 kcfs Tau
90 percent:	(+NAN, +NAN)	(0.9187, 1.0143)
95 percent:	(+NAN, +NAN)	(0.9095, 1.0235)
99 percent:	(+NAN, +NAN)	(0.8916, 1.0414)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at shallow and deep release sites through Spillbay 2 at 12 kcfs spill and 12 total spill at the Dalles Dam, October-November 2002.

Control fish: 530 released, 520 alive, 6 dead. Spillbay 2 shallow: 45 released, 45 alive, 0 dead.

Spillbay 2 deep: 45 released, 43 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9935 (0.0032) Recovery probability
S2 = 1.0 N/A Spillbay 2, shallow, 12/12 kcfs survival*
S3 = 0.9556 (0.0307) Spillbay 2, deep, 12/12 kcfs survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -65.1496

Tau = 1.0115 (0.0047) Spillbay 2, shallow, 12/12 kcfs/Control ratio

Tau = 0.9666 (0.0314) Spillbay 2, deep, 12/12 kcfs/Control ratio

Z statistic for the equality of equal turbine survivals: 1.4156

Compare with quantiles of the normal distribution:

1-tailed 2-tailed

For significance level 0.10: 1.2816 1.6449

For significance level 0.05: 1.6449 1.9600

For significance level 0.01: 2.3263 2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144 0.00000000 0.00000000 0.00000000
0.00000000 0.00001034 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 0.00000000 0.00094376

Confidence intervals:

Spillbay 2, shallow, 12/12 kcfs Tau	Spillbay 2, deep, 12/12 kcfs Tau
90 percent: (1.0037, 1.0193)	(0.9149, 1.0182)
95 percent: (1.0023, 1.0208)	(0.9050, 1.0281)
99 percent: (0.9993, 1.0237)	(0.8857, 1.0474)

=====
Likelihood ratio statistic for equality of recovery probabilities: 0.0128

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706

For significance level 0.05: 3.841

For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 4 at 4.5 kcfs through the spillbay and 33 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 4 test release: 345 released, 338 alive, 6 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9887	(0.0046)	Control group survival
Pa =	0.9942	(0.0026)	Live recovery probability
Pd =	1.0	N/A	Dead recovery probability*
Tau =	0.9939	(0.0085)	Spillbay 4 survival
1-Tau =	0.0061	(0.0085)	Spillbay 4 mortality

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -93.851216

Variance-Covariance matrix for estimated probabilities:

0.00002	-0.00000	-0.00002
-0.00000	0.00001	0.00000
-0.00002	0.00000	0.00007

Profile likelihood intervals:

	Spillbay 4 survival	Spillbay 4 mortality
90 percent:	(0.9782, 1.0000)	(0.0000, 0.0218)
95 percent:	(0.9746, 1.0000)	(0.0000, 0.0254)
99 percent:	(0.9672, 1.0000)	(0.0000, 0.0328)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9886	(0.0046)	Control group survival
Pa = Pd	0.9943	(0.0025)	Recovery probability
Tau =	0.9939	(0.0085)	Spillbay 4 survival
1-Tau =	0.0061	(0.0085)	Spillbay 4 mortality

log-likelihood : -93.857177

Variance-Covariance matrix for estimated probabilities:

0.00002	0.00000	-0.00002
0.00000	0.00001	-0.00000
-0.00002	-0.00000	0.00007

Profile likelihood intervals:

	Spillbay 4 survival	Spillbay 4 mortality
90 percent:	(0.9781, 1.0000)	(0.0000, 0.0219)
95 percent:	(0.9746, 1.0000)	(0.0000, 0.0254)
99 percent:	(0.9672, 1.0000)	(0.0000, 0.0328)

Likelihood ratio statistic for equality of recovery probabilities: 0.011921

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbay 4 at 4.5 kcfs through the spillbay and 33 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 4 test release: 345 released, 328 alive, 16 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9887	(0.0046)	Control group survival
Pa =	0.9941	(0.0026)	Live recovery probability
Pd =	1.0	N/A	Dead recovery probability*
Tau =	0.9645	(0.0123)	Spillbay 4 survival
1-Tau =	0.0355	(0.0123)	Spillbay 4 mortality

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -128.292944

Variance-Covariance matrix for estimated probabilities:

0.00002	-0.00000	-0.00002
-0.00000	0.00001	0.00000
-0.00002	0.00000	0.00015

Profile likelihood intervals:

	Spillbay 4 survival	Spillbay 4 mortality
90 percent:	(0.9423, 0.9833)	(0.0167, 0.0577)
95 percent:	(0.9376, 0.9866)	(0.0134, 0.0624)
99 percent:	(0.9278, 0.9932)	(0.0068, 0.0722)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S =	0.9886	(0.0046)	Control group survival
Pa = Pd	0.9943	(0.0025)	Recovery probability
Tau =	0.9645	(0.0123)	Spillbay 4 survival
1-Tau =	0.0355	(0.0123)	Spillbay 4 mortality

log-likelihood : -128.327363

Variance-Covariance matrix for estimated probabilities:

0.00002	-0.00000	-0.00002
-0.00000	0.00001	0.00000
-0.00002	0.00000	0.00015

Profile likelihood intervals:

	Spillbay 4 survival	Spillbay 4 mortality
90 percent:	(0.9422, 0.9833)	(0.0167, 0.0578)
95 percent:	(0.9374, 0.9867)	(0.0133, 0.0626)
99 percent:	(0.9276, 0.9933)	(0.0067, 0.0724)

Likelihood ratio statistic for equality of recovery probabilities: 0.068839

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 119 alive, 0 dead.

Spillbay 4 test release: 120 released, 118 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9887 (+NAN) Control group survival
Pa = 0.9934 (+NAN) Live recovery probability
Pd = 1.0 N/A Dead recovery probability*
S2 = 1.0 N/A Spillbay 2 deep, 12/72 spill survival*
S3 = 0.9833 (0.0117) Spillbay 4 deep, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -73.1406

Tau = 1.0115 (+NAN) Spillbay 2 deep, 12/72 spill/Control ratio

Tau = 0.9946 (0.0036) Spillbay 4 deep, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00012527	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	-0.00004249	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00013657

Confidence intervals:

Spillbay 2 deep, 12/72 spill Tau	Spillbay 4 deep, 12/72 spill Tau
90 percent: (+NAN, +NAN)	(0.9887, 1.0005)
95 percent: (+NAN, +NAN)	(0.9875, 1.0016)
99 percent: (+NAN, +NAN)	(0.9853, 1.0039)

Appendix D

One hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 119 alive, 0 dead.

Spillbay 4 test release: 120 released, 118 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

 estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9935 (0.0029) Recovery probability
S2 = 1.0 N/A Spillbay 2 deep, 12/72 spill survival*
S3 = 0.9833 (0.0117) Spillbay 4 deep, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -73.1473

Tau = 1.0115 (0.0047) Spillbay 2 deep, 12/72 spill/Control ratio

Tau = 0.9947 (0.0127) Spillbay 4 deep, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 1.2432

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144	0.00000000	0.00000000	0.00000000
0.00000000	0.00000838	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00013657

Confidence intervals:

Spillbay 2 deep, 12/72 spill Tau	Spillbay 4 deep, 12/72 spill Tau
90 percent: (1.0037, 1.0193)	(0.9738, 1.0156)
95 percent: (1.0023, 1.0208)	(0.9698, 1.0196)
99 percent: (0.9993, 1.0237)	(0.9620, 1.0274)

Likelihood ratio statistic for equality of recovery probabilities: 0.0134

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 118 alive, 1 dead.

Spillbay 4 test release: 120 released, 118 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S1 =	0.9887	(0.0046)	Control group survival
Pa =	0.9934	(0.0029)	Live recovery probability
Pd =	1.0	N/A	Dead recovery probability*
S2 =	0.9917	(0.0083)	Spillbay 2 deep, 12/72 spill survival
S3 =	0.9833	(0.0117)	Spillbay 4 deep, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -78.9174

Tau = 1.0030 (0.0096) Spillbay 2 deep, 12/72 spill/Control ratio

Tau = 0.9946 (0.0127) Spillbay 4 deep, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 0.5296

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002112	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000858	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00006887	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00013657

Confidence intervals:

Spillbay 2 deep, 12/72 spill Tau	Spillbay 4 deep, 12/72 spill Tau
90 percent: (0.9872, 1.0188)	(0.9737, 1.0155)
95 percent: (0.9842, 1.0218)	(0.9697, 1.0195)
99 percent: (0.9783, 1.0277)	(0.9619, 1.0273)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 118 alive, 1 dead.

