Lower Snake River Compensation Plan
Confederated Tribes of the Umatilla Indian Reservation
Evaluation Studies for 1 January to 31 December 1995

Section I
Evaluation of Reestablishing Natural Production of Spring Chinook Salmon in Lookingglass Creek, Oregon, Using a Non-endemic Hatchery Stock

Section II
Assistance Provided to LSRCP Cooperators and Other Projects

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SECTION I

Evaluation of Reestablishing Natural Production of Spring Chinook Salmon in Lookingglass Creek, Oregon, Using a Non-endemic Hatchery Stock

Abstract

This was the fourth year of evaluating the reestablishment of natural production of spring Chinook salmon in Lookingglass Creek using the non-endemic Rapid River Hatchery stock. We did not release any of the 211 spring Chinook salmon that returned to Lookingglass Hatchery in 1995 above the hatchery weir because of concern for disease transmission to juvenile salmon rearing in the hatchery. Multiple spawning ground surveys were conducted to document escapement above or below the weir. We observed two completed redds during these surveys above the weir and 3 completed redds below the weir.

Most juvenile spring Chinook salmon from the 1993 cohort migrated past the trapping location in Lookingglass Creek as subyearlings which was similar to that observed for the 1965 to 1969 cohorts. Movement patterns of the 1993 cohort peaked during the January to May and October trapping periods. The first peak was most similar to the 1965 cohort June trapping period. The fall peak for the 1993 cohort was two to three months later than that of all of the fall peaks of the 1965 to 1969 cohorts.

We PIT-tagged three groups of naturally-produced juvenile spring Chinook salmon from the 1992 cohort, November through December, in 1993, at the rotary screw trap (T2), January through June 1994, at the rotary screw trap (T3), and from the creek above the rotary screw trap during one week in September (F1) of 1993 to determine differences in arrival timing at Lower Granite Dam. All of the groups PIT-tagged from the 1992 cohort arrived at Lower Granite Dam about the same time. Arrival timing peaked on the weeks ending 22 or 29 April, 1994, with median arrival dates of 23 to 25 April.

For the 1993 cohort we were able to PIT tag an additional group from the rotary screw trap from July though September (T1) in 1994. The T2 and T3 groups for the 1993 cohort arrived at Lower Granite Dam later than the other two groups, with multiple peaks during the weeks of 15 April, 6 May (T3), and 13 May (T2) and median arrival dates of 17 April (T2) and 25 April (T3). Groups T1 and F1, both had peak arrival during the week of 15 April with median arrival dates of 14 and 15 April respectively.

To determine if the fork length of fish at the time of PIT-tagging influenced the arrival timing at Lower Granite Dam, we split the F1 group into two categories, small fish (F1S) with fork lengths that were less than or equal to the median fork length of fish that were detected from F1, and large fish (F1L) with fork lengths greater than the median fork length. We found no significant difference in arrival timing between F1S and F1L for both the 1992 ($\alpha \leq 0.05$) and 1993 ($\alpha \leq 0.05$) cohorts. Minimum survival rates, using first time PIT tag detections at Snake and Columbia River dams, were calculated for the T1, T2, T3, and F1 groups of the 1993 cohort. Minimum survival rates for T1, T2, T3, were 11.2, 13.0 and 37.5%, respectively. The minimum survival rate of F1 was 12.5%. A minimum survival rate by month of PIT-tagging from July

1994 through July 1995 increased from 19.7 to 42.1% for months with sample sizes greater than 50 fish.

To determine if minimum survival rates differed among fish of different fork lengths, we divided the F1 group into multiple fork length ranges (62-72, 73-77, 78-82, 83-87, 88-92, 93-97, and 98-107 mm). The lack of any significant differences of the individual size ranges from the expected survival of the F1 group as a whole, suggested that the fork length of the fish at PIT-tagging had no effect on survival for either the 1992 cohort ($\alpha \leq 0.05$) or the 1993 cohort ($\alpha \leq 0.05$).

We investigated the use of Passive Integrated Transponder tags in adult steelhead trout to determine potential feasibility of using these tags to identify adult spring Chinook salmon during their time at Lookingglass Hatchery or recovery in Lookingglass Creek. Preliminary tests suggested that the two subdermal tagging sites, near the dorsal fin and near the operculum, both allowed easy identification of adult fish at both the PIT tag insertion site although tag retention was only 80 and 90% respectively. Time required to retrieve the tags was generally less than 1 minute and appeared to have been cost effective.

Introduction

The Grande Ronde River Basin historically supported large populations of fall and spring Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*) and coho (*O. kisutch*) salmon and steelhead (*O. mykiss*) (Nehlsen et al. 1991). Dwindling Chinook salmon and steelhead trout populations and extirpated coho and sockeye salmon populations in the Grande Ronde River Basin were, in part, a result of construction and operation of hydroelectric facilities, over fishing, and loss and degradation of critical spawning and rearing habitat in the Columbia and Snake River basins (Nehlsen et al. 1991).

Hatcheries were built in Oregon, Washington and Idaho under the Lower Snake River Compensation Plan (LSRCP) to compensate for losses of anadromous salmonids due to the construction and operation of the lower four Snake River dams. Lookingglass Hatchery, on Lookingglass Creek, a tributary of the Grande Ronde River, was completed under the LSRCP in 1982 and has served as the main incubation and rearing site for the spring Chinook salmon programs for the Grande Ronde and Imnaha rivers in Oregon. As declines of Chinook salmon in the Snake River Basin continued, on 22 April, 1992, the National Marine Fisheries Service (NMFS) listed fall Chinook salmon as "endangered" and spring/summer Chinook salmon as "threatened" under the federal Endangered Species Act of 1973.

This study was developed under the LSRCP by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and the Oregon Department of Fish and Wildlife (ODFW) in consultation with the Nez Perce Tribe to evaluate the potential for reestablishing natural production in Lookingglass Creek using hatchery spring Chinook salmon (Lofy et al. 1994). Fishery managers believed that Lookingglass Creek was a good location to evaluate reintroduction of a non-endemic stock in the Grande Ronde River Basin for two reasons. First, it was assumed that the relatively good quality habitat in Lookingglass Creek would provide an adequate opportunity for success, and second, the existence of a weir at Lookingglass Hatchery would provide the ability to easily control and enumerate an adult escapement.

Until this study was initiated in 1992, no adult spring Chinook salmon captured at the Lookingglass Hatchery weir were placed upstream of the hatchery, with the exception of a few fish released 1989. The upstream migration has been almost completely blocked by a picket weir located at the hatchery intake (Figure 1). Some fish escaped above the weir each year, as evidenced by redd counts during annual spawning surveys (ODFW, unpublished data). From 1992 to 1994, adults were placed above Lookingglass Hatchery.

Using historical data collected from the now extinct Lookingglass Creek endemic stock, and data collected during this study from the Rapid River stock, we will compare the life history and natural production between the two stocks. In addition, we will compare performance of the Rapid River stock to that of other stocks in the Columbia and Snake river basins. These comparisons will allow us to evaluate the success of the reintroduction effort.

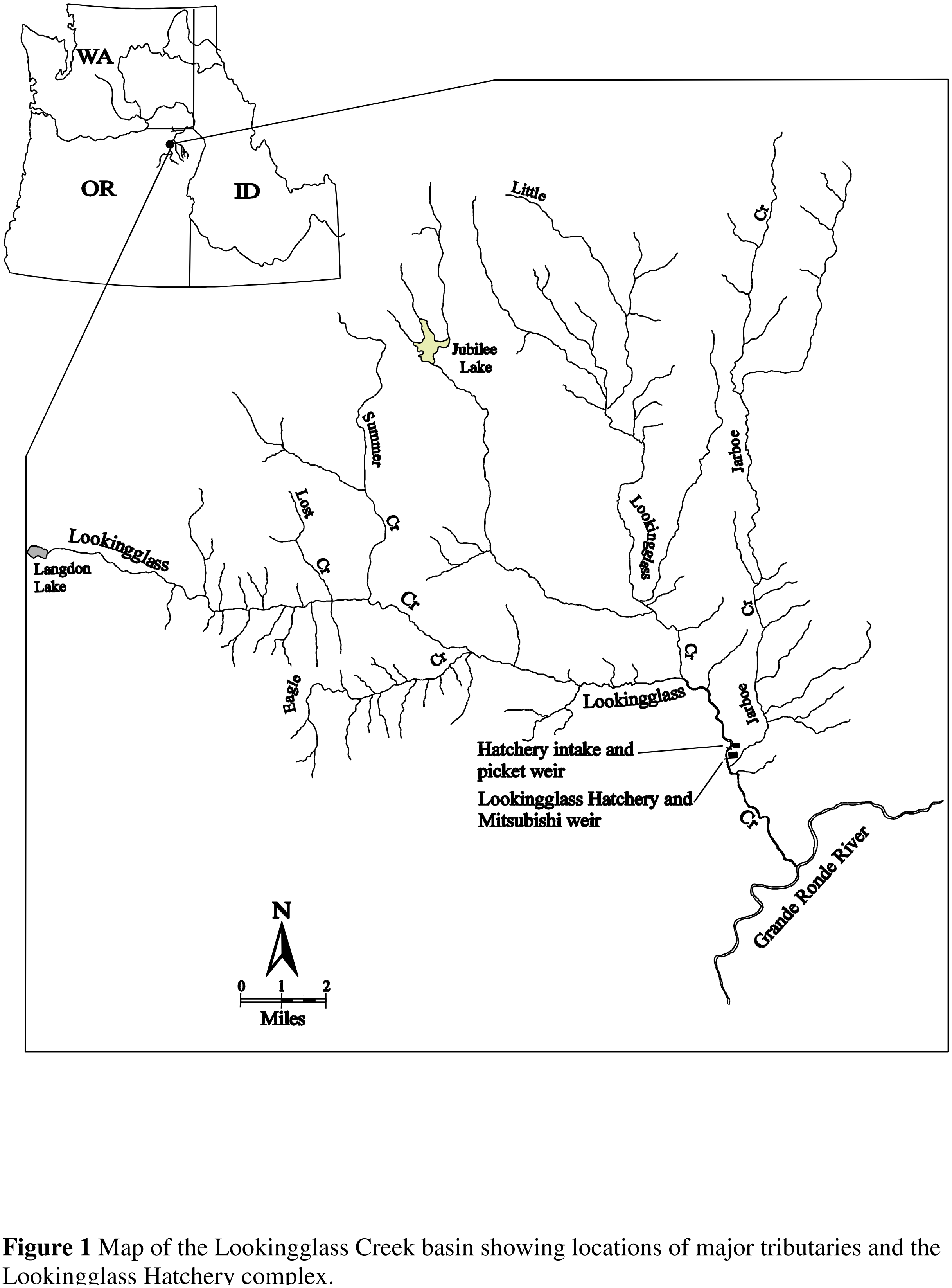

Figure 1 Map of the Lookingglass Creek basin showing locations of major tributaries and the Lookingglass Hatchery complex.

Study Area

The headwaters of Lookingglass Creek are located in the Blue Mountains of northeast Oregon at Langdon Lake (Figure 1), elevation 4,870 feet above mean sea level. Lookingglass Creek flows to the southeast approximately 15 river miles (rm) through the Umatilla National Forest then through private land where it enters at approximately rm 85 of the Grande Ronde River at an elevation about 2,700 feet above mean sea level. Lookingglass Creek has three major tributaries, Eagle Creek (about rm 8.25), Little Lookingglass Creek (just below rm 4.00), and Jarboe Creek (just below rm 2.25).

Compared to other non-wilderness subbasins in the Grande Ronde River Basin, the habitat in the Lookingglass Creek basin has remained relatively undisturbed with small scale logging and grazing occurring in the upper reaches of the system. Clear cutting and recreational development occurred in the upper Lookingglass Creek and Little Lookingglass Creek basins from 1964 to 1974 (Burck 1993). Most of the recent small-scale logging and grazing occurred on the private land from about rm 7.50 of Lookingglass Creek to the mouth. In the spring of 1994, an existing road was widened. A hangar and short dirt airstrip, from about rm 4.75 to rm 5.50, were constructed. A few trees along the existing road were cut when the airstrip was constructed, but the areas near the stream were generally not disturbed.

Lookingglass Creek is the location of Lookingglass Hatchery, which has been the spring Chinook salmon production facility for the Grande Ronde and Imnaha river programs (Figure 1). The hatchery intake and picket weir are located at about rm 2.50. The Lookingglass Hatchery complex and Mitsubishi weir are located at about rm 2.25.

During the previous evaluation of spring Chinook salmon production in the Lookingglass Creek basin (Burck 1993), Lookingglass Creek and Little Lookingglass Creek were divided into four geographic units (Figure 2). Unit 1 extended from the mouth of Lookingglass Creek to Lookingglass Falls (site of the Lookingglass Hatchery intake) at rm 2.25 (which is now the location of the hatchery water intake building). Unit 2 extended from the falls to the mouth of Little Lookingglass Creek (the largest tributary). Unit 3 extended from the mouth of Little Lookingglass Creek to just above the mouth of Lost Creek. Unit 4 in Little Lookingglass Creek, started at the mouth and extended upstream to about rm 3.50 (Figure 2). We used these same units and landmarks in this study, but we divided Unit 3 into upper and lower sections (3U and 3L) to break up the length of the spawning ground survey unit.

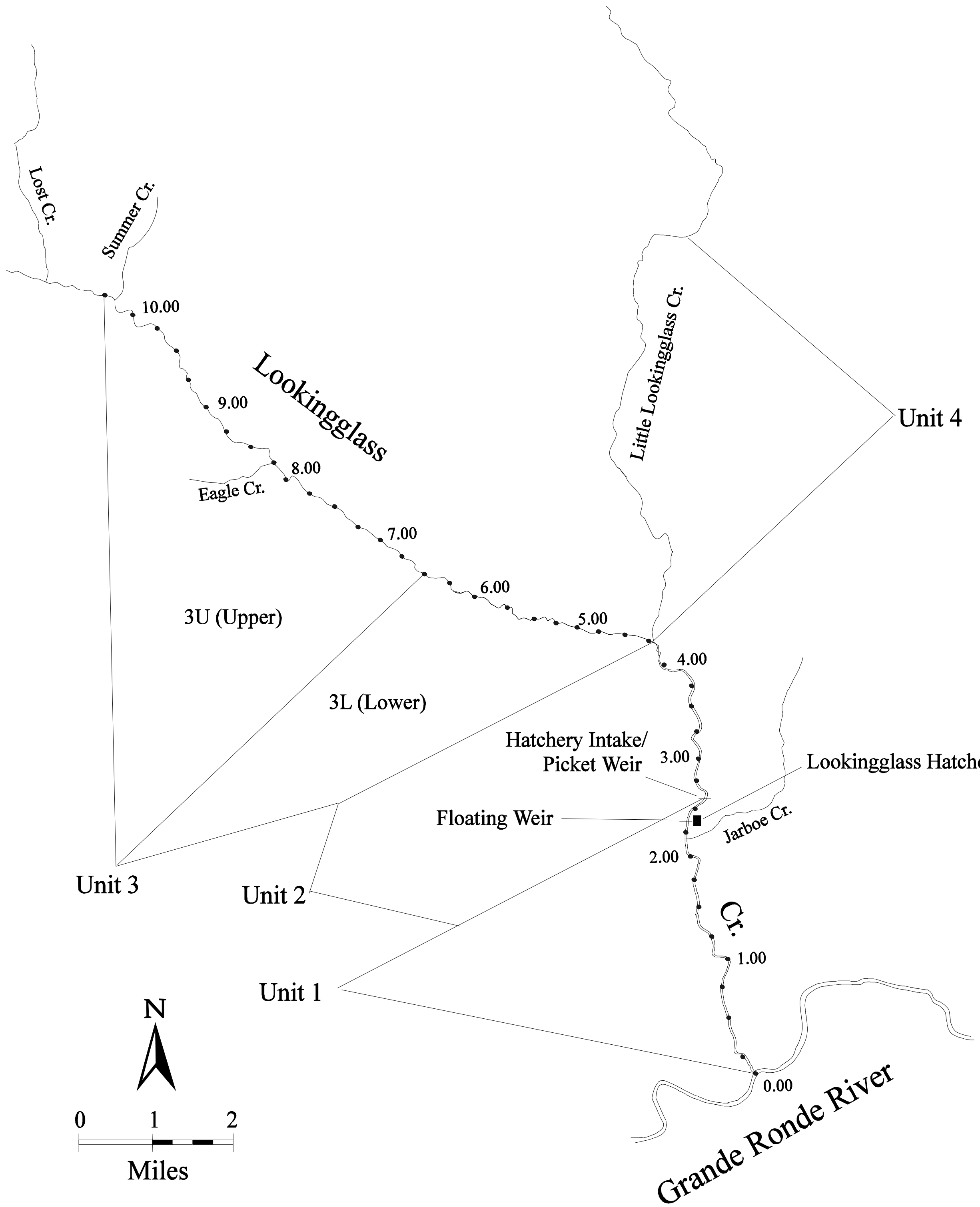

Figure 2 Locations of units and 0.25-river mile sections in Lookingglass Creek.

Methods

Stream Flow and Temperature

During the previous study (Burck 1993) data were collected to document and describe the Lookingglass Creek basin stream flow and water temperature regimes. During this study we also collect stream flow and water temperature data to document changes in the environment that may have occurred over time.

Mean daily stream flows in Lookingglass Creek for 1995 were obtained from the United States Geological Survey (USGS) (personal communication, Jo Miller, USGS, Walla Walla, unpublished data) for comparison to flows recorded from 1964 to 1971 (Burck 1993, summarized in M^{c}Lean and Lofy 1995). Stream flows in 1995 were estimated every 0.5 hours at an electronic stream gauging station operated by the USGS. Maximum and minimum mean flows were summarized for the week using methods described in M^{c}Lean and Lofy (1995).

The daily ranges of water temperatures for 1995 were obtained from unpublished summaries from the United States Forest Service (USFS) (personal communication, Scott Wallace, USFS, Walla Walla District, unpublished data), ODFW (personal communication, Debbie Eddy, Portland, Hatchery Management Information System), and from two electronic thermographs (Ryan Tempmentor® 2000) operated by CTUIR. Water temperature data were collected for comparison to the range of water temperatures recorded in Lookingglass Creek from 1964 to 1971 (Burck 1993, M^{c}Lean and Lofy 1995). Water temperatures measured in 1995 were recorded by the USFS near the downstream end of the Umatilla National Forest boundary (at about rm 7.50), by ODFW Lookingglass Hatchery personnel at the hatchery intake (at about rm 2.50), and by CTUIR approximately 20 yards above the mouth of Little Lookingglass (at about rm 4.25) and inside the livebox of our rotary screw trap. Our rotary screw trap was operated in three locations during 1995 (Figure 3). Stream temperatures from all agencies were recorded hourly and summarized as a daily range so comparisons could be made to historic data. For historic data, only daily ranges were available (Burck 1993). Weekly ranges were summarized using methods described in M^{c}Lean and Lofy (1995).

Spawning Surveys

No adult spring Chinook salmon were intentionally released above the weir in 1995 (unmarked adults that returned to the hatchery were spawned at the hatchery), so intensive spawning surveys were not conducted. In order to document fish spawning in the Lookingglass Creek basin that may have escaped above the weir, as well as spawning that occurred below the weir, six spawning ground surveys were conducted throughout the expected spawning season. One additional survey was conducted below the weir only to retrieve carcasses. Surveys were conducted according to procedures detailed in M^{c}Lean and Lofy (1995).

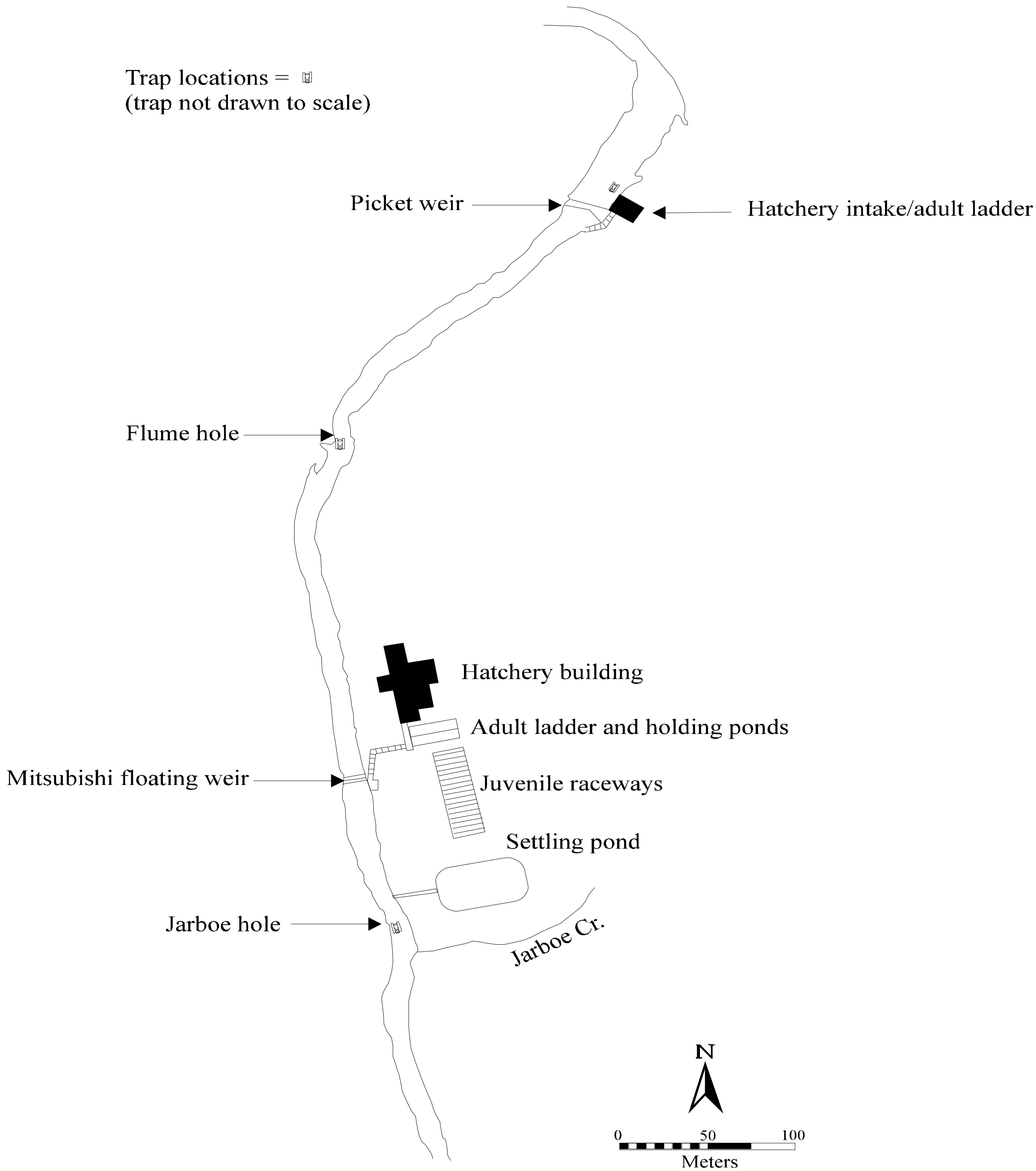

Figure 3 Trapping sites for our rotary screw trap during 1995 in Lookingglass Creek.

Sampling Adult Chinook Salmon Carcasses for Pathogens

In order to document the level of pathogens that occurred in adult spring Chinook salmon that escaped above the Lookingglass Hatchery water intake system, carcasses were collected and frozen for pathological examination. Carcasses were recovered during spawning surveys, from the picket or floating weirs, as well as from the hatchery intake by Lookingglass Hatchery personnel. Carcasses were sampled for pathogens by pathologists from ODFW (Fish Pathology, La Grande) for *Renibacterium salmoninarum* (bacterial kidney disease), *Ceratomyxa shasta* (ceratomyxosis), aeromonad/pseudomonad bacteria (general septicemia) and *Yersinia ruckeri* (enteric redmouth disease). The data provided to us by ODFW were summarized in this report.

Enumeration and Biological Sampling of Juvenile Spring Chinook Salmon at the Rotary Screw Trap

We operated a 1.22-m diameter rotary screw trap year-round in Lookingglass Creek to enumerate and collect information on the juvenile production from adult spring Chinook salmon outplanted above the weir in 1992 and 1993 (M^c^Lean and Lofy 1995). The trap was in operation continuously except when ice prevented turning of the cone, high water occurred (causing a large volume of debris potentially resulting in stress for fish or causing the potential for trap damage), or when damage to the trap prevented operation. From October 1993 to July 1995 (collection of part of the 1992 and all of the 1993 cohorts detailed in this report) non-operational periods were usually short (2-4 days) but one period was 7 days for an extremely cold period during the winter of 1994 and another was 11 days after a major flood. During the trapping of the 1992 and 1993 cohorts the trap was infrequently stopped (usually one to two days) in the spring and fall, when large pieces of debris or ice prevented the drum from turning.

We operated the trap in three different locations during 1995 (Figure 3). We began trapping in 1995 about 15m upstream of the mouth of Jarboe Creek and below the hatchery outflow (Jarboe hole) (Figure 3). We moved the trap upstream from this location because of concerns by ODFW Pathology that the fish in the trap livebox were being held in hatchery effluent water, thereby increasing exposure of fish to possible concentrations of pathogens. The trap was moved on 28 July to 10 m above the hatchery intake (Figure 3), where it was operated until 27 November when high water caused displacement and damage to the trap anchor locations. We moved the trap downstream about 240m on 7 December to a deep hole (Flume hole) located between the hatchery intake and the Mitsubishi floating weir (Figure 3). The trap was usually checked at least every 2 to 3 days. The trap was checked daily or more often during periods of high flow when debris in the stream was high, or when high numbers of fish were being captured the trap.

All fish were removed from the trap and enumerated each time that it was checked. Fish were anaesthetized with a light dose (40-60 mg/l) of MS-222 (tricaine methanesulfonate). They were sampled as quickly as possible and allowed to regain equilibrium before being released. Non-salmonid species were noted and *O. mykiss* were counted and fork length was taken on a subsample of 40 fish per week. All spring Chinook salmon were inspected for marks which would indicate recaptures from a trap efficiency release. The first date after we commenced implanting passive integrated transponder (PIT) tags in fish captured above the trap, all juvenile spring Chinook salmon of that cohort year which were captured in the trap were also scanned for PIT tags.

For the 1992 and 1993 cohorts, fork lengths were recorded for all fish, or when more than 50 fish were captured per week, a subsample of 50 was used. For the 1994 cohort, fork lengths were recorded on every fish because the number of fish being trapped was low.

Estimation of Total Juvenile Spring Chinook Salmon Migration

The total number of 1993 cohort juvenile spring Chinook salmon that passed the trap site was estimated to compare the number and timing of the Rapid River stock to that of the endemic stock for the 1965 to 1969 cohorts (Burck 1964-1974). We also estimated migration for the part of the 1992 cohort after the trap was installed. In order to estimate the total number of juvenile spring Chinook salmon that migrated out of Lookingglass Creek for the 1965 to 1969, and 1993 cohorts, we expanded the number of naive fish (excluding precocial fish), those never previously captured in the trap, based upon trap efficiency estimates.

Assumptions Used to Estimate Trap Efficiencies

In order to estimate trap efficiencies we used the following assumptions: 1) marks on recaptured juvenile spring Chinook salmon used to estimate trap efficiency (trap efficiency fish, i.e., $fish_{TE}$) were correctly recognized, 2) fish released below the trap were not recaptured in the trap and, 3) there was no mortality of $fish_{TE}$ from the time of release to recapture, and 4) the $fish_{TE}$ were as likely to be recaptured as naive fish.

For the 1992 and 1993 cohorts we checked assumptions 2, 3, and 4. $Fish_{TE}$ that were recaptured, and naive fish captured but not marked for trap efficiency tests, were always released below the trap at least one riffle downstream of the trap (usually at least 50-70 m) where we assumed they would not be captured again (assumption 2). To check this assumption we searched our database for PIT-tagged fish recaptured in the trap that had been released below the trap. We anticipated using this information to calculate an adjustment of the numbers of naive fish captured, if necessary. We used PIT-tagged fish for this test because these were the only fish that could be identified as individuals placed below the trap. For fish that were too small to PIT tag (fork length less than 60 mm), we assumed similar behavior when released, and expected to use the same adjustment factor.

When considering assumptions 3 and 4, we felt the relatively short distance of the release site above the trap would diminish mortality back to the trap, but were concerned that this distance, as well as releasing $fish_{TE}$ on one side of the stream, might bias recaptures at the trap which would bias the trap efficiency estimate. In particular, if $fish_{TE}$ released on the same bank as that of the trap location were recaptured at a higher rate than the naive fish, we might be overestimating trap efficiencies of naive fish. Ideally, the release site for $fish_{TE}$ would not be so far upstream that the $fish_{TE}$ would die before passing the trap, and far enough to allow similar dispersion throughout the stream channel as naive fish (assumptions 3 and 4). We checked for differences in recapture rate of $fish_{TE}$ released at the left or right banks in 1995. Tests using the

1993 cohort were conducted at the Jarboe Creek site from 14 March to 26 March using all fish$_{TE}$ released. During these releases, about half of the fish$_{TE}$ were released on either the left bank or the right bank on the day of their capture. Flow conditions were increasing during the releases (Figure 4), but the trap operated continuously. Releases and subsequent recaptures of fish$_{TE}$ were totaled for the entire release period. A Chi-square test ($\alpha \leq 0.05$, df = 1) was then used to identify any significant difference in recapture rates between the banks of release. We had no way of checking the trap efficiency assumptions on fish$_{TE}$ releases from the 1965 to 1969 cohorts, so we assumed none were violated.

Marks Used for Trap Efficiency Estimates

All fish$_{TE}$ from the 1965 to 1969 were marked with either partial fin clips or hot brands (Appendix Table A-1). All fish$_{TE}$ from the 1992 and 1993 cohorts were marked with partial fin clips of caudal, anal or pelvic fins or any combination of these fins, or Alcian blue dye on the skin or fins with a Panjet® injector (Hart and Pitcher 1969) (Appendix Table A-1). When we first installed the trap in October 1993, we marked all fish$_{TE}$ with fin clips. With access to a Panjet® marker in May 1994, we generally used that method for marking fish$_{TE}$. We did, however, have difficulty marking fish$_{TE}$ shorter than 45 mm on specific places of the body with a Panjet ® marker to distinguish fish$_{TE}$ release groups, so we continued to use partial fin clips on these fish. We determined trap efficiency estimates for all cohorts by calculating the number of fish$_{TE}$ released during a trapping period and the subsequent recapture of those releases (Burck 1964-1974).

Release Sites for Trap Efficiency Fish

The release site for the fish$_{TE}$ varied over time. During the historic study the release site was about 0.25 rm above the head works for the trapping facility at a bridge which was at about rm 2.75 (Burck 1993). Release sites for the current study varied depending upon the site of the trap and access to calm water during high water periods. When the trap was at Lookingglass Hatchery intake, the trap efficiency release site was upstream of a bend in the creek about 75 meters upstream of the trap, while trapping at the flume hole, the release site was at the downstream end of the adult ladder next to the hatchery intake (~150 m above the trap), and while trapping at the Jarboe hole, the release site was about 30 m upstream of the floating weir (Figure 3). All fish were released in calm water near shore at least one riffle upstream from the trap.

Trapping Periods Used to Estimate the Total Population

The summarization of historic trap efficiency data (Burck 1964-1974) for the 1965 to 1969 cohorts, revealed highly variable (1 to 70%) monthly trapping efficiencies. We found a similar range for the 1993 cohort. Since a single trap efficiency estimate for the entire migration period may result in a gross overestimation or underestimation of the true population, we divided both historic and current juvenile spring Chinook migration past the trapping site into monthly

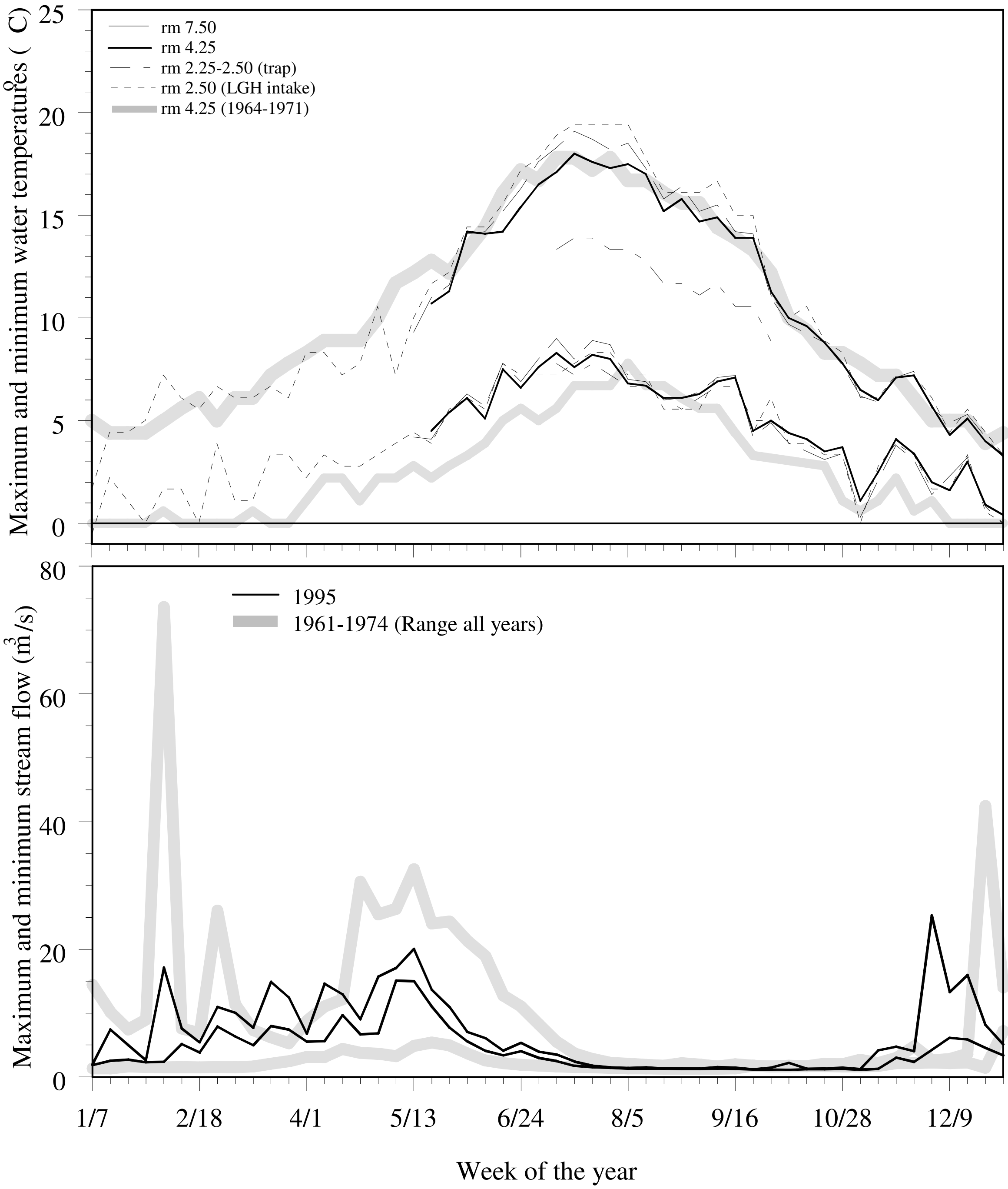

Figure 4 Range of weekly water temperatures (USFS unpublished) and flows (USGS) for Lookingglass Creek in 1995 and the range recorded from 1964 to 1971. Temperature data were a weekly range of daily temperatures measured every hour. Flow data for 1995 were a weekly range of mean daily flows measured every 0.5 hour at a gauging station. The weekly periods end on the dates shown.

trapping periods (January to July, 19 months) to describe the migration timing as well as estimate the total population. Some juvenile spring Chinook salmon from a cohort were captured after the last July trapping period for all cohorts (Appendix Tables A-2 and A-3). Capture of these fish this late suggested these fish were precocial and were probably not going to leave Lookingglass Creek. We assumed they moved both up and downstream, so no trap efficiencies were estimated for these fish

Releases of Fish for Trap Efficiency Estimation

The number of fish released for trap efficiency estimates varied over the years of the historic study for the 1965 to 1969 cohorts (Burck 1964-1974, 1993). Marking normally started within the first 10 days of June after emergence from the gravel. During trapping of the 1965 cohort and part of the 1966 cohort, until August 1967, every healthy fish captured was marked and released for trap efficiency estimates. After that date, the protocol was changed to release a maximum of 500 fish per week, spread out among release dates over the week. Fish were almost always released Monday through Friday, after the trap was checked Monday, Wednesday and Friday. Periodicity of trap checks varied somewhat when the number of fish captured changed (Burck 1964-1974, Appendix Table A-2).

The number of fish released for trap efficiency estimates also varied over dates during the current study (only 1992 and 1993 cohorts reported to date). We started marking fish the last few days of October for a trap efficiency estimate for November of 1993. Because we had the additional task of PIT-tagging fish that were captured in the trap, only a portion of the fish that we captured were available for use to estimate trap efficiency. This was particularly true in the spring, when we attempted to meet our goal of PIT-tagging 500 fish captured in the trap from January to the end of the smolt outmigration that year. Because we expected to have difficulty trapping and releasing enough fish to obtain an accurate trap efficiency estimate, we placed a lower priority upon obtaining trap efficiency estimates for April through July. All fish captured from April through July were PIT-tagged rather than using any of them for trap efficiency. We generally released 50 to 200 fish per period for the 1992 cohort and 100 to 300 fish per period for the 1993 cohort. However, the release number for February 1994 was 25 (Appendix Table A-3).

