ANNUAL REPORT

1998 SKAGIT RIVER WILD 0+ CHINOOK PRODUCTION EVALUATION

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Evaluation of the wild 0+ chinook production from the Skagit River in 1998 was made possible with funding from Seattle City Light. This second year of such support, combined with funds from the Dingle-Johnson/Wallop-Breaux program and matched with Washington Department of Fish & Wildlife funds, enabled the *Wild Salmon Production & Survival Evaluation* unit to trap downstream migrants in the lower Skagit River from mid-January through early-September.

We acknowledge the contributions of field staff who installed, operated and maintained traps to capture, enumerate, and mark wild coho in the upper Skagit Basin: the National Park Service-Sedro Wooley personnel; and WDFW's SHEAR technicians. We also appreciate the contributions of a number individuals who provided logistical support: Dike District Commissioner Neal Hamburg for providing access to and use of the dike adjacent to the traps; and Sherman and Pat Courier, adjacent property owners, for providing drinking water and utility access at the site, and over-winter trap storage; Burlington Northern continued to allow us to anchor the traps to their railroad bridge.

The success of this project relies on the hard work of a number of dedicated permanent and temporary WDFW personnel. Scientific Technicians Dave Collins, Jim Repoz, Scott McGrath, Dean Toba, and Mat Gillum worked long hours operating and maintaining the traps, and enumerating and sampling catches. Unit biologists Mike Ackley and Pete Topping provided valuable logistical support during trap installation and removal. WDFW biologist Mark Hino developed the computer database and analyzed much of the trap data contained in this report.

University of Washington graduate student, Ashley Steel, designed the visibility monitoring study, provided the equipment, and compiled and analyzed the visibility data.

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INTRODUCTION

Skagit River chinook returns (spring and summer/fall combined) have steadily declined over the last fifty years (*PSSSRG* 1992)(*PSSSRG* 1997). In 1994, the Joint Chinook Technical Committee of the Pacific Salmon Commission designated the status of these stocks as "Not Rebuilding." To address this poor stock status, in 1995, resource managers formed the Skagit River Chinook work group. Composed of state, tribal, and federal fish biologists, this group recommends and coordinates restoration and monitoring programs. A major goal of this work group is to determine the limiting factors for chinook. Necessary data for this purpose include an indicator-stock tagging program, habitat inventory, annual adult escapement estimation, and wild juvenile chinook assessment. The juvenile production evaluation is a vital link in this process because it provides a direct measure of freshwater survival.

Seattle City Light (operators of several dams on the Skagit River), through a 1991 fisheries settlement agreement with WDFW, Federal agencies (NMFS, USFWS, USFS, and NPS), and the Skagit Tribes created the Skagit Non-Flow Plan Coordinating Committee (NCC). The NCC is responsible for funding several non-flow fisheries programs including the "Chinook Research Program." Beginning in 1997, this program provided funding to conduct chinook studies. This report documents our 1998 downstream migrant trapping project in the Skagit River which, with funding from the NCC, we expanded to improve our estimates of wild 0+ chinook production.

Understanding the major sources of interannual variation in run size is critical to improving harvest and habitat management. Quantifying anadromous salmonid populations as seaward migrants near saltwater entry is the most direct assessment of stock performance in freshwater because the variation resulting from marine survival and harvest are excluded. Relating smolt production to adult spawners over a number of broods empirically determines the watershed's natural production potential (provided escapement and environmental conditions are sufficient), its stock/recruit function if escapements are less than that required to achieve maximum production, and enables identification of the major density-independent source(s) of interannual variation in freshwater survival. To accomplish these and other fish management objectives, the WDF implemented a long-term research program directed at measuring wild salmon production in terms of smolts and adults in selected watersheds, beginning in 1976 (*Seiler et al.* 1981). In 1981, this program, which was directed primarily at coho salmon, was expanded to include additional large watersheds (*Seiler et al.* 1984).

In 1990, we initiated downstream migrant trapping in the Skagit River system to quantify wild coho smolt production to, among other objectives, resolve a discrepancy in escapement estimates (*Conrad et al* 1997). This program, which in 1998 was in its ninth year, involves trapping and marking wild coho smolts emigrating from a number of tributaries, and sampling a portion of the entire population via floating traps in the lower mainstem (R.M. 17, Burlington Northern railroad bridge). In addition, we coded-wire tag wild coho smolts captured at the gulper in Baker Lake because the upstream migrant trap below the dam provides a reliable accounting of all salmon

returning to this system. Applying the marine survival estimated from the tag-based estimates of harvest and escapement to respective estimates of total system wild coho smolt production yields estimates of adult recruits, escapement, and harvest for the entire Skagit River system (*Seiler et al.* 1995).