Spillbay 4 test release: 120 released, 118 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9935 (0.0029) Recovery probability
S2 = 0.9916 (0.0084) Spillbay 2 deep, 12/72 spill survival
S3 = 0.9833 (0.0117) Spillbay 4 deep, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -78.9222

Tau = 1.0030 (0.0097) Spillbay 2 deep, 12/72 spill/Control ratio

Tau = 0.9947 (0.0127) Spillbay 4 deep, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 0.5233

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144	0.00000000	0.00000000	0.00000000
0.00000000	0.00000838	0.00000000	0.00000000
0.00000000	0.00000000	0.00007002	0.00000000
0.00000000	0.00000000	0.00000000	0.00013657

Confidence intervals:

Spillbay 2 deep, 12/72 spill Tau Spillbay 4 deep, 12/72 spill Tau

90 percent: (0.9871, 1.0190) (0.9738, 1.0156)

95 percent: (0.9841, 1.0220) (0.9698, 1.0196)

99 percent: (0.9781, 1.0280) (0.9620, 1.0274)

Likelihood ratio statistic for equality of recovery probabilities: 0.0097

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706

For significance level 0.05: 3.841

For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released by a shallow pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.
Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 117 alive, 1 dead.
Spillbay 4 test release: 120 released, 119 alive, 1 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9811 (0.0059) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.5714 (0.1323) Dead recovery probability
S2 = 0.9750 (0.0143) Spillbay 2 shallow, 12/72 spill survival
S3 = 0.9917 (0.0083) Spillbay 4 shallow, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -78.9808

Tau = 0.9938 (0.0157) Spillbay 2 shallow, 12/72 spill/Control ratio
Tau = 1.0107 (0.0104) Spillbay 4 shallow, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 0.9010

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00003493	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.01749262	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00020312	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00006887

Confidence intervals:

Spillbay 2 shallow, 12/72 spill Tau	Spillbay 4 shallow, 12/72 spill Tau
90 percent: (0.9679, 1.0196)	(0.9936, 1.0279)
95 percent: (0.9630, 1.0245)	(0.9903, 1.0312)
99 percent: (0.9533, 1.0342)	(0.9839, 1.0376)

Appendix D

One hour survival estimates for juvenile chinook salmon released by a shallow pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.
Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 117 alive, 1 dead.
Spillbay 4 test release: 120 released, 119 alive, 1 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9922 (0.0032) Recovery probability
S2 = 0.9915 (0.0084) Spillbay 2 shallow, 12/72 spill survival
S3 = 0.9917 (0.0083) Spillbay 4 shallow, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -79.4610

Tau = 1.0030 (0.0097) Spillbay 2 shallow, 12/72 spill/Control ratio
Tau = 1.0031 (0.0096) Spillbay 4 shallow, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 0.0104

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144	0.00000000	0.00000000	0.00000000
0.00000000	0.00001004	0.00000000	0.00000000
0.00000000	0.00000000	0.00007121	0.00000000
0.00000000	0.00000000	0.00000000	0.00006887

Confidence intervals:

Spillbay 2 shallow, 12/72 spill Tau	Spillbay 4 shallow, 12/72 spill Tau
90 percent: (0.9869, 1.0190)	(0.9873, 1.0189)
95 percent: (0.9839, 1.0221)	(0.9843, 1.0220)
99 percent: (0.9779, 1.0281)	(0.9783, 1.0279)

Likelihood ratio statistic for equality of recovery probabilities: 0.9603

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a shallow pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 113 alive, 5 dead.

Spillbay 4 test release: 120 released, 117 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9859 (0.0079) Control group survival
Pa = 0.9959 (0.0064) Live recovery probability
Pd = 0.8284 (0.2380) Dead recovery probability
S2 = 0.9466 (0.0238) Spillbay 2 shallow, 12/72 spill survival
S3 = 0.9750 (0.0143) Spillbay 4 shallow, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -102.3966

Tau = 0.9602 (0.0228) Spillbay 2 shallow, 12/72 spill/Control ratio

Tau = 0.9890 (0.0165) Spillbay 4 shallow, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 1.0215

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00006290	-0.00003528	0.00130751	0.00006069	0.00000000
-0.00003528	0.00004053	-0.00130065	-0.00006533	0.00000000
0.00130751	-0.00130065	0.05662176	0.00242152	0.00000000
0.00006069	-0.00006533	0.00242152	0.00056457	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00020312

Confidence intervals:

Spillbay 2 shallow, 12/72 spill Tau	Spillbay 4 shallow, 12/72 spill Tau
90 percent: (0.9227, 0.9978)	(0.9618, 1.0161)
95 percent: (0.9155, 1.0049)	(0.9566, 1.0213)
99 percent: (0.9015, 1.0190)	(0.9465, 1.0315)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released by a shallow pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 72 kcfs total spill at the Dalles Dam, October-November 2002.

Controls: 530 released, 520 alive, 6 dead. Spillbay 2 test release: 120 released, 113 alive, 5 dead.

Spillbay 4 test release: 120 released, 117 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9886 (0.0046) Control group survival
Pa = Pd 0.9922 (0.0032) Recovery probability
S2 = 0.9576 (0.0185) Spillbay 2 shallow, 12/72 spill survival
S3 = 0.9750 (0.0143) Spillbay 4 shallow, 12/72 spill survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -102.6388

Tau = 0.9687 (0.0193) Spillbay 2 shallow, 12/72 spill/Control ratio

Tau = 0.9862 (0.0151) Spillbay 4 shallow, 12/72 spill/Control ratio

Z statistic for the equality of equal turbine survivals: 0.7165

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00002144	0.00000000	0.00000000	0.00000000
0.00000000	0.00001004	0.00000000	0.00000000
0.00000000	0.00000000	0.00034388	0.00000000
0.00000000	0.00000000	0.00000000	0.00020313

Confidence intervals:

Spillbay 2 shallow, 12/72 spill Tau	Spillbay 4 shallow, 12/72 spill Tau
90 percent: (0.9369, 1.0004)	(0.9613, 1.0112)
95 percent: (0.9309, 1.0065)	(0.9566, 1.0159)
99 percent: (0.9190, 1.0184)	(0.9473, 1.0252)

Likelihood ratio statistic for equality of recovery probabilities: 0.4845

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=CTL -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	dead	
Expected			
Cell Chi-Square			
c1_12	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c1_18	30	0	30
	29.72	0.28	
	0.0026	0.28	
c1_21	50	0	50
	49.533	0.4667	
	0.0044	0.4667	
c1_9	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c2_12	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c2_18	37	3	40
	39.627	0.3733	
	0.1741	18.48	
c2_21	50	0	50
	49.533	0.4667	
	0.0044	0.4667	
c2_9	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c3_12	39	1	40
	39.627	0.3733	
	0.0099	1.0519	
c3_18	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
Total	743	7	750

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=CTL -----

The FREQ Procedure
Table of desc by cond

desc	cond		Total
Frequency	alive	dead	
c3_21	49	1	50
	49.533	0.4667	
	0.0057	0.6095	
c3_9	30	0	30
	29.72	0.28	
	0.0026	0.28	
c4_18	29	1	30
	29.72	0.28	
	0.0174	1.8514	
c4_21	20	0	20
	19.813	0.1867	
	0.0018	0.1867	
c4_9	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c5_18	30	0	30
	29.72	0.28	
	0.0026	0.28	
c5_9	30	0	30
	29.72	0.28	
	0.0026	0.28	
c6_18	30	0	30
	29.72	0.28	
	0.0026	0.28	
c7_18	40	0	40
	39.627	0.3733	
	0.0035	0.3733	
c8_18	39	1	40
	39.627	0.3733	
	0.0099	1.0519	
Total	743	7	750

The FREQ Procedure
Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	19	28.4440	0.0752
Likelihood Ratio Chi-Square	19	20.7843	0.3488
Mantel-Haenszel Chi-Square	1	0.0012	0.9719
Phi Coefficient		0.1947	
Contingency Coefficient		0.1912	
Cramer's V		0.1947	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 750

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB2 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
de1_12	29	1	0	30
	29.304	0.6207	0.0752	
	0.0032	0.2318	0.0752	
de1_18	30	0	0	30
	29.304	0.6207	0.0752	
	0.0165	0.6207	0.0752	
de1_21	47	3	0	50
	48.84	1.0345	0.1254	
	0.0693	3.7345	0.1254	
de1_9	37	2	1	40
	39.072	0.8276	0.1003	
	0.1099	1.6609	8.0691	
de2_12	38	1	0	39
	38.095	0.8069	0.0978	
	0.0002	0.0462	0.0978	
de2_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
de2_21	48	2	0	50
	48.84	1.0345	0.1254	
	0.0145	0.9011	0.1254	
de2_9	37	3	0	40
	39.072	0.8276	0.1003	
	0.1099	5.7026	0.1003	
de3_12	39	0	0	39
	38.095	0.8069	0.0978	
	0.0215	0.8069	0.0978	
de3_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
Total	1558	33	4	1595

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB2 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
de3_9	29	1	0	30
	29.304	0.6207	0.0752	
	0.0032	0.2318	0.0752	
de4_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
de4_9	37	2	0	39
	38.095	0.8069	0.0978	
	0.0315	1.7642	0.0978	
de5_9	38	2	0	40
	39.072	0.8276	0.1003	
	0.0294	1.6609	0.1003	
dm1_12	30	0	0	30
	29.304	0.6207	0.0752	
	0.0165	0.6207	0.0752	
dm1_18	30	0	0	30
	29.304	0.6207	0.0752	
	0.0165	0.6207	0.0752	
dm1_21	49	1	0	50
	48.84	1.0345	0.1254	
	0.0005	0.0011	0.1254	
dm1_9	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
dm2_12	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
dm2_18	29	0	0	29
	28.327	0.6	0.0727	
	0.016	0.6	0.0727	
Total	1558	33	4	1595