For the 1965 to 1969 cohorts the use of one mark for $fish_{TE}$ sometimes spanned two or three trapping periods and did not fall strictly within the bounds of a calendar month. Since there was no obvious delineation between trapping periods we used the three-day break, of the weekend between trap checks, to identify $fish_{TE}$ released during a trapping period. We used these delineations because most of the $fish_{TE}$ released for the 1965 to 1969 cohorts were recaptured within three days of release (Burck 1993, Appendix Table A-2). This technique allowed an objective method to assign recaptures of a mark when use of that mark overlapped more than one trapping period. Delayed recaptures ($fish_{TE}$ recaptured more than 3 days after the last date of release with that mark) were usually assigned to the last period in which fish with that mark were released. When recaptures occurred in more than one month after release, fish recaptured in the first month after the last release were assigned to the month immediately prior to the last month of release. All remaining delayed fish recaptures were assigned to the last month of release for that mark.

For the 1992 and 1993 cohorts we tried to release a new group of fish whenever there were obvious changes that might affect trap efficiencies such as movement to a new trap site or a dramatic change in the daily count of the number of fish being captured. Our trap efficiency estimates excluded $fish_{TE}$ releases that occurred within 3 days prior to any date the trap was found not operating. When this occurred, we changed marks on the next release date (Appendix Table A-3). We did not exclude any release groups used for historic trap efficiency estimates because marks used for $fish_{TE}$ did not change when the trap was partially (or totally) clogged making it impossible to discern groups of fish that passed the trap while trap efficiency might have been low from those times when it was operating at "full efficiency".

Occasionally the trap efficiency for a monthly trapping period was not estimated. For months when this occurred, we substituted surrogate estimates from the previous month (we used the following month when the missing estimates were at the beginning of the smolt migration). When there was no recapture of $fish_{TE}$ during a monthly trapping period or the number of $fish_{TE}$ released was below our target of 25, the release of $fish_{TE}$ for that period was combined with the previous month until there was a recapture of at least one and the number of $fish_{TE}$ released was at least 25.

Estimation of Total Population Passing the Trap

We estimated the number of fish that passed the trap during a trapping period by dividing the total number of naive fish captured by the trap efficiency estimate (proportion) for that trapping period. When the days between trap checks overlapped two trapping periods, the number of naive fish captured was prorated on a daily basis (mean number per day) and included in the appropriate trapping period. When the estimated number of fish trapped was not a whole number due to prorating, we rounded to the nearest whole fish for the first trapping period and rounded the opposite way for the second period so that the total number of fish captured for the year would be correct.

Trap efficiency was calculated as the number of fish from a release group that were recaptured divided by the total number of fish in the release group:

$$\hat{E} = R/M$$

$\hat{E}$ = Estimate of the trap efficiency.

R = Number of recaptured fish.

M =Number of marked fish that were released.

All fish that were recaptured were included, regardless of the recapture date.

A 95% confidence interval (CI_{per}) for the number of fish passing the trapping site for each of the thirteen periods was estimated using a bootstrap method to estimate the variance (V) around each monthly population estimate with 1,000 iterations (Efron and Tibshirani 1986; Thedinga et al. 1994):

$$CI_{period} = \text{Population estimate for the Period} \pm 1.96 * s\sqrt{V_{period}}$$

Where V is the bootstrap estimate of the variance for the period. In order to allow us to reproduce results for each pseudo-random number generator, we arbitrarily selected -1 as the seed value for every period for every year. A 95% confidence interval for the total outmigration (CI_{total}) for each cohort was calculated with the equation:

$$CI_{total} = \text{Total Population} +- 1.96*\sqrt{\sum V_{period}}$$

Migration Timing Past the Rotary Screw Trap

The percent of the total estimated population that passed the trap site by month was calculated to describe migration timing and determine if the Rapid River stock juveniles exhibited similar migration patterns as the 1965 to 1969 cohorts of the endemic stock. The monthly migration for the 1992 cohort was not estimated because we did not have an estimate of the number of fish that passed the trap from emergence to November 1993, when we began trapping, however, an estimate of the numbers of fish passing the trap was made.

Arrival Timing and Survival Rate of Juvenile Chinook Salmon to Lower Granite Dam

We PIT-tagged four groups of 1993 cohort juvenile spring Chinook salmon from Lookingglass Creek in order to index the arrival timing at and survival to Lower Granite Dam. Three of the four groups were captured and PIT-tagged at the trap. These groups were determined using dates of capture at the trap and included, T1: from the date when at least 80% of the juvenile spring Chinook salmon captured at the trap were at least 60 mm FL (around the end of June) until 30 September, 1994; T2: from 1 October to 31 December, 1994; and T3: from 1 January until the end of the migration (July). These migration groups were similar to the group intervals used by Burck (1993) with the exception of T1, which ended on 15 September. These groups were tagged to determine the contribution of juveniles from each period of the migration using smolt survival to Lower Granite Dam. The fourth group, F1 were not initially captured in the trap, but were seined from the Lookingglass Creek basin and PIT-tagged so we can make comparisons to groups PIT-tagged by ODFW from August through September in five tributaries of the Grande Ronde River basin: the Minam, Wenaha, Lostine and upper Grande Ronde rivers and Catherine Creek (Walters et al. 1995 and Sankovich et al. 1996). Fish were captured in the Lookingglass Creek basin from about rm 6.5 downstream to the hatchery intake and in Little Lookingglass Creek from about rm 3.0 to the mouth from 22 through 28 September, 1994. Fish were herded into a seine by personnel in dry suits or seined from the creek. They were then anaesthetized, PIT-tagged, held for a minimum of 24 hours to recover and determine a delayed mortality, and placed back in the creek in the approximate area where they were captured.

We also PIT-tagged fish from the 1993 cohort, on 17, 18, and 21 August that were captured in the screw trap after the migration had ended in July (Appendix Table A-3). All of the fish PIT-tagged during this time period had swollen anal areas, were dark in coloration, and often extruded milt, suggesting that these fish were maturing fish. We discontinued tagging on the assumption that these fish would not show up at mainstem dams.

We used detections at Lower Granite Dam to describe arrival timing, and first time detections at Snake and Columbia River dams to calculate a minimum survival rate to Lower Granite Dam. We did not expand actual daily detections at Lower Granite Dam to account for fish that did not pass through the bypass system (spill) because few fish would have been added. Had we used daily expansions for spill (e.g., Walters et al. 1995), we would have estimated 4 additional fish for the three groups in the 1992 cohort (a 1.3% increase over actual detections) and 13 additional fish for the four groups in the 1993 cohort (5.1% increase over actual detections).

Arrival Timing at Lower Granite Dam

Arrival timing at Lower Granite Dam for the PIT-tagged groups of juveniles from the 1992 (Lofy and M^{c}Lean 1995b) and 1993 cohorts was analyzed by grouping unexpanded daily detections at Lower Granite Dam into weeks of the year as a percentage of the total number of fish detected at the Dam. To determine which groups differed from the others ($\alpha \leq 0.20$), we used a Kruskal-Wallis one-way ANOVA to test for differences in the arrival distributions among the three (1992 cohort) or four groups (1993 cohorts) within each cohort ($\alpha \leq 0.05$). We followed the Kruskal-Wallis test with a post-hoc multiple comparison suggested by Dunn (1964, cited by Daniel 1990) when a significant difference among groups within a cohort was detected.

In order to determine if the size of the juvenile spring Chinook salmon at the time of tagging affected the arrival timing at Lower Granite Dam, detections at Lower Granite Dam from the F1 group for the 1992 and 1993 cohorts were divided into two size categories. Fish smaller or equal to the median fork length at tagging (of fish that were detected at Lower Granite Dam) were included in F1S. Fish longer than the median fork length comprised F1L. A Kolmogorov-Smirnov two sample test (Wilkinson 1992) was used for comparison between weekly arrival distributions of F1S and F1L within a cohort ($\alpha \leq 0.05$).

Minimum Survival Rate to Lower Granite Dam

Unexpanded cumulative unique detections at all Snake and Columbia River dams were used to calculate minimum survival rates to Lower Granite Dam. Survival rates for the 1992 and 1993 cohorts for each month of tagging were calculated to determine if trends in survival were evident over time. Minimum survival rates to Lower Granite Dam were calculated for T1, T2, T3, and F1, as well as months within each group, by dividing the cumulative number of unique detections by the total number of the juveniles tagged in the group and each month. Ninety-five percent confidence intervals for cumulative detection percentages were calculated using methods described in Ott and Mendenhall (1985) to determine differences between T1, T2, T3, and F1, based on the overlap of these intervals.

To determine if minimum survival rates to Lower Granite Dam differed among fish of different fork lengths at tagging, fish in F1 were categorized into 5-mm intervals, except at the extremes of the intervals, where intervals were combined due to low sample size (to increase expected number to at least 5). The intervals used were 62-72, 73-77, 78-82, 83-87, 88-92, 93-97 and 98-107 mm. The overall cumulative detection rate was used to calculate the expected number of detections for each size category. A chi-square goodness of fit analysis was used to determine differences between observed and expected detections within fork length intervals from F1 for the 1992 and 1993 cohorts ($\alpha \leq 0.05$).

Monthly Sampling of Juvenile Spring Chinook Salmon

Monthly sampling of the 1994 cohort of juvenile spring Chinook salmon in Lookingglass Creek was conducted to compare growth patterns of Rapid River stock to that of the endemic stock (Burck 1964-1974) based on median fork length. The sampling was completed around the 20th of each month (similar to Burck 1993) and usually took 2 to 3 days to complete. Sampling was conducted from April to October (Lofy and McLean 1995b; McLean and Lofy 1995). These were the months most often sampled by Burck (1964-1974).

We attempted to choose sampling sites that were similar to those used for sampling the endemic stock (Burck 1993). Burck (1993) described 4 locations where monthly samples were collected in Lookingglass Creek: an upper area, rm 10.00 to 10.25; a standard area, rm 4.50 to 4.75, a lower area, rm 0.00 to 0.25 and within Little Lookingglass Creek, about 1.75 rm from its mouth (Figure 5). Juvenile spring Chinook salmon were also sampled by Burck (1993) at the bypass trap located at rm 2.25 (near the present site of the hatchery intake). Low juvenile density precluded us from being able to consistently capture the desired number of fish in the same sampling sites used by Burck (1993). We adjusted our sampling sites to the areas where we could consistently capture adequate numbers of fish. We moved our upper sampling site downstream to about rm 7.00 to 7.25. Our lower sampling site was moved upstream to an area adjacent to the hatchery complex at about rm 2.25 to 2.50. We sampled juveniles within Little Lookingglass Creek in scattered areas throughout the lower 2.50 rms (Figure 5). Our standard site rm 4.50 to 5.50 was similar to that used by Burck (1993) (Figure 5). Our trap locations were in the same general vicinity as that used by Burck (1993) (Figure 3).

We attempted to measure fork lengths from about 50 juvenile spring Chinook salmon at each sampling site for the 1994 cohort. To obtain the appropriate number of fork lengths to complete a statistical comparison to the rotary screw trap with approximately equal sample sizes, we selected fish captured at the trap around the same dates as those sampled in the field. Occasionally we did not capture 50 fish at the trap during days we sampled in the field. When this occurred we took the trap catch on the date of the monthly sample and continued to add the trap catch from one day before and one day after until we had about 50 fish in the sample, or a maximum range of 11 days (selected field sampling date± 5 days) had been encompassed. Whenever more than 50 fish were captured in the field or at the trap, data from the first 50 fish

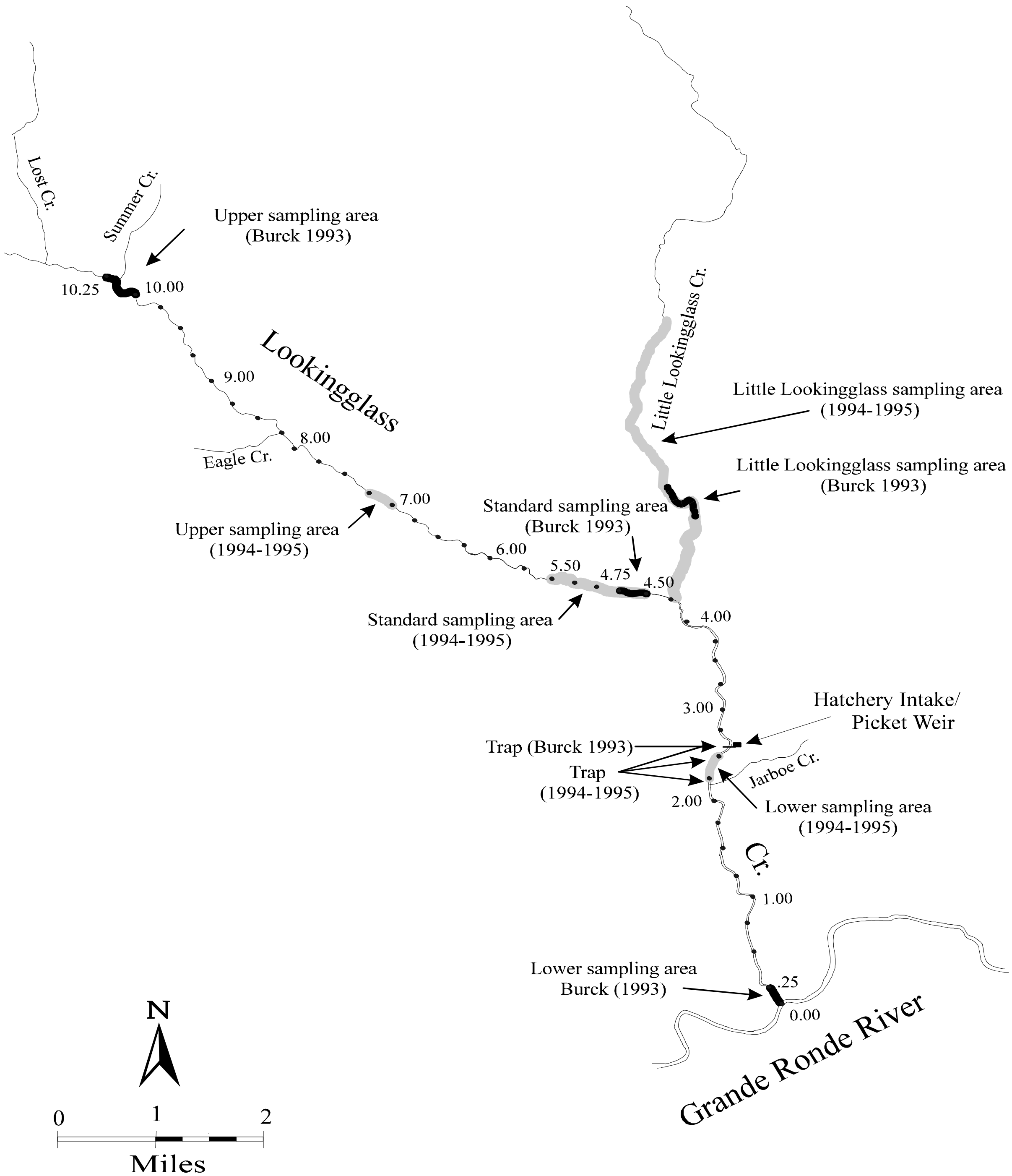

Figure 5 Monthly sampling sites for the 1966 to 1969 cohorts (Burck 1993) and the 1993 and 1994 cohorts in Lookingglass Creek.

that were measured were included. We excluded the one month of sampling that occurred outside the 11-day window (8 September 1970).

We determined if there were any consistent differences in the fork lengths between the standard sampling site and other sampling sites for each cohort within a month for the 1964 to 1969, 1993, and 1994 cohorts. If no consistent differences occurred, we used fork lengths from the standard site to represent the population in Lookingglass Creek to compare stocks. We decided to compare all locations to the standard site because the standard site was in the middle of the rearing distribution and data from the standard site were the only data consistently available in the historic data set (Burck 1966, 1967, 1970, 1971). All of the data for each cohort for each sampling site within a month were tested for normality using a Lilliefors test (Daniel 1990; Wilkinson 1992) to determine if the data met the assumption of normal distribution for an analysis of variance ($\alpha \leq 0.05$). Because both non-transformed and log-transformed fork length data failed tests for normality (36.1 and 30.6% of the outcomes were non-normal, respectively; ≤5% failure rate would allow us to accept the null hypothesis of a normal distribution), we used non-parametric Kruskal-Wallis tests (Wilkinson 1992) for each month for each cohort to determine differences in fork length among sampling sites ($\alpha \leq 0.05$). When a difference among sites was determined, a multiple comparison ($\alpha \leq 0.20$) (Dunn 1964, cited by Daniel 1990) was used to determine if the differences were between the standard sampling site and any other individual sampling sites.

Because all of the other sampling sites exhibited neither consistently larger nor smaller fork lengths through time compared to the standard sampling site, we used the standard sampling site to compare fork length data of the 1993 and 1994 cohorts to those of the 1964 to 1969 cohorts. Because only the standard sampling sites would be used in these analyses, all fork length data from the standard sampling site, by month within a cohort, were ranked again to test for normality ($\alpha \leq .05$). Because both non-transformed and log-transformed fork length data from the standard sampling site failed the tests (48.1 and 42.3%, respectively; ≤5% failure criteria), we again used non-parametric analyses to determine potential differences in monthly fork lengths between the individual 1993 and 1994 cohorts and the range observed for the 1964 to 1969 cohorts. The maximum and minimum mean rank sums for that particular month were determined for each cohort from among the 1964 to 1969 cohorts. Kruskal-Wallis tests (Wilkinson 1992) were then conducted for each month comparing 1993 and 1994 cohorts to the two cohorts among the historic data that previously had the largest and smallest rank sums ($\alpha \leq 0.05$). When this test was completed, rank sums that were compared were from among the data for only these four years. When a difference among cohorts was detected, a multiple comparison ($\alpha \leq 0.20$) (Dunn 1964, cited by Daniel 1990) was used to determine if the distribution of fork lengths of 1993 or 1994 cohorts were higher than the historic maximum or lower than the historic minimum (i.e., significantly outside the historic range).

Genetic Monitoring

As part of an ongoing genetic monitoring program, the NMFS requested that we collect a minimum of 60 juvenile spring Chinook salmon from throughout Lookingglass Creek. After the fish were collected with a seine and from the trap, they were immediately placed on ice and transported to La Grande for storage in a freezer at -80^{o}C. Samples were sent to Dr. Robin

Waples of the National Marine Fisheries Service, Seattle, WA, for electrophoretic, morphometric, and DNA analyses.

Evaluation of PIT-tagging Adult Steelhead Trout

In order to identify individual adult spring Chinook salmon after their initial return to Lookingglass Hatchery, we have used Petersen disc tags (25 mm diameter in 1992 and 1993; 35 mm diameter in 1994) for adults released above the hatchery weir (Lofy and M^{c}Lean 1995a, 1995b; M^{c}Lean and Lofy 1995). Losses of Petersen disc tags until recovery as carcasses in the Lookingglass Creek basin have been unexpectedly high (21.4%, 43.7% and 55.5%, 1992-1994 respectively). ODFW personnel have used spaghetti tags inserted immediately ventral to the posterior edge of the dorsal fin for adults retained for artificial spawning at Lookingglass Hatchery in 1994. Loss of spaghetti tags in adults retained for artificial spawning has not been reported, but was purported to have been a much lower percentage than Petersen tag loss. As the spawning season progressed, tag loss increased, and was higher in males than females (Mike Flesher, ODFW, personal communication). Unacceptably high tag losses for both of these tagging efforts precipitated investigation of alternative tagging methods. We performed a preliminary investigation into the use of PIT tags. We used adult steelhead to determine potential difficulties in tagging, readability, and time required to retrieve the tags in adult spring Chinook salmon.

Tagging protocol differed significantly from that used to tag juvenile spring Chinook salmon. We used PIT tags that were longer (14 mm x 2 mm) and had a different frequency (134.2 *MHZ*) than the standard size most commonly used to tag juvenile salmonids (12 mm x 2 mm; 400 *MHZ*) because the distance at which the tags we used for adults could be interrogated was farther. Previous tests implanting PIT tags in adult salmonids in the body cavity, snout, and caudal areas, and opercular and dorsal musculature suggested that tissue damage was of particular concern (Prentice and Park 1984). We rejected the caudal and opercular musculature sites because of potential tissue damage and the snout site because we felt retrieval of the tag would be time consuming cutting through cartilage. We eliminated intraperitoneal implantation as less practical than subdermal locations because of the potential loss of the tag (released with eggs) at spawning for females (Prentice et al. 1990b) and the increased distance from the PIT-tag reader which we felt would make readability of the tag more difficult. In addition, retrieval of intraperitoneal tags was expected to be time consuming.

We selected two subdermal sites, one near the dorsal fin (dorsal site) and one near the posterior edge of the buccal cavity behind the cleithrum bone (cleithrum site), both on the left side of the fish. It was thought these sites could be readily identified as tag locations to facilitate readability and recoverability of the tag. Tags at the dorsal fin site were to be oriented parallel to the dorsal fin insertion immediately ventral to the anterior end of the dorsal fin (Figure 6 A). Needle insertion point for the tag at the dorsal fin site was about 2 cm posterior to the anterior edge of the dorsal fin with the needle pointed anteriorly. Tags at the cleithrum site were to be oriented perpendicular to the lateral line at the interception of the lateral line and the cleithrum (Figure 6 B). Insertion point for the cleithrum site was about 2 cm dorsal to the intersection of the cleithrum and the lateral line. The needle point was oriented ventrally to prevent the tag from falling out. The tags were inserted under the cleithrum.

Tags were inserted with a modified 10cc syringe and a 12-gauge needle (Prentice et al. 1990a). During the first attempt of tag insertion, resistance indicated that pushing the tag between the skin and musculature might be causing tearing of tissue or damage the tag. Because of these concerns, we inserted the needle to the point of desired tag deposition, and then withdrew it at the same time as the tag was ejected from the syringe. Five female and five male steelhead were haphazardly selected for each tag site from among adults that returned to Wallowa Hatchery or Big Canyon Facility (Oregon) or the Cottonwood Facility (Washington). Seventeen adults were PIT-tagged on 21 March and three were tagged on 28 March, 1995. Fish from each treatment were punched with a paper hole punch in one of two different locations on the left opercle to identify the tag site when the fish were spawned.

Adults were inspected for appropriate opercle punches at spawning. All adults observed with opercle punches were scanned laterally with an AVID® PIT tag detector for the presence of a tag. The scanner was rotated parallel to the tag site, starting from about 20 to 25 cm from the fish, moving closer until the tag was detected. Fish with punches to indicate dorsal site tag placement were additionally scanned from the dorsal side. The following were recorded on all recognizably punched adult steelhead: extent of healing of the insertion site, presence of any internal hemorrhaging around the tag site, and evidence of external bleeding. When a tag was found, we also recorded extraction time and distance from the fish at which the tag was detected. Tags that were found outside the anticipated area were noted.

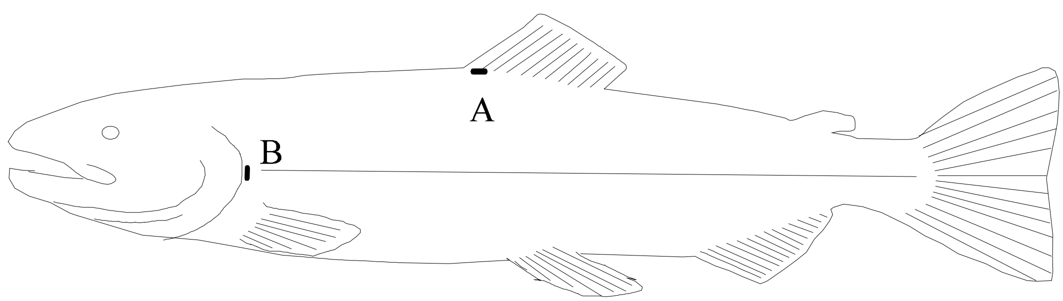

Figure 6 Targeted locations of PIT tag insertions used in adult steelhead .

Results

Stream Flow and Temperature

Stream flow in Lookingglass Creek for 1995 was very similar to what was seen from 1964 to 1971 (Figure 4). Irregularities that were seen in 1995 compared to what was seen historically included higher flows the weeks of 18 March (14.9 m^3/s), 8 May (14.6 m^3/s), 2 December (25.0 m^3/s), and 9 December (13.3 m^3/s).

Maximum temperatures at rm 4.25 in 1995 were similar to maximums observed among all years from 1964 to 1971 at the same site (Figure 4). Maximum temperatures in 1995 at the hatchery intake (19.4^oC) and at the trap live box (19.1^oC) were 1 to 2^oC higher than maximum temperatures recorded from locations upstream in 1995 (Figure 4). The minimum water temperatures for all sites in 1995 were very similar to one another, generally falling within the minimums observed from 1964 to 1971 (Figure 4).

Spawning Surveys

A total of two and three completed redds were observed above and below the weir, respectively, during spawning surveys conducted in 1995 (Appendix Table A-4).

Sampling Adult Chinook Salmon Carcasses for Pathogens

Personnel from ODFW Fish Pathology laboratory were provided with four spring Chinook salmon carcasses recovered during spawning ground surveys in 1995 (Appendix Table A-5). None of the four adult spring Chinook salmon sampled had clinical levels of *Renibacterium salmoninarum* as determined by ELISA (Appendix Table A-5). Of the three fish sampled for *Ceratomyxa shasta*, one had low and two had high infection levels (spores were present) (Appendix Table A-5). Aeromonad-pseudomonad bacteria were the most prevalent bacteria in the culture for two of the four fish sampled (Appendix Table A-5). *Yersinia ruckeri* were the most prevalent bacteria in the other two fish sampled (Appendix Table A-5).

Enumeration and Biological Sampling of Juvenile Spring Chinook Salmon at the Rotary Screw Trap

During operation of the rotary screw trap, we captured 16,522 juveniles from the 1993 cohort 1 March through December in 1994, and 662 juveniles from January through 2 July 1995 (Figure 7). Median fork lengths for the 1993 cohort ranged from 37 mm in March, 1994 to 122 mm in July, 1995, which was the end of the migration out of Lookingglass Creek (Figure 7). Juveniles from the 1993 cohort were captured in August and September (Figure 7), but these fish were maturing and not part of the migration out of Lookingglass Creek. None of the 21 precocial fish tagged were detected at mainstem dams.

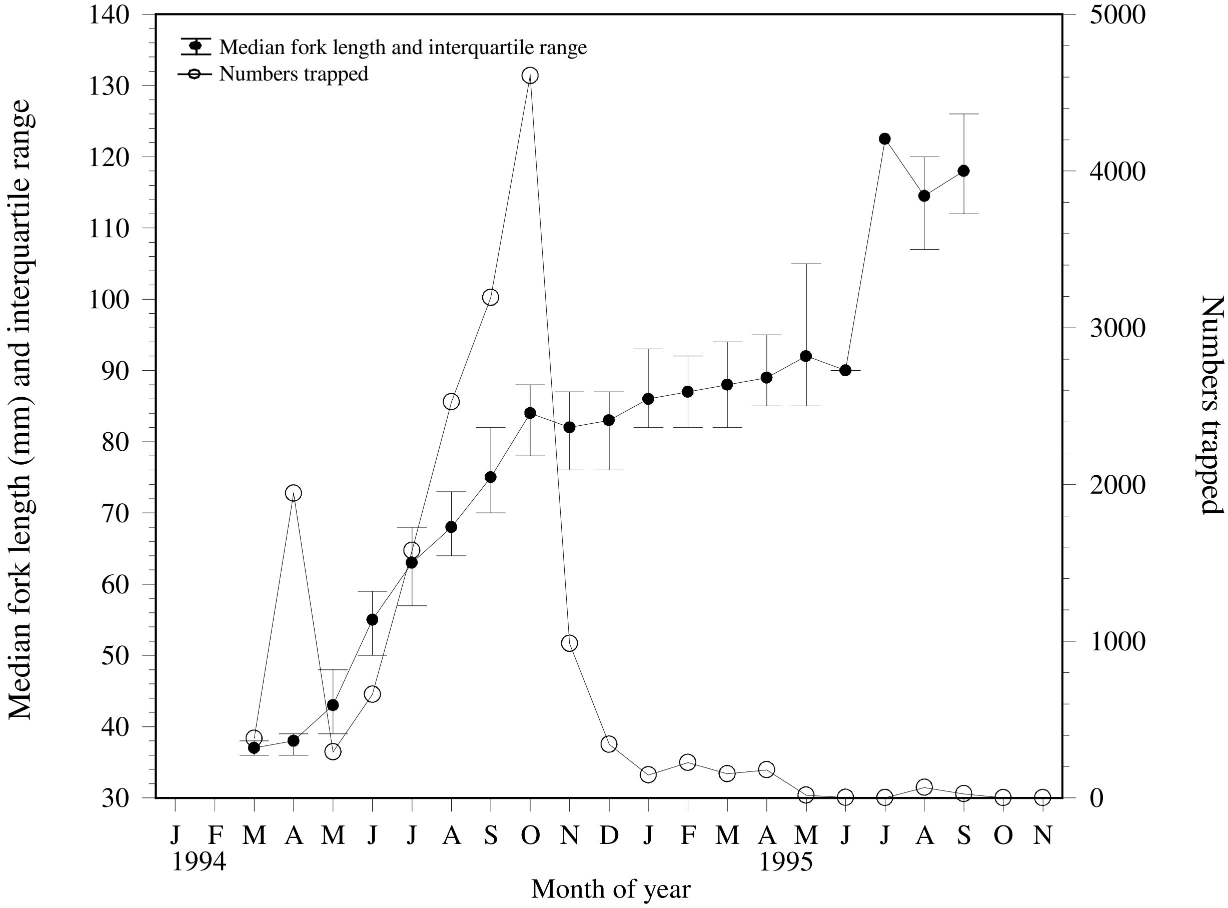

Figure 7 Fork lengths and numbers of 1993 cohort juvenile spring Chinook salmon captured by month at the rotary screw trap on Lookingglass Creek .

Estimation of Total Juvenile Spring Chinook Salmon Outmigration

Assumptions Used to Estimate Trap Efficiencies

The review of trap captures to test the validity of $fish_{TE}$ being recaptured after final release below the trap (assumption 2) revealed that only three (less than 1%) PIT-tagged fish were captured again. All of these fish were recaptured after the trap was moved from the intake site downstream to the flume hole site.

The release of $fish_{TE}$ on the left bank or right bank, to test the assumption of equal chance of capture in the trap as naive fish, showed no significant difference between the banks of release for the 1993 cohort (χ^2=3.841, P=0.45, df=1).

Estimation of Total Population Passing The Trap

After expanding the monthly numbers of juvenile spring Chinook salmon captured in the trap we estimated that the total population that left Lookingglass Creek from the 1965 to 1969 cohorts ranged from 45,732 to 142,518 fish (Appendix Tables A-6 to A-10). For the 1992 cohort, we estimated that 8,715 juvenile spring Chinook salmon left Lookingglass Creek from 29 October, 1993 (when the trap was installed) until the end of the smolt migration, 18 June, 1994 (Appendix Table A-11). Since the trap was in operation for essentially the entire time period that the 1993 cohort passed the trap, we estimated the total population that passed the trap at 152,497 (Appendix Table A-12) from 1 March, 1994 until end of the smolt migration, 2 July, 1995.

Migration Timing Past the Rotary Screw Trap

The 1993 cohort migration timing past the trap was similar to the 1965 to 1969 cohorts in that the majority of the juvenile spring Chinook salmon left Lookingglass Creek as subyearlings (Figure 8). The 1993 cohort, however, showed a large peak in movement past the trap in March (14%) and April (40%) as fry, which none of the 1965 to 1969 cohorts exhibited (Figure 8). The 1993 cohort had relatively stable percentage of fish passing the trap site (4 to 11%) from June through October with the peak in October at 11% of the total population (Figure 8). The percentage of fish that past the trap site during this migration period for the 1993 cohort was lower at every month than the 1965 to 1969 cohorts (Figure 8).

Arrival Timing and Survival Rate of Juvenile Chinook Salmon to Lower Granite Dam

PIT-tagging of the 1993 cohort to describe arrival timing at, and minimum survival rate to, Lower Granite Dam, resulted in 1,776 juvenile spring Chinook salmon from T1, 801 from T2, 275 from T3, and 997 from F1. After holding all of the fish from F1 for 24 hours in liveboxes in Lookingglass Creek, we saw no mortality at release.

Arrival Timing at Lower Granite Dam

PIT-tagged juvenile spring Chinook salmon from the 1992 cohort were first detected at Lower Granite Dam the week of 15 April, with the last fish being detected the week of 3 June (Figure 9). The arrival timing of the F1, T2, and T3 groups from the 1992 cohort were not significantly different, with peaks at Lower Granite Dam the weeks of 22 and 29 April ($P=0.06$) (Figure 9). Median arrival dates were all within three days of one another (23 to 25 April). The number of fish detected (expanded) at Lower Granite Dam for the F1, T2, and T3 groups were 102(103), 140(141), 69(71) respectively (Figure 9).

PIT-tagged juvenile spring Chinook salmon from the 1993 cohort were first detected at Lower Granite Dam the week of 8 April, with the last fish being detected the week of 10 June (Figure 9).

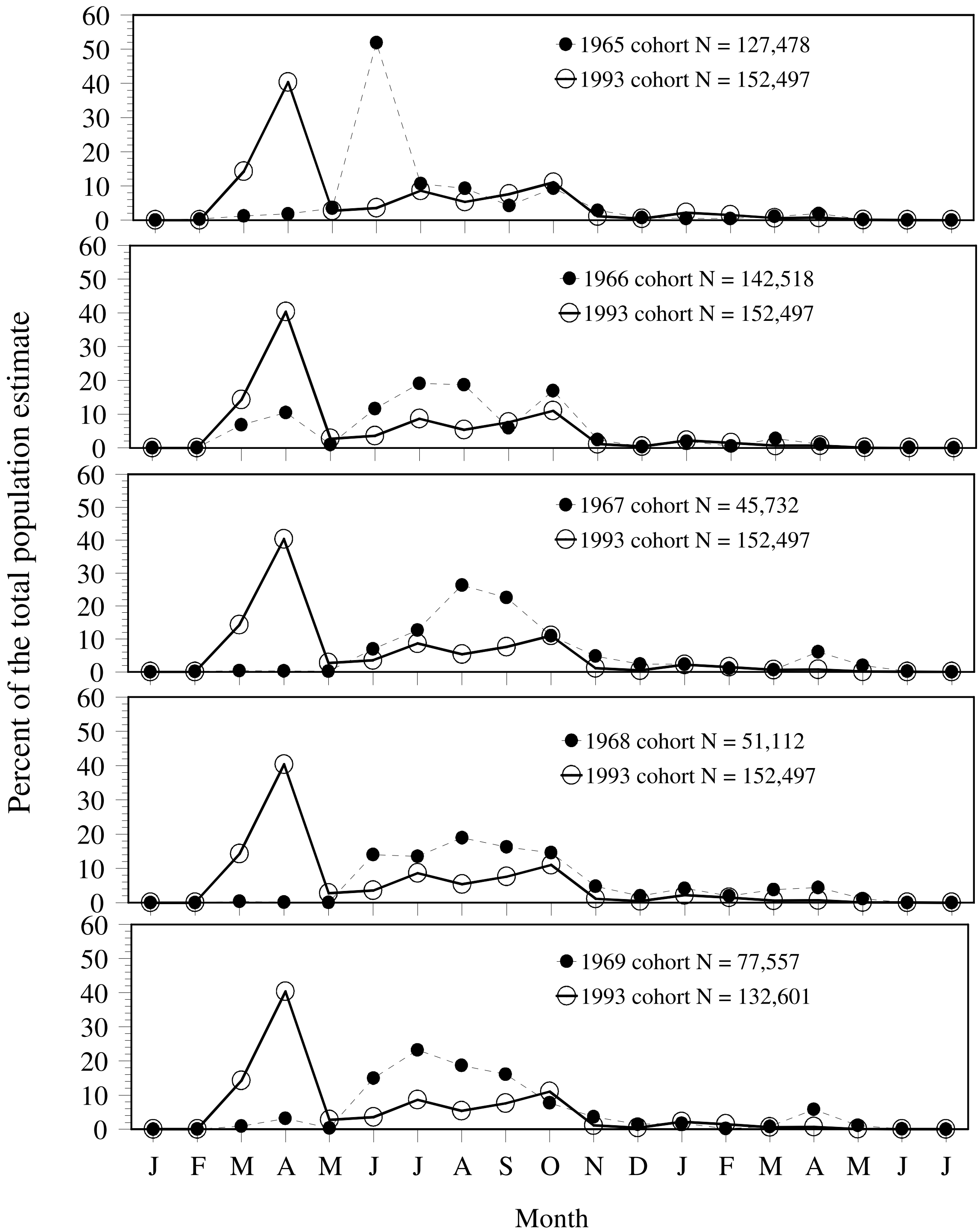

Figure 8 Migration timing by month past the traps in Lookingglass Creek for the 1965 to 1969 and 1993 cohorts . The N values were estimated from numbers of juvenile spring Chinook captured expanded by trapping efficiency.