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB2 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
dm2_21	48	2	0	50
	48.84	1.0345	0.1254	
	0.0145	0.9011	0.1254	
dm2_9	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
dm3_12	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
dm3_18	50	0	0	50
	48.84	1.0345	0.1254	
	0.0275	1.0345	0.1254	
dm3_9	29	1	0	30
	29.304	0.6207	0.0752	
	0.0032	0.2318	0.0752	
dm4_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
dm4_9	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
dm5_9	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
sel_18	30	0	0	30
	29.304	0.6207	0.0752	
	0.0165	0.6207	0.0752	
sel_21	49	1	0	50
	48.84	1.0345	0.1254	
	0.0005	0.0011	0.1254	
Total	1558	33	4	1595

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB2 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
se2_18	37	2	1	40
	39.072	0.8276	0.1003	
	0.1099	1.6609	8.0691	
se2_21	49	1	0	50
	48.84	1.0345	0.1254	
	0.0005	0.0011	0.1254	
se3_18	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
se4_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
sm1_18	38	1	0	39
	38.095	0.8069	0.0978	
	0.0002	0.0462	0.0978	
sm1_21	49	1	0	50
	48.84	1.0345	0.1254	
	0.0005	0.0011	0.1254	
sm2_18	30	0	0	30
	29.304	0.6207	0.0752	
	0.0165	0.6207	0.0752	
sm2_21	48	0	2	50
	48.84	1.0345	0.1254	
	0.0145	1.0345	28.025	
sm3_18	39	1	0	40
	39.072	0.8276	0.1003	
	0.0001	0.0359	0.1003	
sm4_18	40	0	0	40
	39.072	0.8276	0.1003	
	0.022	0.8276	0.1003	
Total	1558	33	4	1595

The FREQ Procedure
Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	78	80.8718	0.3896
Likelihood Ratio Chi-Square	78	60.4492	0.9296
Mantel-Haenszel Chi-Square	1	0.7304	0.3928
Phi Coefficient		0.2252	
Contingency Coefficient		0.2197	
Cramer's V		0.1592	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 1595

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB4 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
Expected				
Cell Chi-Square				
dm1_12	59	0	1	60
	58.444	1.4815	0.0741	
	0.0053	1.4815	11.574	
dm1_18	40	0	0	40
	38.963	0.9877	0.0494	
	0.0276	0.9877	0.0494	
dm1_9	46	4	0	50
	48.704	1.2346	0.0617	
	0.1501	6.1946	0.0617	
dm2_12	49	1	0	50
	48.704	1.2346	0.0617	
	0.0018	0.0446	0.0617	
dm2_18	40	0	0	40
	38.963	0.9877	0.0494	
	0.0276	0.9877	0.0494	
dm2_9	50	1	0	51
	49.678	1.2593	0.063	
	0.0021	0.0534	0.063	
dm3_12	49	1	0	50
	48.704	1.2346	0.0617	
	0.0018	0.0446	0.0617	
dm3_18	47	1	0	48
	46.756	1.1852	0.0593	
	0.0013	0.0289	0.0593	
dm3_9	50	0	0	50
	48.704	1.2346	0.0617	
	0.0345	1.2346	0.0617	
Total	789	20	1	810

(Continued)

Appendix D

Chi square tests of homogeneity for the recovery of chinook salmon juveniles released through units at the Dalles Dam, May-June 2003.

----- sbay=SB4 -----

The FREQ Procedure
Table of desc by cond

desc	cond			Total
Frequency	alive	dead	unkn	
dm4_18	29	1	0	30
	29.222	0.7407	0.037	
	0.0017	0.0907	0.037	
dm4_9	47	3	0	50
	48.704	1.2346	0.0617	
	0.0596	2.5246	0.0617	
dm5_18	41	1	0	42
	40.911	1.037	0.0519	
	0.0002	0.0013	0.0519	
dm5_9	39	1	0	40
	38.963	0.9877	0.0494	
	352E-7	0.0002	0.0494	
sm1_18	30	0	0	30
	29.222	0.7407	0.037	
	0.0207	0.7407	0.037	
sm2_18	46	3	0	49
	47.73	1.2099	0.0605	
	0.0627	2.6487	0.0605	
sm3_18	48	2	0	50
	48.704	1.2346	0.0617	
	0.0102	0.4746	0.0617	
sm4_18	40	0	0	40
	38.963	0.9877	0.0494	
	0.0276	0.9877	0.0494	
sm5_18	39	1	0	40
	38.963	0.9877	0.0494	
	352E-7	0.0002	0.0494	
Total	789	20	1	810

The FREQ Procedure

Statistics for Table of desc by cond

Statistic	DF	Value	Prob
Chi-Square	34	31.4607	0.5927
Likelihood Ratio Chi-Square	34	26.6869	0.8098
Mantel-Haenszel Chi-Square	1	0.0009	0.9758
Phi Coefficient		0.1971	
Contingency Coefficient		0.1934	
Cramer's V		0.1394	

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 810

Appendix D

One hour survival estimates for juvenile chinook salmon released at both the center and off-center of a deep pipe through Spillbay 2 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 center release: 190 released, 187 alive, 3 dead. Spillbay 2 off-center release: 189 released, 178 alive, 10 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.9524 (0.0465) Dead recovery probability
S2 = 0.9842 (0.0090) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9418 (0.0170) Spillbay 2, off-center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -101.0840

Tau = 0.9935 (0.0098) Spillbay 2, center-deep, 9/113 /Control ratio
Tau = 0.9507 (0.0175) Spillbay 2, off-center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 2.1336

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00215959	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00008179	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00029002

Confidence intervals:

	Spillbay 2, center-deep, 9/113 Tau	Spillbay 2, off-center-deep, 9/113 Tau
90 percent:	(0.9774, 1.0096)	(0.9219, 0.9795)
95 percent:	(0.9743, 1.0127)	(0.9163, 0.9850)
99 percent:	(0.9683, 1.0187)	(0.9056, 0.9958)

Appendix D

One hour survival estimates for juvenile chinook salmon released at both the center and off-center of a deep pipe through Spillbay 2 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 center release: 190 released, 187 alive, 3 dead. Spillbay 2 off-center release: 189 released, 178 alive, 10 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 0.9991 (0.0009) Recovery probability
S2 = 0.9842 (0.0090) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9468 (0.0164) Spillbay 2, off-center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -102.2042

Tau = 0.9935 (0.0098) Spillbay 2, center-deep, 9/113 /Control ratio
Tau = 0.9557 (0.0169) Spillbay 2, off-center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.9363

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000078	0.00000000	0.00000000
0.00000000	0.00000000	0.00008179	0.00000000
0.00000000	0.00000000	0.00000000	0.00026788

Confidence intervals:

Spillbay 2, center-deep, 9/113	Tau	Spillbay 2, off-center-deep, 9/113	Tau
90 percent:	(0.9774, 1.0096)	(0.9280, 0.9835)	
95 percent:	(0.9743, 1.0127)	(0.9227, 0.9888)	
99 percent:	(0.9683, 1.0187)	(0.9123, 0.9992)	

=====
Likelihood ratio statistic for equality of recovery probabilities: 2.2404

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at both the center and off-center of a deep pipe through Spillbay 2 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 741 alive, 9 dead. Spillbay 2 center release: 190 released, 183 alive, 7 dead.

Spillbay 2 off-center release: 189 released, 173 alive, 15 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.9688 (0.0308) Dead recovery probability
S2 = 0.9632 (0.0137) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9153 (0.0202) Spillbay 2, off-center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -137.9879

Tau = 0.9749 (0.0144) Spillbay 2, center-deep, 9/113 /Control ratio

Tau = 0.9265 (0.0208) Spillbay 2, off-center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.9120

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00094605	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00018676	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00041000

Confidence intervals:

Spillbay 2, center-deep, 9/113 Tau Spillbay 2, off-center-deep, 9/113 Tau

90 percent: (0.9512, 0.9985) (0.8922, 0.9607)

95 percent: (0.9467, 1.0030) (0.8856, 0.9673)

99 percent: (0.9378, 1.0119) (0.8728, 0.9801)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at both the center and off-center of a deep pipe through Spillbay 2 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 741 alive, 9 dead. Spillbay 2 center release: 190 released, 183 alive, 7 dead.