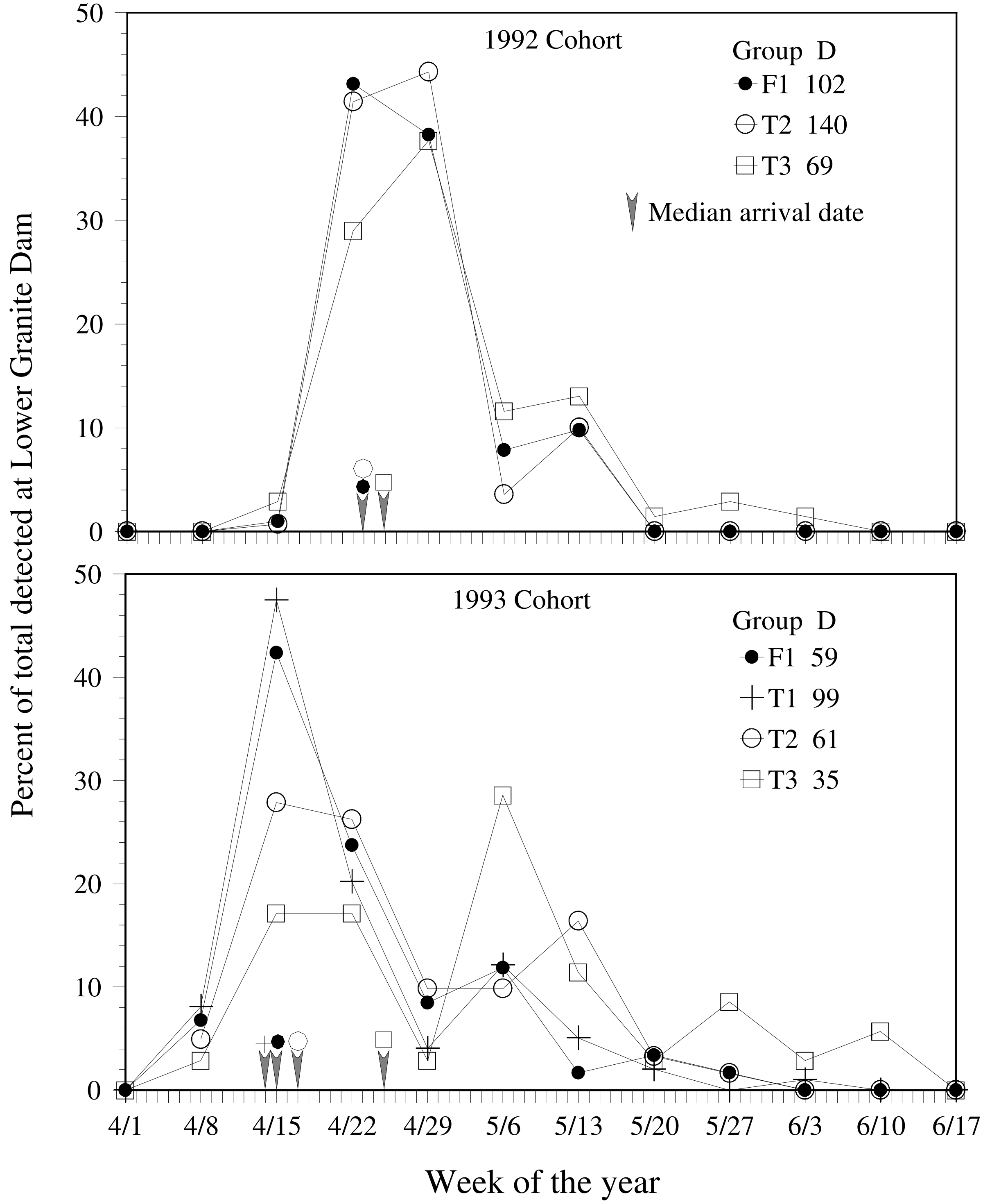

Figure 9 Arrival timing and median arrival dates at Lower Granite Dam of groups of juvenile spring Chinook salmon from Lookingglass Creek that were PIT-tagged at the trap and in the field. Week of the year of detection is represented by the last date of the week. The value under the D represents the numbers of fish from those groups that were detected at Lower Granite Dam.

There was no significant difference between the arrival timing of the F1 and T1 groups, with peak arrival at Lower Granite Dam the week of 15 April (Figure 9) and median arrival dates of 14 and 15 April. Arrival timing of the T2 and T3 groups were significantly different from the F1 and T1 groups as well as each other (Figure 9). A bimodal distribution in arrival timing was observed for all of the groups, with the second peaks occurring 3 or 4 weeks after the initial peaks, which was similar to the 1992 cohort (Figure 9). In addition, median arrival date of the T3 group (25 April) was 8 days later than the latest of the other three groups, which was the T2 group. The number of fish detected (expanded) at Lower Granite Dam for the F1, T1, T2, and T3 groups were 59(61), 99(102), 61(65) and 35(39), respectively.

Using the subgroups F1L and F1S from the F1 group to determine if the size at PIT-tagging affects the arrival timing at Lower Granite Dam, we found no significant difference between F1L and F1S for either of the 1992 (P=0.27) or 1993 cohorts (P=0.20) (Figure 10). For the 1992 cohort, the median length at tagging for the fish that were detected was 84 mm with sample sizes of 55 for the F1S group and 48 for the F1L group. Among fish which were detected from the 1993 cohort, median fork length at tagging was 83 mm and sample sizes were 31 for the F1S group and 29 for the F1L group.

Minimum Survival Rate to Lower Granite Dam

For the 1992 cohort, minimum survival rate of PIT-tagged juvenile spring Chinook salmon to Lower Granite Dam from the F1, T2, and T3 groups were 17.4, 21.8, 31.8%, respectively. No significant difference in survival was observed between the F1 and T2 groups, but the survival rate for the T3 group was significantly greater than the other two groups (Figure 11). For the 1993 cohort, minimum survival rate of PIT-tagged juvenile spring Chinook salmon from the F1, T1, T2, and T3 groups were 12.5, 11.2, 13.0, and 37.5%, respectively. No significant difference in survival was observed between the F1, T1, or T2 groups, but again, the survival of the T3 group was significantly greater than the other groups (Figure 11). Monthly minimum survival rates of the 1992 and 1993 cohorts captured and PIT-tagged at the trap ranged from 19.7 to 42.1% and 7.4 to 45.6% respectively for those months when more than 50 fish were tagged (Figure 11).

The division of the 1992 cohort F1 group into 5mm intervals to determine if size of the fish at PIT-tagging affected survival to the mainstem dams showed no significant difference between length intervals (χ^2=8.804, P=0.185, df=6) (Figure 12). Similar non-significant results were seen for the 1993 cohort (χ^2=11.172, P=0.083, df=6) (Figure 12).

Monthly Sampling of Juvenile Spring Chinook Salmon

The collection of monthly fork length data from five sampling sites in the Lookingglass Creek basin (Figure 5) for the 1965 to 1969, 1993, and 1994 cohorts, revealed that only the 1965, 1967, and 1994 cohorts exhibited consistent differences, always higher or always lower, in median fork length between the standard sampling site and all other sampling sites within a cohort (Figures 13-16). The consistent differences from the standard site included lower median fork lengths at the upper site for the 1965 cohort from June to August (Figure 13), higher median fork lengths at the Little Lookingglass Creek site for the 1967 cohort from June to August and June to September, respectively (Figure 14), and lower median fork lengths at the Little Lookingglass site for the 1994 cohort from August to October (Figure 16).

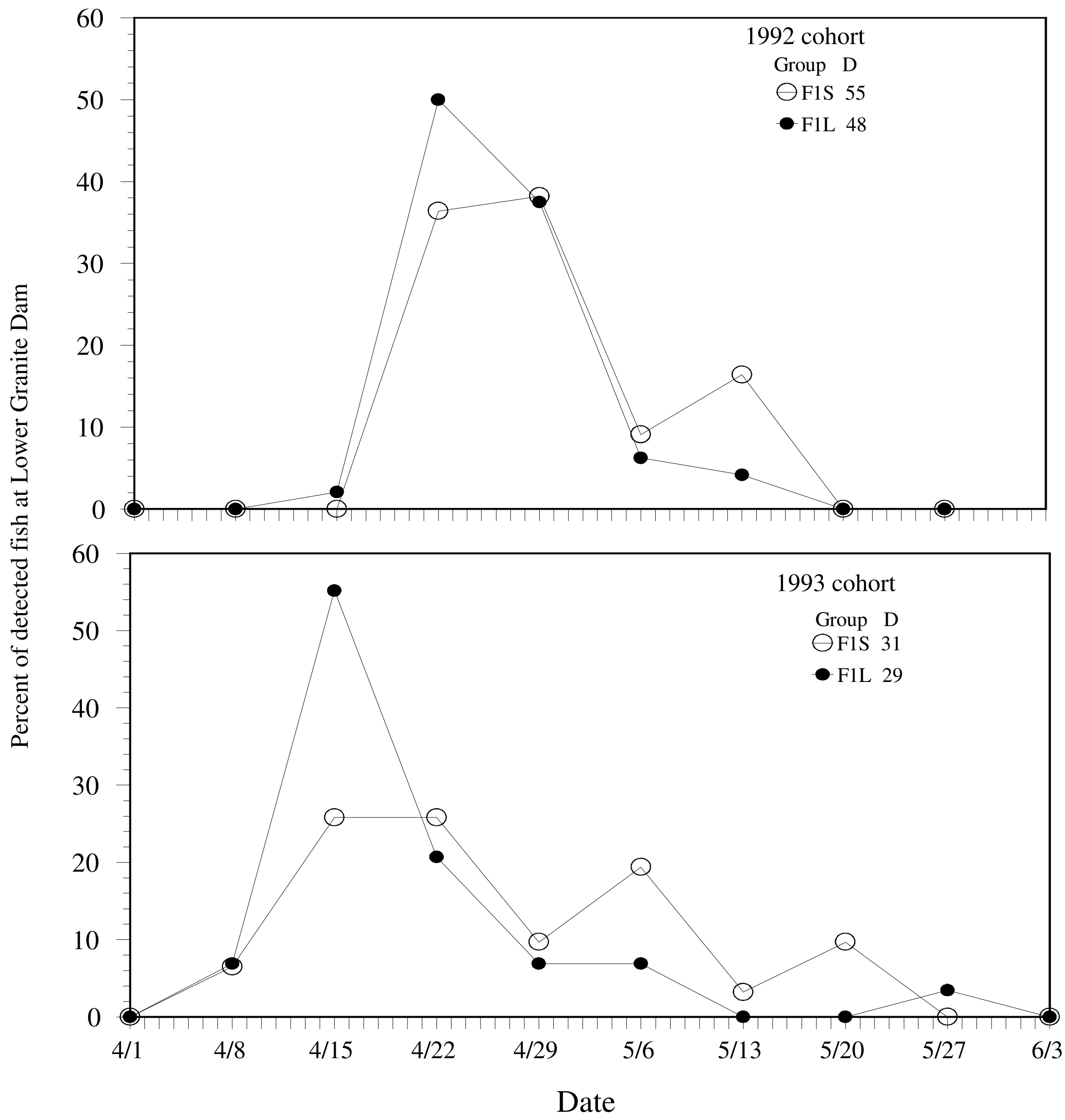

Figure 10 Arrival timing at Lower Granite Dam of two size groups of juvenile spring Chinook salmon from Lookingglass Creek that were tagged in the field. Group F1S was less than or equal to the median fork length of detected fish (84mm for the 1992 cohort and 82 mm for the 1993 cohort) and the F1L group was greater than the median fork length The value under the D represents the number of fish detected from each size group at Lower Granite Dam.

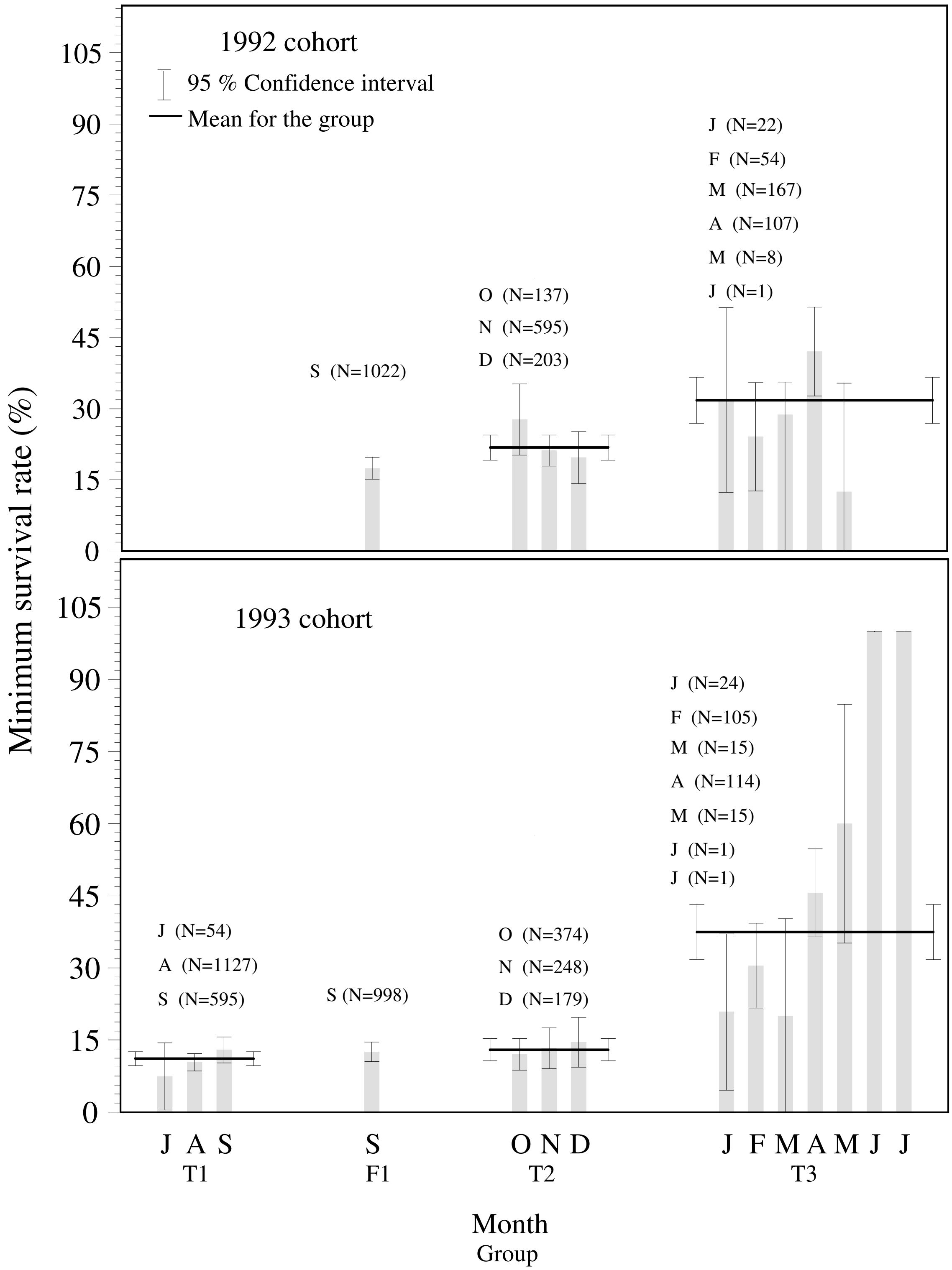

Figure 11 Minimum survival rates to Lower Granite Dam of four groups of juvenile spring Chinook salmon PIT-tagged from Lookingglass Creek. The N value represents the number of fish PIT-tagged from that month.

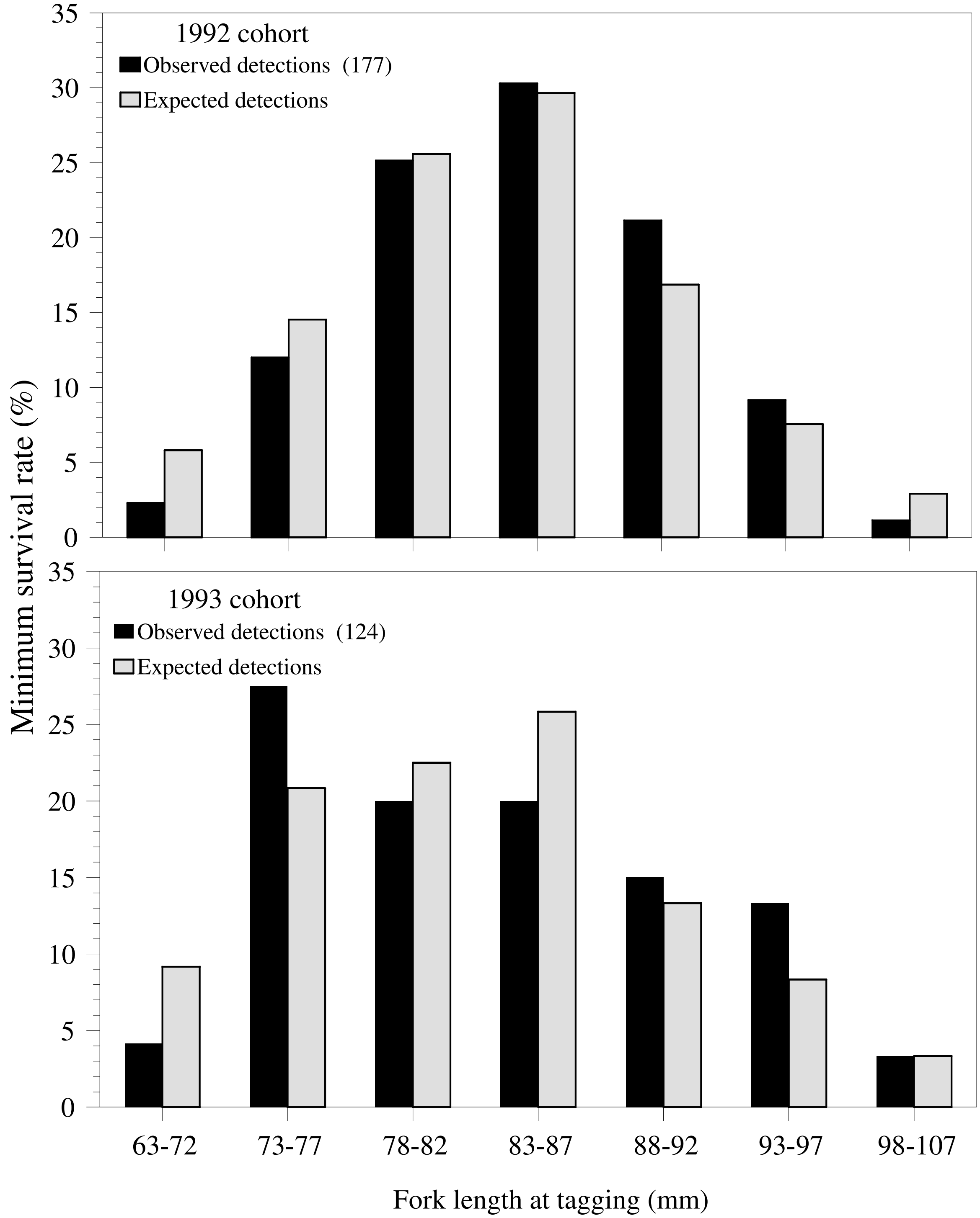

Figure 12 Minimum survival rate to Lower Granite Dam of the juvenile spring Chinook salmon of several size groups from fish PIT-tagged from the field (F1) in Lookingglass Creek. The number in parentheses represents the number of fish PIT-tagged that were detected from the F1 group.

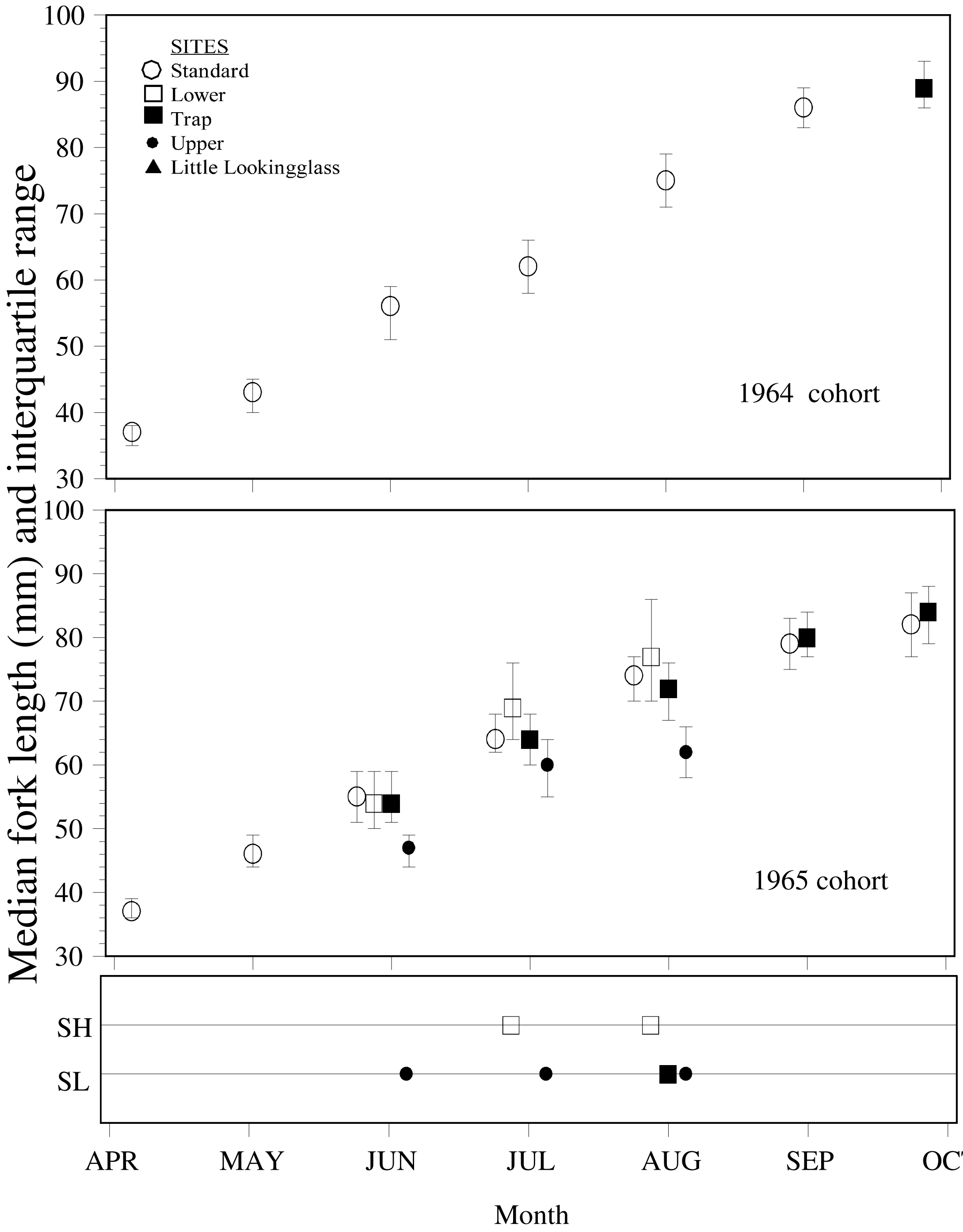

Figure 13 Comparison of juvenile spring Chinook salmon fork lengths from the standard sampling site to four other sites in the Lookingglass Creek basin for the 1964 and 1965 cohorts from April to October. Fork length data were collected around the 20th of each month at all sites. Differences from the standard site are indicated in the box below each graph (SH=significantly higher, SL=significantly lower).

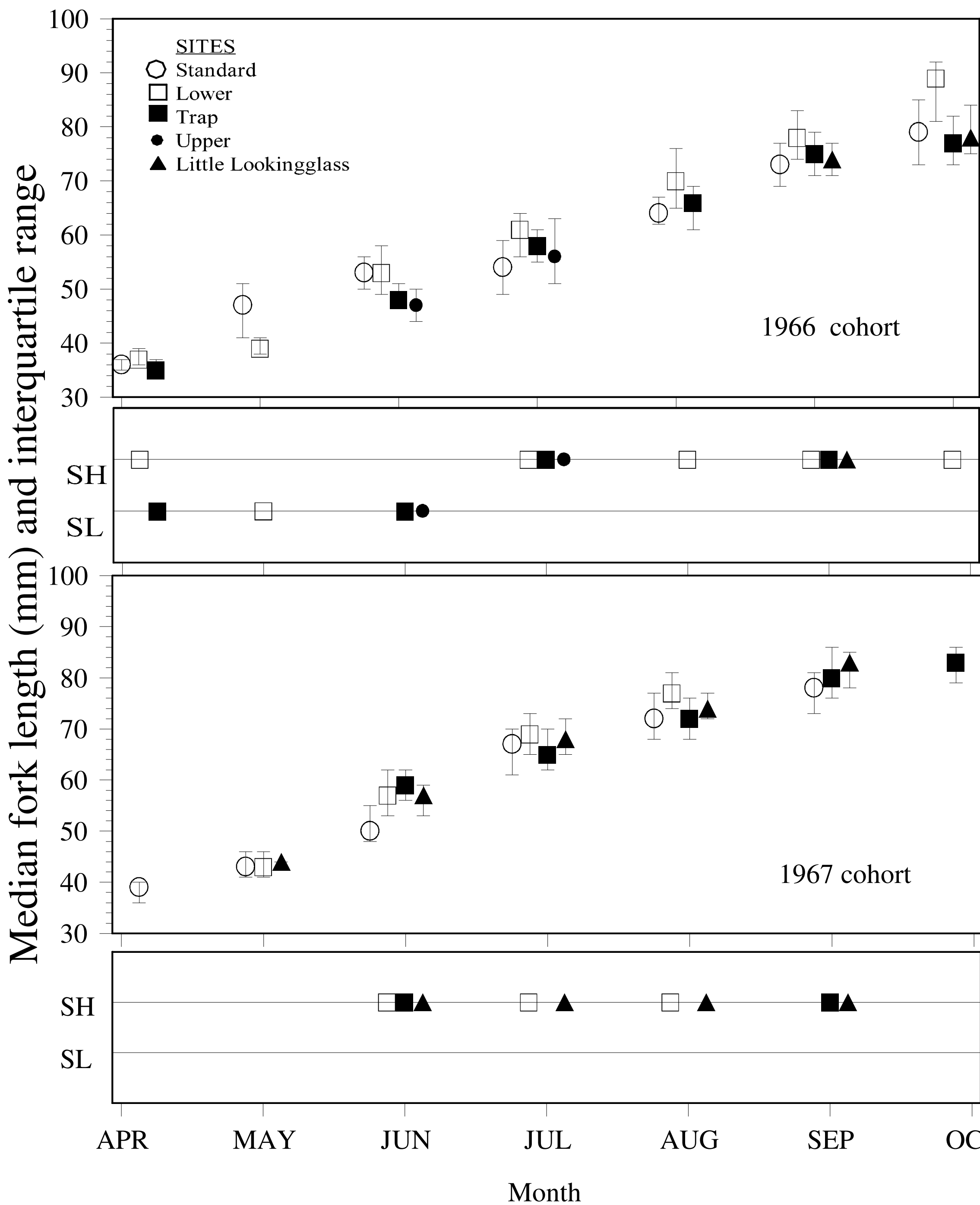

Figure 14 Comparison of juvenile spring Chinook salmon fork lengths from the standard sampling site to four other sites in the Lookingglass Creek basin for the 1966 and 1967 cohorts from April to October. Fork length data were collected around the 20th of each month at all sites. Differences from the standard site are indicated in the box below each graph (SH=significantly higher, SL=significantly lower).

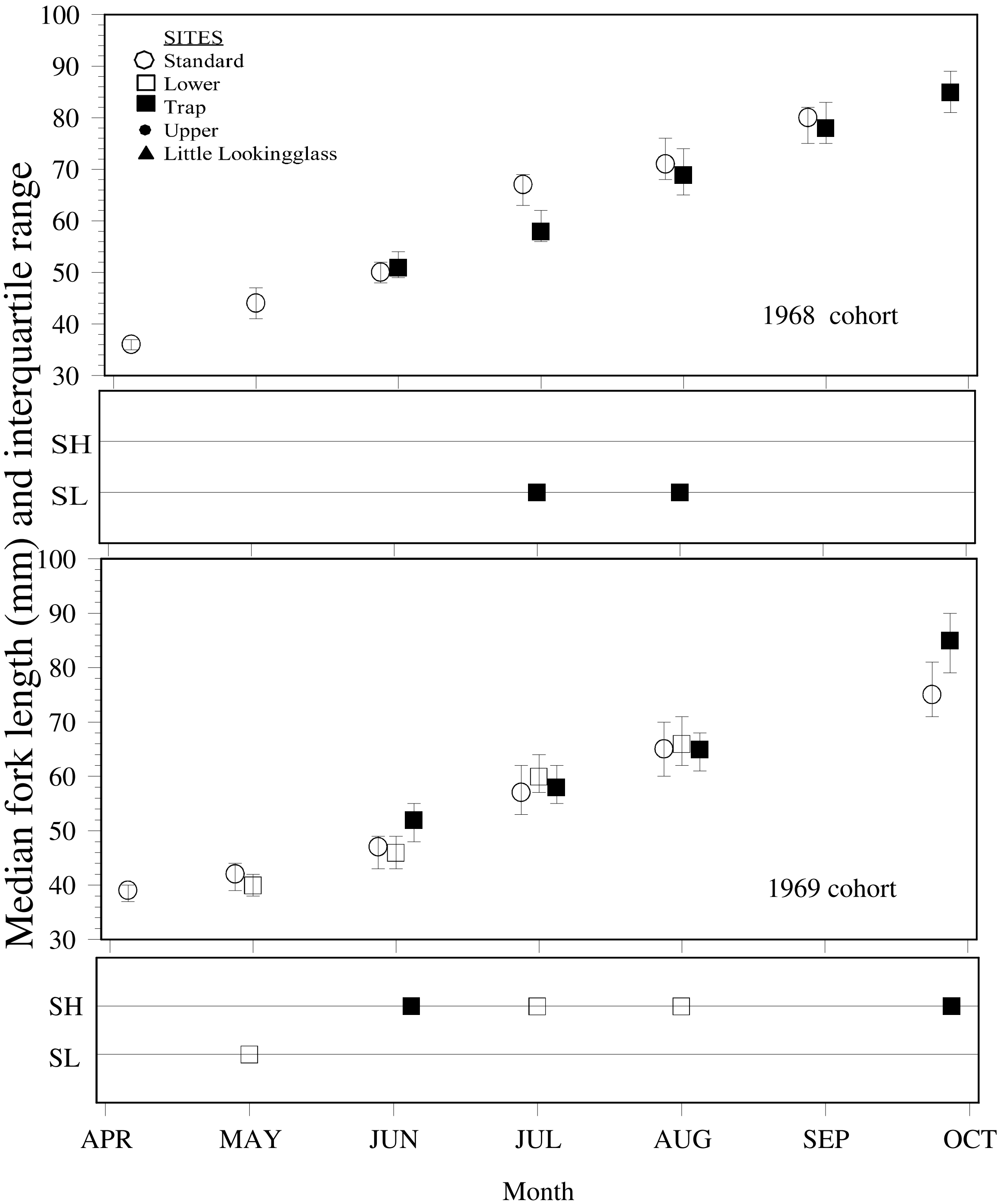

Figure 15 Comparison of juvenile spring Chinook salmon fork lengths from the standard sampling site to four other sites in the Lookingglass Creek basin for the 1968 and 1969 cohorts from April to October. Fork length data were collected around the 20^{th} of each month at all sites. Differences from the standard site are indicated in the box below each graph (SH=significantly higher, SL=significantly lower).

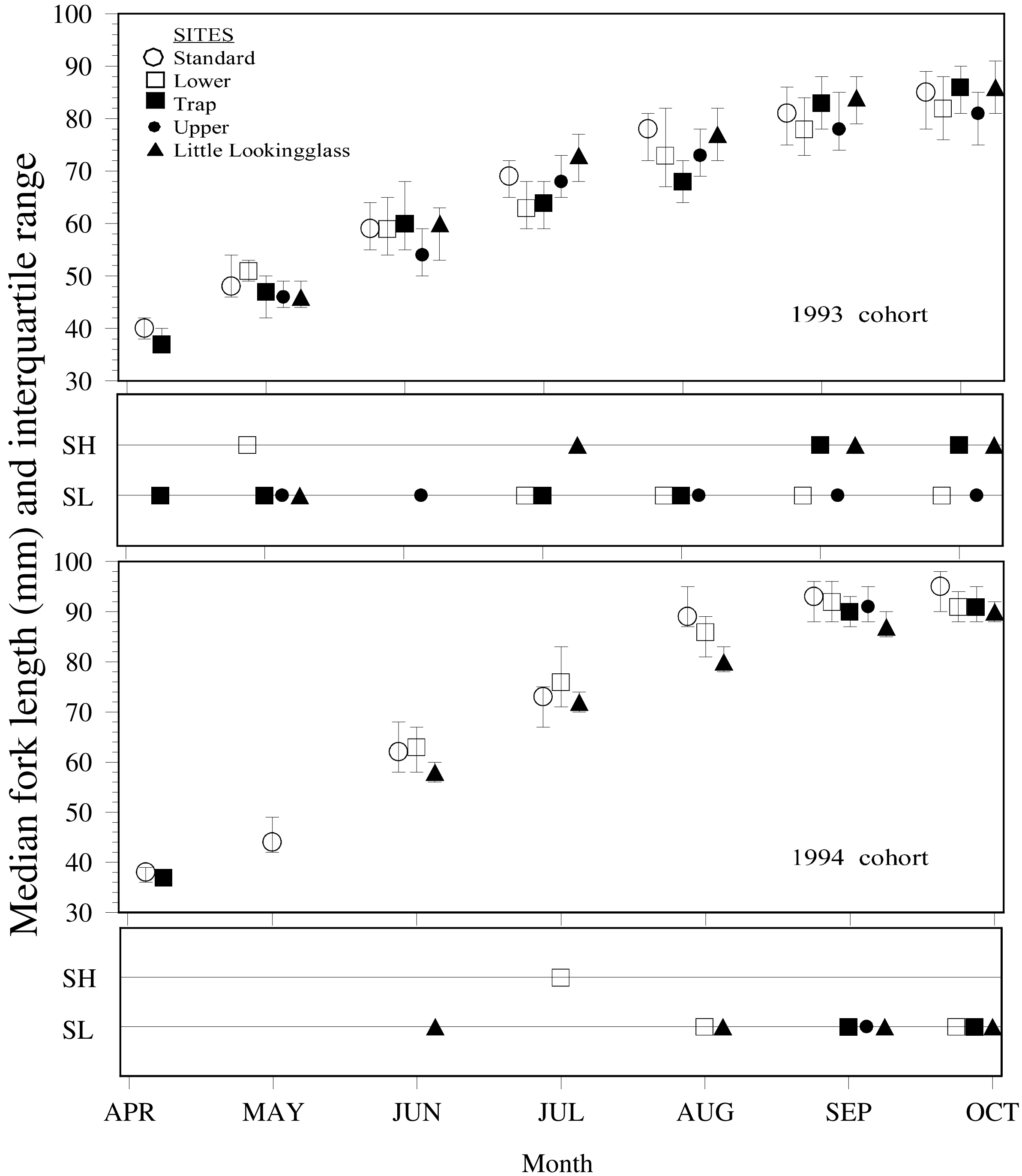

Figure 16 Comparison of juvenile spring Chinook salmon fork lengths from the standard sampling site to four other sites in the Lookingglass Creek basin for the 1993 and 1994 cohorts from April to October. Fork length data were collected around the 20th of each month at all sites. Differences from the standard site are indicated in the box below each graph (SH=significantly higher, SL=significantly lower).

At the standard site, comparisons of the median fork lengths, of the 1993 and 1994 cohorts to that of the range seen for the 1964 to 1969 cohorts, showed that the 1993 and 1994 cohorts were within or significantly greater than the range observed for the 1964 to 1969 cohorts at every month (Figure 17). When they were within the range observed, they were generally closer to the maximum.

Genetic Monitoring

We collected 63 juvenile spring Chinook salmon for genetic analysis for the NMFS genetics monitoring program in 1995. Seven fish were collected during PIT-tagging activities and the rest were collected from the screw trap.

Evaluation of PIT-tagging Adult Steelhead Trout

Seventeen of the twenty steelhead PIT-tagged adults that we opercle punched were identified by Wallowa Hatchery and ODFW research personnel at the time of spawning, 9 with cleithrum site punches (5 males and 4 females) and 8 with dorsal site punches (4 males and 4 females). Tags were detected in 16 of the 17 adult steelhead from about 1 to 15 cm between the body and the PIT tag reader. Most tags were detected at least 7-12 cm from the fish. One tag was never detected in one of the fish tagged at the cleithrum site. Only one of the insertion wounds had healed by the time of spawning.

Since the skin of adult steelhead nearing spawning was difficult to penetrate with the needle, we had difficulty placing the PIT tags immediately below the skin. In two fish that were dorsally tagged, blood vessels were broken at the insertion point, and hemorrhaging around the sterigiophores of the dorsal fin was noted. External bleeding (clotted) was noted in one of these two fish.

Extraction time was 15 to 60 seconds for each of 15 fish. Tag recovery took 5 minutes for one fish tagged at the dorsal site where the tag had been inserted deep in the muscle and ended up lying next to the sterigiophores. The tag was never found in one fish tagged at the cleithrum site. Shards of glass found at the tag site suggested the glass capsule had been shattered in the fish, perhaps at spawning, by a blow to the head. The end of one of the tags at the cleithrum site extended into the intraperitoneal cavity.