Spillbay 2 off-center release: 189 released, 173 alive, 15 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

 estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 0.9991 (0.0009) Recovery probability
S2 = 0.9632 (0.0137) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9202 (0.0198) Spillbay 2, off-center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -139.0682

Tau = 0.9749 (0.0144) Spillbay 2, center-deep, 9/113 /Control ratio

Tau = 0.9314 (0.0204) Spillbay 2, off-center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.7445

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000078	0.00000000	0.00000000
0.00000000	0.00000000	0.00018676	0.00000000
0.00000000	0.00000000	0.00000000	0.00039054

Confidence intervals:

Spillbay 2, center-deep, 9/113 Tau	Spillbay 2, off-center-deep, 9/113 Tau
90 percent: (0.9512, 0.9985)	(0.8979, 0.9649)
95 percent: (0.9467, 1.0030)	(0.8915, 0.9713)
99 percent: (0.9378, 1.0119)	(0.8790, 0.9838)

=====
Likelihood ratio statistic for equality of recovery probabilities: 2.1605

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 190 released, 187 alive, 3 dead. Spillbay 4 test release: 241 released, 232 alive, 9 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9842 (0.0090) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9627 (0.0122) Spillbay 4, center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -93.5259

Tau = 0.9935 (+NAN) Spillbay 2, center-deep, 9/113 /Control ratio
Tau = 0.9717 (0.0084) Spillbay 4, center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00008179	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00014917

Confidence intervals:

	Spillbay 2, center-deep, 9/113 Tau	Spillbay 4, center-deep, 9/113 Tau
90 percent:	(+NAN, +NAN)	(0.9580, 0.9855)
95 percent:	(+NAN, +NAN)	(0.9554, 0.9881)
99 percent:	(+NAN, +NAN)	(0.9502, 0.9932)

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 190 released, 187 alive, 3 dead. Spillbay 4 test release: 241 released, 232 alive, 9 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9842 (0.0090) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9627 (0.0122) Spillbay 4, center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -93.5258

Tau = 0.9935 (0.0098) Spillbay 2, center-deep, 9/113 /Control ratio
Tau = 0.9717 (0.0128) Spillbay 4, center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.3504

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00008179	0.00000000
0.00000000	0.00000000	0.00000000	0.00014917

Confidence intervals:

Spillbay 2, center-deep, 9/113 Tau	Spillbay 4, center-deep, 9/113 Tau
90 percent: (0.9774, 1.0096)	(0.9507, 0.9928)
95 percent: (0.9743, 1.0127)	(0.9466, 0.9968)
99 percent: (0.9683, 1.0187)	(0.9388, 1.0047)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 190 released, 183 alive, 7 dead. Spillbay 4 test release: 241 released, 230 alive, 11 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9632 (0.0137) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9544 (0.0134) Spillbay 4, center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -123.4297

Tau = 0.9749 (0.0074) Spillbay 2, center-deep, 9/113 /Control ratio
Tau = 0.9659 (0.0071) Spillbay 4, center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.8682

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00014056	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00018676	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00018075

Confidence intervals:

Spillbay 2, center-deep, 9/113 Tau	Spillbay 4, center-deep, 9/113 Tau
90 percent: (0.9627, 0.9870)	(0.9542, 0.9777)
95 percent: (0.9604, 0.9893)	(0.9520, 0.9799)
99 percent: (0.9559, 0.9939)	(0.9476, 0.9843)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays and 4 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 190 released, 183 alive, 7 dead.

Spillbay 4 test release: 241 released, 230 alive, 11 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9632 (0.0137) Spillbay 2, center-deep, 9/113 survival
S3 = 0.9544 (0.0134) Spillbay 4, center-deep, 9/113 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -123.4296

Tau = 0.9749 (0.0144) Spillbay 2, center-deep, 9/113 /Control ratio

Tau = 0.9659 (0.0142) Spillbay 4, center-deep, 9/113 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.4416

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00018676	0.00000000
0.00000000	0.00000000	0.00000000	0.00018075

Confidence intervals:

Spillbay 2, center-deep, 9/113	Tau	Spillbay 4, center-deep, 9/113	Tau
90 percent:	(0.9512, 0.9985)	(0.9427, 0.9892)	
95 percent:	(0.9467, 1.0030)	(0.9382, 0.9937)	
99 percent:	(0.9378, 1.0119)	(0.9295, 1.0024)	

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center and off-center of a deep pipe through Spillbay 2 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 off-center release: 108 released, 106 alive, 2 dead. Spillbay 2 center release: 110 released, 108 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9818 (0.0127) Spillbay 2, center-deep, 12/108 survival
S3 = 0.9815 (0.0130) Spillbay 2, off-center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -59.6422

Tau = 0.9911 (0.0089) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9907 (0.0093) Spillbay 2, off-center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.0264

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00016228	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00016829

Confidence intervals:

Spillbay 2, center-deep, 12/108 Tau	Spillbay 2, off-center-deep, 12/108 Tau
90 percent: (0.9764, 1.0058)	(0.9755, 1.0060)
95 percent: (0.9736, 1.0086)	(0.9726, 1.0089)
99 percent: (0.9681, 1.0141)	(0.9669, 1.0146)

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center and off-center of a deep pipe through Spillbay 2 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 off-center release: 108 released, 106 alive, 2 dead. Spillbay 2 center release: 110 released, 108 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9818 (0.0127) Spillbay 2, center-deep, 12/108 survival
S3 = 0.9815 (0.0130) Spillbay 2, off-center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -59.6421

Tau = 0.9911 (0.0133) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9907 (0.0136) Spillbay 2, off-center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.0179

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00016228	0.00000000
0.00000000	0.00000000	0.00000000	0.00016829

Confidence intervals:

Spillbay 2, center-deep, 12/108	Tau	Spillbay 2, off-center-deep, 12/108	Tau
90 percent:	(0.9691, 1.0130)	(0.9684, 1.0130)	
95 percent:	(0.9649, 1.0172)	(0.9642, 1.0173)	
99 percent:	(0.9567, 1.0254)	(0.9558, 1.0256)	

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center and off-center of a deep pipe through Spillbay 2 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 741 alive, 9 dead. Spillbay 2 off-center release: 108 released, 106 alive, 2 dead.

Spillbay 2 center release: 110 released, 107 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S1 =	0.9880	(+NAN)	Control group survival
Pa =	1.0	N/A	Live recovery probability*
Pd =	1.0	N/A	Dead recovery probability*
S2 =	0.9727	(0.0155)	Spillbay 2, center-deep, 12/108 survival
S3 =	0.9815	(0.0130)	Spillbay 2, off-center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -72.4752

Tau = 0.9845 (0.0104) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9934 (0.0055) Spillbay 2, off-center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.7549

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00014056	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00024117	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00016829

Confidence intervals:

Spillbay 2, center-deep, 12/108 Tau	Spillbay 2, off-center-deep, 12/108 Tau
90 percent: (0.9675, 1.0016)	(0.9843, 1.0025)
95 percent: (0.9642, 1.0049)	(0.9826, 1.0042)
99 percent: (0.9578, 1.0112)	(0.9792, 1.0076)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center and off-center of a deep pipe through Spillbay 2 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 741 alive, 9 dead. Spillbay 2 off-center release: 108 released, 106 alive, 2 dead.

Spillbay 2 center release: 110 released, 107 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S1 =	0.9880 (0.0040)		Control group survival
Pa = Pd	1.0	N/A	Recovery probability*
S2 =	0.9727 (0.0155)		Spillbay 2, center-deep, 12/108 survival
S3 =	0.9815 (0.0130)		Spillbay 2, off-center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -72.4751

Tau = 0.9845 (0.0162) Spillbay 2, center-deep, 12/108 /Control ratio

Tau = 0.9934 (0.0137) Spillbay 2, off-center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.4172

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00024117	0.00000000
0.00000000	0.00000000	0.00000000	0.00016829

Confidence intervals:

Spillbay 2, center-deep, 12/108 Tau	Spillbay 2, off-center-deep, 12/108 Tau
90 percent: (0.9579, 1.0112)	(0.9708, 1.0160)
95 percent: (0.9528, 1.0163)	(0.9665, 1.0203)
99 percent: (0.9428, 1.0263)	(0.9581, 1.0287)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 110 released, 108 alive, 2 dead. Spillbay 4 test release: 160 released, 157 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.9167 (0.0798) Dead recovery probability
S2 = 0.9818 (0.0127) Spillbay 2, center-deep, 12/108 survival
S3 = 0.9813 (0.0107) Spillbay 4, center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -68.0262

Tau = 0.9911 (0.0133) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9905 (0.0114) Spillbay 4, center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.0327

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00636574	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00016228	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00011499

Confidence intervals:

Spillbay 2, center-deep, 12/108	Tau	Spillbay 4, center-deep, 12/108	Tau
90 percent:	(0.9691, 1.0130)	(0.9718, 1.0092)	
95 percent:	(0.9649, 1.0172)	(0.9682, 1.0128)	
99 percent:	(0.9567, 1.0254)	(0.9612, 1.0198)	

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 110 released, 108 alive, 2 dead. Spillbay 4 test release: 160 released, 157 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 0.9990 (0.0010) Recovery probability
S2 = 0.9818 (0.0127) Spillbay 2, center-deep, 12/108 survival
S3 = 0.9874 (0.0088) Spillbay 4, center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -68.3487