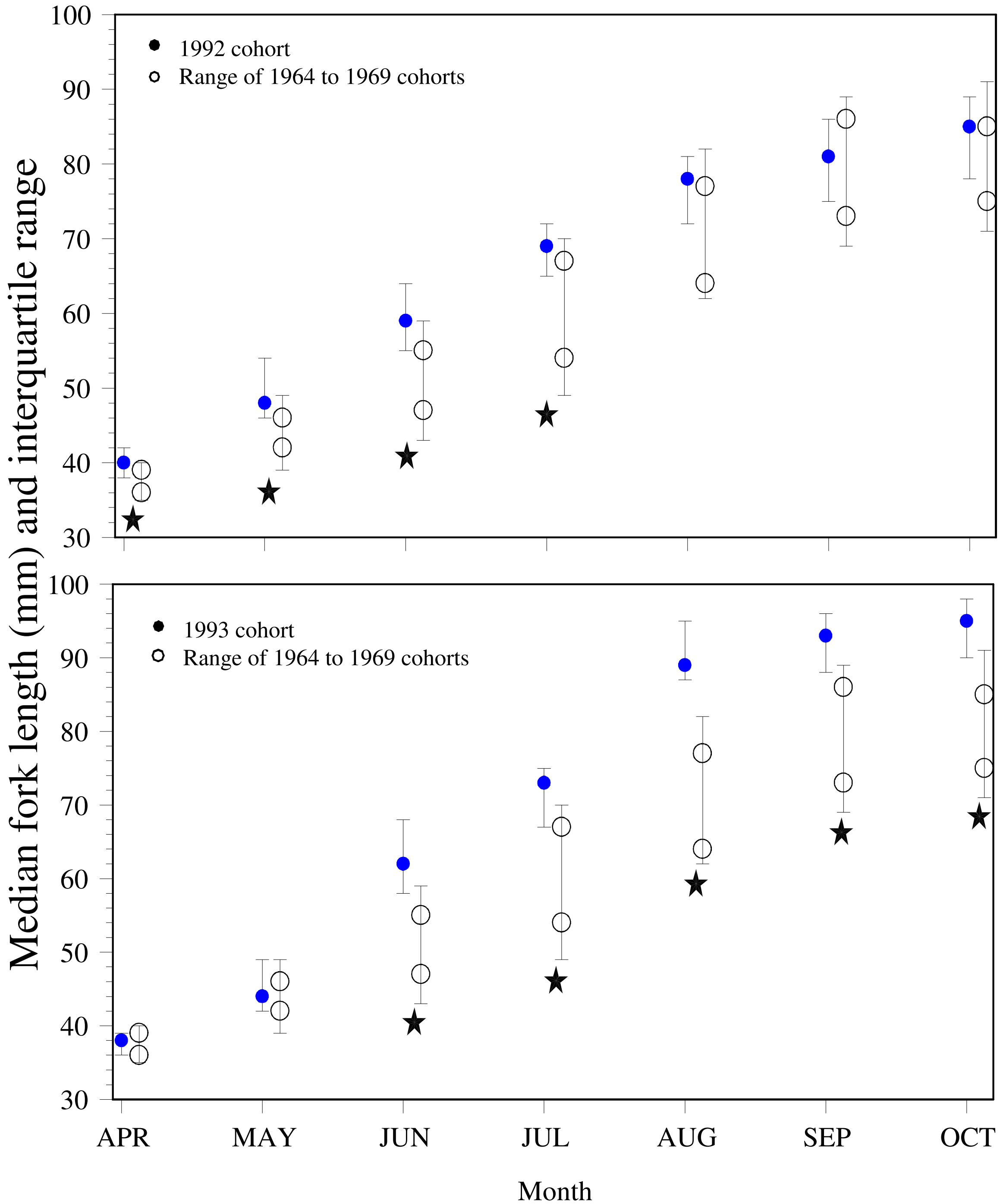

Figure 17 Comparison of juvenile spring Chinook salmon fork lengths at the standard site between the range seen for the 1964 to 1969 cohorts and the 1993 and 1994 cohorts from April to October. Fork length data were collected around the 20th of each month. Stars indicate a significant difference between the two data sets.

Discussion

The addition of a temperature monitoring site at rm 4.25 helped us determine that the data collected at rm 7.50 by the U.S. Forest Service (USFS) from 1992 to 1995 was not comparable to data collected from 1964 to 1971. Previously we had reported that peak weekly summer water temperatures recorded by the USFS at rm 7.50 were consistently lower than historic data (Lofy and McLean 1995a, 1995b; McLean and Lofy 1995). We had cautioned, however, that if differences between downstream and upstream sites (3.25 rm apart) were evident, comparison between temperatures recorded by the USFS and historic data would be inappropriate. The water temperatures seen at rm 4.25 for 1995 were similar to the maximum water temperatures seen at the same site from 1964 to 1971. Minimum temperatures (at least for the time periods during which data were collected at the 7.50 rm site) appeared generally similar among all four of the temperature monitoring sites in 1995 but were above the minimums recorded historically. The slightly warmer water temperatures (above the historic minimums and near the historic maximums) and low juvenile population densities may account for the larger size of the Rapid River stock compared to the endemic stock.

The two redds observed during spawning surveys suggested that the floating weir was relatively successful at precluding passage of adult spring Chinook salmon above the hatchery weir. Because the floating weir was installed later than desired (2 June, 1995), fish that built redds and/or that were recovered above the weir may have passed the weir site before installation.

Differences between cohorts in the arrival timing at Lower Granite Dam of the T3 group may have been due, at least in part, to dates of PIT-tagging at the screw trap. Arrival timing of the T3 group in a particular year may have much to do with dates individual fish were tagged. In 1994, more than half of the fish from the T3 group were already tagged by the time the first fish from the T3 group was detected at Lower Granite Dam (median tag date was 6 March). In contrast, in 1995 the first fish showed up earlier than the previous year, and the median tag date was about two weeks later (20 March).

Minimum survival rates of juvenile spring Chinook salmon were highly variable. In general, as might be expected, the later that a group was PIT-tagged, the higher the survival. The lower survival rate for the F1 group for the 1993 cohort compared to the 1992 cohort in Lookingglass Creek was generally similar to lower survival indices of the same two cohorts from other tributaries in the Grande Ronde River basin PIT-tagged in the fall (Sankovich et al. 1996).

PIT-tagging of adult steelhead suggested that this method may be useful in tracking individual adult salmonids. Tag reading distance and tag readability appeared adequate. Tag retrieval percentage was excellent (we retrieved all tags that were detected) and time required for retrieval (mostly less than 1 minute) seemed cost effective considering cost of the tags (~$3.00 each). However, some problems still remain in using PIT tags to track adult salmonids in a hatchery environment. From 7 to 21 days after tag placement, healing of the insertion wound had generally not occurred in adult steelhead. Because these fish were so close to spawning, and were in such poor condition, we were not surprised to find wounds that had not healed. Presumably, wounds would heal more quickly for most adult spring Chinook salmon at Lookingglass Hatchery because adult spring Chinook salmon would be in better condition at the time of tagging than the adult steelhead we PIT-tagged. We have observed numerous healed wounds on adult spring Chinook salmon that returned to Lookingglass Hatchery which appeared to have been the result of gaffing in Lookingglass Creek while a tribal fishery was underway (spring/summer of 1992 and 1993). The wound from PIT tag insertion would be much smaller than the gaff wounds observed and would be administered with a sterile instrument. Hemorrhaging generally did not appear to be a problem, although there was somewhat more bleeding in the dorsal sites than at the cleithrum sites. General indications were that readability of PIT tags did not differ between tagging sites. Two drawbacks were noted for tag placement at the cleithrum site. One was that the tag site was so close to the head that it could be impacted with a blow to the fish. This would only be a problem for fish that are killed in such a manner. Secondly, because of the short distance from the skin to the intraperitoneal cavity at the cleithrum location, the end of one of the tags extended into the intraperitoneal cavity. Had the tag ended up in the body cavity, retrieval would have been difficult and the potential for internal damage would have been greater. Either site would probably be adequate if care was taken during tag insertion and the fish were killed with a method other than a blow to the head.

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SECTION II

Assistance Provided to LSRCP Cooperators and Other Projects

We provided assistance to LSRCP cooperator ODFW in 1995 for ongoing hatchery evaluation research. Project personnel completed extensive spawning ground surveys for spring Chinook salmon in the Grande Ronde and Imnaha river basins. We provided assistance in pre-release sampling of juvenile summer steelhead at Irrigon Hatchery and the Little Sheep and Big Canyon acclimation facilities and spring Chinook salmon at Lookingglass Hatchery and the Imnaha River Facility. In addition, project personnel provided assistance in sampling adult spring Chinook salmon at Oregon LSRCP facilities. Assistance was provided in data summarization and analysis for ODFW monthly and annual progress reports. Data used in scale pattern analysis to differentiate hatchery and natural adult spring Chinook salmon were summarized and provided to the ODFW scale reading laboratory in Corvallis. Details of data collection, summarization and analysis are not included in this report and are available in ODFW reports. We assisted in designing and conducting an experiment to evaluate overnight drawdown as an option to release juvenile spring Chinook salmon from Lookingglass Hatchery.

We provided assistance to ODFW personnel who were starting to collect data on bull trout (*Salvelinus confluentus*) in the Grande Ronde River basin. We reviewed and provided comments on numerous draft bull trout proposals. We collected fork length and weight data, scales and genetic samples from bull trout captured in Lookingglass Creek in our screw trap and those captured in the Lookingglass Hatchery adult bypass. In addition, we have implanted PIT tags in bull trout we have captured.

We assisted a local high school student in completing an "Apprenticeship in Science and Engineering" project. Paul Price presented his findings for "The diet of *Oncorhynchus mykiss* in Lookingglass Creek in northeastern Oregon" with a poster and a slide presentation at a state-wide presentation. We also helped train local high school students to identify aquatic insects for an "Outdoors Day". We assisted Stevco Stefanoski, a local high school student, in designing an experiment to monitor the potential differences in aquatic macroinvertebrate communities in Catherine Creek above and below an effluent from a sewage treatment plant near the city of Union.

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Our thanks to Dan Herrig and Ed Crateau (United States Fish and Wildlife Service) for administering this contract and coordinating communication between CTUIR and other management and research entities. Gary James, Joe Richards and Michelle Thompson (CTUIR) provided technical and administrative support, particularly with contract modifications. Thanks go to members of the Research and Development Section of Oregon Department of Fish and Wildlife (ODFW) in La Grande: Rich Carmichael, Mike Flesher, Brian Jonasson, MaryLouise Keefe, Rhine Messmer, Steve Parker, Debbie Eddy, and Tim Whitesel for their assistance in the field and the office. Thanks to Craig Contor (CTUIR), Dan Herrig, Gary James, Tim Whitesel and Rich Carmichael for reviewing drafts of this report. Warren Groberg, Sam Onjukka and Karen Waln of ODFW Fish Pathology, La Grande, sampled adult spring Chinook salmon for pathogens and provided results. Thanks to ODFW employees: Brian Cannon, Misty Donaghy, Scott Stennfeld and Amy Wilson for assistance in capturing and PIT-tagging juvenile spring Chinook salmon in Lookingglass Creek. We thank Jo Miller (United States Geologic Survey) for providing stream flow data and Scott Wallace (United States Forest Service, Walla Walla District) for providing stream temperature data for 1995. Thanks go to ODFW Lookingglass and Wallowa Hatchery personnel: Robin Crisler, Bob Lund, Ken Danison, Greg Davis, Bob Jones, Mike Parish and numerous seasonal personnel for assisting in handling and tagging fish, allowing us the use of facilities at the hatchery, keeping an eye on the screw trap for us and especially for cheerfully offering assistance during emergency situations that helped us prevent or minimize damage to the trap during high water incidences that happened more often than usual in the spring and during the flood in December, 1995.

Special thanks to CTUIR technicians Cynthia Danison and Troy Rohweder for working under adverse conditions, often on weekends, collecting, handling and releasing fish, maintaining the screw trap and assisting in data analysis.

Appendices

Appendix Table A-1. Dates and marks used during trap efficiency estimation for the 1965 to 1969, 1992 and 1993 cohorts of juvenile spring Chinook salmon leaving Lookingglass Creek .

Month of efficiency estimation	Trap efficiency release dates	Trap efficiency recapture dates	Delayed recapture date range[a],(#)		Marks included in group[b]
1965 cohort					
Jun	06/13/66 - 06/24/66	06/14/66 - 06/27/66			LC
Jul	06/27/66 - 07/25/66	06/28/66 - 07/26/66	07/27/66 - 08/15/66,	(24)	LC
Aug	07/26/66 - 08/31/66	07/27/66 - 09/02/66	09/03/66 - 11/18/66	(41)	LA,LAA,RA
Sep	09/02/66 - 09/30/66	09/03/66 - 10/03/66	10/04/66 - 12/14/66	(18)	RA,RD
Oct	10/03/66 - 10/28/66	10/04/66 - 10/31/66	--		RD
Nov	10/31/66 - 11/30/66	11/01/66 - 12/02/66	12/05/66 - 05/03/67	(17)	RD
Dec	12/02/66 - 12/30/66	12/03/66 - 01/06/67	--		RP
Jan	01/06/67 - 01/27/67	01/09/67 - 02/06/67	--		RP
Feb	02/06/67 - 02/27/67	02/07/67 - 03/01/67	03/03/67 - 05/01/67	(4)	RP,LP
Mar	03/01/67 - 03/24/67	03/02/67 - 03/27/67	04/05/67	(1)	LP
Apr	04/03/67 - 04/28/67	04/04/67 - 05/01/67	--		LD
May	05/01/67 - 05/17/67	05/02/67 - 05/05/67	--		LD
Jun	06/07/67 - 06/23/67	06/08/67 - 06/27/67	--		LD
1966 cohort					
Jun	06/19/67 - 06/28/67	06/20/67 - 07/02/67	--		LC
Jul	07/02/67 - 07/28/67	07/03/67 - 07/31/67	--		LC
Aug	07/31/67 - 09/01/67	08/01/67 - 09/04/67	--		LC
Sep	09/04/67 - 09/29/67	09/05/67 - 10/02/67	--		LC
Oct	10/02/67 - 11/03/67	10/03/67 - 11/06/67	--		LC
Nov	11/06/67 - 12/01/67	11/07/67 - 12/04/67	--		LC
Dec	12/04/67 - 12/29/67	12/05/67 - 01/05/68	--		LC
Jan	01/02/68 - 02/01/68	01/03/68 - 02/05/68	02/08/68 - 02/13/68	(2)	LC
Feb	02/05/68 - 02/29/68	02/06/68 - 03/04/68	--		LA
Mar	03/04/68 - 03/28/68	03/05/68 - 04/01/68	--		LD
Apr	04/01/68 - 04/29/68	04/02/68 - 05/02/68	--		RA
May	05/02/68 - 05/31/68	05/03/68 - 06/03/68	--		RD
Jun	06/05/68 - 06/17/68	06/06/68 - 06/20/68			RD

Appendix Table A-1 (cont.). Dates and marks used during trap efficiency estimation for the 1965 to 1969, 1992 and 1993 cohorts of juvenile spring Chinook salmon leaving Lookingglass Creek.

Month of efficiency estimation	Trap efficiency release dates	Trap efficiency recapture dates	Delayed recapture date range[a],(#)		Marks included in group[b]
1967 cohort					
Jun	06/17/68 - 06/28/68	06/18/68 - 07/01/68	07/22/68	(1)	LC
Jul	07/01/68 - 07/26/68	07/02/68 - 07/29/68	07/30/68 - 10/25/68	(44)	LD,RD
Aug	07/29/68 - 08/30/68	07/30/68 - 09/03/68	09/04/68 - 11/01/68	(8)	LA
Sep	09/03/68 - 09/28/68	09/04/68 - 09/30/68	--		LP
Oct	09/30/68 - 11/01/68	10/01/68 - 11/06/68	11/07/68 - 04/21/69	(13)	LP,RP
Nov	11/06/68 - 11/22/68	11/07/68 - 11/25/68	01/16/69 - 02/10/69	(3)	RP
Dec	11/25/68 - 01/02/69	11/26/68 - 01/06/69	--		RDA
Jan	01/06/69 - 01/30/69	01/07/69 - 02/07/69	--		RDA
Feb	02/07/69 - 02/27/69	02/08/69 - 03/03/69	03/31/69 - 04/14/69	(3)	RDA
Mar	03/03/69 - 03/31/69	03/04/69 - 04/02/69	--		LDA
Apr	04/02/69 - 05/02/69	04/03/69 - 05/05/69	--		LDA
May	05/05/69 - 05/28/69	05/06/69 - 06/30/69	--		LDA
Jun	None released				
1968 cohort					
Jun	06/06/69 - 06/27/69	06/07/69 - 06/30/69	--		LV
Jul	06/30/69 - 08/01/69	07/01/69 - 08/04/69	--		LV
Aug	08/04/69 - 08/30/69	08/05/69 - 09/02/69	--		LV
Sep	09/02/69 - 09/26/69	09/03/69 - 09/29/69	10/02/69 - 01/21/70	(28)	LV,RV
Oct	09/29/69 - 10/31/69	09/30/69 - 11/03/69	--		RV
Nov	11/03/69 - 11/28/69	11/04/69 - 12/01/69	--		RV
Dec	12/01/69 - 12/31/69	12/02/69 - 01/02/70	01/05/70 - 01/21/70	(5)	RV
Jan	01/02/70 - 01/29/70	01/03/70 - 02/02/70	--		LC
Feb	02/02/70 - 02/26/70	02/03/70 - 03/02/70	--		LC
Mar	03/02/70 - 03/26/70	03/03/70 - 03/30/70	--		LC
Apr	03/30/70 - 04/29/70	03/31/70 - 05/01/70	--		LC
May	05/01/70 - 05/29/70	05/02/70 - 06/29/70	--		LC
Jun	None released				

Appendix Table A-1 (cont.). Dates and marks used during trap efficiency estimation for the 1965 to 1969, 1992 and 1993 cohorts of juvenile spring Chinook salmon leaving Lookingglass Creek.

Month of efficiency estimation	Trap efficiency release dates	Trap efficiency recapture dates	Delayed recapture date range[a],(#)		Marks included in group[b]
1969 cohort					
Jun	06/15/70 - 07/03/70	06/16/70 - 07/06/70	--		LV
Jul	07/06/70 - 07/31/70	07/07/70 - 08/03/70	--		LV
Aug	08/03/70 - 09/05/70	08/04/70 - 09/08/70	--		LV
Sep	09/08/70 - 09/29/70	09/09/70 - 10/02/70	10/09/70 - 04/26/71	(24)	LV,RV
Oct	10/02/70 - 10/30/70	10/03/70 - 11/04/70	--		RV
Nov	11/04/70 - 12/04/70	11/05/70 - 12/07/70	--		RV
Dec	12/07/70 - 12/31/70	12/08/70 - 01/08/71	01/11/71 - 01/25/71	(5)	RV
Jan	01/08/71 - 01/28/71	01/09/71 - 02/02/71	--		LC
Feb	02/02/71 - 02/25/71	02/03/71 - 03/01/71	--		LC
Mar	03/01/71 - 04/02/71	03/02/71 - 04/05/71	--		LC
Apr	04/05/71 - 04/29/71	04/06/71 - 05/01/71	--		LC
May	05/01/71 - 06/04/71	05/02/71 - 06/07/71	--		LC
Jun	None released				
1992 cohort					
Nov	10/31/93 - 11/13/93	11/02/93 - 11/15/93	01/19/93	(1)	LC,TC,LV,RV
Dec	None released				
Jan	01/02/94 - 01/21/94	01/04/94 - 01/28/94	02/07/94	(1)	RV,TC
Feb	02/25/94	03/01/94	--		LV
Mar	03/01/94 - 03/21/94	03/02/94 - 03/23/94	--		
LC,TCLC,RV,LV					
					LV,RV,RVLC
Apr	None released				
May	None released				
Jun	None released				

Appendix Table A-1 (cont.). Dates and marks used during trap efficiency estimation for the 1965 to 1969, 1992 and 1993 cohorts of juvenile spring Chinook salmon leaving Lookingglass Creek.

Month of efficiency estimation	Trap efficiency release dates	Trap efficiency recapture dates	Delayed recapture date range[a],(#)		Marks included in group[b]
1993 cohort					
Mar	03/25/94 - 03/30/94	03/26/94 - 04/01/94	--		LC,TC
Apr	04/23/94 - 04/29/94	04/24/94 - 05/02/94	--		LC,TC,D
May	05/16/94 - 05/29/94	05/17/94 - 06/02/94	06/06/94 - 06/10/94	(2)	LC,TC,ABTC,
Jun	06/02/94 - 06/17/94	06/06/94 - 06/19/94	08/01/94	(1)	LC,TC,RVTC
Jul	07/03/94	07/05/94 - 07/25/94	08/01/94	(1)	TC,LV
Aug	08/03/94 - 08/19/94	08/05/94 - 08/31/94	09/01/94 - 01/16/95	(6)	LC,TC
Sep	09/01/94 - 09/30/94	09/03/94 - 10/03/94	10/10/94 - 11/30/94	(5)	LV,LC,D
Oct	10/07/94 - 10/15/94	10/08/94 - 10/17/94	01/16/95	(1)	RVLC,TC
Nov	11/01/94	11/03/94 - 11/30/94	12/02/94	(2)	TC
Dec	12/02/94	12/05/94	--		LC
Jan	01/11/95 - 01/18/95	01/18/95	--		LV,RV,LVLC
Feb	02/06/95	02/08/95	--		RVTC
Mar	03/10/95 - 03/26/95	03/17/95 - 03/29/95	--		TC,LC,LVTC
Apr	None released				
May	None released				
Jun	None released				

[a] Delayed recaptures are fish recaptured in the trap after the period had ended.

[b] Mark codes for the trap efficiency releases and recaptures:

LA=Branded left anterior astride lateral line
LAA=Branded left anterior above lateral line
LD=Branded left dorsal astride lateral line
LDA=Branded left dorsal above lateral line
LP=Branded left posterior astride lateral line
RA=Branded right anterior astride lateral line
RD=Branded right dorsal astride lateral line
RDA=Branded right dorsal above lateral line
RP=Branded right posterior astride lateral line
AA=Anterior anal fin clip
ABA=Anal fin Alcian Blue mark

ABC=Lower caudal Alcian Blue mark
ABTC=Upper caudal Alcian Blue mark
D=Dorsal fin clip
LC=Lower caudal fin clip
LV=Left pelvic fin clip
LVBC=Left ventral and lower caudal fin clips
LVTC=Left pelvic and upper caudal fin clips combination
RV=Right pelvic fin clip
RVBC =Right ventral and lower caudal fin clips combination
LVBC=Left ventral and lower caudal fin clips combination

Appendix Table A-1 (cont.). Dates and marks used during trap efficiency estimation for the 1965 to 1969, 1992 and 1993 cohorts of juvenile spring Chinook salmon leaving Lookingglass Creek.

Month of efficiency estimation	Trap efficiency release dates	Trap efficiency recapture dates	Delayed recapture date range[a],(#)	Marks included in group[b]

D=Dorsal fin clip
LC=Lower caudal fin clip
LV=Left pelvic fin clip
RVTC=Right ventral and upper caudal fin clips
TC=Upper caudal fin clip
TCLC=Upper and lower caudal clip

Appendix Table A-2. Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts .

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
25-Feb-66	1.6	First fish from the 65 cohort	65	2	2.0							
26-Feb-66			65		0.1							
27-Feb-66			65		0.1							
28-Feb-66	1.7		65		0.1							
01-Mar-66			65		0.1							
02-Mar-66	1.6		65		0.1							
03-Mar-66			65		0.1							
04-Mar-66	1.6		65		0.1							
05-Mar-66			65		0.1							
06-Mar-66			65		0.1							
07-Mar-66	1.6		65	1	0.1							
08-Mar-66			65		0.5							
09-Mar-66	3.9		65	1	0.5							
10-Mar-66			65		1.0							
11-Mar-66	3.3		65	2	1.0							
12-Mar-66			65		0.2							
13-Mar-66			65		0.2							
14-Mar-66	4.2		65		0.2							
15-Mar-66			65		0.2							
16-Mar-66			65		0.2							
17-Mar-66			65		0.2							
18-Mar-66	2.8		65	2	0.8							
19-Mar-66			65		0.1							
20-Mar-66			65		0.1							
21-Mar-66	2.7		65		0.1							
22-Mar-66	2.5		65		0.1							
23-Mar-66	2.5		65		0.1							
24-Mar-66			65		0.1							
25-Mar-66	2.7		65		0.1							
26-Mar-66			65		0.1							
27-Mar-66			65		0.1							
28-Mar-66	3.9		65		0.1							
29-Mar-66			65		0.1							
30-Mar-66	5.7		65	2	0.9							
31-Mar-66			65		0.2							
01-Apr-66	6.6	Screen plugged trap overflow	65		0.2							
02-Apr-66			65		0.2							
03-Apr-66	6.4	Stopped trap	65	1	0.4							
04-Apr-66			65		---							
05-Apr-66			65		---							
06-Apr-66	8.8		65		---							
07-Apr-66			65		---							
08-Apr-66			65		---							
09-Apr-66	8.1	Started trap	65		---							
10-Apr-66	8.1		65		1.0							
11-Apr-66	8.3	Screen plugged trap overflow	65	2	1.0							
12-Apr-66	7.8		65	1	1.0							
13-Apr-66	6.9		65	5	5.0							
14-Apr-66			65		0.5							
15-Apr-66	6.7		65	1	0.5							
16-Apr-66			65		0.1							
17-Apr-66			65		0.1							
18-Apr-66	7.2		65		0.1							
19-Apr-66			65		0.1							
20-Apr-66			65		0.1							
21-Apr-66	5.9		65	1	0.5							
22-Apr-66	5.4		65		0.2							
23-Apr-66			65		0.2							
24-Apr-66			65		0.2							
25-Apr-66	6.4		65	1	0.4							
26-Apr-66			65		0.4							
27-Apr-66	6.2		65		0.4							
28-Apr-66			65		0.4							
29-Apr-66	5.9		65		0.4							
30-Apr-66			65		0.4							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-66			65		0.4							
02-May-66	7.6		65	3	0.6							
03-May-66			65		0.1							
04-May-66			65		0.1							
05-May-66			65		0.1							
06-May-66	16.1		65		0.1							
07-May-66			65		0.1							
08-May-66	16.7		65		0.1							
09-May-66	12.6	Trap entrance plugged	65	1	0.4							
10-May-66			65		0.2							
11-May-66	10.8		65		0.2							
12-May-66			65		0.2							
13-May-66	8.4		65	1	0.4							
14-May-66			65		0.6							
15-May-66			65		0.6							
16-May-66	6.2		65	2	0.8							
17-May-66			65		0.5							
18-May-66	5.4		65	1	0.5							
19-May-66			65		0.4							
20-May-66	5.7		65		0.4							
21-May-66			65		0.4							
22-May-66			65		0.4							
23-May-66	5.7		65	2	0.4							
24-May-66			65		2.5							
25-May-66	5.4		65	5	2.5							
26-May-66	5.8		65		2.0							
27-May-66	6.2		65	4	2.0							
28-May-66	6.1		65		1.0							
29-May-66			65	2	1.0							
30-May-66			65		1.0							
31-May-66	5.1		65	2	1.0							
01-Jun-66	4.7		65		0.1							
02-Jun-66	4.5		65		0.1							
03-Jun-66	5.1		65		0.1							
04-Jun-66			65		0.1							
05-Jun-66			65		0.1							
06-Jun-66	4.0		65	1	0.5							
07-Jun-66	3.9		65		1.5							
08-Jun-66	3.9		65	3	1.5							
09-Jun-66	4.0		65		8.0							
10-Jun-66	3.9		65	16	8.0							
11-Jun-66			65		9.7							
12-Jun-66			65		9.7							
13-Jun-66	3.5		65	29	9.6	a29						
14-Jun-66	3.5		65		6.5							
15-Jun-66	3.3		65	13	6.5	a13						
16-Jun-66	3.2		65		2.5							
17-Jun-66	3.1		65	5	2.5	a5						
18-Jun-66	3.0		65		8.3							
19-Jun-66	2.9		65		8.3							
20-Jun-66	2.8		65	25	8.4	a25						
21-Jun-66	2.6		65		22.5							
22-Jun-66	2.6		65	45	22.5	a45						
23-Jun-66	2.6		65		41.5							
24-Jun-66	2.5		65	83	41.5	a76	a1					
25-Jun-66			65		22.7							
26-Jun-66			65		22.7							
27-Jun-66	2.3		65	68	22.6	a66						
28-Jun-66			65		18.0							
29-Jun-66	2.2		65	36	18.0	a36	a2					
30-Jun-66	2.1		65		18.5							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jul-66	2.2		65	37	18.5	a36	a2					
02-Jul-66			65		71.0							
03-Jul-66	2.4	Trap entrance partially plugged	65	142	71.0	a141	a8					
04-Jul-66			65		49.0							
05-Jul-66	2.1		65	98	49.0	a92	a13					
06-Jul-66	2.0		65	33	33.0	a33	a9					
07-Jul-66	1.9		65		40.0							
08-Jul-66	1.9		65	80	40.0	a79	a8					
09-Jul-66			65		50.3							
10-Jul-66			65		50.3							
11-Jul-66	1.9		65	151	50.4	a146	a15					
12-Jul-66	1.9		65	146	146.0	a142	a55					
13-Jul-66	1.9	Trap entrance partially plugged	65	120	120.0	a119	a44					
14-Jul-66	1.9		65	237	237.0	a230	a52					
15-Jul-66	1.8		65	289	289.0	a283	a109					
16-Jul-66			65		262.0							
17-Jul-66			65		262.0							
18-Jul-66	1.7		65	786	262.0	a774	a137					
19-Jul-66	1.7		65	309	309.0	a306	a322					
20-Jul-66	1.7		65	327	327.0	a322	a158					
21-Jul-66	1.6		65	472	472.0	a469	a186					
22-Jul-66	1.5		65	413	413.0	a393	a262					
23-Jul-66			65		293.7							
24-Jul-66			65		293.7							
25-Jul-66	1.5		65	881	293.4	a874	a215					
26-Jul-66	1.5		65	438	438.0	c425	a373					
27-Jul-66	1.5		65	349	349.0	b348	c187a11					
28-Jul-66	1.4		65	285	285.0	b271	b156c18a5					
29-Jul-66	1.4		65	238	238.0	b236	b146c6a3					
30-Jul-66			65		81.7							
31-Jul-66			65		81.7							
01-Aug-66	1.4	Trap entranc mostly plugged	65	245	81.6	b241	b125c2					
02-Aug-66	1.4		65	130	130.0	b130	b113					
03-Aug-66	1.4		65		243.0							
04-Aug-66	1.4		65		243.0							
05-Aug-66	1.4		65	730	244.0	b711	b103a3					
06-Aug-66			65		379.6							
07-Aug-66			65		379.7							
08-Aug-66	1.4		65	1139	379.7	b1123	b387a1					
09-Aug-66	1.4		65		345.0							
10-Aug-66	1.4		65	690	345.0	b685	b612					
11-Aug-66	1.4		65	340	340.0	b340	b371					
12-Aug-66	1.4		65	363	363.0	b360	b244					
13-Aug-66			65		287.0							
14-Aug-66	1.4		65		287.0							
15-Aug-66	1.4		65	861	287.0	b860	b224c1a1					
16-Aug-66	1.4		65	185	185.0	d185	b504					
17-Aug-66	1.4		65	145	145.0	d145	d116b38					
18-Aug-66	1.4		65	154	154.0	d152	d110b9					
19-Aug-66	1.3		65		146.5							
20-Aug-66	1.3		65	293	146.5	d293	d99					
21-Aug-66			65		151.5							
22-Aug-66	1.3		65	303	151.5	d297	d189b1					
23-Aug-66	1.4		65	114	114.0	d112	d141					
24-Aug-66	1.3		65		100.0							
25-Aug-66	1.4		65		100.0							
26-Aug-66	1.4		65	300	100.0	d298	d93					
27-Aug-66			65		269.0							
28-Aug-66	1.4		65	538	269.0	d536	d175b6					
29-Aug-66	1.5		65		135.50							
30-Aug-66	1.4		65	271	135.5	d268	d257b3					
31-Aug-66	1.4	Trap entrance plugged	65	58	58.0	d57	d44b1					

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-66	1.3		65		67.0							
02-Sep-66	1.3	Trap entrance plugged	65	134	67.0	d132	d46					
03-Sep-66			65		109.5							
04-Sep-66	1.3		65	219	109.5	d217	d97					
05-Sep-66			65		83.5							
06-Sep-66	1.4		65	167	83.5	d167	d144					
07-Sep-66	1.4		65	99	99.0	d97	d133					
08-Sep-66			65		80.0							
09-Sep-66	1.4		65	160	80.0	d158	d68					
10-Sep-66			65		172.3							
11-Sep-66			65		172.3							
12-Sep-66	1.4		65	517	172.4	d506	d115b3					
13-Sep-66	1.4		65		379.0							
14-Sep-66	1.7		65	758	379.0	d754	d267b8					
15-Sep-66	1.4		65	498	498.0	d492	d417b2					
16-Sep-66	1.4		65	173	173.0	d173	d327					
17-Sep-66			65		73.7							
18-Sep-66	1.4		65		73.7							
19-Sep-66	1.4		65	221	73.6	e217	d123					
20-Sep-66	1.4	Trap entrance plugged	65	69	69.0	e68	e127d3					
21-Sep-66			65		42.0							
22-Sep-66	1.4	Trap entrance plugged	65	84	42.0	e84	e46					
23-Sep-66	1.4		65	56	56.0	e56	e51d1					
24-Sep-66			65		50.7							
25-Sep-66			65		50.7							
26-Sep-66	1.4		65	152	50.6	e150	e40d1					
27-Sep-66	1.4		65	69	69.0	e68	e83d1					
28-Sep-66	1.4		65		15.5							
29-Sep-66			65	31	15.5	e29	e30b1					
30-Sep-66	1.4		65	16	16.0	e16	e16					
01-Oct-66			65		287.3							
02-Oct-66			65		287.3							
03-Oct-66	1.4		65	862	287.4	e860	e23b5d3					
04-Oct-66	1.4		65	292	292.0	e290	e413					
05-Oct-66	1.4		65	185	185.0	e185	e182					
06-Oct-66	1.4		65	117	117.0	e117	e136					
07-Oct-66	1.4		65	94	94.0	e94	e103					
08-Oct-66			65		146.0							
09-Oct-66			65		146.0							
10-Oct-66	1.4		65	438	146.0	e435	e71b3					
11-Oct-66	1.4		65	159	159.0	e158	e239b1d1					
12-Oct-66			65		290.0							
13-Oct-66			65		290.0							
14-Oct-66	1.4		65	870	290.0	e867	e143b1d3					
15-Oct-66			65		238.0							
16-Oct-66			65		238.0							
17-Oct-66	1.4		65	714	238.0	e712	e550b3					
18-Oct-66	1.4		65	152	152.0	e150	e355b1					
19-Oct-66	1.4		65	185	185.0	e185	e88					
20-Oct-66	1.4		65	249	249.0	e247	e122b1d1					
21-Oct-66	1.5		65	393	393.0	e393	e189					
22-Oct-66			65		359.3							
23-Oct-66			65		359.3							
24-Oct-66		Screen plugged trap overflow	65	1078	359.4	e1075	e198b3c1d3					
25-Oct-66	1.8		65	272	272.0	e272	e389d1					
26-Oct-66	1.8		65	187	187.0	e185	e118b2c2d2					
27-Oct-66	1.7	Trap entrance plugged	65	48	48.0	e48	e38d2					
28-Oct-66	1.6	Trap entrance plugged	65	42	42.0	e40	e33d1					
29-Oct-66			65		12.0							
30-Oct-66			65		12.0							
31-Oct-66	1.6	Trap entrance plugged	65	36	12.0	e36	e15					

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Nov-66	1.6	Trap entrance partially plugged	65	74	74.0	e72	e20					
02-Nov-66	1.6		65	46	46.0	e46	e34d1					
03-Nov-66	1.5		65	71	71.0	e71	e30d1					
04-Nov-66	1.5		65	68	68.0	e68	e34b1					
05-Nov-66			65		86.0							
06-Nov-66			65		86.0							
07-Nov-66	1.5		65	258	86.0		e46d1					
08-Nov-66	1.5		65	52	52.0		e1					
09-Nov-66			65		118.0							
10-Nov-66	1.6		65	235	117.0		e4					
11-Nov-66	1.5		65	33	33.0							
12-Nov-66			65		119.3							
13-Nov-66			65		119.3							
14-Nov-66	2.2	Trap entrance plugged	65	358	119.4	e358	e6b2					
15-Nov-66	2.2		65	56	56.0	e56	e105					
16-Nov-66	3.0	Screen plugged trap overflow	65	80	80.0	e79	e36b1					
17-Nov-66	2.1		65		20.2							
18-Nov-66			65		20.2							
19-Nov-66			65		20.2							
20-Nov-66			65		20.2							
21-Nov-66	1.9		65	101	20.2	e100	e7					
22-Nov-66	1.8		65	13	13.0	e13	e25					
23-Nov-66	1.7		65		9.8							
24-Nov-66			65		9.8							
25-Nov-66			65		9.8							
26-Nov-66			65		9.8							
27-Nov-66			65		9.8							
28-Nov-66			65	59	10.0	e59	e11					
29-Nov-66	1.7		65	8	8.0	e8	e14					
30-Nov-66	1.8		65	5	5.0	e5	e7					
01-Dec-66			65		8.5							
02-Dec-66	2.3		65	17	8.5	f17	e8					
03-Dec-66			65		6.0							
04-Dec-66			65		6.0							
05-Dec-66	2.2		65	18	6.0	f18	f3e1					
06-Dec-66			65		7.5							
07-Dec-66	1.9		65	15	7.5	f15	f5					
08-Dec-66			65		10.0							
09-Dec-66	1.7		65	20	10.0	f20	f7					
10-Dec-66			65		13.3							
11-Dec-66			65		13.3							
12-Dec-66	1.8		65	40	13.4	f40	f10					
13-Dec-66			65		11.0							
14-Dec-66	3.6		65	22	11.0	f22	f14d1					
15-Dec-66			65		10.0							
16-Dec-66	2.0		65	20	10.0	f20	f1					
17-Dec-66			65		4.7							
18-Dec-66			65		4.7							
19-Dec-66	1.6		65	14	4.6	f14	f2					
20-Dec-66			65		9.0							
21-Dec-66	1.6		65	18	9.0	f17	f1					
22-Dec-66			65		5.0							
23-Dec-66	1.4		65	10	5.0	f10	f1e1					
24-Dec-66			65		3.3							
25-Dec-66			65		3.3							
26-Dec-66			65		3.3							
27-Dec-66	1.3		65	13	3.1	f12	f3					
28-Dec-66			65		4.0							
29-Dec-66			65		4.0							
30-Dec-66	1.4	Stopped trap	65	12	4.0	f12	f2e1					
31-Dec-66			65		---							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jan-67			65		---							
02-Jan-67			65		---							
03-Jan-67	1.4	Started trap	65		---							
04-Jan-67			65		8.7							
05-Jan-67			65		8.7							
06-Jan-67	1.4		65	26	8.6	f26	f2e1					
07-Jan-67			65		7.0							
08-Jan-67			65		7.0							
09-Jan-67	1.4		65	21	7.0	f19	f5e1					
10-Jan-67			65		4.5							
11-Jan-67	1.4		65	9	4.5	f9	f7e2					
12-Jan-67			65		4.0							
13-Jan-67			65		4.0							
14-Jan-67			65		4.0							
15-Jan-67			65		4.0							
16-Jan-67	3.7		65	20	4.0	f20	f4e1	66	1	1.0		
17-Jan-67			65		3.0			66				
18-Jan-67	2.4		65	6	3.0	f5		66	0			
19-Jan-67			65		6.0			66				
20-Jan-67	2.3		65	12	6.0	f9	f1e1	66	0			
21-Jan-67			65		1.3			66				
22-Jan-67			65		1.3			66				
23-Jan-67	1.8		65	4	1.4	f4	f1	66	0			
24-Jan-67	1.7		65		3.0			66				
25-Jan-67	1.8		65	6	3.0	f6	f1	66	0			
26-Jan-67			65		1.5			66				
27-Jan-67	1.9		65	3	1.5	f3	f1e1	66	0			
28-Jan-67			65		10.0			66				
29-Jan-67			65		10.0			66				
30-Jan-67	5.8		65	30	10.0	f27	f4	66	0			
31-Jan-67			65		2.5			66				
01-Feb-67	4.6		65	5	2.5	f5		66	0			
02-Feb-67			65		1.0			66				
03-Feb-67	3.7		65	2	1.0			66	0			
04-Feb-67			65		2.0			66				
05-Feb-67			65		2.0			66				
06-Feb-67	3.2		65	6	2.0	f5	e1	66	0			
07-Feb-67			65		1.5			66				
08-Feb-67	3.0		65	3	1.5	f3		66	0			
09-Feb-67			65		3.5			66				
10-Feb-67	2.9		65	7	3.5	f7		66	0			
11-Feb-67			65		2.5			66				
12-Feb-67			65		2.5			66				
13-Feb-67			65		2.5			66				
14-Feb-67	2.6		65	10	2.5	f10	f2e1	66	0			
15-Feb-67			65		3.0			66		0.7		
16-Feb-67			65		3.0			66		0.7		
17-Feb-67	2.5		65	9	3.0	g9	f2	66	2	0.6		
18-Feb-67			65		2.7			66				
19-Feb-67			65		2.7			66				
20-Feb-67	2.3		65	8	2.6	g8	g2	66	0			
21-Feb-67	2.6		65		1.5			66				
22-Feb-67			65		1.5			66				
23-Feb-67			65		1.5			66				
24-Feb-67	2.5		65	6	1.5	g6		66	0			
25-Feb-67			65		5.0			66				
26-Feb-67			65		5.0			66				
27-Feb-67	2.4		65	15	5.0	g15	g1	66	0			
28-Feb-67			65		4.0			66		0.5		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Mar-67	2.6		65	8	4.0	g8	g1	66	1	0.5		
02-Mar-67			65		3.0			66		0.5		
03-Mar-67	2.5		65	6	3.0	g6		66	1	0.5		
04-Mar-67			65		5.0			66		0.3		
05-Mar-67			65		5.0			66		0.3		
06-Mar-67	2.3		65	15	5.0	g15	g3	66	1	0.4		
07-Mar-67			65		3.0			66		6.5		
08-Mar-67	2.3		65	6	3.0	g5	g3	66	13	6.5		
09-Mar-67			65		9.5			66		10.5		
10-Mar-67	2.4		65	19	9.5	g19	g1	66	21	10.5		
11-Mar-67			65		10.3			66		4.3		
12-Mar-67			65		10.3			66		4.3		
13-Mar-67	2.2		65	31	10.4	g31	g4	66	13	4.4		
14-Mar-67			65		8.0			66		8.0		
15-Mar-67	2.1		65	16	8.0	g16	g6	66	16	8.0		
16-Mar-67			65		25.0			66		20.5		
17-Mar-67	2.8		65	50	25.0	g50	g7	66	41	20.5		
18-Mar-67			65		8.7			66		10.7		
19-Mar-67			65		8.7			66		10.7		
20-Mar-67	3.4		65	26	8.6	g26	g5	66	32	10.6		
21-Mar-67			65		12.0			66		8.5		
22-Mar-67	3.6		65	24	12.0	g24	g2	66	17	8.5		
23-Mar-67			65		8.5			66		13.5		
24-Mar-67			65	17	8.5	g17	g4	66	27	13.5		
25-Mar-67			65		7.3			66		4.0		
26-Mar-67			65		7.3			66		4.0		
27-Mar-67	3.7	Stopped trap	65	22	7.4		g1e1	66	12	4.0		
28-Mar-67			65		---			66		---		
29-Mar-67			65		---			66		---		
30-Mar-67			65		---			66		---		
31-Mar-67			65		---			66		---		
01-Apr-67	3.2	Started trap	65		---			66		---		
02-Apr-67			65		26.5			66		50.0		
03-Apr-67	3.1		65	53	26.5	h52	f1	66	100	50.0		
04-Apr-67			65		17.5			66		26.0		
05-Apr-67	3.6		65	35	17.5	h35	h7g1	66	52	26.0		
06-Apr-67			65		19.5			66		20.5		
07-Apr-67	3.8		65	39	19.5	h38	h4f1	66	41	20.5		
08-Apr-67			65		10.0			66		11.3		
09-Apr-67			65		10.0			66		11.3		
10-Apr-67	4.4		65	30	10.0	h30	h1e2	66	34	11.4		
11-Apr-67			65		10.5			66		15.5		
12-Apr-67	4.8		65	21	10.5	h21	h3f1	66	31	15.5		
13-Apr-67			65		5.5			66		8.5		
14-Apr-67	4.8		65	11	5.5	h11	h2	66	17	8.5		
15-Apr-67			65		4.3			66		3.0		
16-Apr-67			65		4.3			66		3.0		
17-Apr-67	4.2		65	13	4.4	h12	e1f1	66	9	3.0		
18-Apr-67	4.2		65		2.5			66		3.5		
19-Apr-67	4.2		65	5	2.5	h5		66	7	3.5		
20-Apr-67	4.2		65		2.0			66		2.0		
21-Apr-67	3.8		65	4	2.0	h4	h1	66	4	2.0		
22-Apr-67			65		0.7			66		0.0		
23-Apr-67			65		0.7			66		0.0		
24-Apr-67	3.6		65	2	0.6	h2	h1	66	0	0.0		
25-Apr-67			65		2.5			66		1.5		
26-Apr-67	3.6		65	5	2.5	h4		66	3	1.5		
27-Apr-67			65		3.5			66		0.5		
28-Apr-67	3.6		65	7	3.5	h7		66	1	0.5		
29-Apr-67			65		4.0			66		1.7		
30-Apr-67			65		4.0			66		1.7		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-67	3.3		65	12	4.0	h12	h1f1	66	5	1.6		
02-May-67	3.4		65		3.5			66		3.0		
03-May-67	4.0		65	7	3.5	h7	h1e1	66	6	3.0		
04-May-67			65		2.5			66		3.0		
05-May-67	5.4		65	5	2.5	h5	h5	66	6	3.0		
06-May-67			65		1.0			66		0.7		
07-May-67			65		1.0			66		0.7		
08-May-67	9.5		65	3	1.0	h3		66	2	0.6		
09-May-67			65		2.0			66		0.5		
10-May-67	10.8	Trap entrance plugged	65	4	2.0	h4		66	1	0.5		
11-May-67			65		2.5			66		1.0		
12-May-67	8.2		65	5	2.5	h5		66	2	1.0		
13-May-67			65		0.3			66		0.3		
14-May-67			65		0.3			66		0.3		
15-May-67	8.7		65	1	0.4	h1		66	1	0.4		
16-May-67			65		1.0			66		0.0		
17-May-67	12.2	Trap entrance partially plugged	65	2	1.0	h2		66	0	0.0		
18-May-67			65		0.0			66		0.2		
19-May-67	14.8	Trap entrance plugged	65		0.0			66		0.2		
20-May-67			65		0.0			66		0.2		
21-May-67			65		0.0			66		0.2		
22-May-67	19.3	Trap entrance plugged	65		0.0			66		0.2		
23-May-67	19.3	Trap entrance plugged	65		0.0			66		0.2		
24-May-67	17.7		65		0.0			66		0.2		
25-May-67	14.8	Trap entrance partially plugged	65		0.0			66		0.2		
26-May-67	12.7		65	0	0.0			66	2	0.4		
27-May-67			65		0.0			66		0.3		
28-May-67			65		0.0			66		0.3		
29-May-67	12.5	Trap entrance plugged	65	0	0.0			66	1	0.4		
30-May-67			65		0.0			66		1.0		
31-May-67	9.5		65	0	0.0			66	2	1.0		
01-Jun-67	9.3		65		0.0			66		0.5		
02-Jun-67	9.0		65	0	0.0			66	1	0.5		
03-Jun-67	9.1		65		0.0			66		1.0		
04-Jun-67			65		0.0			66		1.0		
05-Jun-67			65	0	0.0			66	3	1.0		
06-Jun-67	8.8		65		0.5			66		3.0		
07-Jun-67	8.2		65	1	0.5	h1		66	6	3.0		
08-Jun-67	8.2		65		0.0			66		1.5		
09-Jun-67	8.1		65	0	0.0			66	3	1.5		
10-Jun-67	8.0		65		1.0			66		4.0		
11-Jun-67			65		1.0			66		4.0		
12-Jun-67	7.1		65	3	1.0	h3		66	12	4.0		
13-Jun-67	6.7		65		0.0			66		13.0		
14-Jun-67	6.9		65	0	0.0			66	26	13.0		
15-Jun-67	6.5		65		0.0			66		7.5		
16-Jun-67	6.3		65	0	0.0			66	15	7.5		
17-Jun-67			65		0.0			66		3.7		
18-Jun-67	5.5		65		0.0			66		3.7		
19-Jun-67	5.4		65	0	0.0			66	11	3.6	a11	
20-Jun-67	5.0		65		0.0			66		8.0		
21-Jun-67	5.4		65	0	0.0			66	16	8.0	a13	
22-Jun-67	4.7		65		0.5			66		12.0		
23-Jun-67	4.5	End of smolt migration	65	1	0.5	h1		66	24	12.0	a24	
24-Jun-67	3.9	for the 65 cohort	65		0.0			66		19.0		
25-Jun-67			65		0.0			66		19.0		
26-Jun-67	3.4		65	0	0.0			66	57	19.0	a49	a3
27-Jun-67	3.1		65		0.0			66		51.0		
28-Jun-67	2.9	Stopped trap	65	0	0.0			66	102	51.0	a102	a1
29-Jun-67	2.8		65		---			66		---		
30-Jun-67	2.7	Started trap	65		---			66		---		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jul-67	2.5		65		0.0			66		86.0		
02-Jul-67	2.4		65	0	0.0			66	172	86.0	a168	
03-Jul-67	2.4		65	0	0.0			66	73	73.0	a73	a11
04-Jul-67	2.2	Trap entrance plugged	65	0	0.0			66	75	75.0	a75	a3
05-Jul-67	2.2		65	0	0.0			66	203	203.0	a201	a14
06-Jul-67	2.1		65	0	0.0			66	179	179.0	a179	a28
07-Jul-67	2.1		65	0	0.0			66	236	236.0	a236	a22
08-Jul-67			65		0.0			66		231.7		
09-Jul-67	2.0	Trap entrance plugged	65		0.0			66		231.7		
10-Jul-67	2.0		65	0	0.0			66	695	231.6	a691	a22
11-Jul-67	1.9		65		0.0			66		238.0		
12-Jul-67	1.9		65	0	0.0			66	476	238.0	a474	a103
13-Jul-67	1.9		65	0	0.0			66	141	141.0	a140	a76
14-Jul-67	1.8		65	0	0.0			66	239	239.0	a238	a31
15-Jul-67	1.8		65		0.0			66		223.7		
16-Jul-67	1.8		65		0.0			66		223.7		
17-Jul-67	1.8		65	0	0.0			66	671	223.6	a667	a52
18-Jul-67	1.7		65	0	0.0			66	150	150.0	a149	a119
19-Jul-67	1.7		65	0	0.0			66	85	85.0	a85	a32
20-Jul-67	1.7		65	0	0.0			66	50	50.0	a50	a19
21-Jul-67	1.6		65	0	0.0			66	42	42.0	a42	a11
22-Jul-67			65		0.0			66		52.7		
23-Jul-67			65		0.0			66		52.7		
24-Jul-67	1.6		65	0	0.0			66	158	52.6	a158	a16
25-Jul-67	1.6		65	0	0.0			66	28	28.0	a28	a23
26-Jul-67	1.6		65	0	0.0			66	117	117.0	a117	a20
27-Jul-67	1.6		65	0	0.0			66	124	124.0	a124	a32
28-Jul-67	1.6		65	0	0.0			66	187	187.0	a185	a46
29-Jul-67			65		0.0			66		288.7		
30-Jul-67			65		0.0			66		288.7		
31-Jul-67	1.6		65	0	0.0			66	866	288.6	a864	a57
01-Aug-67	1.6		65	0	0.0			66	521	521.0	a518	a223
02-Aug-67	1.5		65	0	0.0			66	342	342.0	a342	a215
03-Aug-67	1.5		65	0	0.0			66	352	352.0	a351	a142
04-Aug-67	1.5		65	0	0.0			66	342	342.0	a339	a135
05-Aug-67			65		0.3			66		469.3		
06-Aug-67			65		0.3			66		469.3		
07-Aug-67	1.5	First precocial 65 cohort	65	1	0.4			66	1408	469.4	a100	a146
08-Aug-67	1.5		65	1	1.0			66	628	628.0	a100	a36
09-Aug-67			65		0.7			66		518.3		
10-Aug-67	1.4		65		0.7			66		518.3		
11-Aug-67	1.5		65	2	0.6			66	1555	518.4	a300	a45
12-Aug-67			65		4.7			66		388.7		
13-Aug-67			65		4.7			66		388.7		
14-Aug-67	1.4		65	14	4.6			66	1166	388.6	a100	a79
15-Aug-67	1.4		65	4	4.0			66	239	239.0	a100	a23
16-Aug-67	1.4		65	5	5.0			66	262	262.0	a100	a45
17-Aug-67			65		5.0			66		170.5		
18-Aug-67	1.4		65	10	5.0			66	341	170.5	a200	a40
19-Aug-67			65		1.7			66		19.3		
20-Aug-67			65		1.7			66		19.3		
21-Aug-67	1.4	Trap entrance plugged	65	5	1.6			66	58	19.4	a56	a14
22-Aug-67	1.4		65	21	21.0			66	245	245.0	a144	a29
23-Aug-67	1.4		65	13	13.0			66	235	235.0	a100	a66
24-Aug-67	1.4		65		15.0			66		277.0		
25-Aug-67	1.4		65	30	15.0			66	554	277.0	a200	a48
26-Aug-67			65		27.3			66		285.0		
27-Aug-67			65		27.3			66		285.0		
28-Aug-67	1.4		65	82	27.4			66	855	285.0	a100	a91
29-Aug-67	1.4		65	52	52.0			66	203	203.0	a100	a32
30-Aug-67			65	37	37.0			66	258	258.0	a100	a50
31-Aug-67			65		33.5			66		186.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-67	1.4		65	67	33.5			66	372	186.0	a200	a56
02-Sep-67			65		14.3			66		141.7		
03-Sep-67			65		14.3			66		141.7		
04-Sep-67	1.4		65	43	14.4			66	425	141.6	a100	a101
05-Sep-67	1.4		65	9	9.0			66	148	148.0	a100	a51
06-Sep-67	1.4		65	14	14.0			66	118	118.0	a100	a55
07-Sep-67			65		6.5			66		130.0		
08-Sep-67	1.4		65	13	6.5			66	259	129.0	a200	a59
09-Sep-67			65		9.0			66		146.7		
10-Sep-67			65		9.0			66		146.7		
11-Sep-67	1.5		65	27	9.0			66	440	146.6	a100	a103
12-Sep-67	1.5		65	10	10.0			66	623	623.0	a100	a43
13-Sep-67	1.5		65	8	8.0			66	293	293.0	a100	a49
14-Sep-67	1.4		65	5	5.0			66	200	200.0	a100	a40
15-Sep-67	1.4		65	3	3.0			66	91	91.0	a90	a41
16-Sep-67			65		0.7			66		40.0		
17-Sep-67			65		0.7			66		40.0		
18-Sep-67	1.5		65	2	0.6			66	120	40.0	a100	a45
19-Sep-67	1.4		65	0	0.0			66	19	19.0	a19	a26
20-Sep-67	1.4		65		0.5			66		62.0		
21-Sep-67	1.4		65	1	0.5			66	124	62.0	a114	a18
22-Sep-67	1.4		65	0	0.0			66	53	53.0	a49	a53
23-Sep-67			65		0.0			66		105.0		
24-Sep-67			65		0.0			66		105.0		
25-Sep-67	1.4		65	0	0.0			66	315	105.0	a100	a27
26-Sep-67	1.4		65	0	0.0			66	95	95.0	a93	a43
27-Sep-67	1.4		65	0	0.0			66	94	94.0	a94	a52
28-Sep-67	1.4		65	0	0.0			66	106	106.0	a104	a54
29-Sep-67	1.4		65	0	0.0			66	94	94.0	a92	a61
30-Sep-67			65		0.0			66		409.7		
01-Oct-67			65		0.0			66		409.7		
02-Oct-67	1.5		65	0	0.0			66	1229	409.6	a100	a54
03-Oct-67	1.6		65	0	0.0			66	1486	1486.0	a100	a49
04-Oct-67	1.5		65	0	0.0			66	244	244.0	a100	a39
05-Oct-67	1.5		65	0	0.0			66	175	175.0	a100	a53
06-Oct-67	1.5		65	0	0.0			66	184	184.0	a100	a57
07-Oct-67			65		0.0			66		170.3		
08-Oct-67			65		0.0			66		170.3		
09-Oct-67	1.5		65	0	0.0			66	511	170.4	a100	a64
10-Oct-67	1.5		65	0	0.0			66	140	140.0	a100	a55
11-Oct-67	1.5		65	0	0.0			66	209	209.0	a100	a43
12-Oct-67			65		0.0			66		474.5		
13-Oct-67	1.6		65	0	0.0			66	949	474.5	a200	a44
14-Oct-67			65		0.0			66		164.3		
15-Oct-67			65		0.0			66		164.3		
16-Oct-67	1.5		65	0	0.0			66	493	164.4	a100	a78
17-Oct-67	1.5		65	0	0.0			66	153	153.0	a100	a33
18-Oct-67	1.5		65	0	0.0			66	193	193.0	a83	a51
19-Oct-67	1.5		65	0	0.0			66	117	117.0	a117	a38
20-Oct-67	1.5	Trap entrance partially plugged	65	0	0.0			66	189	189.0	a100	a33
21-Oct-67			65		0.3			66		716.0		
22-Oct-67			65		0.3			66		716.0		
23-Oct-67	2.0	Last precocial 65 cohort	65	1	0.4			66	2148	716.0	a100	a52
24-Oct-67	1.6							66	573	573.0	a100	a35
25-Oct-67	1.6							66	203	203.0	a100	a38
26-Oct-67	1.5							66	128	128.0	a100	a49
27-Oct-67	1.7							66	122	122.0	a100	a34
28-Oct-67								66		247.3		
29-Oct-67								66		247.3		
30-Oct-67	1.7							66	742	247.4	a100	a22
31-Oct-67	1.6							66	108	108.0	a100	a24

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m³/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Nov-67	1.8							66	83	83.0	a81	a25
02-Nov-67	1.6							66	50	50.0	a50	a28
03-Nov-67	1.6							66	93	93.0	a92	a10
04-Nov-67								66		101.0		
05-Nov-67								66		101.0		
06-Nov-67	1.6							66	303	101.0	a100	a38
07-Nov-67	1.6							66	84	84.0	a84	a17
08-Nov-67	1.6							66	52	52.0	a52	a22
09-Nov-67	1.6							66	58	58.0	a57	a25
10-Nov-67	2.2							66	33	33.0	a33	a22
11-Nov-67								66		22.0		
12-Nov-67								66		22.0		
13-Nov-67	2.0							66	66	22.0	a65	a9
14-Nov-67	1.9							66	9	9.0	a9	a7
15-Nov-67	1.9							66	12	12.0	a12	a3
16-Nov-67								66		9.4		
17-Nov-67								66		9.4		
18-Nov-67								66		9.4		
19-Nov-67								66		9.4		
20-Nov-67	1.7							66	47	9.4	a47	a3
21-Nov-67	1.6							66		14.0		
22-Nov-67	1.6							66	28	14.0	a28	a7
23-Nov-67								66		16.5		
24-Nov-67	1.6							66	33	16.5	a33	a15
25-Nov-67								66		22.3		
26-Nov-67								66		22.3		
27-Nov-67	1.6							66	67	22.4	a65	a17
28-Nov-67								66		36.0		
29-Nov-67	1.7							66	72	36.0	a72	a22
30-Nov-67								66		40.0		
01-Dec-67	1.6							66	80	40.0	a80	a34
02-Dec-67								66		16.7		
03-Dec-67								66		16.7		
04-Dec-67	1.6							66	50	16.6	a48	a34
05-Dec-67								66		8.0		
06-Dec-67	1.6							66	16	8.0	a16	a17
07-Dec-67								66		10.5		
08-Dec-67	1.6							66	21	10.5	a21	a10
09-Dec-67								66		3.7		
10-Dec-67								66		3.7		
11-Dec-67	1.8							66	11	3.6	a11	a8
12-Dec-67								66		3.0		
13-Dec-67		Bypass ditch frozen						66		3.0		
14-Dec-67		Stop trap						66	9	3.0		a9
15-Dec-67								66		---		
16-Dec-67								66		---		
17-Dec-67								66		---		
18-Dec-67								66		---		
19-Dec-67								66		---		
20-Dec-67								66		---		
21-Dec-67								66		---		
22-Dec-67								66		---		
23-Dec-67								66		---		
24-Dec-67								66		---		
25-Dec-67								66		---		
26-Dec-67	12.0	Start trap						66		---		
27-Dec-67								66		2.5		
28-Dec-67	6.9							66	5	2.5	a5	
29-Dec-67	5.4							66	13	13.0	a13	
30-Dec-67								66		11.8		
31-Dec-67								66		11.8		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-68								66		11.8		
02-Jan-68	3.2							66	47	11.6	a47	a1
03-Jan-68								66		8.3		
04-Jan-68								66		8.3		
05-Jan-68	2.8							66	25	8.4	a25	
06-Jan-68								66		0.0		
07-Jan-68								66		0.0		
08-Jan-68	2.5	Trap entrance plugged						66	0	0.0		
09-Jan-68								66		6.7		
10-Jan-68								66		6.7		
11-Jan-68	2.4							66	20	6.6	a20	
12-Jan-68								66		1.0		
13-Jan-68								66		1.0		
14-Jan-68								66		1.0		
15-Jan-68	2.4							66	4	1.0	a4	
16-Jan-68								66		0.5		
17-Jan-68	2.2							66	1	0.5	a1	a1
18-Jan-68								66		3.6		
19-Jan-68								66		3.6		
20-Jan-68								66		3.6		
21-Jan-68								66		3.6		
22-Jan-68	2.3							66	18	3.6	a18	
23-Jan-68	2.3							66		3.7		
24-Jan-68								66		3.7		
25-Jan-68	2.3							66	11	3.6	a11	a2
26-Jan-68								66		1.0		
27-Jan-68								66		1.0		
28-Jan-68								66		1.0		
29-Jan-68	2.2							66	4	1.0	a4	
30-Jan-68								66		4.3		
31-Jan-68								66		4.3		
01-Feb-68	2.1							66	13	4.4	a13	a1
02-Feb-68								66		2.5		
03-Feb-68								66		2.5		
04-Feb-68								66		2.5		
05-Feb-68	3.1							66	10	2.5	b10	a1
06-Feb-68								66		1.0		
07-Feb-68								66		1.0		
08-Feb-68	2.8		67	1	1.0			66	3	1.0	b3	a1b1
09-Feb-68			67		0.0			66		0.8		
10-Feb-68			67		0.0			66		0.8		
11-Feb-68			67		0.0			66		0.8		
12-Feb-68			67		0.0			66		0.8		
13-Feb-68	2.2		67	0	0.0			66	4	0.8	b3	a1
14-Feb-68			67		0.0			66		1.0		
15-Feb-68			67		0.0			66		1.0		
16-Feb-68	2.2		67	0	0.0			66	3	1.0	b3	
17-Feb-68			67		0.3			66		0.3		
18-Feb-68			67		0.3			66		0.3		
19-Feb-68	9.0	Trap entrance plugged	67		0.3			66		0.3		
20-Feb-68	11.9		67	1	0.1			66	1	0.1	b1	
21-Feb-68	16.1	Trap entrance plugged	67		1.3			66		1.3		
22-Feb-68	13.6	Trap entrance plugged	67		1.3			66		1.3		
23-Feb-68	26.1	Trap entrance plugged	67	4	1.4			66	4	1.4	b3	
24-Feb-68			67		1.0			66		0.3		
25-Feb-68			67		1.0			66		0.3		
26-Feb-68	11.3	Trap entrance plugged	67	3	1.0			66	1	0.4	b1	
27-Feb-68			67		0.3			66		4.0		
28-Feb-68			67		0.3			66		4.0		
29-Feb-68	8.1		67	1	0.4			66	12	4.0	b11	

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Mar-68			67		0.3			66		6.3		
02-Mar-68			67		0.3			66		6.3		
03-Mar-68			67		0.3			66		6.3		
04-Mar-68	7.4		67	1	0.1			66	25	6.1	h25	b1
05-Mar-68			67		0.7			66		5.0		
06-Mar-68			67		0.7			66		5.0		
07-Mar-68	7.4		67	2	0.6			66	15	5.0	h15	h1
08-Mar-68			67		0.3			66		4.0		
09-Mar-68			67		0.3			66		4.0		
10-Mar-68			67		0.3			66		4.0		
11-Mar-68	5.5		67	1	0.1			66	16	4.0	h14	
12-Mar-68			67		0.0			66		2.7		
13-Mar-68			67		0.0			66		2.7		
14-Mar-68	4.8		67	0	0.0			66	8	2.6	h8	
15-Mar-68			67		0.5			66		2.8		
16-Mar-68			67		0.5			66		2.8		
17-Mar-68			67		0.5			66		2.8		
18-Mar-68	4.1	Stop trap	67	2	0.5			66	11	2.6	h11	h1
19-Mar-68			67		---			66		---		
20-Mar-68			67		---			66		---		
21-Mar-68			67		---			66		---		
22-Mar-68			67		---			66		---		
23-Mar-68			67		---			66		---		
24-Mar-68			67		---			66		---		
25-Mar-68	4.1	Start trap	67		---			66		---		
26-Mar-68	4.2		67	18	18.0			66	14	14	h14	
27-Mar-68			67		2.0			66		8.0		
28-Mar-68	4.5		67	4	2.0			66	16	8.0	h16	h1
29-Mar-68			67		1.3			66		3.8		
30-Mar-68			67		1.3			66		3.8		
31-Mar-68			67		1.3			66		3.8		
01-Apr-68	4.7		67	5	1.1			66	15	3.6	d15	
02-Apr-68			67		1.3			66		1.3		
03-Apr-68			67		1.3			66		1.3		
04-Apr-68	4.2		67	4	1.4			66	4	1.4	d4	d1
05-Apr-68			67		1.0			66		3.8		
06-Apr-68			67		1.0			66		3.8		
07-Apr-68			67		1.0			66		3.8		
08-Apr-68	4.0		67	4	1.0			66	15	3.6	d15	d2
09-Apr-68			67		0.3			66		2.0		
10-Apr-68			67		0.3			66		2.0		
11-Apr-68	4.9		67	1	0.4			66	6	2.0	d5	
12-Apr-68			67		0.0			66		4.5		
13-Apr-68			67		0.0			66		4.5		
14-Apr-68			67		0.0			66		4.5		
15-Apr-68	4.5		67	0	0.0			66	18	4.5	d18	d1
16-Apr-68			67		0.7			66		1.7		
17-Apr-68			67		0.7			66		1.7		
18-Apr-68	3.9		67	2	0.6			66	5	1.6	d5	
19-Apr-68			67		0.3			66		1.8		
20-Apr-68			67		0.3			66		1.8		
21-Apr-68			67		0.3			66		1.8		
22-Apr-68	3.8		67	1	0.1			66	7	1.6	d6	
23-Apr-68			67		0.7			66		2.3		
24-Apr-68			67		0.7			66		2.3		
25-Apr-68	3.9		67	2	0.6			66	7	2.4	d7	
26-Apr-68			67		0.8			66		1.8		
27-Apr-68			67		0.8			66		1.8		
28-Apr-68			67		0.8			66		1.8		
29-Apr-68	4.2		67	3	0.6			66	7	1.6	d7	
30-Apr-68			67		2.0			66		2.7		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-68			67		2.0			66		2.7		
02-May-68	5.0		67	6	2.0			66	8	2.6	e5	
03-May-68			67		0.5			66		0.5		
04-May-68			67		0.5			66		0.5		
05-May-68			67		0.5			66		0.5		
06-May-68	5.8		67	2	0.5			66	2	0.5	e2	
07-May-68			67		0.0			66		0.7		
08-May-68			67		0.0			66		0.7		
09-May-68	5.0		67	0	0.0			66	2	0.6	e2	
10-May-68			67		0.0			66		0.3		
11-May-68			67		0.0			66		0.3		
12-May-68			67		0.0			66		0.3		
13-May-68	6.7		67	0	0.0			66	1	0.1	e1	
14-May-68			67		0.0			66		1.5		
15-May-68	5.8		67	0	0.0			66	3	1.5	e3	
16-May-68			67		0.5			66		0.5		
17-May-68	5.4		67	1	0.5			66	1	0.5	e1	
18-May-68			67		1.0			66		0.3		
19-May-68			67		1.0			66		0.3		
20-May-68	6.1		67	3	1.0			66	1	0.4	e1	
21-May-68	6.1		67		0.3			66		0.0		
22-May-68	5.8		67		0.3			66		0.0		
23-May-68			67		0.3			66		0.0		
24-May-68	5.2		67	1	0.1			66	0	0.0		
25-May-68			67		0.0			66		0.3		
26-May-68			67		0.0			66		0.3		
27-May-68	5.0		67	0	0.0			66	1	0.4	e1	
28-May-68			67		0.5			66		0.5		
29-May-68	4.5		67	1	0.5			66	1	0.5		
30-May-68	4.2		67		0.5			66		0.5		
31-May-68	3.7		67	1	0.5			66	1	0.5	e1	
01-Jun-68			67		0.7			66		0.0		
02-Jun-68			67		0.7			66		0.0		
03-Jun-68	4.0		67	2	0.6			66	0	0.0		
04-Jun-68			67		0.0			66		0.5		
05-Jun-68	3.2		67	0	0.0			66	1	0.5	e1	
06-Jun-68	2.9		67		1.0			66		2.5		
07-Jun-68	2.9		67	2	1.0			66	5	2.5	e5	
08-Jun-68	2.8		67		0.3			66		0.3		
09-Jun-68			67		0.3			66		0.3		
10-Jun-68	2.6		67	1	0.4			66	1	0.4	e1	
11-Jun-68			67		0.5			66		0.0		
12-Jun-68	2.9		67	1	0.5			66	0	0.0		
13-Jun-68			67		4.5			66		0.0		
14-Jun-68	2.5		67	9	4.5			66	0	0.0		
15-Jun-68			67		11.0			66		1.3		
16-Jun-68			67		11.0			66		1.3		
17-Jun-68	2.2	End of smolt migration	67	33	11.0	a28		66	4	1.4	e4	
18-Jun-68	2.1	for the 66cohort	67	15	15.0	a15	a5	66	0	0.0		e1
19-Jun-68	2.0		67	1	1.0	a1		66	0	0.0		
20-Jun-68	2.0		67	45	45.0	a44	a1	66	0	0.0		e1
21-Jun-68	2.0		67	24	24.0	a23	a7	66	0	0.0		
22-Jun-68	2.5		67		50.3			66		0.0		
23-Jun-68			67		50.3			66		0.0		
24-Jun-68	1.9		67	151	50.4	a148	a2	66	0	0.0		
25-Jun-68	1.9		67	40	40.0	a40	a23	66	0	0.0		
26-Jun-68	1.8		67	46	46.0	a46	a9	66	0	0.0		
27-Jun-68	1.8		67	49	49.0	a48	a5	66	0	0.0		
28-Jun-68	1.8		67	35	35.0	a34	a7	66	0	0.0		
29-Jun-68			67		38.0			66		0.0		
30-Jun-68			67		38.0			66		0.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jul-68	1.8		67	114	38.0	h114	a11	66	0	0.0		
02-Jul-68	1.7		67	16	16.0	h16	h25	66	0	0.0		
03-Jul-68	1.7		67	33	33.0	h32	h5	66	0	0.0		
04-Jul-68	1.7		67	22	22.0	h22	h5	66	0	0.0		
05-Jul-68	1.6		67	17	17.0	h17	h6	66	0	0.0		
06-Jul-68			67		4.3			66		0.0		
07-Jul-68			67		4.3			66		0.0		
08-Jul-68	1.6		67	13	4.4	h13	h2	66	0	0.0		
09-Jul-68	1.6		67	27	27.0	h27	h4	66	0	0.0		
10-Jul-68	1.6		67	25	25.0	h25	h7	66	0	0.0		
11-Jul-68	1.6		67	42	42.0	h40	h5	66	0	0.0		
12-Jul-68	1.6		67	56	56.0	h56	h18	66	0	0.0		
13-Jul-68			67		99.3			66		0.0		
14-Jul-68			67		99.3			66		0.0		
15-Jul-68	1.6		67	298	99.4	e100	h12	66	0	0.0		
16-Jul-68	1.5		67	214	214.0	e100	e37	66	0	0.0		
17-Jul-68	1.5		67	101	101.0	e100	e25	66	0	0.0		
18-Jul-68	1.5		67	139	139.0	e100	e47	66	0	0.0		
19-Jul-68	1.5		67	81	81.0	e81	e48	66	0	0.0		
20-Jul-68			67		76.0			66		0.0		
21-Jul-68			67		76.0			66		0.0		
22-Jul-68	1.5		67	228	76.0	e100	e26	66	0	0.0		
23-Jul-68	1.5		67	79	79.0	e79	e31	66	0	0.0		
24-Jul-68	1.5		67	102	102.0	e100	e34	66	0	0.0		
25-Jul-68	1.5		67	102	102.0	e100	e47	66	0	0.0		
26-Jul-68	1.5		67	127	127.0	e100	e44	66	0	0.0		
27-Jul-68			67		80.7			66		0.0		
28-Jul-68			67		80.7			66		0.0		
29-Jul-68	1.5		67	242	80.6	d100	e35	66	0	0.0		
30-Jul-68	1.5		67	92	92.0	d90	d54e2	66	0	0.0		
31-Jul-68	1.5		67	121	121.0	d100	d57e1	66	0	0.0		
01-Aug-68	1.5		67	167	167.0	d100	d50h1e2	66	0	0.0		
02-Aug-68	1.5		67	172	172.0	d100	d43e1	66	0	0.0		
03-Aug-68			67		191.6			66		0.0		
04-Aug-68			67		191.6			66		0.0		
05-Aug-68	1.5		67	575	191.8	d100	d57e3	66	0	0.0		
06-Aug-68	1.4	First precocial 66 cohort	67	136	136.0	d100	d44e1	66	2	2.0		
07-Aug-68	1.4		67	133	133.0	d100	d51e3	66	1	1.0		
08-Aug-68	1.4		67	163	163.0	d100	d59h1e2	66	1	1.0		
09-Aug-68	1.4		67	64	64.0	d64	d47h1	66	1	1.0		
10-Aug-68			67		138.3			66		2.0		
11-Aug-68			67		138.3			66		2.0		
12-Aug-68	1.4		67	415	138.4	b100	d39e4	66	6	2.0		
13-Aug-68	1.4		67	157	157.0	b100	b45h1	66	4	4.0		
14-Aug-68	1.4		67	378	378.0	b100	b64d2e1	66	6	6.0		
15-Aug-68	1.5		67		754.0			66		5.5		
16-Aug-68	1.4		67	1508	754.0	b200	b50d1h5	66	11	5.5		
17-Aug-68			67		226.6			66		10.0		
18-Aug-68			67		226.6			66		10.0		
19-Aug-68	1.5		67	680	226.8	b100	b103h1	66	30	10.0		
20-Aug-68	1.4		67	255	255.0	b100	b59	66	7	7.0		
21-Aug-68	1.4		67	200	200.0	b100	b59	66	18	18.0		
22-Aug-68	1.4		67		130.0			66		42.5		
23-Aug-68	1.4		67	260	130.0	b200	b58	66	85	42.5		
24-Aug-68			67		118.0			66		49.0		
25-Aug-68			67		118.0			66		49.0		
26-Aug-68	1.4		67	354	118.0	b100	b113	66	147	49.0		
27-Aug-68	1.4		67		304.5			66		23.0		
28-Aug-68	1.5		67	609	304.5	b200	b51	66	46	23.0		
29-Aug-68	1.4		67	254	254.0	b100	b109	66	28	28.0		
30-Aug-68	1.4		67	96	96.0	b96	b51	66	20	20.0		
31-Aug-68			67		18.8			66		12.5		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