Tau = 0.9911 (0.0133) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9967 (0.0096) Spillbay 4, center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.3444

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000096	0.00000000	0.00000000
0.00000000	0.00000000	0.00016228	0.00000000
0.00000000	0.00000000	0.00000000	0.00007812

Confidence intervals:

Spillbay 2, center-deep, 12/108	Tau	Spillbay 4, center-deep, 12/108	Tau
90 percent:	(0.9691, 1.0130)	(0.9809, 1.0125)	
95 percent:	(0.9649, 1.0172)	(0.9779, 1.0155)	
99 percent:	(0.9567, 1.0254)	(0.9720, 1.0214)	

Likelihood ratio statistic for equality of recovery probabilities: 0.6451

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 110 released, 107 alive, 3 dead. Spillbay 4 test release: 160 released, 157 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

	estim.	std. err.	
S1 =	0.9880	(0.0040)	Control group survival
Pa =	1.0	N/A	Live recovery probability*
Pd =	0.9333	(0.0644)	Dead recovery probability
S2 =	0.9727	(0.0155)	Spillbay 2, center-deep, 12/108 survival
S3 =	0.9812	(0.0107)	Spillbay 4, center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -81.0911

Tau = 0.9845 (0.0162) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9932 (0.0116) Spillbay 4, center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.4332

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00414818	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00024117	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00011499

Confidence intervals:

	Spillbay 2, center-deep, 12/108 Tau	Spillbay 4, center-deep, 12/108 Tau
90 percent:	(0.9579, 1.0112)	(0.9741, 1.0122)
95 percent:	(0.9528, 1.0163)	(0.9705, 1.0158)
99 percent:	(0.9428, 1.0263)	(0.9634, 1.0230)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 110 released, 107 alive, 3 dead. Spillbay 4 test release: 160 released, 157 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 0.9990 (0.0010) Recovery probability
S2 = 0.9727 (0.0155) Spillbay 2, center-deep, 12/108 survival
S3 = 0.9874 (0.0088) Spillbay 4, center-deep, 12/108 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -81.1817

Tau = 0.9845 (0.0162) Spillbay 2, center-deep, 12/108 /Control ratio
Tau = 0.9994 (0.0098) Spillbay 4, center-deep, 12/108 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.7850

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000096	0.00000000	0.00000000
0.00000000	0.00000000	0.00024117	0.00000000
0.00000000	0.00000000	0.00000000	0.00007812

Confidence intervals:

Spillbay 2, center-deep, 12/108	Tau	Spillbay 4, center-deep, 12/108	Tau
90 percent:	(0.9579, 1.0112)	(0.9833, 1.0155)	
95 percent:	(0.9528, 1.0163)	(0.9802, 1.0186)	
99 percent:	(0.9428, 1.0263)	(0.9742, 1.0247)	

Likelihood ratio statistic for equality of recovery probabilities: 0.1812

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released off-center of shallow and deep pipes through Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003.
Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 150 released, 150 alive, 0 dead.
Spillbay 2 shallow test release: 150 released, 146 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

stim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.9091 (0.0867) Dead recovery probability
S2 = 1.0 N/A Spillbay 2, off-center-deep, 18/102 survival*
S3 = 0.9733 (0.0132) Spillbay 2, off-center-shallow, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -61.4810

Tau = 1.0094 (+NAN) Spillbay 2, off-center-deep, 18/102 /Control ratio
Tau = 0.9825 (0.0096) Spillbay 2, off-center-shallow, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00751320	0.00000000	0.00000002
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000002	0.00000000	0.00017304

Confidence intervals:

	Spillbay 2, off-center-deep, 18/102 Tau	Spillbay 2, off-center-shallow, 18/102 Tau
90 percent:	(+NAN, +NAN)	(0.9667, 0.9983)
95 percent:	(+NAN, +NAN)	(0.9637, 1.0013)
99 percent:	(+NAN, +NAN)	(0.9578, 1.0072)

Appendix D

One hour survival estimates for juvenile chinook salmon released off-center of shallow and deep pipes through Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003.

Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 150 released, 150 alive, 0 dead.

Spillbay 2 shallow test release: 150 released, 146 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 0.9990 (0.0010) Recovery probability
S2 = 1.0 N/A Spillbay 2, off-center-deep, 18/102 survival*
S3 = 0.9799 (0.0115) Spillbay 2, off-center-shallow, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -62.3280

Tau = 1.0094 (0.0036) Spillbay 2, off-center-deep, 18/102 /Control ratio

Tau = 0.9891 (0.0121) Spillbay 2, off-center-shallow, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.6067

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000091	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00013241

Confidence intervals:

Spillbay 2, off-center-deep, 18/102 Tau	Spillbay 2, off-center-shallow, 18/102 Tau
90 percent: (1.0035, 1.0153)	(0.9691, 1.0091)
95 percent: (1.0024, 1.0164)	(0.9653, 1.0129)
99 percent: (1.0002, 1.0186)	(0.9579, 1.0203)

Likelihood ratio statistic for equality of recovery probabilities: 1.6941

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released off-center of deep and shallow pipes through Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 150 released, 147 alive, 3 dead. Spillbay 2 shallow test release: 150 released, 144 alive, 5 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.9444 (0.0540) Dead recovery probability
S2 = 0.9800 (0.0114) Spillbay 2,off-center-deep, 18/102 survival
S3 = 0.9600 (0.0160) Spillbay 2,off-center-shallow, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -92.5110

Tau = 0.9919 (0.0122) Spillbay 2,off-center-deep, 18/102 /Control ratio
Tau = 0.9717 (0.0167) Spillbay 2,off-center-shallow, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.9792

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00291495	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00013067	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00025600

Confidence intervals:

	Spillbay 2,off-center-deep, 18/102 Tau	Spillbay 2,off-center-shallow, 18/102 Tau
90 percent:	(0.9718, 1.0120)	(0.9443, 0.9991)
95 percent:	(0.9679, 1.0159)	(0.9390, 1.0043)
99 percent:	(0.9604, 1.0234)	(0.9288, 1.0146)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released off-center of deep and shallow pipes through Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 150 released, 147 alive, 3 dead. Spillbay 2 shallow test release: 150 released, 144 alive, 5 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 0.9990 (0.0010) Recovery probability
S2 = 0.9800 (0.0114) Spillbay 2,off-center-deep, 18/102 survival
S3 = 0.9664 (0.0148) Spillbay 2,off-center-shallow, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -93.3011

Tau = 0.9919 (0.0122) Spillbay 2,off-center-deep, 18/102 /Control ratio
Tau = 0.9782 (0.0154) Spillbay 2,off-center-shallow, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.6964

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000091	0.00000000	0.00000000
0.00000000	0.00000000	0.00013067	0.00000000
0.00000000	0.00000000	0.00000000	0.00021766

Confidence intervals:

Spillbay 2,off-center-deep, 18/102 Tau	Spillbay 2,off-center-shallow, 18/102 Tau
90 percent: (0.9718, 1.0120)	(0.9528, 1.0036)
95 percent: (0.9679, 1.0159)	(0.9479, 1.0084)
99 percent: (0.9604, 1.0234)	(0.9384, 1.0179)

Likelihood ratio statistic for equality of recovery probabilities: 1.5802

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 149 released, 149 alive, 0 dead. Spillbay 4 test release: 200 released, 197 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 1.0 N/A Spillbay 2, center-deep, 18/102 survival*
S3 = 0.9850 (0.0086) Spillbay 4, center-deep, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -55.2630

Tau = 1.0094 (+NAN) Spillbay 2, center-deep, 18/102 /Control ratio
Tau = 0.9943 (+NAN) Spillbay 4, center-deep, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00007388

Confidence intervals:

Spillbay 2, center-deep, 18/102 Tau	Spillbay 4, center-deep, 18/102 Tau
90 percent: (+NAN, +NAN)	(+NAN, +NAN)
95 percent: (+NAN, +NAN)	(+NAN, +NAN)
99 percent: (+NAN, +NAN)	(+NAN, +NAN)

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003.
Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 149 released, 149 alive, 0 dead.
Spillbay 4 test release: 200 released, 197 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

 estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 1.0 N/A Spillbay 2, center-deep, 18/102 survival*
S3 = 0.9850 (0.0086) Spillbay 4, center-deep, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -55.2629

Tau = 1.0094 (0.0036) Spillbay 2, center-deep, 18/102 /Control ratio
Tau = 0.9943 (0.0094) Spillbay 4, center-deep, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.5098

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001234	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00007385

Confidence intervals:

	Spillbay 2, center-deep, 18/102 Tau	Spillbay 4, center-deep, 18/102 Tau
90 percent:	(1.0035, 1.0153)	(0.9789, 1.0097)
95 percent:	(1.0024, 1.0164)	(0.9759, 1.0126)
99 percent:	(1.0002, 1.0186)	(0.9702, 1.0184)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0001

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 149 released, 149 alive, 0 dead. Spillbay 4 test release: 200 released, 197 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 1.0 N/A Spillbay 2, center-deep, 18/102 survival*
S3 = 0.9850 (0.0086) Spillbay 4, center-deep, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -64.3280