	Flow		Brood	#of.	Daily	Trap efficiency		Brood	# of	Daily	Trap efficiency	
Date	m^3/s	Comments	yr.	fish.	□	rel.[a]	re.[a]	yr.	fish	□	rel.[a]	re.[a]
01-Sep-68			67		18.8			66		12.5		
02-Sep-68			67		18.8			66		12.5		
03-Sep-68	1.4		67	75	18.6	g73	b66	66	50	12.5		
04-Sep-68	1.4		67	96	96.0	g94	g25b1	66	39	39.0		
05-Sep-68	1.4		67		236.5			66		9.5		
06-Sep-68	1.4		67	473	236.5	g200	g46e1	66	19	9.5		
07-Sep-68			67		314.3			66		9.3		
08-Sep-68			67		314.3			66		9.3		
09-Sep-68	1.4		67	943	314.4	g100	g81b2d2e4h6		66	28	9.4	
10-Sep-68	1.4		67	678	678.0	g100	g42e1	66	10	10.0		
11-Sep-68	1.4		67	136	136.0	g100	g36d1	66	2	2.0		
12-Sep-68	1.4		67		90.5			66		3.5		
13-Sep-68	1.4		67	181	90.5	g181	g49	66	7	3.5		
14-Sep-68			67		184.0			66		0.3		
15-Sep-68			67		184.0			66		0.3		
16-Sep-68	1.5		67	552	184.0	g100	g119e1	66	1	0.4		
17-Sep-68	1.4		67	353	353.0	g100	g58e1	66	1	1.0		
18-Sep-68	1.5		67	277	277.0	g100	g57	66	3	3.0		
19-Sep-68	1.5		67	356	356.0	g100	g58	66	0	0.0		
20-Sep-68	1.4		67	90	90.0	g90	g38	66	0	0.0		
21-Sep-68			67		140.6			66		0.0		
22-Sep-68			67		140.6			66		0.0		
23-Sep-68	1.5		67	422	140.8	g100	g45b1	66	0	0.0		
24-Sep-68	1.5		67	116	116.0	g100	g30	66	0	0.0		
25-Sep-68	1.4		67	67	67.0	g67	g40	66	0	0.0		
26-Sep-68	1.5		67	57	57.0	g56	g17	66	0	0.0		
27-Sep-68	1.5		67	72	72.0	g70	g23	66	0	0.0		
28-Sep-68			67		22.3			66		0.0		
29-Sep-68			67		22.3			66		0.0		
30-Sep-68	1.4		67	67	22.4	g66	g36	66	0	0.0		
01-Oct-68	1.4		67	51	51.0	g51	g31	66	0	0.0		
02-Oct-68	1.4		67	43	43.0	g42	g18	66	0	0.0		
03-Oct-68	1.4		67	72	72.0	g71	g14	66	0	0.0		
04-Oct-68	1.4		67	61	61.0	g60	g27	66	0	0.0		
05-Oct-68			67		17.0			66		0.0		
06-Oct-68			67		17.0			66		0.0		
07-Oct-68	1.4		67	51	17.0	g50	g10	66	0	0.0		
08-Oct-68	1.4		67	112	112.0	g112	g28	66	0	0.0		
09-Oct-68	1.4		67	112	112.0	g112	g42b1	66	0	0.0		
10-Oct-68	1.4	Last precocial 66 cohort	67	52	52.0	g51	g55	66	1	1.0		
11-Oct-68	1.6		67	67	67.0	g65	g37					
12-Oct-68			67		82.0							
13-Oct-68			67		82.0							
14-Oct-68	1.6		67	246	82.0	f100	g24					
15-Oct-68	2.1		67	325	325.0	f100	f42g1					
16-Oct-68	1.8		67	72	72.0	f71	f18					
17-Oct-68	1.7		67	105	105.0	f100	f25g1					
18-Oct-68	1.7		67	51	51.0	f51	f43					
19-Oct-68			67		51.7							
20-Oct-68			67		51.7							
21-Oct-68	1.9		67	155	51.6	f100	f20					
22-Oct-68	1.8		67	69	69.0	f69	f36					
23-Oct-68	1.8		67	34	34.0	f34	f28					
24-Oct-68	1.8		67	13	13.0	f13	f12					
25-Oct-68	1.7		67	40	40.0	f40	f13h1					
26-Oct-68			67		17.7							
27-Oct-68			67		17.7							
28-Oct-68	1.6		67	53	17.6	f52	8					
29-Oct-68	1.6		67	67	67.0	f67	24					
30-Oct-68	1.6		67	17	17.0	f17	31					
31-Oct-68	2.7		67	18	18.0	f18	5					

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Nov-68	2.7		67	58	58.0	f58	f7b1					
02-Nov-68			67		24.0							
03-Nov-68			67		24.0							
04-Nov-68			67		24.0							
05-Nov-68			67		24.0							
06-Nov-68	1.6		67	120	24.0	f100	f16g1					
07-Nov-68	1.5		67	39	39.0	f39	f19					
08-Nov-68	1.7		67	27	27.0	f27	f25					
09-Nov-68			67		18.3							
10-Nov-68			67		18.3							
11-Nov-68			67		18.3							
12-Nov-68	2.7		67	73	18.1	f72	f7					
13-Nov-68	2.5		67	19	19.0	f19	f7g1					
14-Nov-68	2.3		67	15	15.0	f14	f4					
15-Nov-68	2.2		67	19	19.0	f19						
16-Nov-68			67		20.7							
17-Nov-68			67		20.7							
18-Nov-68	2.2		67	62	20.6	f61	f6					
19-Nov-68	2.2		67	7	7.0	f7	f8					
20-Nov-68	2.2		67	4	4.0	f4	f2					
21-Nov-68	2.2		67	1	1.0							
22-Nov-68	4.8		67	5	5.0	f5						
23-Nov-68			67		3.7							
24-Nov-68			67		3.7							
25-Nov-68	2.9		67	11	3.6	i11	g1					
26-Nov-68			67		5.5							
27-Nov-68	2.6		67	11	5.5	i11	i4g2					
28-Nov-68			67		7.5							
29-Nov-68	2.3		67	15	7.5	i15	i1					
30-Nov-68			67		5.0							
01-Dec-68			67		5.0							
02-Dec-68	2.1		67	15	5.0	i15	i1					
03-Dec-68			67		4.0							
04-Dec-68	2.4		67	8	4.0	i8						
05-Dec-68			67		2.0							
06-Dec-68	2.2		67	4	2.0	i4						
07-Dec-68			67		1.7							
08-Dec-68			67		1.7							
09-Dec-68	2.2		67	5	1.6	i5						
10-Dec-68			67		6.5							
11-Dec-68	3.0		67	13	6.5	i13	i1g1					
12-Dec-68			67		0.5							
13-Dec-68	2.5		67	1	0.5		i1					
14-Dec-68			67		3.0							
15-Dec-68			67		3.0							
16-Dec-68	2.3		67	9	3.0	i8						
17-Dec-68	2.2		67		2.5							
18-Dec-68	2.2		67	5	2.5	i5	i1					
19-Dec-68			67		4.5							
20-Dec-68	2.1	Rotary screen froze overflow	67	9	4.5	i7						
21-Dec-68			67		0.7							
22-Dec-68			67		0.7							
23-Dec-68	2.0		67	2	0.6	i2						
24-Dec-68			67		11.3							
25-Dec-68			67		11.3							
26-Dec-68	2.2		67	34	11.4	i33	i1					
27-Dec-68			67		0.6							
28-Dec-68			67		0.6							
29-Dec-68			67		0.6							
30-Dec-68			67		0.6							
31-Dec-68		Ice blocked diversion	67	3	0.6		i2					

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-69			67		---							
02-Jan-69		Diversion cleared	67	0	---							
03-Jan-69			67		0.8							
04-Jan-69			67		0.8							
05-Jan-69			67		0.8							
06-Jan-69	14.4		67	3	0.6	i3	i1					
07-Jan-69	13.6		67		1.0							
08-Jan-69	10.2		67	2	1.0	i2						
09-Jan-69			67		1.2							
10-Jan-69			67		1.2							
11-Jan-69			67		1.2							
12-Jan-69			67		1.2							
13-Jan-69	6.1		67	6	1.2	i5	i1					
14-Jan-69			67		15.3							
15-Jan-69			67		15.3							
16-Jan-69	5.0		67	46	15.4	i46	i1f1g3					
17-Jan-69			67		5.8							
18-Jan-69			67		5.8							
19-Jan-69			67		5.8							
20-Jan-69	4.1		67	23	5.6	i23	i4					
21-Jan-69			67		0.6							
22-Jan-69			67		0.6							
23-Jan-69	3.7	Trap stopped; icing	67		0.6							
24-Jan-69		Trap frozen	67		0.6							
25-Jan-69			67		0.6							
26-Jan-69			67		0.6							
27-Jan-69			67	4	0.4	i3						
28-Jan-69			67		0.7							
29-Jan-69			67		0.7							
30-Jan-69	3.1		67	2	0.6	i2						
31-Jan-69			67		1.8							
01-Feb-69			67		1.8							
02-Feb-69			67		1.8							
03-Feb-69			67		1.8							
04-Feb-69			67		1.8							
05-Feb-69			67		1.8							
06-Feb-69			67		1.8							
07-Feb-69		Trap frozen, entrance plugged	67	14	1.4	i14	i1f1g1					
08-Feb-69			67		1.3							
09-Feb-69			67		1.3							
10-Feb-69	2.6		67	4	1.4	i4	i1f1					
11-Feb-69			67		2.0							
12-Feb-69			67		2.0							
13-Feb-69	2.9		67	6	2.0	i6						
14-Feb-69			67		5.5							
15-Feb-69			67		5.5							
16-Feb-69			67		5.5							
17-Feb-69	2.7		67	22	5.5	i22						
18-Feb-69			67		2.7							
19-Feb-69			67		2.7							
20-Feb-69	2.7		67	8	2.6	i8						
21-Feb-69			67		0.5							
22-Feb-69			67		0.5							
23-Feb-69			67		0.5							
24-Feb-69	2.4		67	2	0.5	i2						
25-Feb-69			67		1.3							
26-Feb-69			67		1.3							
27-Feb-69	2.4		67	4	1.4	i4						
28-Feb-69			67		0.5							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Mar-69			67		0.5							
02-Mar-69			67		0.5							
03-Mar-69	2.4		67	2	0.5	j2	i2	68	1	1.0		
04-Mar-69			67		0.0			68		3.0		
05-Mar-69			67	0	0.0			68	6	3.0		
06-Mar-69	2.6		67	4	4.0	j4		68	0	0.0		
07-Mar-69			67		0.3			68		0.2		
08-Mar-69			67		0.3			68		0.2		
09-Mar-69			67		0.3			68		0.2		
10-Mar-69	2.3		67	1	0.1			68	1	0.4		
11-Mar-69			67		1.7			68		0.0		
12-Mar-69			67		1.7			68		0.0		
13-Mar-69	2.4		67	5	1.6	j5		68	0	0.0		
14-Mar-69			67		0.3			68		0.2		
15-Mar-69			67		0.3			68		0.2		
16-Mar-69			67		0.3			68		0.2		
17-Mar-69	2.5		67	1	0.1	j1		68	1	0.4		
18-Mar-69			67		1.0			68		0.3		
19-Mar-69			67		1.0			68		0.3		
20-Mar-69	3.1		67	3	1.0	j3	j1	68	1	0.4		
21-Mar-69			67		0.3			68		0.3		
22-Mar-69			67		0.3			68		0.3		
23-Mar-69			67		0.3			68		0.3		
24-Mar-69	3.7		67	1	0.1	j1		68	1	0.1		
25-Mar-69			67		2.7			68		0.4		
26-Mar-69			67		2.7			68		0.4		
27-Mar-69			67		2.7			68		0.4		
28-Mar-69			67		2.7			68		0.4		
29-Mar-69			67		2.7			68		0.4		
30-Mar-69			67		2.7			68		0.4		
31-Mar-69	8.8		67	19	2.8	j19	i1	68	3	0.6		
01-Apr-69			67		4.5			68		0.0		
02-Apr-69	9.2		67	9	4.5	j9	i1g1	68	0	0.0		
03-Apr-69			67		0.0			68		0.5		
04-Apr-69	9.6		67	0	0.0			68	1	0.5		
05-Apr-69			67		3.0			68		0.3		
06-Apr-69			67		3.0			68		0.3		
07-Apr-69	11.0		67	9	3.0	j9		68	1	0.4		
08-Apr-69			67		0.5			68		0.0		
09-Apr-69	9.2		67	1	0.5	j1		68	0	0.0		
10-Apr-69			67		3.5			68		1.0		
11-Apr-69	9.5		67	7	3.5	j7		68	2	1.0		
12-Apr-69			67		2.7			68		0.0		
13-Apr-69			67		2.7			68		0.0		
14-Apr-69	12.2		67	8	2.6	j8	i1	68	0	0.0		
15-Apr-69			67		1.0			68		0.5		
16-Apr-69	10.5		67	2	1.0	j2		68	1	0.5		
17-Apr-69			67		2.0			68		0.0		
18-Apr-69	13.6		67	4	2.0	j4		68	0	0.0		
19-Apr-69			67		1.3			68		0.0		
20-Apr-69			67		1.3			68		0.0		
21-Apr-69	11.3		67	4	1.4	j4	g1	68	0	0.0		
22-Apr-69			67		0.5			68		0.0		
23-Apr-69	23.8		67	1	0.5	j1		68	0	0.0		
24-Apr-69			67		0.0			68		0.0		
25-Apr-69	16.1		67	0	0.0			68	0	0.0		
26-Apr-69			67		3.0			68		0.0		
27-Apr-69			67		3.0			68		0.0		
28-Apr-69	11.6		67	9	3.0	j9	j2	68	0	0.0		
29-Apr-69			67		2.0			68		0.0		
30-Apr-69	12.2		67	4	2.0	j4		68	0	0.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-69			67		0.5			68		0.0		
02-May-69	9.9		67	1	0.5	j1		68	0	0.0		
03-May-69			67		1.7			68		0.0		
04-May-69			67		1.7			68		0.0		
05-May-69	9.0		67	5	1.6	j5		68	0	0.0		
06-May-69			67		1.5			68		0.5		
07-May-69	11.6		67	3	1.5	j3		68	1	0.5		
08-May-69			67		1.0			68		0.0		
09-May-69	18.1		67	2	1.0	j2		68	0	0.0		
10-May-69			67		0.7			68		0.0		
11-May-69			67		0.7			68		0.0		
12-May-69	23.8		67	2	0.6	j2		68	0	0.0		
13-May-69			67		0.5			68		0.0		
14-May-69	19.7		67	1	0.5	j1		68	0	0.0		
15-May-69			67		0.0			68		0.0		
16-May-69	15.6		67		0.0			68		0.0		
17-May-69			67		0.0			68		0.0		
18-May-69			67		0.0			68		0.0		
19-May-69	13.8		67	0	0.0			68	0	0.0		
20-May-69	13.1		67		1.5			68		0.0		
21-May-69	12.2		67	3	1.5	j3		68	0	0.0		
22-May-69			67		0.0			68		0.0		
23-May-69	10.9		67		0.0			68		0.0		
24-May-69			67		0.0			68		0.0		
25-May-69			67		0.0			68		0.0		
26-May-69	11.0		67	0	0.0			68	0	0.0		
27-May-69			67		1.0			68		0.0		
28-May-69	8.8		67	2	1.0	j2		68	0	0.0		
29-May-69	7.9		67		0.0			68		0.3		
30-May-69			67		0.0			68		0.3		
31-May-69	9.7		67	0	0.0			68	1	0.4		
01-Jun-69			67		0.0			68		0.5		
02-Jun-69	7.9		67		0.0			68		0.5		
03-Jun-69	7.4	Trap entrance plugged	67		0.0			68		0.5		
04-Jun-69	7.4		67		0.0			68		0.5		
05-Jun-69	7.2		67		0.0			68		0.5		
06-Jun-69	6.9		67	0	0.0			68	3	0.5	k3	
07-Jun-69	6.7		67		0.0			68		6.3		
08-Jun-69	6.0	Trap entrance plugged	67		0.0			68		6.3		
09-Jun-69	5.6		67	0	0.0			68	19	6.4	k19	
10-Jun-69	6.3		67		0.0			68		1.5		
11-Jun-69	4.8		67	0	0.0			68	3	1.5	k2	
12-Jun-69	4.5		67		0.0			68		4.0		
13-Jun-69	4.2		67	0	0.0			68	8	4.0	k8	
14-Jun-69			67		0.0			68		8.3		
15-Jun-69	3.5		67		0.0			68		8.3		
16-Jun-69	3.2		67	0	0.0			68	25	8.4	k25	
17-Jun-69	2.9		67		0.5			68		23.0		
18-Jun-69	2.9		67	1	0.5			68	46	23.0	k46	k1
19-Jun-69	2.8		67		0.0			68		22.5		
20-Jun-69	2.7		67	0	0.0			68	45	22.5	k45	k5
21-Jun-69			67		0.0			68		69.7		
22-Jun-69	2.4		67		0.0			68		69.7		
23-Jun-69	2.8		67	0	0.0			68	209	69.6	k208	k3
24-Jun-69	3.5		67		0.5			68		34.0		
25-Jun-69	3.2	End of smolt migration	67	1	0.5			68	68	34.0	k67	k14
26-Jun-69		for the 67 cohort	67		0.0			68		43.5		
27-Jun-69	2.8		67	0	0.0			68	87	43.5	k87	k3
28-Jun-69			67		0.0			68		7.0		
29-Jun-69	2.3		67		0.0			68		7.0		
30-Jun-69	2.3		67	0	0.0			68	21	7.0	k21	k12

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jul-69	2.3		67		0.0			68		18.0		
02-Jul-69	2.2		67	0	0.0			68	36	18.0	k36	k2
03-Jul-69			67	0	0.0			68	13	13.0	k13	k6
04-Jul-69			67		0.0			68		37.0		
05-Jul-69			67		0.0			68		37.0		
06-Jul-69	2.2		67		0.0			68		37.0		
07-Jul-69	2.1		67	0	0.0			68	148	37.0	k100	k4
08-Jul-69	2.0		67		0.0			68		15.5		
09-Jul-69	2.0		67	0	0.0			68	31	15.5	k31	k16
10-Jul-69	2.0		67		0.0			68		50.5		
11-Jul-69			67	0	0.0			68	101	50.5	k100	k8
12-Jul-69			67		0.3			68		84.0		
13-Jul-69	1.9		67		0.3			68		84.0		
14-Jul-69	1.8	First precocial 67 cohort	67	1	0.4			68	252	84.0	k100	k38
15-Jul-69	1.8		67		0.0			68		181.0		
16-Jul-69	1.8		67	0	0.0			68	362	181.0	k100	k25
17-Jul-69	1.8		67	0	0.0			68	190	190.0	k100	k34
18-Jul-69	2.0		67	0	0.0			68	141	141.0	k100	k31
19-Jul-69			67		0.3			68		58.3		
20-Jul-69			67		0.3			68		58.3		
21-Jul-69			67		0.3			68		58.3		
22-Jul-69	1.7		67	1	0.1			68	233	58.1	k100	k42
23-Jul-69	1.7		67	0	0.0			68	36	36.0	k16	
24-Jul-69	1.7		67	0	0.0			68	40	40.0	k40	k4
25-Jul-69			67	0	0.0			68	357	357.0	k100	k21
26-Jul-69			67		0.0			68		135.6		
27-Jul-69	1.6		67		0.0			68		135.6		
28-Jul-69	1.6		67	0	0.0			68	407	135.8	k100	k47
29-Jul-69	1.6		67	0	0.0			68	37	37.0	k37	k23
30-Jul-69	1.6		67	0	0.0			68	73	73.0	k71	k22
31-Jul-69	1.6		67	0	0.0			68	95	95.0	k94	k39
01-Aug-69			67	0	0.0			68	158	158.0	k100	k71
02-Aug-69			67		0.0			68		257.0		
03-Aug-69	1.6		67		0.0			68		257.0		
04-Aug-69	1.6		67	0	0.0			68	771	257.0	k100	k69
05-Aug-69	1.6		67	0	0.0			68	269	269.0	k100	k62
06-Aug-69	1.6		67	1	1.0			68	332	332.0	k100	k61
07-Aug-69	1.6		67	1	1.0			68	381	381.0	k100	k62
08-Aug-69			67	0	0.0			68	299	299.0	k100	k67
09-Aug-69			67		0.7			68		158.0		
10-Aug-69	1.5		67		0.7			68		158.0		
11-Aug-69			67	2	0.6			68	474	158.0	k100	k60
12-Aug-69	1.5		67		2.5			68		300.0		
13-Aug-69	1.5		67	5	2.5			68	600	300.0	k202	k67
14-Aug-69	1.5		67		3.0			68		263.5		
15-Aug-69			67	6	3.0			68	527	263.5	k200	k123
16-Aug-69			67		9.0			68		270.3		
17-Aug-69	1.5		67		9.0			68		270.3		
18-Aug-69	1.5		67	27	9.0			68	811	270.4	k100	k137
19-Aug-69			67	4	4.0			68	250	250.0	k100	k70
20-Aug-69	1.5		67	12	12.0			68	228	228.0	k100	k64
21-Aug-69	1.5		67		18.0			68		174.5		
22-Aug-69	1.5		67	36	18.0			68	349	174.5	k200	k69
23-Aug-69			67		5.5			68		40.0		
24-Aug-69	1.5		67	11	5.5			68	80	40.0	k80	k83
25-Aug-69	1.5		67		13.0			68		98.0		
26-Aug-69	1.5		67	26	13.0			68	196	98.0	k100	k56
27-Aug-69	1.5		67	5	5.0			68	19	19.0	k19	k44
28-Aug-69	1.5		67	15	15.0			68	42	42.0	k42	k21
29-Aug-69	1.5		67		19.0			68		103.5		
30-Aug-69			67	38	19.0			68	207	103.5	k100	k45
31-Aug-69			67		14.7			68		123.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-69	1.5		67		14.7			68		123.0		
02-Sep-69	1.5		67	44	14.6			68	369	123.0	k200	k74
03-Sep-69	1.5		67	16	16.0			68	170	170.0	k100	k123
04-Sep-69	1.5		67		16.0			68		311.5		
05-Sep-69			67	32	16.0			68	623	311.5	k200	k88
06-Sep-69			67		4.3			68		166.6		
07-Sep-69	1.5		67		4.3			68		166.6		
08-Sep-69	1.5		67	13	4.4			68	500	166.8	k100	k146
09-Sep-69	1.5		67	10	10.0			68	204	204.0	k100	k81
10-Sep-69	1.5		67	1	1.0			68	149	149.0	k100	k75
11-Sep-69	1.5		67		1.5			68		95.0		
12-Sep-69			67	3	1.5			68	190	95.0	k189	k80
13-Sep-69			67		1.3			68		316.3		
14-Sep-69	1.5		67		1.3			68		316.3		
15-Sep-69	1.5		67	4	1.4			68	949	316.4	m100	k117
16-Sep-69	1.5		67	1	1.0			68	375	375.0	m100	m71k3
17-Sep-69	1.5		67	1	1.0			68	136	136.0	m100	m68k4
18-Sep-69	1.5		67	0	0.0			68	157	157.0	m100	m72k1
19-Sep-69			67	0	0.0			68	169	169.0	m100	m70
20-Sep-69			67		0.0			68		143.6		
21-Sep-69	1.5		67		0.0			68		143.6		
22-Sep-69	1.5		67	0	0.0			68	431	143.8	m100	m30k18
23-Sep-69	1.5		67	0	0.0			68	1420	1420.0	m100	m91k13
24-Sep-69	1.5		67	0	0.0			68	87	87.0	m86	m59
25-Sep-69			67	0	0.0			68	19	19.0	m19	m43
26-Sep-69			67	0	0.0			68	11	11.0	m11	m8
27-Sep-69			67		0.0			68		21.3		
28-Sep-69			67		0.0			68		21.3		
29-Sep-69	1.6		67	0	0.0			68	64	21.4	m63	m10
30-Sep-69	1.5		67		0.0			68		71.5		
01-Oct-69	1.8		67	0	0.0			68	143	71.5	m100	m12
02-Oct-69	1.7		67	0	0.0			68	496	496.0	m100	m46k2
03-Oct-69			67	0	0.0			68	338	338.0	m100	m57
04-Oct-69			67		0.3			68		113.3		
05-Oct-69	1.5		67		0.3			68		113.3		
06-Oct-69	1.5	Last precocial 67 cohort	67	1	0.4			68	340	113.4	m100	m56k1
07-Oct-69	1.6							68	127	127.0	m100	m59
08-Oct-69	1.6							68	137	137.0	m100	m63
09-Oct-69	1.5							68	134	134.0	m100	m65
10-Oct-69								68	105	105.0	m100	m67
11-Oct-69								68		175.3		
12-Oct-69	1.5							68		175.3		
13-Oct-69	1.5							68	526	175.4	m100	m55k2
14-Oct-69	1.5							68	415	415.0	m100	m67k2
15-Oct-69	1.6							68	303	303.0	m100	m66k1
16-Oct-69	1.6							68	264	264.0	m100	m80k2
17-Oct-69								68	239	239.0	m100	m73
18-Oct-69								68		155.6		
19-Oct-69	1.6							68		155.6		
20-Oct-69	1.5							68	467	155.8	m100	m66
21-Oct-69	1.5	Stop trap						68	91	91.0	m91	m60
22-Oct-69	1.5	Start trap						68		---		
23-Oct-69	1.5							68	62	62.0	m61	m42k1
24-Oct-69								68	15	15.0	m15	m32
25-Oct-69	1.5							68		28.5		
26-Oct-69								68	57	28.5	m57	m15k1
27-Oct-69								68		43.3		
28-Oct-69	1.6							68		43.3		
29-Oct-69	1.6							68	130	43.4	m100	m28
30-Oct-69	1.6							68	136	136.0	m100	m66k1
31-Oct-69								68	89	89.0	m88	m70

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Nov-69								68		55.0		
02-Nov-69	1.5							68		55.0		
03-Nov-69	1.5							68	165	55.0	m100	m58
04-Nov-69	1.7							68	151	151.0	m100	m65
05-Nov-69	1.6							68	495	495.0	m100	m84k2
06-Nov-69	1.6							68	96	96.0	m96	m49
07-Nov-69								68	70	70.0	m70	m62k1
08-Nov-69								68		44.0		
09-Nov-69	1.5							68		44.0		
10-Nov-69								68	132	44.0	m100	m52k1
11-Nov-69								68		22.3		
12-Nov-69	1.5							68		22.3		
13-Nov-69	1.5							68	67	22.4	m67	m70
14-Nov-69		Stopped trap						68	16	16.0	m15	m41
15-Nov-69								68		---		
16-Nov-69								68		---		
17-Nov-69								68		---		
18-Nov-69	1.5	Started trap						68		---		
19-Nov-69								68	72	72.0	m72	m4
20-Nov-69	1.5							68		32.0		
21-Nov-69								68	64	32.0	m64	m46
22-Nov-69								68		5.0		
23-Nov-69	1.5							68		5.0		
24-Nov-69								68	15	5.0	m15	m28
25-Nov-69	1.5							68		35.0		
26-Nov-69								68	70	35.0	m70	m18k1
27-Nov-69	1.5							68		41.0		
28-Nov-69								68	82	41.0	m82	m45
29-Nov-69								68		58.3		
30-Nov-69	1.5							68		58.3		
01-Dec-69								68	175	58.4	m100	m63
02-Dec-69	1.5							68		34.0		
03-Dec-69								68	68	34.0	m68	m60k2
04-Dec-69	1.5							68		68.0		
05-Dec-69								68	136	68.0	m100	m52k2
06-Dec-69								68		20.0		
07-Dec-69	1.5							68		20.0		
08-Dec-69								68	60	20.0	m60	m78k1
09-Dec-69	1.5							68		7.5		
10-Dec-69								68	15	7.5	m14	m43
11-Dec-69	1.8							68		5.5		
12-Dec-69								68	11	5.5	m11	m7
13-Dec-69								68		13.3		
14-Dec-69	1.7							68		13.3		
15-Dec-69								68	40	13.4	m40	m9
16-Dec-69	1.6							68		18.0		
17-Dec-69								68	36	18.0	m36	m22
18-Dec-69	2.2							68		10.0		
19-Dec-69								68	20	10.0	m20	m23
20-Dec-69								68		16.7		
21-Dec-69	2.6							68		16.7		
22-Dec-69								68	50	16.6	m50	m14k1
23-Dec-69	2.1							68		12.5		
24-Dec-69								68	25	12.5	m25	m15
25-Dec-69	1.8							68		17.5		
26-Dec-69								68	35	17.5	m34	m12k1
27-Dec-69								68		12.7		
28-Dec-69	1.7							68		12.7		
29-Dec-69								68	38	12.6	m38	m13
30-Dec-69	1.7							68		8.0		
31-Dec-69								68	16	8.0	m16	m15

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-70	1.6							68		6.0		
02-Jan-70								68	12	6.0	a12	m8
03-Jan-70								68		9.0		
04-Jan-70	1.6							68		9.0		
05-Jan-70								68	27	9.0	a26	a3m1
06-Jan-70								68		1.0		
07-Jan-70	1.6							68		1.0		
08-Jan-70								68	3	1.0	a3	a4
09-Jan-70								68		7.5		
10-Jan-70								68		7.5		
11-Jan-70	1.8							68		7.5		
12-Jan-70								68	30	7.5	a29	a4m1
13-Jan-70	2.9							68		1.5		
14-Jan-70		Stopped trap, AFS mtg.						68	3	1.5	a2	a1m1
15-Jan-70								68		---		
16-Jan-70								68		---		
17-Jan-70								68		---		
18-Jan-70								68		---		
19-Jan-70	6.7							68		---		
20-Jan-70	7.4	Started trap						68		---		
21-Jan-70								68	83	83.0	a81	a3k2m2
22-Jan-70	9.0							68		7.0		
23-Jan-70								68	14	7.0	a14	a1
24-Jan-70								68		1.0		
25-Jan-70	8.0							68		1.0		
26-Jan-70								68	3	1.0	a3	
27-Jan-70	7.1							68		8.3		
28-Jan-70	5.5							68		8.3		
29-Jan-70								68	25	8.4	a24	a1
30-Jan-70								68		3.5		
31-Jan-70								68		3.5		
01-Feb-70								68		3.5		
02-Feb-70	3.8		69	1	1.0			68	14	3.5	a14	
03-Feb-70			69		0.0			68		8.3		
04-Feb-70			69		0.0			68		8.3		
05-Feb-70	3.2		69	0	0.0			68	25	8.4	a25	a1
06-Feb-70			69		0.0			68		7.5		
07-Feb-70			69		0.0			68		7.5		
08-Feb-70			69		0.0			68		7.5		
09-Feb-70	3.1		69	0	0.0			68	30	7.5	a30	a4
10-Feb-70			69		0.0			68		5.2		
11-Feb-70			69		0.0			68		5.2		
12-Feb-70			69		0.0			68		5.2		
13-Feb-70	3.9	Stopped trap for staff mtg.	69	0	0.0			68	21	5.4	a19	a6
14-Feb-70			69		---			68		---		
15-Feb-70			69		---			68		---		
16-Feb-70			69		---			68		---		
17-Feb-70			69		---			68		---		
18-Feb-70			69		---			68		---		
19-Feb-70	5.0	Started trap	69		---			68		---		
20-Feb-70	4.7		69	1	1.0			68	8	8.0	a8	a1
21-Feb-70			69		0.0			68		3.3		
22-Feb-70			69		0.0			68		3.3		
23-Feb-70			69		0.0			68		3.3		
24-Feb-70	3.9		69	0	0.0			68	13	3.1	a13	
25-Feb-70			69		0.0			68		1.0		
26-Feb-70	3.7		69	0	0.0			68	2	1.0	a2	a1
27-Feb-70			69		0.0			68		6.0		
28-Feb-70			69		0.0			68		6.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Mar-70			69		0.0			68		6.0		
02-Mar-70			69	0	0.0			68	24	6.0	a24	
03-Mar-70			69		0.0			68		2.7		
04-Mar-70			69		0.0			68		2.7		
05-Mar-70	3.3		69	0	0.0			68	8	2.6	a8	a3
06-Mar-70			69		0.0			68		5.3		
07-Mar-70			69		0.0			68		5.3		
08-Mar-70			69		0.0			68		5.3		
09-Mar-70	3.9		69	0	0.0			68	21	5.1	a20	a4
10-Mar-70			69		0.6			68		3.7		
11-Mar-70			69		0.6			68		3.7		
12-Mar-70	3.5		69	2	0.8			68	11	3.6	a11	a4
13-Mar-70	3.6		69		1.5			68		12.0		
14-Mar-70			69		1.5			68		12.0		
15-Mar-70			69		1.5			68		12.0		
16-Mar-70	6.2		69	6	1.5			68	48	12.0	a47	a1
17-Mar-70			69		0.0			68		13.3		
18-Mar-70	5.8		69		0.0			68		13.3		
19-Mar-70	5.3		69	0	0.0			68	40	13.4	a40	a4
20-Mar-70			69		0.5			68		10.3		
21-Mar-70			69		0.5			68		10.3		
22-Mar-70			69		0.5			68		10.3		
23-Mar-70	4.4		69	2	0.5			68	41	10.1	a41	a2
24-Mar-70			69		2.7			68		7.7		
25-Mar-70			69		2.7			68		7.7		
26-Mar-70	4.2		69	8	2.6			68	23	7.6	a23	a8
27-Mar-70			69		4.3			68		10.5		
28-Mar-70			69		4.3			68		10.5		
29-Mar-70			69		4.3			68		10.5		
30-Mar-70	4.8		69	17	4.1			68	42	10.5	a41	a2
31-Mar-70			69		2.0			68		6.5		
01-Apr-70	4.4		69	4	2.0			68	13	6.5	a13	a2
02-Apr-70			69		1.0			68		7.5		
03-Apr-70	4.2		69	2	1.0			68	15	7.5	a15	
04-Apr-70			69		10.0			68		10.7		
05-Apr-70			69		10.0			68		10.7		
06-Apr-70	4.8		69	30	10.0			68	32	10.6	a32	a1
07-Apr-70			69		10.0			68		9.0		
08-Apr-70	5.3		69	20	10.0			68	18	9.0	a17	a2
09-Apr-70			69		10.0			68		8.5		
10-Apr-70	6.5		69	20	10.0			68	17	8.5	a17	a2
11-Apr-70			69		2.3			68		3.3		
12-Apr-70			69		2.3			68		3.3		
13-Apr-70	6.1		69	7	2.4			68	10	3.4	a10	a2
14-Apr-70			69		0.5			68		2.5		
15-Apr-70	5.6		69	1	0.5			68	5	2.5	a5	
16-Apr-70			69		3.0			68		3.0		
17-Apr-70	5.0		69	6	3.0			68	6	3.0	a6	a2
18-Apr-70			69		0.7			68		1.7		
19-Apr-70			69		0.7			68		1.7		
20-Apr-70	5.2		69	2	0.6			68	5	1.6	a5	a1
21-Apr-70	4.8		69		4.0			68		3.5		
22-Apr-70	4.7		69	8	4.0			68	7	3.5	a7	
23-Apr-70			69		5.0			68		6.0		
24-Apr-70	4.5		69	10	5.0			68	12	6.0	a12	a1
25-Apr-70			69		3.3			68		4.0		
26-Apr-70			69		3.3			68		4.0		
27-Apr-70	4.5		69	10	3.4			68	12	4.0	a11	
28-Apr-70			69		2.5			68		1.0		
29-Apr-70	4.1		69	5	2.5			68	2	1.0	a2	a2
30-Apr-70			69		3.0			68		4.5		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-70	4.5		69	6	3.0			68	9	4.5	a9	a1
02-May-70			69		1.0			68		5.7		
03-May-70			69		1.0			68		5.7		
04-May-70	8.6		69	3	1.0			68	17	5.6	a17	a1
05-May-70			69		0.0			68		4.0		
06-May-70	15.0		69	0	0.0			68	8	4.0	a8	
07-May-70	15.0		69		0.0			68		1.0		
08-May-70	14.1		69	0	0.0			68	2	1.0	a1	
09-May-70			69		1.3			68		1.3		
10-May-70			69		1.3			68		1.3		
11-May-70	12.5		69	4	1.4			68	4	1.4	a4	
12-May-70	11.6		69		0.0			68		0.5		
13-May-70	10.5		69	0	0.0			68	1	0.5	a1	
14-May-70			69		0.0			68		0.0		
15-May-70	11.3		69	0	0.0			68	0	0.0		
16-May-70			69		0.0			68		0.0		
17-May-70			69		0.0			68		0.0		
18-May-70	22.7		69	0	0.0			68	0	0.0		
19-May-70	21.0	Trap entrance plugged	69		0.0			68		0.0		
20-May-70	24.1		69	0	0.0			68	0	0.0		
21-May-70	21.2	Trap entrance plugged	69		0.5			68		0.5		
22-May-70	21.2		69	1	0.5			68	1	0.5	a1	
23-May-70			69		0.0			68		0.3		
24-May-70	24.4	Trap entrance plugged	69		0.0			68		0.3		
25-May-70	19.0		69	0	0.0			68	1	0.4	a1	
26-May-70			69		0.0			68		0.0		
27-May-70	17.9		69	0	0.0			68	0	0.0		
28-May-70	15.1	Trap entrance plugged	69		0.0			68		0.5		
29-May-70	13.4		69	0	0.0			68	1	0.5	a1	
30-May-70			69		0.0			68		0.0		
31-May-70			69		0.0			68		0.0		
01-Jun-70	11.9		69	0	0.0			68	0	0.0		
02-Jun-70	14.3		69		0.0			68		0.0		
03-Jun-70	15.1		69	0	0.0			68	0	0.0		
04-Jun-70	16.0		69		0.0			68		0.0		
05-Jun-70	17.9		69	0	0.0			68	0	0.0		
06-Jun-70	16.9		69		0.0			68		0.0		
07-Jun-70			69	0	0.0			68	0	0.0		
08-Jun-70	12.6		69		0.3			68		0.0		
09-Jun-70	13.4	Trap entrance plugged	69		0.3			68		0.0		
10-Jun-70	11.9		69	1	0.4			68	0	0.0		
11-Jun-70	9.2		69		2.0			68		0.0		
12-Jun-70	8.7		69	4	2.0			68	0	0.0		
13-Jun-70			69		3.0			68		0.0		
14-Jun-70			69		3.0			68		0.0		
15-Jun-70	8.7		69	9	3.0	k9		68	0	0.0		
16-Jun-70	8.1	Trap entrance plugged	69		3.5			68		0.0		
17-Jun-70	7.1		69	7	3.5	k7		68	0	0.0		
18-Jun-70	7.1		69		3.0			68		0.0		
19-Jun-70	7.1		69	6	3.0	k6		68	0	0.0		
20-Jun-70	7.1		69		3.7			68		0.0		
21-Jun-70	6.7		69		3.7			68		0.0		
22-Jun-70	6.7		69	11	3.6	k11		68	0	0.0		
23-Jun-70	6.5		69		12.0			68		0.0		
24-Jun-70	6.0		69	24	12.0	k24	k1	68	0	0.0		
25-Jun-70	5.3		69		37.0			68		0.0		
26-Jun-70	5.0		69	74	37.0	k74		68	0	0.0		
27-Jun-70	5.5		69		98.0			68		0.0		
28-Jun-70	4.5		69		98.0			68		0.0		
29-Jun-70	4.0		69	294	98.0	k100	k5	68	0	0.0		
30-Jun-70	4.0	Stopped trap	69	160	160.0	k100	k8	68		0.0		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jul-70	3.6	Started trap	69		---			68		---		
02-Jul-70	3.3		69	187	187.0	k100	k2	68	0	0.0		
03-Jul-70	3.1		69	139	139.0	k100	k5	68	0	0.0		
04-Jul-70	2.9		69		44.7			68		0.0		
05-Jul-70	2.7		69		44.7			68		0.0		
06-Jul-70			69	134	44.6	k100	k6	68	0	0.0		
07-Jul-70	2.6	Trap entrance plugged few fish	69		56.5			68		0.0		
08-Jul-70	2.4		69	113	56.5	k100	k4	68	0	0.0		
09-Jul-70	2.4		69	144	144.0	k100	k10	68	0	0.0		
10-Jul-70	2.3		69	115	115.0	k100	k8	68	0	0.0		
11-Jul-70			69		106.3			68		0.0		
12-Jul-70	2.2	Trap entrance plugged	69		106.3			68		0.0		
13-Jul-70	2.4		69	319	106.4	k100	k10	68	0	0.0		
14-Jul-70	2.1		69	242	242.0	k100	k14	68	0	0.0		
15-Jul-70	2.0		69	76	76.0	k75	k10	68	0	0.0		
16-Jul-70			69	140	140.0	k125	k27	68	0	0.0		
17-Jul-70	2.0		69	72	72.0	k72	k39	68	0	0.0		
18-Jul-70			69		43.0			68		0.0		
19-Jul-70			69		43.0			68		0.0		
20-Jul-70	1.9		69	129	43.0	k100	k28	68	0	0.0		
21-Jul-70	1.8		69	122	122.0	k100	k37	68	0	0.0		
22-Jul-70	1.8		69	357	357.0	k100	k60	68	0	0.0		
23-Jul-70	1.8		69	456	456.0	k100	k34	68	0	0.0		
24-Jul-70	1.8		69	358	358.0	k100	k35	68	0	0.0		
25-Jul-70			69		457.0			68		0.0		
26-Jul-70			69		457.0			68		0.0		
27-Jul-70	1.8		69	1371	457.0	k100	k60	68	0	0.0		
28-Jul-70	2.0		69	407	407.0	k100	k42	68	0	0.0		
29-Jul-70	1.8		69	460	460.0	k100	k50	68	0	0.0		
30-Jul-70	1.7		69	459	459.0	k100	k49	68	0	0.0		
31-Jul-70	1.7		69	329	329.0	k100	k58	68	0	0.0		
01-Aug-70			69		249.3			68		0.3		
02-Aug-70			69		249.3			68		0.3		
03-Aug-70	1.6		69	748	249.4	k100	k62	68	1	0.4		
04-Aug-70	1.6		69	342	342.0	k100	k39	68	0	0.0		
05-Aug-70	1.6		69	268	268.0	k100	k51	68	0	0.0		
06-Aug-70	1.6		69	345	345.0	k100	k60	68	0	0.0		
07-Aug-70	1.6		69	292	292.0	k100	k60	68	0	0.0		
08-Aug-70			69		426.3			68		0.7		
09-Aug-70			69		426.3			68		0.7		
10-Aug-70	1.6		69	1279	426.4	k100	k59	68	2	0.6		
11-Aug-70			69		400.0			68		2.5		
12-Aug-70	1.6		69	800	400.0	k200	k48	68	5	2.5		
13-Aug-70			69		285.0			68		2.0		
14-Aug-70	1.6		69	570	285.0	k100	k122	68	4	2.0		
15-Aug-70			69		151.3			68		1.7		
16-Aug-70			69		151.3			68		1.7		
17-Aug-70	1.6		69	454	151.4	k100	k65	68	5	1.6		
18-Aug-70	1.6		69	255	255.0	k100	k47	68	2	2.0		
19-Aug-70	1.5		69	303	303.0	k100	k80	68	7	7.0		
20-Aug-70			69		357.5			68		5.0		
21-Aug-70	1.5		69	715	357.5	k200	k80	68	10	5.0		
22-Aug-70			69		275.0			68		6.0		
23-Aug-70	1.5		69	550	275.0	k100	k122	68	12	6.0		
24-Aug-70			69		364.0			68		4.5		
25-Aug-70	1.5		69	728	364.0	k100	k68	68	9	4.5		
26-Aug-70	1.5		69	294	294.0	k100	k67	68	3	3.0		
27-Aug-70	1.5		69	255	255.0	k100	k64	68	10	10.0		
28-Aug-70			69		249.5			68		11.0		
29-Aug-70	1.5		69	499	249.5	k100	k74	68	22	11.0		
30-Aug-70			69		289.5			68		10.5		
31-Aug-70	1.5		69	579	289.5	k100	k63	68	21	10.5		