Tau = 1.0121 (+NAN) Spillbay 2, center-deep, 18/102 /Control ratio
Tau = 0.9970 (+NAN) Spillbay 4, center-deep, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00014056	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00007388

Confidence intervals:

Spillbay 2, center-deep, 18/102 Tau	Spillbay 4, center-deep, 18/102 Tau
90 percent: (+NAN, +NAN)	(+NAN, +NAN)
95 percent: (+NAN, +NAN)	(+NAN, +NAN)
99 percent: (+NAN, +NAN)	(+NAN, +NAN)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a deep pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 149 released, 149 alive, 0 dead. Spillbay 4 test release: 200 released, 197 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 1.0 N/A Spillbay 2, center-deep, 18/102 survival*
S3 = 0.9850 (0.0086) Spillbay 4, center-deep, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -64.3280

Tau = 1.0121 (0.0041) Spillbay 2, center-deep, 18/102 /Control ratio
Tau = 0.9970 (0.0096) Spillbay 4, center-deep, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.4589

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00007392

Confidence intervals:

Spillbay 2, center-deep, 18/102 Tau	Spillbay 4, center-deep, 18/102 Tau
90 percent: (1.0054, 1.0188)	(0.9812, 1.0127)
95 percent: (1.0042, 1.0201)	(0.9782, 1.0157)
99 percent: (1.0017, 1.0226)	(0.9723, 1.0216)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0001

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a shallow pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 149 released, 147 alive, 2 dead. Spillbay 4 test release: 209 released, 203 alive, 6 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9866 (0.0094) Spillbay 2, center-shallow,18/102 survival
S3 = 0.9713 (0.0116) Spillbay 4, center-shallow,18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -77.5111

Tau = 0.9959 (0.0020) Spillbay 2, center-shallow,18/102 /Control ratio
Tau = 0.9804 (0.0072) Spillbay 4, center-shallow,18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 2.0550

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00008888	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00013342

Confidence intervals:

Spillbay 2, center-shallow,18/102	Tau	Spillbay 4, center-shallow,18/102	Tau
90 percent:	(0.9925, 0.9992)		(0.9686, 0.9923)
95 percent:	(0.9919, 0.9999)		(0.9663, 0.9946)
99 percent:	(0.9906, 1.0011)		(0.9618, 0.9990)

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of a shallow pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 test release: 149 released, 147 alive, 2 dead. Spillbay 4 test release: 209 released, 203 alive, 6 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9866 (0.0094) Spillbay 2, center-shallow,18/102 survival
S3 = 0.9713 (0.0116) Spillbay 4, center-shallow,18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -77.5110

Tau = 0.9959 (0.0101) Spillbay 2, center-shallow,18/102 /Control ratio
Tau = 0.9804 (0.0122) Spillbay 4, center-shallow,18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.9738

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00008888	0.00000000
0.00000000	0.00000000	0.00000000	0.00013342

Confidence intervals:

Spillbay 2, center-shallow,18/102 Tau	Spillbay 4, center-shallow,18/102 Tau
90 percent: (0.9792, 1.0126)	(0.9604, 1.0005)
95 percent: (0.9760, 1.0158)	(0.9566, 1.0043)
99 percent: (0.9697, 1.0220)	(0.9491, 1.0118)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a shallow pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 149 released, 146 alive, 3 dead. Spillbay 4 test release: 209 released, 201 alive, 8 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9799 (0.0115) Spillbay 2, 18/102 survival
S3 = 0.9617 (0.0133) Spillbay 4, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -97.3852

Tau = 0.9918 (+NAN) Spillbay 2, 18/102 /Control ratio
Tau = 0.9734 (0.0066) Spillbay 4, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: +NAN

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00014056	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00013241	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00017614

Confidence intervals:

	Spillbay 2, 18/102 Tau	Spillbay 4, 18/102 Tau
90 percent:	(+NAN, +NAN)	(0.9625, 0.9843)
95 percent:	(+NAN, +NAN)	(0.9604, 0.9864)
99 percent:	(+NAN, +NAN)	(0.9563, 0.9905)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of a shallow pipe through Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 test release: 149 released, 146 alive, 3 dead. Spillbay 4 test release: 209 released, 201 alive, 8 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

 estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9799 (0.0115) Spillbay 2, 18/102 survival
S3 = 0.9617 (0.0133) Spillbay 4, 18/102 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -97.3851

Tau = 0.9918 (0.0123) Spillbay 2, 18/102 /Control ratio
Tau = 0.9734 (0.0140) Spillbay 4, 18/102 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.9853

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00013241	0.00000000
0.00000000	0.00000000	0.00000000	0.00017614

Confidence intervals:

Spillbay 2, 18/102 Tau	Spillbay 4, 18/102 Tau
90 percent: (0.9715, 1.0120)	(0.9504, 0.9964)
95 percent: (0.9676, 1.0159)	(0.9460, 1.0008)
99 percent: (0.9601, 1.0235)	(0.9374, 1.0094)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10:	2.706
For significance level 0.05:	3.841
For significance level 0.01:	6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of shallow and deep pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 100 released, 97 alive, 3 dead. Spillbay 2 shallow test release: 100 released, 97 alive, 1 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.8462 (0.1001) Dead recovery probability
S2 = 0.9700 (0.0171) Spillbay 2, center-deep, 21/98.5 survival
S3 = 0.9700 (0.0171) Spillbay 2, center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -72.2160

Tau = 0.9791 (0.0176) Spillbay 2, center-deep, 21/98.5 /Control ratio
Tau = 0.9791 (0.0176) Spillbay 2, center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.0000

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.01001365	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00029100	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00029100

Confidence intervals:

	Spillbay 2, center-deep, 21/98.5 Tau	Spillbay 2, center-shallow, 21/98.5 Tau
90 percent:	(0.9502, 1.0080)	(0.9502, 1.0080)
95 percent:	(0.9447, 1.0136)	(0.9447, 1.0136)
99 percent:	(0.9339, 1.0244)	(0.9339, 1.0244)

Appendix D

One hour survival estimates for juvenile chinook salmon released at the center of shallow and deep pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 100 released, 97 alive, 3 dead. Spillbay 2 shallow test release: 100 released, 97 alive, 1 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 0.9979 (0.0015) Recovery probability
S2 = 0.9700 (0.0171) Spillbay 2, center-deep, 21/98.5 survival
S3 = 0.9898 (0.0102) Spillbay 2, center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -73.0650

Tau = 0.9791 (0.0176) Spillbay 2, center-deep, 21/98.5 /Control ratio
Tau = 0.9991 (0.0108) Spillbay 2, center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.9680

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000221	0.00000000	0.00000000
0.00000000	0.00000000	0.00029100	0.00000000
0.00000000	0.00000000	0.00000000	0.00010306

Confidence intervals:

Spillbay 2, center-deep, 21/98.5 Tau	Spillbay 2, center-shallow, 21/98.5 Tau
90 percent: (0.9502, 1.0080)	(0.9813, 1.0170)
95 percent: (0.9447, 1.0136)	(0.9779, 1.0204)
99 percent: (0.9339, 1.0244)	(0.9712, 1.0270)

Likelihood ratio statistic for equality of recovery probabilities: 1.6979

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of deep and shallow pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 100 released, 97 alive, 3 dead. Spillbay 2 shallow test release: 100 released, 94 alive, 4 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 0.8889 (0.0741) Dead recovery probability
S2 = 0.9700 (0.0171) Spillbay 2, center-deep, 21/98.5 survival
S3 = 0.9400 (0.0237) Spillbay 2, center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -91.2014

Tau = 0.9818 (0.0177) Spillbay 2, center-deep, 21/98.5 /Control ratio
Tau = 0.9514 (0.0243) Spillbay 2, center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.0087

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00548697	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00029100	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00056400

Confidence intervals:

	Spillbay 2, center-deep, 21/98.5 Tau	Spillbay 2, center-shallow, 21/98.5 Tau
90 percent:	(0.9526, 1.0109)	(0.9114, 0.9915)
95 percent:	(0.9471, 1.0165)	(0.9037, 0.9991)
99 percent:	(0.9362, 1.0274)	(0.8887, 1.0141)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released at the center of deep and shallow pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 100 released, 97 alive, 3 dead. Spillbay 2 shallow test release: 100 released, 94 alive, 4 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 0.9979 (0.0015) Recovery probability
S2 = 0.9700 (0.0171) Spillbay 2, center-deep, 21/98.5 survival
S3 = 0.9592 (0.0200) Spillbay 2, center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -93.2621

Tau = 0.9818 (0.0177) Spillbay 2, center-deep, 21/98.5 /Control ratio
Tau = 0.9708 (0.0206) Spillbay 2, center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 0.4029

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000221	0.00000000	0.00000000
0.00000000	0.00000000	0.00029100	0.00000000
0.00000000	0.00000000	0.00000000	0.00039949

Confidence intervals:

Spillbay 2, center-deep, 21/98.5 Tau	Spillbay 2, center-shallow, 21/98.5 Tau
90 percent: (0.9526, 1.0109)	(0.9369, 1.0047)
95 percent: (0.9471, 1.0165)	(0.9305, 1.0112)
99 percent: (0.9362, 1.0274)	(0.9178, 1.0239)

Likelihood ratio statistic for equality of recovery probabilities: 4.1214

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

One hour survival estimates for juvenile chinook salmon released off-center of shallow and deep pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 100 released, 95 alive, 5 dead. Spillbay 2 shallow test release: 100 released, 98 alive, 2 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9500 (0.0218) Spillbay 2, off-center-deep, 21/98.5 survival
S3 = 0.9800 (0.0140) Spillbay 2, off-center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -69.3419

Tau = 0.9590 (0.0201) Spillbay 2, off-center-deep, 21/98.5 /Control ratio
Tau = 0.9892 (0.0107) Spillbay 2, off-center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.3301

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00008549	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00047500	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00019600

Confidence intervals:

	Spillbay 2, off-center-deep, 21/98.5 Tau	Spillbay 2, off-center-shallow, 21/98.5 Tau
90 percent:	(0.9259, 0.9920)	(0.9716, 1.0068)
95 percent:	(0.9196, 0.9983)	(0.9683, 1.0102)
99 percent:	(0.9072, 1.0107)	(0.9617, 1.0168)

Appendix D

One hour survival estimates for juvenile chinook salmon released off-center of shallow and deep pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 743 alive, 7 dead. Spillbay 2 deep test release: 100 released, 95 alive, 5 dead. Spillbay 2 shallow test release: 100 released, 98 alive, 2 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9907 (0.0035) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9500 (0.0218) Spillbay 2, off-center-deep, 21/98.5 survival
S3 = 0.9800 (0.0140) Spillbay 2, off-center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -69.3418

Tau = 0.9590 (0.0223) Spillbay 2, off-center-deep, 21/98.5 /Control ratio
Tau = 0.9892 (0.0146) Spillbay 2, off-center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.1385

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001233	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00047500	0.00000000
0.00000000	0.00000000	0.00000000	0.00019600

Confidence intervals:

Spillbay 2, off-center-deep, 21/98.5 Tau	Spillbay 2, off-center-shallow, 21/98.5 Tau
90 percent: (0.9223, 0.9956)	(0.9653, 1.0132)
95 percent: (0.9153, 1.0026)	(0.9607, 1.0178)
99 percent: (0.9016, 1.0163)	(0.9517, 1.0267)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released off-center of deep and shallow pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 100 released, 92 alive, 8 dead. Spillbay 2 shallow test release: 100 released, 97 alive, 3 dead.

RESULTS FOR FULL MODEL (UNEQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (+NAN) Control group survival
Pa = 1.0 N/A Live recovery probability*
Pd = 1.0 N/A Dead recovery probability*
S2 = 0.9200 (0.0271) Spillbay 2, off-center-deep, 21/98.5 survival
S3 = 0.9700 (0.0171) Spillbay 2, off-center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -90.1027

Tau = 0.9312 (0.0251) Spillbay 2, off-center-deep, 21/98.5 /Control ratio
Tau = 0.9818 (0.0126) Spillbay 2, off-center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.8023

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

-0.00014056	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00073600	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00029100

Confidence intervals:

	Spillbay 2, off-center-deep, 21/98.5 Tau	Spillbay 2, off-center-shallow, 21/98.5 Tau
90 percent:	(0.8899, 0.9724)	(0.9610, 1.0025)
95 percent:	(0.8820, 0.9803)	(0.9570, 1.0065)
99 percent:	(0.8666, 0.9958)	(0.9493, 1.0143)

Appendix D

Forty-eight hour survival estimates for juvenile chinook salmon released off-center of deep and shallow pipes through Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June 2003. Controls: 750 released, 741 alive, 9 dead. Spillbay 2 deep test release: 100 released, 92 alive, 8 dead. Spillbay 2 shallow test release: 100 released, 97 alive, 3 dead.

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std. err.
S1 = 0.9880 (0.0040) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9200 (0.0271) Spillbay 2, off-center-deep, 21/98.5 survival
S3 = 0.9700 (0.0171) Spillbay 2, off-center-shallow, 21/98.5 survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -90.1026

Tau = 0.9312 (0.0277) Spillbay 2, off-center-deep, 21/98.5 /Control ratio
Tau = 0.9818 (0.0177) Spillbay 2, off-center-shallow, 21/98.5 /Control ratio

Z statistic for the equality of equal turbine survivals: 1.5387

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00001581	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00073600	0.00000000
0.00000000	0.00000000	0.00000000	0.00029100

Confidence intervals:

Spillbay 2, off-center-deep, 21/98.5	Tau	Spillbay 2, off-center-shallow, 21/98.5	Tau
90 percent: (0.8856, 0.9768)		(0.9526, 1.0109)	
95 percent: (0.8769, 0.9855)		(0.9471, 1.0165)	
99 percent: (0.8598, 1.0025)		(0.9362, 1.0274)	

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay and off-center through deep pipes at Spillbay 2 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 mid-bay release: 188 examined, 182 without maladies (clean), 6 with maladies. Spillbay 2 off-center release: 181 examined, 166 without maladies (clean), 15 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9681 (0.0128) Spillbay 2, mid-bay deep, 9/113 kcfs without maladies (clean)
S3 = 0.9171 (0.0205) Spillbay 2, off-center deep, 9/113 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -85.8999

Tau = 0.9694 (0.0129) Spillbay 2, mid-bay deep, 9/113 kcfs/Control ratio
Tau = 0.9184 (0.0206) Spillbay 2, off-center deep, 9/113 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 2.1024

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00016434	0.00000000
0.00000000	0.00000000	0.00000000	0.00041992

Confidence intervals:

Spillbay 2, mid-bay deep, 9/113 kcfs Tau	Spillbay 2, off-center deep, 9/113 kcfs Tau
90 percent: (0.9482, 0.9906)	(0.8845, 0.9522)
95 percent: (0.9441, 0.9947)	(0.8781, 0.9587)
99 percent: (0.9362, 1.0026)	(0.8654, 0.9713)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay through deep pipes at Spillbays 2 and 4 at 9 kcfs through the spillbay and 113 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 mid-bay release: 188 examined, 182 without maladies (clean), 6 with maladies. Spillbay 4 mid-bay release: 235 examined, 225 without maladies (clean), 10 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9681 (0.0128) Spillbay 2, mid-bay deep, 9/113 kcfs without maladies (clean)
S3 = 0.9574 (0.0132) Spillbay 4, mid-bay deep, 9/113 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -75.5368

Tau = 0.9694 (0.0129) Spillbay 2, mid-bay deep, 9/113 kcfs/Control ratio
Tau = 0.9587 (0.0132) Spillbay 4, mid-bay deep, 9/113 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 0.5760

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00016434	0.00000000
0.00000000	0.00000000	0.00000000	0.00017337

Confidence intervals:

Spillbay 2, mid-bay deep, 9/113 kcfs Tau	Spillbay 4, mid-bay deep, 9/113 kcfs Tau
90 percent: (0.9482, 0.9906)	(0.9369, 0.9805)
95 percent: (0.9441, 0.9947)	(0.9328, 0.9847)
99 percent: (0.9362, 1.0026)	(0.9246, 0.9928)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay and off-center through deep pipes at Spillbay 2 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 mid-bay release: 110 examined, 103 without maladies (clean), 7 with maladies. Spillbay 2 off-center release: 108 examined, 105 without maladies (clean), 3 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9364 (0.0000) Spillbay 2 mid-bay deep, 12/108 kcfs without maladies (clean)
S3 = 0.9722 (0.0158) Spillbay 2 off-center deep, 12/108 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -47.3743

Tau = 0.9376 (0.0013) Spillbay 2 mid-bay deep, 12/108 kcfs/Control ratio
Tau = 0.9735 (0.0159) Spillbay 2 off-center deep, 12/108 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 2.2528

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	-0.00000037	0.00001408	0.00000000
0.00000000	0.00001408	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00025006

Confidence intervals:

Spillbay 2 mid-bay deep, 12/108 kcfs Tau	Spillbay 2 off-center deep, 12/108 kcfs Tau
90 percent: (0.9355, 0.9397)	(0.9474, 0.9997)
95 percent: (0.9352, 0.9401)	(0.9424, 1.0047)
99 percent: (0.9344, 0.9409)	(0.9326, 1.0144)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay through deep pipes at Spillbays 2 and 4 at 12 kcfs through the spillbay and 108 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 mid-bay release: 110 examined, 103 without maladies (clean), 7 with maladies. Spillbay 4 mid-bay release: 158 examined, 155 without maladies (clean), 3 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9364 (0.0233) Spillbay 2, mid-bay deep, 12/108 kcfs without maladies (clean)
S3 = 0.9810 (0.0000) Spillbay 4, mid-bay deep, 12/108 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -48.5290

Tau = 0.9376 (0.0233) Spillbay 2, mid-bay deep, 12/108 kcfs/Control ratio
Tau = 0.9823 (0.0013) Spillbay 4, mid-bay deep, 12/108 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 1.9125

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	-0.00034502	0.00000000	-0.00020168
0.00000000	0.00000000	0.00054170	0.00000000
0.00000000	-0.00020168	0.00000000	0.00000000

Confidence intervals:

Spillbay 2, mid-bay deep, 12/108 kcfs Tau	Spillbay 4, mid-bay deep, 12/108 kcfs Tau
90 percent: (0.8992, 0.9760)	(0.9802, 0.9845)
95 percent: (0.8919, 0.9834)	(0.9797, 0.9849)
99 percent: (0.8775, 0.9977)	(0.9789, 0.9857)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay through deep and shallow pipes at Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 deep release: 149 examined, 147 without maladies (clean), 2 with maladies. Spillbay 2 shallow release: 148 examined, 144 without maladies (clean), 4 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9866 (0.0094) Spillbay 2, mid-bay deep, 18/102 kcfs without maladies (clean)
S3 = 0.9730 (0.0133) Spillbay 2, mid-bay shallow, 18/102 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -36.6086

Tau = 0.9879 (0.0095) Spillbay 2, mid-bay deep, 18/102 kcfs/Control ratio
Tau = 0.9743 (0.0134) Spillbay 2, mid-bay shallow, 18/102 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 0.8279

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00008888	0.00000000
0.00000000	0.00000000	0.00000000	0.00017768

Confidence intervals:

Spillbay 2, mid-bay deep, 18/102 kcfs Tau	Spillbay 2, mid-bay shallow, 18/102 kcfs Tau
90 percent: (0.9722, 1.0036)	(0.9522, 0.9963)
95 percent: (0.9692, 1.0066)	(0.9480, 1.0006)
99 percent: (0.9634, 1.0125)	(0.9397, 1.0088)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released off-center through deep and shallow pipes at Spillbay 2 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 deep release: 150 examined, 142 without maladies (clean), 8 with maladies. Spillbay 2 shallow release: 148 examined, 143 without maladies (clean), 5 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9467 (0.0183) Spillbay 2, off-center deep, 18/102 kcfs without maladies (clean)
S3 = 0.9662 (0.0149) Spillbay 2, off-center shallow, 18/102 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -60.6971

Tau = 0.9479 (0.0184) Spillbay 2, off-center deep, 18/102 kcfs/Control ratio
Tau = 0.9675 (0.0149) Spillbay 2, off-center shallow, 18/102 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean)s: 0.8258

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00033659	0.00000000
0.00000000	0.00000000	0.00000000	0.00022056

Confidence intervals:

Spillbay 2, off-center deep, 18/102 kcfs Tau	Spillbay 2, off-center shallow, 18/102 kcfs Tau
90 percent: (0.9176, 0.9782)	(0.9430, 0.9921)
95 percent: (0.9118, 0.9840)	(0.9383, 0.9968)
99 percent: (0.9005, 0.9954)	(0.9291, 1.0060)

Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released off-center through deep and shallow pipes at Spillbay 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 4 deep release: 200 examined, 194 without maladies (clean), 6 with maladies. Spillbay 4 shallow release: 205 examined, 196 without maladies (clean), 9 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9700 (0.0121) Spillbay 4, mid-bay deep, 18/102 kcfs without maladies (clean)
S3 = 0.9561 (0.0143) Spillbay 4, mid-bay shallow, 18/102 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -71.4914

Tau = 0.9713 (0.0121) Spillbay 4, mid-bay deep, 18/102 kcfs/Control ratio
Tau = 0.9574 (0.0144) Spillbay 4, mid-bay shallow, 18/102 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 0.7393

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00014550	0.00000000
0.00000000	0.00000000	0.00000000	0.00020476

Confidence intervals:

Spillbay 4, mid-bay deep, 18/102 kcfs Tau	Spillbay 4, mid-bay shallow, 18/102 kcfs Tau
90 percent: (0.9513, 0.9913)	(0.9337, 0.9810)
95 percent: (0.9475, 0.9951)	(0.9292, 0.9856)
99 percent: (0.9400, 1.0026)	(0.9203, 0.9944)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released mid-bay through deep pipes at Spillbays 2 and 4 at 18 kcfs through the spillbay and 102 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 release: 149 examined, 147 without maladies (clean), 2 with maladies. Spillbay 4 release: 200 examined, 194 without maladies (clean), 6 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group survival
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9866 (0.0094) Spillbay 2, mid-bay deep, 18/102 kcfs survival
S3 = 0.9700 (0.0121) Spillbay 4, mid-bay deep, 18/102 kcfs survival

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -45.1679

Tau = 0.9879 (0.0095) Spillbay 2, mid-bay deep, 18/102 kcfs/Control ratio
Tau = 0.9713 (0.0121) Spillbay 4, mid-bay deep, 18/102 kcfs/Control ratio

Z statistic for the equality of equal turbine survivals: 1.0749

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00008888	0.00000000
0.00000000	0.00000000	0.00000000	0.00014550

Confidence intervals:

Spillbay 2, mid-bay deep, 18/102 kcfs Tau	Spillbay 4, mid-bay deep, 18/102 kcfs Tau
90 percent: (0.9722, 1.0036)	(0.9513, 0.9913)
95 percent: (0.9692, 1.0066)	(0.9475, 0.9951)
99 percent: (0.9634, 1.0125)	(0.9400, 1.0026)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Clean fish rates for juvenile chinook salmon released off-center through a deep and shallow pipes at Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 deep release: 100 examined, 83 without maladies (clean), 17 with maladies. Spillbay 2 shallow release: 100 examined, 95 without maladies (clean), 5 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.8300 (0.0376) Spillbay 2, deep off-center, 21/98.5 kcfs without maladies (clean)
S3 = 0.9500 (0.0218) Spillbay 2, shallow off-center, 21/98.5 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -73.0515

Tau = 0.8311 (0.0376) Spillbay 2, deep off-center, 21/98.5 kcfs/Control ratio
Tau = 0.9513 (0.0219) Spillbay 2, shallow off-center, 21/98.5 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 2.7611

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00141100	0.00000000
0.00000000	0.00000000	0.00000000	0.00047500

Confidence intervals:

Spillbay 2, deep off-center, 21/98.5 kcfs Tau	Spillbay 2, shallow off-center, 21/98.5 kcfs Tau
90 percent: (0.7692, 0.8930)	(0.9153, 0.9872)
95 percent: (0.7574, 0.9049)	(0.9084, 0.9941)
99 percent: (0.7342, 0.9280)	(0.8950, 1.0076)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635

Appendix D

Spillbay 2 at 21 kcfs through the spillbay and 98.5 kcfs total spill at the Dalles Dam, May-June, 2003. Controls: 744 examined, 743 without maladies (clean), 1 with maladies. Spillbay 2 mid-bay release: 100 examined, 90 without maladies (clean), 10 with maladies. Spillbay 2 shallow release: 100 examined, 83 without maladies (clean), 17 with maladies. (Values from Table 3-9.)

RESULTS FOR REDUCED MODEL (EQUAL LIVE/DEAD RECOVERY)

estim. std.err.
S1 = 0.9987 (0.0013) Control group without maladies (clean)
Pa = Pd 1.0 N/A Recovery probability*
S2 = 0.9000 (0.0300) Spillbay 2, mid-bay deep, 21/98.5 kcfs without maladies (clean)
S3 = 0.8300 (0.0376) Spillbay 2, off-center deep, 21/98.5 kcfs without maladies (clean)

* -- Because of constraints in the data set, this probability is assumed equal to 1.0; not estimated.

log-likelihood : -85.7083

Tau = 0.9012 (0.0301) Spillbay 2, mid-bay deep, 21/98.5 kcfs/Control ratio
Tau = 0.8311 (0.0376) Spillbay 2, off-center deep, 21/98.5 kcfs/Control ratio

Z statistic for the equality of equal rates without maladies (clean): 1.4553

Compare with quantiles of the normal distribution:

	1-tailed	2-tailed
For significance level 0.10:	1.2816	1.6449
For significance level 0.05:	1.6449	1.9600
For significance level 0.01:	2.3263	2.5758

Variance-Covariance matrix for estimated probabilities:

0.00000180	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00090000	0.00000000
0.00000000	0.00000000	0.00000000	0.00141101

Confidence intervals:

Spillbay 2, mid-bay deep, 21/98.5 kcfs Tau	Spillbay 2, off-center deep, 21/98.5 kcfs Tau
90 percent: (0.8518, 0.9507)	(0.7692, 0.8930)
95 percent: (0.8423, 0.9601)	(0.7574, 0.9049)
99 percent: (0.8238, 0.9786)	(0.7342, 0.9280)

=====
Likelihood ratio statistic for equality of recovery probabilities: -0.0002

Compare with quantiles of the chi-squared distribution with 1 d.f.:

For significance level 0.10: 2.706
For significance level 0.05: 3.841
For significance level 0.01: 6.635