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-70	1.5		69	197	197.0	k100	k60	68	2	2.0		
02-Sep-70	1.5		69	255	255.0	k100	k78	68	12	12.0		
03-Sep-70			69		395.0			68		5.5		
04-Sep-70	1.6		69	790	395.0	k200	k70	68	11	5.5		
05-Sep-70	1.6		69	504	504.0	k100	k143	68	3	3.0		
06-Sep-70			69		406.3			68		3.0		
07-Sep-70			69		406.3			68		3.0		
08-Sep-70	1.6		69	1219	406.4	k200	k68	68	9	3.0		
09-Sep-70			69		89.0			68		0.3		
10-Sep-70			69		89.0			68		0.3		
11-Sep-70	1.5		69	267	89.0	k200	k136	68	1	0.4		
12-Sep-70			69		109.3			68		1.7		
13-Sep-70			69		109.3			68		1.7		
14-Sep-70	1.5		69	328	109.4	k100	k100	68	5	1.6		
15-Sep-70	1.5	Last precocial 68 cohort	69	32	32.0	k31	k35	68	2	2.0		
16-Sep-70			69		28.3							
17-Sep-70			69		28.3							
18-Sep-70	1.6		69	85	28.4	k84	k28					
19-Sep-70			69		89.0							
20-Sep-70			69		89.0							
21-Sep-70	1.6		69	267	89.0	m100	k54					
22-Sep-70	1.6		69	125	125.0		m66					
23-Sep-70			69	174	174.0		m1k3					
24-Sep-70	1.6	Trap entrance plugged	69	89	89.0	m88	m2					
25-Sep-70			69	625	625.0	m100	m37k15					
26-Sep-70	1.5		69	1741	1741.0	m100	m97k29					
27-Sep-70			69		177.0							
28-Sep-70	1.5		69	354	177.0	m100	m12k2					
29-Sep-70	1.5		69	1571	1571.0	m100	m140k6					
30-Sep-70			69		140.0							
01-Oct-70			69		140.0							
02-Oct-70	1.5		69	420	140.0	m100	m68k1					
03-Oct-70			69		76.3							
04-Oct-70			69		76.3							
05-Oct-70	1.5		69	229	76.4	m100	m53					
06-Oct-70			69		120.7							
07-Oct-70		Trap entrance plugged	69		120.7							
08-Oct-70			69		120.7							
09-Oct-70	1.7		69	483	120.9	m100	m37k3					
10-Oct-70			69		204.6							
11-Oct-70			69		204.6							
12-Oct-70	1.6		69	614	204.8	m100	m34k5					
13-Oct-70	1.6		69	38	38.0	m38	m34					
14-Oct-70	1.6		69	64	64.0	m62	m18					
15-Oct-70			69		47.5							
16-Oct-70	1.6		69	95	47.5	m94	m27k1					
17-Oct-70			69		52.3							
18-Oct-70			69		52.3							
19-Oct-70	1.6		69	157	52.4	m100	m62					
20-Oct-70	1.7		69	46	46.0		m43					
21-Oct-70	1.6		69	37	37.0		m3					
22-Oct-70			69		33.5							
23-Oct-70	1.9		69	67	33.5	m67	m1					
24-Oct-70			69		61.0							
25-Oct-70			69		61.0							
26-Oct-70	1.6		69	183	61.0	m100	m31					
27-Oct-70			69		68.0							
28-Oct-70	1.6		69	136	68.0	m100	m41k1					
29-Oct-70			69		68.0							
30-Oct-70	1.5		69	136	68.0	m100	m50k1					
31-Oct-70			69		40.2							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

	Flow		Brood	#of.	Daily	Trap efficiency		Brood	# of	Daily	Trap efficiency	
Date	m^3/s	Comments	yr.	fish.	□	rel.[a]	re.[a]	yr.	fish	□	rel.[a]	re.[a]
01-Nov-70			69		40.2							
02-Nov-70			69		40.2							
03-Nov-70			69		40.2							
04-Nov-70	1.6		69	201	40.2	m100	m27					
05-Nov-70			69		57.5							
06-Nov-70	1.8		69	115	57.5	m100	m57					
07-Nov-70			69		12.7							
08-Nov-70			69		12.7							
09-Nov-70	1.7		69	38	12.6	m37	m52					
10-Nov-70			69		18.0							
11-Nov-70			69		18.0							
12-Nov-70	2.5		69	54	18.0	m53	m13k4					
13-Nov-70	2.1		69	29	29.0	m29	m8k2					
14-Nov-70			69		28.3							
15-Nov-70			69		28.3							
16-Nov-70	2.1		69	85	28.4	m84	m13					
17-Nov-70			69		15.0							
18-Nov-70	2.0		69	30	15.0	m30	m26					
19-Nov-70			69		15.0							
20-Nov-70	2.0		69	30	15.0	m29	m8k1					
21-Nov-70			69		17.0							
22-Nov-70			69		17.0							
23-Nov-70	1.8		69	51	17.0	m49	m8k1					
24-Nov-70			69		38.0							
25-Nov-70	3.5		69	76	38.0	m76	m24					
26-Nov-70			69		51.5							
27-Nov-70	2.6		69	103	51.5	m102	m6					
28-Nov-70			69		36.0							
29-Nov-70			69		36.0							
30-Nov-70	2.4		69	108	36.0	m100	m24					
01-Dec-70			69		25.5							
02-Dec-70	2.3		69	51	25.5	m51	m19					
03-Dec-70			69		10.5							
04-Dec-70	2.1		69	21	10.5	m20	m7					
05-Dec-70			69		19.3							
06-Dec-70			69		19.3							
07-Dec-70	2.7		69	58	19.4	m57	m4					
08-Dec-70			69		8.0							
09-Dec-70	2.6		69	16	8.0	m16	m9					
10-Dec-70			69		13.0							
11-Dec-70	2.3		69	26	13.0	m26	m5					
12-Dec-70			69		15.3							
13-Dec-70			69		15.3							
14-Dec-70			69	46	15.4	m45	m10					
15-Dec-70			69		11.0							
16-Dec-70	2.1		69	22	11.0	m22	m13					
17-Dec-70			69		6.7							
18-Dec-70		Icing problems	69		6.7							
19-Dec-70	2.0		69	20	6.6	m20	m7					
20-Dec-70			69		5.0							
21-Dec-70	2.0		69	10	5.0	m10	m4					
22-Dec-70			69		6.0							
23-Dec-70	1.9	Icing problems	69		6.0							
24-Dec-70	1.9		69	18	6.0	m18	m4					
25-Dec-70			69		3.3							
26-Dec-70			69		3.3							
27-Dec-70			69		3.3							
28-Dec-70	1.8	Bypass frozen	69	13	3.1	m13	m3					
29-Dec-70			69		6.3							
30-Dec-70			69		6.3							
31-Dec-70	2.0		69	19	6.4	m19	m6					

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-71			69		0.9							
02-Jan-71			69		0.9							
03-Jan-71			69		0.9							
04-Jan-71		Bypass frozen	69		0.9							
05-Jan-71			69		0.9							
06-Jan-71		Bypass thawed, ice in front	69		0.9							
07-Jan-71	1.8	Bypass working normally	69		0.9							
08-Jan-71	2.0		69	7	0.7	a7	m5					
09-Jan-71			69		5.0							
10-Jan-71			69		5.0							
11-Jan-71	3.6		69	15	5.0	a2	a1m3					
12-Jan-71	3.0		69		9.7							
13-Jan-71			69		9.7							
14-Jan-71	2.5		69	29	9.6	a29	k2					
15-Jan-71	3.3		69		9.8							
16-Jan-71			69		9.8							
17-Jan-71	4.9		69		9.8							
18-Jan-71	5.3		69	39	9.6	a37	a7					
19-Jan-71	5.6	Trap entrance plugged	69		8.3							
20-Jan-71	7.1		69		8.3							
21-Jan-71	5.5		69	25	8.4	a25	a2m1					
22-Jan-71			69		5.0							
23-Jan-71			69		5.0							
24-Jan-71			69		5.0							
25-Jan-71	3.9		69	20	5.0	a20	a2m1					
26-Jan-71			69		1.7							
27-Jan-71			69		1.7							
28-Jan-71	4.0		69	5	1.6	a5	a1					
29-Jan-71			69		0.8							
30-Jan-71			69		0.8							
31-Jan-71			69		0.8							
01-Feb-71			69		0.8							
02-Feb-71	6.3		69	4	0.8	a4	a1					
03-Feb-71	5.7		69		1.0							
04-Feb-71			69		1.0							
05-Feb-71	4.8		69	3	1.0	a3						
06-Feb-71			69		0.8							
07-Feb-71			69		0.8							
08-Feb-71			69		0.8							
09-Feb-71	3.7		69	3	0.6	a3						
10-Feb-71			69		0.6							
11-Feb-71			69		0.6							
12-Feb-71			69		0.6							
13-Feb-71			69		0.6							
14-Feb-71			69		0.6							
15-Feb-71			69		0.6							
16-Feb-71	6.9		69	4	0.4	a4						
17-Feb-71			69		0.5							
18-Feb-71			69		0.5							
19-Feb-71	5.7		69		0.5							
20-Feb-71			69		0.5							
21-Feb-71			69		0.5							
22-Feb-71	4.7		69	3	0.5	a3						
23-Feb-71			69		0.3							
24-Feb-71			69		0.3							
25-Feb-71	4.4		69	1	0.4	a1						
26-Feb-71			69		0.5							
27-Feb-71			69		0.5							
28-Feb-71			69		0.5							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Mar-71	3.6		69	2	0.5	a2						
02-Mar-71			69		0.0							
03-Mar-71			69		0.0							
04-Mar-71	3.3	Icing problems	69	0	0.0							
05-Mar-71			69		0.3							
06-Mar-71			69		0.3							
07-Mar-71			69		0.3							
08-Mar-71	2.9	Icing problems	69	1	0.1	a1						
09-Mar-71			69		0.7							
10-Mar-71			69		0.7							
11-Mar-71	3.5		69	2	0.6	a2						
12-Mar-71			69		1.3							
13-Mar-71			69		1.3							
14-Mar-71			69		1.3							
15-Mar-71	3.4		69	5	1.1	a5						
16-Mar-71			69		0.3							
17-Mar-71			69		0.3							
18-Mar-71			69		0.3							
19-Mar-71	2.7		69	1	0.1	a1						
20-Mar-71			69		0.2							
21-Mar-71			69		0.2							
22-Mar-71			69		0.2							
23-Mar-71			69		0.2							
24-Mar-71			69		0.2							
25-Mar-71			69		0.2							
26-Mar-71			69		0.2							
27-Mar-71			69		0.2							
28-Mar-71			69		0.2							
29-Mar-71	4.7		69	2	0.2	a2						
30-Mar-71			69		5.0							
31-Mar-71	4.9		69	10	5.0	a10	a1k1					
01-Apr-71			69		2.5							
02-Apr-71	4.5		69	5	2.5	a5						
03-Apr-71			69		0.3							
04-Apr-71			69		0.3							
05-Apr-71	4.8		69	1	0.4	a1						
06-Apr-71			69		5.0							
07-Apr-71			69		5.0							
08-Apr-71	7.5		69	15	5.0	a15	k1					
09-Apr-71			69		5.3							
10-Apr-71			69		5.3							
11-Apr-71			69		5.3							
12-Apr-71	6.7		69	21	5.1	a21						
13-Apr-71			69		1.3							
14-Apr-71			69		1.3							
15-Apr-71	7.4		69	4	1.4	a4	a1					
16-Apr-71	6.9		69	5	5.0	a5						
17-Apr-71			69		5.7							
18-Apr-71			69		5.7							
19-Apr-71	6.5	Vandals, bypass overflowing	69	17	5.6	a12						
20-Apr-71			69		0.5							
21-Apr-71	7.1		69	1	0.5	a1						
22-Apr-71			69		8.0							
23-Apr-71	6.7		69	16	8.0	a16						
24-Apr-71			69		4.3							
25-Apr-71			69		4.3							
26-Apr-71	6.3		69	13	4.4	a13	a1k1					
27-Apr-71			69		3.0							
28-Apr-71	8.1		69	6	3.0	a6	a1					
29-Apr-71	8.8		69	4	4.0	a4						
30-Apr-71			69		1.7							

Appendix Table A-2 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1965 to 1969 cohorts.

	Flow		Brood	#of.	Daily	Trap efficiency		Brood	# of	Daily	Trap efficiency	
Date	m^3/s	Comments	yr.	fish.	□	rel.[a]	re.[a]	yr.	fish	□	rel.[a]	re.[a]
01-May-71			69		1.7							
02-May-71			69		1.7							
03-May-71	16.9		69	7	1.9	a7						
04-May-71			69		2.5							
05-May-71	19.0		69	5	2.5	a5						
06-May-71	19.0		69		3.0							
07-May-71	20.2		69	6	3.0	a6						
08-May-71			69		0.3							
09-May-71			69		0.3							
10-May-71	20.2		69	1	0.4	a1						
11-May-71	20.2		69		0.3							
12-May-71	21.5		69		0.3							
13-May-71	32.6		69		0.3							
14-May-71	22.1		69	1	0.1	a1						
15-May-71			69		0.2							
16-May-71			69		0.2							
17-May-71	13.8		69		0.2							
18-May-71			69		0.2							
19-May-71	11.5		69	1	0.2	a1						
20-May-71			69		0.5							
21-May-71	8.9		69	1	0.5	a1						
22-May-71			69		0.1							
23-May-71			69		0.1							
24-May-71	10.1		69		0.1							
25-May-71			69		0.1							
26-May-71			69		0.1							
27-May-71			69		0.1							
28-May-71	20.7		69	1	0.4	a1						
29-May-71			69		0.3							
30-May-71	13.8		69		0.3							
31-May-71			69		0.3							
01-Jun-71	9.5		69		0.3							
02-Jun-71	10.1		69		0.3							
03-Jun-71			69		0.3							
04-Jun-71	10.8	End of migration for 69 cohort	69	2	0.2	a2						

[a]Mark codes for the trap efficiency releases and recaptures:

a=Lower caudal fin clip
b=Branded left anterior astride lateral line
c=Branded left anterior above lateral line
d=Branded right anterior astride lateral line
e=Branded right dorsal astride lateral line
f=Branded right posterior astride lateral line
g=Branded left posterior astride lateral line
h=Branded left dorsal astride lateral line
I=Branded right dorsal above lateral line
j=Branded left dorsal above lateral line
k=Left ventral fin clip
m=Right ventral fin clip

All brands used were hot brands, and the clips were only partial fin clips.

Appendix Table A-3. Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts .

	Flow		Brood	#of.	Daily	Trap efficiency		Brood	# of	Daily	Trap efficiency	
Date	m^3/s	Comments	yr.	fish.	□	rel.[a]	re.[a]	yr.	fish	□	rel.[a]	re.[a]
29-Oct-93	1.4		92	144	144.0							
30-Oct-93	1.3		92		14.5							
31-Oct-93	1.3		92	29	14.5	a28						
01-Nov-93	1.3		92		34.0							
02-Nov-93	1.3	"n"group rel.[a] further upstream	92	68	34.0	n46a21	a10					
03-Nov-93	1.4		92		300.0							
04-Nov-93	1.4	"n"group rel.[a] further upstream	92	600	300.0	n4	a6n7					
05-Nov-93	1.4		92		20.0							
06-Nov-93	1.4		92	40	20.0							
07-Nov-93	1.4		92	19	19.0	k18						
08-Nov-93	1.3		92	30	30.0	k30	k7					
09-Nov-93	1.4		92	28	28.0							
10-Nov-93	1.4		92		15.5							
11-Nov-93	1.4		92	31	15.5	k2	k9					
12-Nov-93	1.4		92		260.5							
13-Nov-93	1.4		92	521	260.5	m50	k1n3					
14-Nov-93	1.4		92		42.5							
15-Nov-93	1.4		92	85	42.5		m17					
16-Nov-93	1.4		92		21.5							
17-Nov-93	1.5		92	43	21.5							
18-Nov-93	1.5		92		13.0							
19-Nov-93	1.4		92	26	13.0							
20-Nov-93	1.4		92		8.3							
21-Nov-93	1.4		92		8.3							
22-Nov-93	1.4		92	25	8.4							
23-Nov-93	1.4		92		4.0							
24-Nov-93	1.5	Trap not turning at check	92	8	4.0							
25-Nov-93	1.6	Stopped trap due to freezing	92		---							
26-Nov-93	1.6		92		---							
27-Nov-93	1.7		92		---							
28-Nov-93	1.6		92		---							
29-Nov-93	1.5		92		---							
30-Nov-93	1.6		92		---							
01-Dec-93	1.8	Started trap a.m.	92		---							
02-Dec-93	1.7		92	46	46.0							
03-Dec-93	1.6		92	10	10.0							
04-Dec-93	1.7		92		21.5							
05-Dec-93	1.6		92	43	21.5							
06-Dec-93	1.5		92		2.0							
07-Dec-93	1.6		92	4	2.0							
08-Dec-93	1.8		92		27.3							
09-Dec-93	1.8		92		27.3							
10-Dec-93	1.8		92	82	27.4							
11-Dec-93	1.8		92		4.7							
12-Dec-93	1.7		92		4.7							
13-Dec-93	1.6		92	14	4.6							
14-Dec-93	1.6		92		1.3							
15-Dec-93	1.6		92		1.3							
16-Dec-93	1.6		92	4	1.4							
17-Dec-93	1.5		92		3.5							
18-Dec-93	1.5		92		3.5							
19-Dec-93	1.5		92		3.5							
20-Dec-93	1.5		92	14	3.5							
21-Dec-93	1.5		92		0.7							
22-Dec-93	1.5		92		0.7							
23-Dec-93	1.5	Trap not turning at check	92	2	0.6							
24-Dec-93	1.6	Stopped trap due to freezing	92		---							
25-Dec-93	1.6		92		---							
26-Dec-93	1.6		92		---							
27-Dec-93	1.5	Started trap a.m.	92		---							
28-Dec-93	1.5		92		0.5							
29-Dec-93	1.6		92	1	0.5							
30-Dec-93	1.6		92		2.8							
31-Dec-93	1.6		92		2.8							

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-94	1.9		92		2.8							
02-Jan-94	2.0		92	11	2.6	m11						
03-Jan-94	2.4		92		15.5							
04-Jan-94	3.0		92	31	15.5	m14	m7					
05-Jan-94	3.0		92		6.5							
06-Jan-94	2.4		92	13	6.5	n12	m1					
07-Jan-94	2.1		92	6	6.0	n6	n4					
08-Jan-94	1.9		92		1.0							
09-Jan-94	1.9		92	2	1.0	n2	n3					
10-Jan-94	1.8		92		1.0							
11-Jan-94	1.9		92	2	1.0							
12-Jan-94	1.9		92		0.5							
13-Jan-94	2.0		92		0.5							
14-Jan-94	2.0		92		0.5							
15-Jan-94	2.0		92	2	0.5	n2						
16-Jan-94	2.0		92		0.8							
17-Jan-94	2.0		92		0.8							
18-Jan-94	1.9		92		0.8							
19-Jan-94	1.8		92	3	0.6	n3	a1					
20-Jan-94	1.8		92		0.5							
21-Jan-94	1.8		92	1	0.5	n1	n2					
22-Jan-94	1.8		92		0.8							
23-Jan-94	1.8		92		0.8							
24-Jan-94	1.8		92		0.8							
25-Jan-94	1.8		92	3	0.6		n1					
26-Jan-94	1.8		92		0.3							
27-Jan-94	1.8		92		0.3							
28-Jan-94	1.7		92	1	0.4		m1					
29-Jan-94	1.7		92		1.0							
30-Jan-94	1.7		92		1.0							
31-Jan-94	1.6		92		1.0							
01-Feb-94	1.7	Trap not turning/started	92	4	1.0							
02-Feb-94	1.7		92	1	1.0							
03-Feb-94	1.7		92		1.0							
04-Feb-94	1.7		92	2	1.0							
05-Feb-94	1.7		92		3.0							
06-Feb-94	1.7		92		3.0							
07-Feb-94	1.7	Trap not turning/started noon	92	9	3.0		n1					
08-Feb-94	1.6		92		5.0							
09-Feb-94	1.6	Trap not turning/started a.m.	92	10	5.0							
10-Feb-94	1.6		92	1	1.0							
11-Feb-94	1.6		92	4	4.0							
12-Feb-94	1.6		92		1.3							
13-Feb-94	1.6		92		1.3							
14-Feb-94	1.6		92		1.3							
15-Feb-94	1.6		92	5	1.1							
16-Feb-94	1.6		92		2.3							
17-Feb-94	1.7		92		2.3							
18-Feb-94	1.7		92	7	2.4							
19-Feb-94	1.6		92		3.8							
20-Feb-94	1.6		92		3.8							
21-Feb-94	1.6		92		3.8							
22-Feb-94	1.6		92	15	3.6							
23-Feb-94	1.8		92		1.0							
24-Feb-94	1.8		92		1.0							
25-Feb-94	1.7		92	3	1.0	k2						
26-Feb-94	1.8		92		8.3							
27-Feb-94	2.0		92		8.3							
28-Feb-94	2.1		92		8.3							

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Mar-94	2.6		92	33	8.1	k23	k2	93	2	2.0		
02-Mar-94	3.6	Moved out of main flow 3/3	92	55	55.0		k15	93	4	4.0		
03-Mar-94	4.8	Trap stopped 2hrs then started	92	93	93.0	n50-		93	2	2.0		
04-Mar-94	5.8	Trap stopped started 1030	92	3	3.0		n1-	93	0	0.0		
05-Mar-94	4.9		92	33	33.0	o33-	n3-	93	1	1.0		
06-Mar-94	4.0	Trap stopped started	92	17	17.0		o5-	93	3	3.0		
07-Mar-94	3.5		92	9	9.0	a9		93	1	1.0		
08-Mar-94	3.2		92		17.5			93		0.5		
09-Mar-94	3.1		92	35	17.5	a35	a4	93	1	0.5		
10-Mar-94	3.1		92		0.5			93		4.0		
11-Mar-94	3.4	Moved trap slightly	92	1	0.5		a1	93	8	4.0		
12-Mar-94	3.3		92		3.0			93		1.3		
13-Mar-94	3.3		92		3.0			93		1.3		
14-Mar-94	3.5	Moved trap slightly upstream	92	9	3.0	p8		93	4	1.4		
15-Mar-94	4.0		92		10.0			93		1.5		
16-Mar-94	4.4	Moved trap slightly	92	20	10.0		p3	93	3	1.5		
17-Mar-94	4.2		92		2.0			93		2.5		
18-Mar-94	4.1		92	4	2.0			93	5	2.5		
19-Mar-94	4.0		92		7.7			93		2.3		
20-Mar-94	3.7		92		7.7			93		2.3		
21-Mar-94	3.9		92	23	7.6	m14		93	7	2.4		
22-Mar-94	3.5		92		0.5			93		5.5		
23-Mar-94	3.4	Moved trap slightly	92	1	0.5		m1	93	11	5.5		
24-Mar-94	3.2		92		4.5			93		72.5		
25-Mar-94	3.3		92	9	4.5			93	145	72.5	n50	
26-Mar-94	3.3		92		2.0			93		15.0		
27-Mar-94	3.5		92		2.0			93		15.0		
28-Mar-94	3.5		92	6	2.0			93	45	15.0		
29-Mar-94	3.7		92		9.0			93		68.5		
30-Mar-94	4.4	T.E. released 20ft above trap	92	18	9.0			93	137	68.5	a122	
31-Mar-94	4.5		92		16.0			93		167.5		
01-Apr-94	4.8		92	32	16.0			93	335	167.5		a3
02-Apr-94	5.6		92		11.7			93		97.7		
03-Apr-94	6.5		92		11.7			93		97.7		
04-Apr-94	6.1		92	35	11.6			93	293	97.6		
05-Apr-94	5.8		92	11	11.0			93	85	85.0		
06-Apr-94	6.1		92	9	9.0			93	150	150.0		
07-Apr-94	6.1		92	5	5.0			93	182	182.0		
08-Apr-94	6.1		92	5	5.0			93	89	89.0		
09-Apr-94	6.7		92		2.3			93		47.7		
10-Apr-94	6.9		92		2.3			93		47.7		
11-Apr-94	6.9		92	7	2.4			93	143	47.6		
12-Apr-94	7.1		92		2.5			93		8.5		
13-Apr-94	6.9		92	5	2.5			93	17	8.5		
14-Apr-94	6.7		92		1.0			93		38.0		
15-Apr-94	6.7		92	2	1.0			93	76	38.0		
16-Apr-94	8.0		92		0.3			93		19.0		
17-Apr-94	10.6		92		0.3			93		19.0		
18-Apr-94	14.2		92	1	0.4			93	57	19.0		
19-Apr-94	17.8	Trap stopped by log/started	92	0	0.0			93	12	12.0		
20-Apr-94	20.2	Trap full of debris, fry dead	92	1	1.0			93	306	306.0	a100-	
21-Apr-94	21.2	Lots of debris in trap	92	1	1.0			93	32	32.0		
22-Apr-94	18.9		92	0	0.0			93	8	8.0		
23-Apr-94	16.7	T.E. released midstream at	92	0	0.0			93	38	38.0	n36	
24-Apr-94	15.7	upper ladder.	92	1	1.0			93	11	11.0		n2
25-Apr-94	14.8		92	0	0.0			93	19	19.0	q19	
26-Apr-94	13.3		92		1.0			93		21.5		
27-Apr-94	12.4	"n" group midstream "a"group	92	2	1.0			93	43	21.5	a19n21	q1
28-Apr-94	10.8	near edge(upper ladder)	92		0.5			93		17.5		
29-Apr-94	10.9	"a"group rt.bank "n" lt. bank	92	1	0.5			93	35	17.5	a17-a14-	
30-Apr-94	10.5	Moved trap to right bank	92	0	0.0			93	12	12.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-May-94	9.5	Trap stopped by log/started	92	0	0.0			93	1	1.0		
02-May-94	9.8	Trap stopped by 2x4's	92	1	1.0			93	3	3.0		
03-May-94	9.4		92		0.5			93		5.0		
04-May-94	11.3		92	1	0.5			93	10	5.0		
05-May-94	11.4		92		1.0			93		2.0		
06-May-94	12.0		92	2	1.0			93	4	2.0		
07-May-94	11.8		92		1.3			93		7.3		
08-May-94	12.5		92		1.3			93		7.3		
09-May-94	13.0		92	4	1.4			93	22	7.4		
10-May-94	12.1		92		1.5			93		14.5		
11-May-94	10.9		92	3	1.5			93	29	14.5		a1-
12-May-94	10.3		92		0.0			93		9.5		
13-May-94	9.2	Trap stopped, cone hit bottom	92	0	0.0			93	19	9.5		
14-May-94	8.9	Moved into flow 5/13	92		4.0			93		17.0		
15-May-94	8.1		92		4.0			93		17.0		
16-May-94	7.2		92	12	4.0			93	51	17.0	r41	
17-May-94	6.9		92		4.0			93		28.5		
18-May-94	6.7		92	8	4.0			93	57	28.5	s39t8	
19-May-94	6.3		92		0.5			93		10.0		
20-May-94	7.1		92	1	0.5			93	20	10.0		r1
21-May-94	6.9		92		0.3			93		11.7		
22-May-94	6.9		92		0.3			93		11.7		
23-May-94	6.9		92	1	0.4			93	35	11.6		s4t1
24-May-94	6.1		92		0.0			93		6.0		
25-May-94	5.9		92	0	0.0			93	12	6.0		
26-May-94	5.4		92		2.0			93		3.0		
27-May-94	5.2		92	4	2.0			93	6	3.0		
28-May-94	4.8		92		1.5			93		12.0		
29-May-94	4.3		92	3	1.5			93	24	12.0	n24	n1-
30-May-94	3.9		92		1.0			93		20.5		
31-May-94	3.7		92		1.0			93		20.5		
01-Jun-94	3.6		92		1.0			93		20.5		
02-Jun-94	3.5		92	4	1.0			93	82	20.5	a82	n1
03-Jun-94	3.5		92		4.5			93		20.5		
04-Jun-94	3.7		92		4.5			93		20.5		
05-Jun-94	3.1		92		4.5			93		20.5		
06-Jun-94	3.1		92	18	4.5			93	82	20.5		a5n1
07-Jun-94	3.0		92		10.0			93		28.0		
08-Jun-94	3.0		92	20	10.0			93	56	28.0	a54	a2
09-Jun-94	2.8		92		5.5			93		20.0		
10-Jun-94	2.7		92	11	5.5			93	40	20.0	a39	a9s1
11-Jun-94	2.6		92		0.8			93		20.5		
12-Jun-94	2.5		92		0.8			93		20.5		
13-Jun-94	2.6		92		0.8			93		20.5		
14-Jun-94	2.5		92	3	0.6			93	82	20.5	n81-	a8
15-Jun-94	2.4		92		1.7			93		53.3		
16-Jun-94	2.2		92		1.7			93		53.3		
17-Jun-94	2.0	Trap stopped,cone hit bottom	92	5	1.6			93	160	53.4		a3n4-
18-Jun-94	1.9	Started 6/17 @ 2000	92	3	3.0			93	17	17.0	u103	a1n1-
19-Jun-94	1.9	End of 92 brood smolts	92	0	0.0			93	17	17.0		u3a2
20-Jun-94	1.8		92		0.0			93		3.3		
21-Jun-94	1.7		92		0.0			93		3.3		
22-Jun-94	1.7		92		0.0			93		3.3		
23-Jun-94	1.6	Moved trap to new location	92	0	0.0			93	13	3.1		
24-Jun-94	1.5	From the flume hole to the	92		---			93		---		
25-Jun-94	1.5	hatchery intake	92		---			93		---		
26-Jun-94	1.5		92		---			93		---		
27-Jun-94	1.4		92		---			93		---		
28-Jun-94	1.5	Started trap @ 1430	92		---			93		---		
29-Jun-94	1.4		92	0	0.0			93	60	60.0		
30-Jun-94	1.4		92	0	0.0			93	92	92.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Jul-94	1.4		92	0	0.0			93	94	94.0		
02-Jul-94	1.4		92		0.0			93		96.5		
03-Jul-94	1.4		92	0	0.0			93	193	96.5	n85k15	
04-Jul-94	1.4		92		0.0			93		93.0		
05-Jul-94	1.5		92	0	0.0			93	186	93.0		n5k2
06-Jul-94	1.8		92		0.0			93		213.0		
07-Jul-94	1.5		92	0	0.0			93	426	213.0		
08-Jul-94	1.4		92	0	0.0			93	47	47.0		
09-Jul-94	1.4		92		0.0			93		59.3		
10-Jul-94	1.4		92		0.0			93		59.3		
11-Jul-94	1.4		92	0	0.0			93	178	59.4		n1
12-Jul-94	1.3		92		0.0			93		39.0		
13-Jul-94	1.3		92	0	0.0			93	78	39.0		k1
14-Jul-94	1.3		92		0.0			93		44.5		
15-Jul-94	1.3		92	0	0.0			93	89	44.5		n1
16-Jul-94	1.3		92		0.0			93		22.3		
17-Jul-94	1.3		92		0.0			93		22.3		
18-Jul-94	1.2		92	0	0.0			93	67	22.4		
19-Jul-94	1.2		92		0.0			93		13.7		
20-Jul-94	1.3		92		0.0			93		13.7		
21-Jul-94	1.3		92	0	0.0			93	41	13.6		
22-Jul-94	1.3		92		0.0			93		12.0		
23-Jul-94	1.3		92		0.0			93		12.0		
24-Jul-94	1.3		92		0.0			93		12.0		
25-Jul-94	1.3		92	0	0.0			93	48	12.0		n1
26-Jul-94	1.3		92	0	0.0			93	19	19.0		
27-Jul-94	1.2		92	0	0.0			93	21	21.0		
28-Jul-94	1.2		92	0	0.0			93	15	15.0		
29-Jul-94	1.2		92	0	0.0			93	10	10.0		
30-Jul-94	1.2	First precocial 92 cohort	92	2	2.0			93	33	33.0		
31-Jul-94	1.2		92	0	0.0			93	33	33.0		
01-Aug-94	1.2		92	0	0.0			93	38	38.0		a1n1
02-Aug-94	1.2		92		0.0			93		52.0		
03-Aug-94	1.2		92	0	0.0			93	104	52.0	a102-	
04-Aug-94	1.2		92		0.0			93		50.0		
05-Aug-94	1.1		92	0	0.0			93	100	50.0		a20-
06-Aug-94	1.1		92		0.0			93		74.0		
07-Aug-94	1.1		92		0.0			93		74.0		
08-Aug-94	1.1		92	0	0.0			93	222	74.0	m100	a7-
09-Aug-94	1.1		92		0.0			93		98.0		
10-Aug-94	1.1		92		0.0			93		98.0		
11-Aug-94	1.1		92	0	0.0			93	294	98.0		m24a2-
12-Aug-94	1.0		92	0	0.0			93	72	72.0		
13-Aug-94	1.0		92		0.3			93		78.3		
14-Aug-94	1.0		92		0.3			93		78.3		
15-Aug-94	1.0		92	1	0.4			93	235	78.4		a1-m1
16-Aug-94	1.0		92		0.5			93		121.0		
17-Aug-94	1.0		92	1	0.5			93	242	121.0		
18-Aug-94	1.0		92	1	1.0			93	132	132.0		
19-Aug-94	1.0		92	0	0.0			93	72	72.0	n71	
20-Aug-94	1.0		92		0.6			93		32.0		
21-Aug-94	1.0		92		0.6			93		32.0		
22-Aug-94	1.0		92	2	0.8			93	96	32.0		n14m2
23-Aug-94	1.0		92		2.5			93		134.0		
24-Aug-94	1.0		92	5	2.5			93	268	134.0		n2
25-Aug-94	1.0		92		1.7			93		95.7		
26-Aug-94	1.0		92		1.7			93		95.7		
27-Aug-94	1.0		92	5	1.6			93	287	95.6		m1
28-Aug-94	1.0		92		2.0			93		84.0		
29-Aug-94	1.0		92	4	2.0			93	168	84.0		
30-Aug-94	1.0		92	3	3.0			93	105	105.0		
31-Aug-94	1.0		92	3	3.0			93	92	92.0		n1

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-94	1.0		92	2	2.0			93	140	140.0	k55	n1
02-Sep-94	1.0		92		0.5			93		125.0		
03-Sep-94	1.1		92	1	0.5			93	250	125.0	k45	k20n1a1
04-Sep-94	1.2		92		1.3			93		123.3		
05-Sep-94	1.1		92		1.3			93		123.3		
06-Sep-94	1.1		92	4	1.4			93	370	123.4		k12
07-Sep-94	1.1		92		0.5			93		53.5		
08-Sep-94	1.0		92	1	0.5			93	107	53.5		
09-Sep-94	1.0		92	0	0.0			93	57	57.0		
10-Sep-94	1.1		92		1.3			93		142.3		
11-Sep-94	1.1		92		1.3			93		142.3		
12-Sep-94	1.2		92	4	1.4			93	427	142.4		n1m1
13-Sep-94	1.2		92		0.5			93		142.5		
14-Sep-94	1.2		92	1	0.5			93	285	142.5		
15-Sep-94	1.2		92		2.0			93		110.5		
16-Sep-94	1.2	Last precocial 92 cohort	92	4	2.0			93	221	110.5		
17-Sep-94	1.2							93		23.0		
18-Sep-94	1.1							93		23.0		
19-Sep-94	1.1							93	69	23.0	a69	a1
20-Sep-94	1.1							93		59.0		
21-Sep-94	1.1							93	118	59.0		a13
22-Sep-94	1.1							93		63.5		
23-Sep-94	1.1							93	127	63.5		a1
24-Sep-94	1.1							93		104.0		
25-Sep-94	1.1							93		104.0		
26-Sep-94	1.1							93	312	104.0	a31	
27-Sep-94	1.2							93		104.0		
28-Sep-94	1.2							93	208	104.0		a6
29-Sep-94	1.3							93		251.0		
30-Sep-94	1.2							93	502	251.0	v90q10	
01-Oct-94								93		96.0		
02-Oct-94								93		96.0		
03-Oct-94								93	288	96.0		v21q1a1
04-Oct-94								93		189.5		
05-Oct-94								93	379	189.5		
06-Oct-94								93	92	92.0		
07-Oct-94	1.2							93	257	257.0	w100	
08-Oct-94	1.2							93	141	141.0		w35
09-Oct-94	1.2							93	130	130.0		w2
10-Oct-94	1.2							93	91	91.0		w1a1k1
11-Oct-94	1.2							93	281	281.0		k1
02-Oct-94	1.2							93	171	171.0		
13-Oct-94	1.2							93		462.0		
14-Oct-94	1.4							93	924	462.0		a2
15-Oct-94	1.3	Moved trap slightly						93	289	289.0	n100	
16-Oct-94	1.3							93		41.0		
17-Oct-94	1.2							93	82	41.0		n15
18-Oct-94	1.3							93		4.8		
19-Oct-94	1.3							93		4.8		
20-Oct-94	1.2							93		4.8		
21-Oct-94	1.4							93	19	4.6		
22-Oct-94	1.3							93	380	380.0		k1m1
23-Oct-94	1.3							93	125	125.0		
24-Oct-94	1.3							93	104	104.0		
25-Oct-94	1.3							93		40.5		
26-Oct-94	1.3							93	81	40.5		
27-Oct-94	1.7							93	146	146.0		
28-Oct-94	1.6							93	390	390.0		
29-Oct-94	1.3							93	164	164.0		
30-Oct-94	1.3							93		37.0		
31-Oct-94	2.1	Moved trap from intake to Jarboe						93	74	37.0	a72-	

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Nov-94	3.1	Trap stopped by log						93	590	590.0	n100	a15-n3
02-Nov-94	1.8							93	85	85.0		
03-Nov-94	1.6							93	75	75.0		n44
04-Nov-94	1.6							93	30	30.0		n3
05-Nov-94	1.6							93	47	47.0		n7v1
06-Nov-94	1.6							93	0			
07-Nov-94	1.6							93	1	1.0		
08-Nov-94	1.5							93		13.0		
09-Nov-94	1.8							93	26	13.0		
10-Nov-94	1.9							93		1.0		
11-Nov-94	1.8							93	2	1.0		
12-Nov-94	1.8							93		2.3		
13-Nov-94	1.7							93		2.3		
14-Nov-94	1.6							93	7	2.4		
15-Nov-94	1.6							93		1.5		
16-Nov-94	1.6							93	3	1.5		
17-Nov-94	1.6							93		5.0		
18-Nov-94	1.7							93	10	5.0		
19-Nov-94	1.8							93		8.7		
20-Nov-94	1.8							93		8.7		
21-Nov-94	1.7							93	26	8.6		
22-Nov-94	1.7							93		18.5		
23-Nov-94	1.8	Stopped trap due to freezing						93	37	18.5		
24-Nov-94	1.8							93		---		
25-Nov-94	1.8	Started trap						93		---		
26-Nov-94	1.8							93		0.0		
27-Nov-94	1.8							93		0.0		
28-Nov-94	1.8							93	0	0.0		
29-Nov-94	1.8							93		23.0		
30-Nov-94	2.0							93	46	23.0		n1v1
01-Dec-94	3.0							93		78.5		
02-Dec-94	2.7							93	157	78.5	a100	n2
03-Dec-94	2.4							93		39.0		
04-Dec-94	2.1							93		39.0		
05-Dec-94	2.0	Stopped trap						93	117	39.0		a51
06-Dec-94	1.9							93		---		
07-Dec-94	1.8	Started trap						93		---		
08-Dec-94	1.8							93		10.0		
09-Dec-94	1.8							93	20	10.0		
10-Dec-94	1.7							93		14.7		
11-Dec-94	1.7							93		14.7		
12-Dec-94	1.7							93	44	14.6		
13-Dec-94	1.7							93		1.0		
14-Dec-94	1.6							93	2	1.0		
15-Dec-94	1.6							93		0.2		
16-Dec-94	1.7							93		0.2		
17-Dec-94	2.5							93		0.2		
18-Dec-94	3.0							93		0.2		
19-Dec-94	2.7							93	1	0.2		
20-Dec-94	2.4							93		0.0		
21-Dec-94	2.2							93		0.0		
22-Dec-94	2.0							93	0	0.0		
23-Dec-94	1.9							93		0.0		
24-Dec-94	1.9							93		0.0		
25-Dec-94	1.8							93		0.0		
26-Dec-94	2.0							93		0.0		
27-Dec-94	3.0							93	0	0.0		
28-Dec-94	3.3							93		0.0		
29-Dec-94	2.8							93		0.0		
30-Dec-94	2.3							93		0.0		
31-Dec-94	2.1							93		0.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Jan-95	2.0	Stopped trap						93	0	0.0		
02-Jan-95	1.9							93		---		
03-Jan-95	1.9							93		---		
04-Jan-95	2.0							93		---		
05-Jan-95	2.0							93		---		
06-Jan-95	2.0							93		---		
07-Jan-95	1.9							93		---		
08-Jan-95	1.9	Started trap @ 1030						93		---		
09-Jan-95	2.5							93	2	2.0		
10-Jan-95	3.8							93		17.5		
11-Jan-95	4.4							93	35	17.5	k25	
12-Jan-95	4.2							93		0.0		
13-Jan-95	4.6							93	0	0.0		
14-Jan-95	7.4							93		28.0		
15-Jan-95	6.3							93		28.0		
16-Jan-95	5.0							93	84	28.0	m49	m1w1
17-Jan-95	4.1							93		8.5		
18-Jan-95	3.9							93	17	8.5	v17	m4
19-Jan-95	3.5							93		0.5		
20-Jan-95	3.1							93	1	0.5		
21-Jan-95	2.8							93		0.0		
22-Jan-95	2.7							93		0.0		
23-Jan-95	2.6							93	0	0.0		
24-Jan-95	2.6							93		0.0		
25-Jan-95	2.6							93		0.0		
26-Jan-95	2.5							93		0.0		
27-Jan-95	2.4							93	0	0.0		
28-Jan-95	2.3							93		1.3		
29-Jan-95	2.4							93		1.3		
30-Jan-95	2.9							93	4	1.4		
31-Jan-95	6.7							93	3	3.0		
01-Feb-95	14.2	Stopped trap						93	0	0.0		
02-Feb-95	17.2							93		---		
03-Feb-95	11.4							93		---		
04-Feb-95	8.7	Started trap						93		---		
05-Feb-95	7.6							93		60.5		
06-Feb-95	7.0							93	121	60.5	u100	
07-Feb-95	6.5							93		13.5		
08-Feb-95	6.1							93	27	13.5		u10
09-Feb-95	5.6							93		0.5		
10-Feb-95	5.2							93	1	0.5		
11-Feb-95	5.2							93		0.0		
12-Feb-95	5.4							93		0.0		
13-Feb-95	4.6							93	0	0.0		
14-Feb-95	4.2	Stopped trap						93	0	0.0		
15-Feb-95	4.1							93		---		
16-Feb-95	3.9	Started trap						93		---		
17-Feb-95	4.6							93	11	11.0		
18-Feb-95	5.3							93		31.0		
19-Feb-95	7.9							93	62	31.0		
20-Feb-95	10.4							93		0.0		
21-Feb-95	11.0							93		0.0		
22-Feb-95	10.8							93		0.0		
23-Feb-95	9.5							93		0.0		
24-Feb-95	9.3							93	0	0.0		
25-Feb-95	10.0							93	0	0.0		
26-Feb-95	10.1							93	0	0.0		
27-Feb-95	9.3							93	2	2.0		
28-Feb-95	8.4							93	1	1.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-Mar-95	8.0							93	0	0.0		
02-Mar-95	7.2							93	0	0.0		
03-Mar-95	6.7							93	1	1.0		
04-Mar-95	6.3							93	0	0.0		
05-Mar-95	5.9							93	0	0.0		
06-Mar-95	5.4							93	1	1.0		
07-Mar-95	5.0							93	1	1.0		
08-Mar-95	5.0							93	1	1.0		
09-Mar-95	6.1							93	0	0.0		
10-Mar-95	6.7							93	17	17.0	n16	
11-Mar-95	7.7							93	0	0.0		
12-Mar-95	8.0							93	5	5.0	a5	
13-Mar-95	8.4							93	5	5.0	a5	
14-Mar-95	9.6	“x”group rel.[a] rt. bank						93	2	2.0	x2	
15-Mar-95	14.9	“x”group rel.[a] rt. bank						93	3	3.0	x3	
16-Mar-95	13.4	“k”group rel.[a] lt. bank						93	36	36.0	k18x17	
17-Mar-95	12.1							93	21	21.0	k11x10	k4x4
18-Mar-95	11.8							93	5	5.0	x5	n2x1
19-Mar-95	12.4							93	6	6.0	k4x2	
20-Mar-95	12.4							93	14	14.0	k1x1	
21-Mar-95	12.5	“m” lt. bank “w”rt. bank						93	10	10.0	m5w4	x3
22-Mar-95	10.7							93	4	4.0	m4	
23-Mar-95	9.4							93	5	5.0	w4	
24-Mar-95	8.3							93	5	5.0	m2w2	w1
25-Mar-95	7.4							93	2	2.0	m1w1	
26-Mar-95	6.8							93	3	3.0	m1w2	
27-Mar-95	6.3							93	0	0.0		
28-Mar-95	6.0							93	1	1.0		m1w2
29-Mar-95	5.7							93	0	0.0		k2
30-Mar-95	5.6							93	2	2.0		
31-Mar-95	5.6							93	4	4.0		
01-Apr-95	5.8							93	2	2.0		
02-Apr-95	5.6							93	2	2.0		
03-Apr-95	5.8							93	2	2.0		
04-Apr-95	6.5							93	3	3.0		
05-Apr-95	7.5							93	2	2.0		
06-Apr-95	9.2							93		8.5		
07-Apr-95	12.7							93	17	8.5		
08-Apr-95	14.6							93	2	2.0		
09-Apr-95	13.0							93	38	38.0		
10-Apr-95	11.6							93	11	11.0		
11-Apr-95	11.3							93	19	19.0		
12-Apr-95	10.9							93	6	6.0		
13-Apr-95	11.6							93	4	4.0		
14-Apr-95	10.7							93	5	5.0		
15-Apr-95	9.7							93	4	4.0		
16-Apr-95	9.1	Trap stopped						93	5	5.0		
17-Apr-95	8.5	Trap started @ 0745						93		---		
18-Apr-95	8.1							93	6	6.0		
19-Apr-95	8.0							93	0	0.0		
20-Apr-95	7.6							93	1	1.0		
21-Apr-95	6.9							93	9	9.0		
22-Apr-95	6.7							93	9	9.0		
23-Apr-95	6.9							93	1	1.0		
24-Apr-95	8.2							93	10	10.0		
25-Apr-95	9.5							93	3	3.0		
26-Apr-95	9.9							93	6	6.0		
27-Apr-95	11.7							93	5	5.0		
28-Apr-95	15.7							93	2	2.0		
29-Apr-95	15.6							93	1	1.0		
30-Apr-95	15.3							93	4	4.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	re.[a]
01-May-95	15.1							93	1	1.0		
02-May-95	17.1							93	2	2.0		
03-May-95	16.8							93	1	1.0		
04-May-95	15.8							93	1	1.0		
05-May-95	15.5							93	0	0.0		
06-May-95	15.5							93	2	2.0		
07-May-95	16.3							93	0	0.0		
08-May-95	16.3							93	2	2.0		
09-May-95	16.7							93	0	0.0		
10-May-95	17.5							93	2	2.0		
11-May-95	20.1							93	0	0.0		
12-May-95	17.7							93	1	1.0		
13-May-95	15.0							93	0	0.0		
14-May-95	13.6							93	0	0.0		
15-May-95	13.4							93	0	0.0		
16-May-95	13.5							93	0	0.0		
17-May-95	13.1							93	0	0.0		
18-May-95	11.8							93	0	0.0		
19-May-95	11.1							93	0	0.0		
20-May-95	11.0							93	0	0.0		
21-May-95	11.0							93	0	0.0		
22-May-95	10.2							93	0	0.0		
23-May-95	9.5							93	1	1.0		
24-May-95	9.0							93	0	0.0		
25-May-95	8.5							93	0	0.0		
26-May-95	8.4							93	0	0.0		
27-May-95	7.7							93		0.0		
28-May-95	7.1							93	0	0.0		
29-May-95	6.6							93	2	2.0		
30-May-95	6.6							93	2	2.0		
31-May-95	6.6							93	0	0.0		
01-Jun-95	6.5							93	0	0.0		
02-Jun-95	6.1							93	0	0.0		
03-Jun-95	5.6							93	2	2.0		
04-Jun-95	5.4							93	0	0.0		
05-Jun-95	6.1							93	0	0.0		
06-Jun-95	5.6							93	0	0.0		
07-Jun-95	5.5							93	0	0.0		
08-Jun-95	5.4							93		0.0		
09-Jun-95	4.5							93	0	0.0		
10-Jun-95	4.1							93	0	0.0		
11-Jun-95	4.1							93	0	0.0		
12-Jun-95	4.1							93	0	0.0		
13-Jun-95	3.9							93	0	0.0		
14-Jun-95	3.9							93		0.0		
15-Jun-95	3.7							93		0.0		
16-Jun-95	3.7							93		0.0		
17-Jun-95	3.4							93		0.0		
18-Jun-95	4.1							93		0.0		
19-Jun-95	5.3							93		0.0		
20-Jun-95	5.4							93	0	0.0		
21-Jun-95	4.7							93	0	0.0		
22-Jun-95	4.5							93	0	0.0		
23-Jun-95	4.2							93	0	0.0		
24-Jun-95	4.0							93	0	0.0		
25-Jun-95	4.0							93		0.0		
26-Jun-95	3.7							93	0	0.0		
27-Jun-95	3.6							93	0	0.0		
28-Jun-95	3.3							93	0	0.0		
29-Jun-95	3.2							93	0	0.0		
30-Jun-95	3.3							93	0	0.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

	Flow		Brood	#of.	Daily	Trap efficiency		Brood	# of	Daily	Trap efficiency	
Date	m^3/s	Comments	yr.	fish.	□	rel.[a]	re.[a]	yr.	fish	□	rel.[a]	re.[a]
01-Jul-95	3.0							93	0	0.0		
02-Jul-95	3.0	End of 93 brood smolts						93	1	1.0	y1	
03-Jul-95	3.5							93	0	0.0		
04-Jul-95	3.1							93	0	0.0		
05-Jul-95	2.9							93	0	0.0		
06-Jul-95	2.8							93		0.0		
07-Jul-95	2.7							93	0	0.0		
08-Jul-95	2.5							93		0.0		
09-Jul-95	2.4							93	0	0.0		y1
10-Jul-95	2.1							93	0	0.0		
11-Jul-95	1.9							93	0	0.0		
12-Jul-95	1.9							93	0	0.0		
13-Jul-95	1.9							93		0.0		
14-Jul-95	1.8							93	0	0.0		
15-Jul-95	1.8							93	0	0.0		
16-Jul-95	1.8							93	0	0.0		
17-Jul-95	1.7							93	0	0.0		
18-Jul-95	1.7							93	0	0.0		
19-Jul-95	1.8							93		0.0		
20-Jul-95	1.7							93	0	0.0		
21-Jul-95	1.6							93		0.0		
22-Jul-95	1.5							93	0	0.0		
23-Jul-95	1.5							93		0.0		
24-Jul-95	1.5							93		0.0		
25-Jul-95	1.5							93	0	0.0		
26-Jul-95	1.5							93	0	0.0		
27-Jul-95	1.5							93	0	0.0		
28-Jul-95	1.5							93		0.0		
29-Jul-95	1.4							93		0.0		
30-Jul-95	1.3							93	0	0.0		
31-Jul-95	1.4							93	0	0.0		
01-Aug-95	1.4							93		0.0		
02-Aug-95	1.4							93	0	0.0		
03-Aug-95	1.4							93		0.0		
04-Aug-95	1.4							93	0	0.0		
05-Aug-95	1.4							93		0.0		
06-Aug-95	1.4							93	0	0.0		
07-Aug-95	1.5							93	0	0.0		
08-Aug-95	1.5							93	0	0.0		
09-Aug-95	1.4							93		0.0		
10-Aug-95	1.4							93	0	0.0		
11-Aug-95	1.4							93		0.7		
12-Aug-95	1.3							93		0.7		
13-Aug-95	1.3	First precocial 93 cohort						93	2	0.6		
14-Aug-95	1.4							93		2.0		
15-Aug-95	1.4							93	4	2.0		
16-Aug-95	1.4							93		6.5		
17-Aug-95	1.3							93	13	6.5		
18-Aug-95	1.3							93	5	5.0		
19-Aug-95	1.3							93		3.0		
20-Aug-95	1.4							93		3.0		
21-Aug-95	1.4							93	9	3.0		
22-Aug-95	1.3							93		3.0		
23-Aug-95	1.3							93	6	3.0		
24-Aug-95	1.3							93		4.0		
25-Aug-95	1.3							93	8	4.0		
26-Aug-95	1.3							93		0.5		
27-Aug-95	1.2							93	1	0.5		
28-Aug-95	1.3							93		3.0		
29-Aug-95	1.3							93	6	3.0		
30-Aug-95	1.3							93		6.0		
31-Aug-95	1.3							93	12	6.0		

Appendix Table A-3 (cont.). Juvenile spring Chinook trapping data from Lookingglass Creek for the 1992 to 1993 cohorts.

Date	Flow m^3/s	Comments	Brood yr.	#of. fish.	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]	Brood yr.	# of fish	Daily □	Trap efficiency rel.[a]	Trap efficiency re.[a]
01-Sep-95	1.3							93	4	4.0		
02-Sep-95	1.3							93		2.7		
03-Sep-95	1.3							93		2.7		
04-Sep-95	1.3							93	8	2.6		
05-Sep-95	1.3							93	0	0.0		
06-Sep-95	1.4							93	0	0.0		
07-Sep-95	1.6							93	5	5.0		
08-Sep-95	1.5							93		0.0		
09-Sep-95	1.5							93		0.0		
10-Sep-95	1.4							93	0	0.0		
11-Sep-95	1.4							93	2	2.0		
12-Sep-95	1.4							93	0	0.0		
13-Sep-95	1.5							93		0.5		
14-Sep-95	1.4							93	1	0.5		
15-Sep-95	1.3							93		0.7		
16-Sep-95	1.2							93		0.7		
17-Sep-95	1.2							93	2	0.6		
18-Sep-95	1.2							93	0	0.0		
19-Sep-95	1.2							93		0.0		
20-Sep-95	1.2							93		0.0		
21-Sep-95	1.2							93		0.0		
22-Sep-95	1.2							93	0	0.0		
23-Sep-95	1.2							93		0.0		
24-Sep-95	1.2							93	0	0.0		
25-Sep-95	1.2							93	2	2.0		
26-Sep-95	1.2	Last precocial 93 cohort						93	2	2.0		

[a]Mark codes for the trap efficiency releases and recaptures:

a=Lower caudal fin clip
k=Left ventral fin clip
m=Right ventral fin clip
n=Upper caudal fin clip
o=Anterior anal fin clip
p=Upper and lower caudal clip
q=Dorsal fin clip
r=Upper caudal Alcian Blue mark
s=Lower caudal Alcian Blue mark
t=Anal fin Alcian Blue mark
u=Right ventral and upper caudal fin clips combination
v=Left ventral and lower caudal fin clips combination
w=Right ventral and lower caudal fin clips combination
x=Left ventral and upper caudal fin clips combination

All clips used were only partial fin clips.
The minus sign following a release or recapture indicates the group was not used in calculation of trap efficiency.

Appendix Table A-4. Data from spawning ground surveys conducted in Lookingglass and Little Lookingglass creeks in 1995.

Date of Survey	Unit[a]	0.25 rm section	Live Fish On redd	Live Fish Off redd	Redd status[b]	Redd number	Carcass data Fork length(mm)	Carcass data Sex	Carcass data % spawn	Carcass to pathology
08/17	3Lower	--	0	0	--	--	--	--	--	--
	3Upper	8.00	0	0	UT	1	--	--	--	--
	3Upper	6.75	0	0	UT	2	--	--	--	--
08/30	3Lower	5.75	2	0	OC	1	--	--	--	--
	3Upper	8.00	0	0	UT	1	--	--	--	--
	3Upper	6.75	0	0	UC	2	--	--	--	--
	3Upper	6.75	0	0	--	--	800	F	100	Yes
08/31	1	--	0	0	--	--	--	--	--	--
	2	--	0	0	--	--	840	M	--	Yes
	4	--	0	0	--	--	--	--	--	--
09/08	3Lower	9.3	0	0	UC	1	--	--	--	--
	3Lower	9.3	0	0	--	--	675	F	100	Yes
	3Upper	8.00	0	0	UT	1	--	--	--	--
	3Upper	6.75	0	0	UC	2	--	--	--	--

Appendix Table A-4 (cont.). Data from spawning ground surveys conducted in Lookingglass and Little Lookingglass creeks in 1995.

Date of Survey	Unit[a]	0.25 rm section	Live Fish On redd	Live Fish Off redd	Redd status[b]	Redd number	Carcass data Fork length(mm)	Carcass data Sex	Carcass data % spawn	Carcass to pathology
09/12	1	2.25	2	0	OC	1	--	--	--	--
	1	2.00	0	0	UT	2	--	--	--	--
	1	1.75	0	0	UT	3	--	--	--	--
	2	--	0	0	--	--	--	--	--	--
	4	--	0	0	--	--	--	--	--	--
09/27	1	2.25	1	0	OC	1	--	--	--	--
	1	2.25	1	0	OC	4	--	--	--	--
	1	2.00	0	0	UT	2	--	--	--	--
	1	1.75	0	0	UT	3	--	--	--	--
	1	1.50	0	0	--	--	725	F	100	Yes
	1	0.25	0	0	UC	5	--	--	--	--
10/12	1	Carcass Survey: No carcasses recovered.								

[a] Unit 1 went from the mouth of Lookingglass Creek to the Hatchery, Unit 2 went from the hatchery to the mouth of Little Lookingglass Creek, Unit 3Lower went from the mouth of Little Lookingglass Creek upstream 2.00 rm, Unit 3Upper went from the end of Unit 3L to Summer Creek, and Unit 4 went from the mouth of Little Lookingglass Creek upstream 3.00 rms.

[b] O = occupied, U unoccupied; T = test , C = complete

Appendix Table A-5. Results of analyses by ODFW Fish Pathology for pathogens of adult spring Chinook salmon recovered above the weir on Lookingglass Creek in 1995.

		Renibacterium salmoninarum			
Date recovered	Sex	OD[a] level	ELISA level[b]	*Ceratomyxa shasta* infection	Aeromonad-pseudomonad (APS) infection and *Yersinia ruckeri* (ERM-1)[c]
08/30	F	0.177	Low	Low	APS
08/31	M	0.161	Low	High	APS
09/08	F	0.209	Low	ND	ERM-1
09/27	F	0.205	Low	High	ERM-1

[a] ELISA = Enzyme-linked immunosorbent assay; OD=optical density.

[b] ND = analyses not done. Low, Moderate or High = *C. shasta* spores were observed. Negative = no spores were observed.

[c] The most common bacteria type in the culture.

Appendix Table A-6. Juvenile spring Chinook salmon from the 1965 cohort captured in a bypass fish trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1966 and 1967.

Month of trapping	Total trapped[a]	Trap efficiency release[a]	Trap efficiency recapture[a]	%Trap efficiency	Population Estimate	±95%CI
Jan	0				0	
Feb	2	0	0	0.52[b]	386	462
Mar	8	0	0	0.52[b]	1,544	1,478
Apr	12	0	0	0.52[b]	2,316	2,112
May	23	0	0	0.52[b]	4,439	3,925
Jun	343	193	1	0.52	66,199	56,548
Jul	5,975	4,541	1,994	43.91	13,607	569
Aug	6,696	8,073	4,568	56.58	11,834	351
Sep	3,423	3,384	2,134	63.06	5,428	180
Oct	6,373	6,313	3,382	53.57	11,896	391
Nov	1,517	971	405	41.71	3,637	310
Dec	219	217	51	23.50	932	260
Jan	140	101	24	23.76	589	234
Feb	72	95	12	12.63	570	392
Mar	236	217	37	17.05	1,384	461
Apr	233	221	21	9.50	2,453	1,252
May	31	39	6	13.64[c]	227	336
Jun	5	5	0	13.64[c]	37	69
Jul	0				0	0
	25,308				127,478	56,770

[a] Data are from Burck (1964-1974).

[b] For the trapping periods February-May no trap efficiency estimate were made so the first available trap efficiency estimate was used (June).

[c] The months of May-June were combined to increase the trap efficiency release above our target of 25 fish.

Appendix Table A-7. Juvenile spring Chinook salmon from the 1966 cohort captured in a bypass fish trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1967 and 1968.

Month of trapping	Total trapped[a]	Trap efficiency release[a]	Trap efficiency recapture[a]	%Trap efficiency	Population Estimate	±95%CI
Jan	1	0	0	2.01[b]	50	171
Feb	2	0	0	2.01[b]	100	267
Mar	195	0	0	2.01[b]	9,701	18,277
Apr	299	0	0	2.01[b]	14,875	26,310
May	28	0	0	2.01[b]	1,393	3,925
Jun	333	199	4	2.01	16,567	28,426
Jul	4,910	4,080	737	18.06	27,182	1,987
Aug	9,750	4,414	1,616	36.61	26,631	1,217
Sep	4,213	1,755	874	49.80	8,460	438
Oct	9,886	2,423	992	40.94	24,147	1,269
Nov	1,130	737	237	32.16	3,514	416
Dec	189	114	45	39.47	479	127
Jan	115	143	6	4.20	2,741	4,383
Feb	43	35	2	5.71	753	1,014
Mar	116	103	3	2.91	3,983	6,630
Apr	75	82	4	4.88	1,538	2,485
May	18	17	0	7.14[c]	252	372
Jun	11	11	2	7.14[c]	154	225
Jul	0				0	
	31,314				142,518	43,907

a Data are from Burck (1964-1974).

b For the trapping periods January-May no trap efficiency estimate were made so the first available trap efficiency estimate was used (June).

c The months of May-June were combined to increase the trap efficiency release above our target of 25 fish.

Appendix Table A-8. Juvenile spring Chinook salmon from the 1967 cohort captured in a bypass fish trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1968 and 1969.

Month of trapping	Total trapped[a]	Trap efficiency release[a]	Trap efficiency recapture[a]	%Trap efficiency	Population Estimate	±95%CI
Jan	0				0	
Feb	10	0	0	16.63[b]	60	36
Mar	28	0	0	16.63[b]	168	70
Apr	22	0	0	16.63[b]	132	57
May	15	0	0	16.63[b]	90	45
Jun	530	427	71	16.63	3,187	760
Jul	2,215	1,322	505	38.20	5,798	433
Aug	6,595	2,450	1,342	54.78	12,040	515
Sep	4,992	1,731	838	48.41	10,312	570
Oct	1,886	1,570	590	37.58	5,019	366
Nov	491	367	82	22.34	2,198	465
Dec	103	137	13	9.49	1,085	775
Jan	88	84	7	8.33	1,056	1,467
Feb	59	60	8	11.84	498	572
Mar	35	16	1	11.84	296	292
Apr	58	78	2	2.08[c]	2,784	3,775
May	19	18	0	2.08[c]	912	1,327
Jun	2	0	0	2.08[c]	96	203
Jul	0				0	
	17,148				45,732	4,575

[a] Data are from Burck (1964-1974).

[b] For the trapping periods February-May no trap efficiency estimate were made so the first available trap efficiency estimate was used (June).

[c] The months of April-June were combined to increase the trap efficiency release above our target of 25 fish.

Appendix Table A-9. Juvenile spring Chinook salmon from the 1968 cohort captured in a bypass fish trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1969 and 1970.

Month of trapping	Total trapped[a]	Trap efficiency release[a]	Trap efficiency recapture[a]	%Trap efficiency	Population Estimate	±95%CI
Jan	0				0	
Feb	0	0	0	7.45[b]	0	0
Mar	14	0	0	7.45[b]	188	115
Apr	5	0	0	7.45[b]	67	65
May	2	0	0	7.45[b]	27	37
Jun	534	510	38	7.45	7,167	2,314
Jul	2,552	1,359	502	36.94	6,909	526
Aug	6,116	1,843	1,165	63.21	9,675	361
Sep	5,972	1,805	1,297	71.86	8,311	267
Oct	4,542	1,975	1,203	60.91	7,457	305
Nov	1,612	951	627	65.93	2,445	132
Dec	608	612	374	61.11	995	79
Jan	207	194	19	9.79	2,114	1,058
Feb	118	111	13	11.71	1,008	700
Mar	253	214	28	13.08	1,934	752
Apr	152	202	16	6.78	2,242	1,333
May	39	34	0	6.78	575	387
Jun	0				0	
Jul	0				0	
	22,726				51,112	3,173

a Data are from Burck (1964-1974).

b For the trapping periods February-May no trap efficiency estimate were made so the first available trap efficiency estimate was used (June).

Appendix Table A-10. Juvenile spring Chinook salmon from the 1969 cohort captured in a bypass fish trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1970 and 1971 .

Month of trapping	Total trapped[a]	Trap efficiency release[a]	Trap efficiency recapture[a]	%Trap efficiency	Population Estimate	±95%CI
Jan	0				0	
Feb	2	0	0	5.08[b]	39	56
Mar	35	0	0	5.08[b]	688	360
Apr	125	0	0	5.08[b]	2,458	1,104
May	14	0	0	5.08[b]	275	182
Jun	590	531	27	5.08	11,603	5,033
Jul	6,129	1,872	637	34.03	18,012	1,235
Aug	9,276	2,500	1,599	63.96	14,503	463
Sep	8,763	1,203	845	70.24	12,476	499
Oct	2,605	1,061	461	43.45	5,995	450
Nov	880	860	269	31.28	2,813	323
Dec	320	246	71	28.86	1,109	261
Jan	142	125	14	10.49	1,354	1,009
Feb	17	18	1	10.49	162	132
Mar	22	28	1	3.57	616	556
Apr	110	98	3	2.44[c]	4,510	7,504
May	21	23	0	2.44[c]	861	1,553
Jun	2	2	0	2.44[c]	82	223
Jul	0				0	
	29,053				77,557	9,444

[a] Data are from Burck (1964-1974).

[b] For the trapping periods February-May no trap efficiency estimate were made so the first available trap efficiency estimate was used (June).

[c] Since there were no recaptures in May or June the months of April-June were combined.

Appendix Table A-11. Juvenile spring Chinook salmon from the 1992 cohort captured in a rotary screw trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1993 and 1994.

Month of trapping	Total trapped[a]	Trap efficiency release	Trap efficiency recapture	%Trap efficiency	Population Estimate	±95%CI
Nov	1,697	199	61	30.65	5,536	1,227
Dec	226	0	0	30.65[b]	737	185
Jan	72	51	22	45.28[c]	159	64
Feb	83	2	2	45.28[c]	183	65
Mar	360	89	24	26.97	1,335	543
Apr	102	0	0	26.97[b]	378	156
May	40	0	0	26.97[b]	148	71
Jun	64	0	0	26.97[b]	237	110
Jul	0				0	
	2,644				8,715	1,373

[a] Trapping of the 1992 cohort began on 28 October 1993.

[b] No trap efficiencies were estimated during this time period so the trap efficiency estimate for the preceding period was used.

[c] The months of January and February were combined to increase the trap efficiency release above our target of 25 fish.

Appendix Table A-12. Juvenile spring Chinook salmon from the 1993 cohort captured in a rotary screw trap, releases and recaptures from trap efficiency tests, and the total estimated migration past the trap from Lookingglass Creek during 1994 and 1995.

Month of trapping	Total trapped[a]	Trap efficiency release	Trap efficiency recapture	%Trap efficiency	Population Estimate	±95%CI
Jan	0				0	
Feb	0				0	
Mar	379	172	3	1.74	21,729	35,545
Apr	1,943	95	3	3.16	61,528	103,766
May	334	112	9	8.04	4,156	4,184
Jun	660	278	34	12.23	5,396	1,895
Jul	1,578	100	12	12.00	13,150	10,025
Aug	2,527	171	53	30.99	8,153	1,934
Sep	3,193	300	83	27.67	11,541	2,248
Oct	4,608	200	55	27.50	16,756	3,912
Nov	985	100	57	57.00	1,728	327
Dec	341	100	51	51.00	669	152
Jan	146	91	4	4.40	3,321	5,826
Feb	225	100	10	10.00	2,250	1,967
Mar	154	126	20	16.67	924	436
Apr	179	0	0	16.67 [a]	1,074	514
May	17	0	0	16.67 [a]	102	64
Jun	2	0	0	16.67 [a]	12	17
Jul	0	1	1	16.67 [a]	6	12
	17,272				152,497	110,521

a The month of July was combined with March to increase the trap efficiency release above our target of 25 fish.