Although our trapping in the mainstem has been directed at coho smolts, we identify and enumerate all fish captured. For the first seven years (1990-1996), season total 0+ chinook catches in the one scoop trap have varied six-fold, from 1,700 to 10,500 chinook. (As of 1993, we have simultaneously operated both a scoop and a screw trap.) In addition to abundance, these catch totals are influenced by fishing effort (the time fished on each date and for the season), migration timing relative to the interval we trapped, and instantaneous trap efficiency. Many such variables as discharge, water velocity, turbidity, debris, channel configuration, trap placement, and fish size combine to affect instantaneous trap efficiency.

Preliminary expansion of these 0+ chinook catches, based on the season average recapture rates of wild coho and several other assumptions held consistent between years, has yielded chinook production estimates that range from 0.5 to 3.0 million. The accuracy and precision of these estimates is presently incalculable because the assumptions remain unverified. We believe, however, that these estimates reflect the abundance of wild 0+ chinook production from these broods, at least in a relative sense. We base this contention upon the significant negative correlation between the freshwater survival estimates and the severity of flow during the period that the eggs were incubating in the gravel. The survival rates in this relationship are the ratio of total 0+ chinook emigrants estimated past the traps to the potential egg deposition. System total egg deposition is simply the product of the estimated total adult chinook escapement, an assumed even sex ratio and a fecundity of 4,500 eggs/female. This relationship indicates that overall egg-to-migrant survival for Skagit River chinook may have varied twenty-fold or more within just these seven broods, almost entirely as a function of flow during egg incubation.

In 1997, we began trapping in mid-February and continued into September. This first season of extended trapping produced our first insight into the migration timing. For the season, we estimated 4.5 million 0+ chinook — the highest production estimated thus far.

Measuring the biological attributes of outmigration timing and size contributes to our understanding of juvenile chinook freshwater life history. This information is useful for flow management (dams and other flow controls), habitat protection, and designing hatchery programs to minimize hatchery/wild interactions.

We estimate coho smolt production from the Skagit River with the mark and recapture strategy that we developed and have used successfully in a number of large watersheds throughout the state over many years. This method involves the following components:

1. Trapping all the wild coho smolts emigrating from a number of tributaries located throughout the basin;
2. Identifying each of these smolts with an external mark; and

3. Capturing a portion of the smolt population migrating through the lower mainstem and examining each fish for the mark.

This design produces relatively precise (CV<5%) and (we believe) unbiased production estimates, because a significant and representative portion of the coho smolt population is marked at the tributary traps. Therefore, trapping in the mainstem does not have to be continuous or even representative with respect to timing (*Seber* 1982). We explicitly developed this design to avoid the requirement of estimating gear efficiency.

Because of the early life history characteristics of chinook in freshwater, estimating their smolt production with the same statistical precision we achieve for coho smolts is not possible. Chinook originate in discrete portions of the mainstem, and subsequently rear for variable intervals in various reaches. Therefore, the methodology we use with coho, capturing and identifying a representative portion of the entire population, is not feasible for chinook. Each component likely has different survival patterns that result from the complex interactions of a number of factors: their parent's spawning timing and distribution; genetically-programed juvenile rearing strategies; and the flow and habitat conditions each brood and sub-population within it encounters. In a system as wide as the lower Skagit River, the migration pathways selected may also vary between sub-populations, which would affect capture rates. The susceptibility of migrants to capture also varies as a function of flow and environmental conditions in effect upstream of the trap and at the trap.

Operating downstream migrant traps over an extended period in the dynamic environment of the lower mainstem of a large river is challenging when conditions are optimal. During the spring runoff, however, as flows and debris levels exceed some threshold, it becomes impossible. Above a certain discharge, capture efficiency is generally some negative function of flow. When the traps are inoperable, however, it is zero. For these periods, migration has to be estimated by interpolation. Such estimates are biased if smolt migration rates are affected by flow changes, which we believe they are.

Calibrating the traps in the lower Skagit River with wild chinook caught in the traps is not feasible; catches within a sufficiently narrow time strata are simply too low. While hatchery chinook offer the potential of sufficient release group sizes on some broods, the requisite assumptions that they survive, distribute vertically and laterally, behave, and consequently, are caught at the same rate as wild chinook, are unverifiable and therefore, problematic as well.

Sources of Variation Affecting Wild 0+ chinook Estimates

Given the foregoing problems, estimating wild juvenile 0+ chinook production from the trapping data we have collected in the lower Skagit River involves a number of assumptions. Accuracy of the resultant estimates are a direct function of the veracity of these assumptions. Each assumption deals with the uncertainty resulting from the following five major sources of variation we have identified.

1. **Trap efficiency**. Expanding catches to estimate wild 0+ chinook production requires estimates of instantaneous gear efficiency, ideally as a function of some measurable variable such as discharge.

2. **Day vs night trap efficiency**. Trap efficiency may be influenced by light. For example, it may be lower during the daylight than at night.

   We have operated the traps primarily at night because catch rates, especially for coho and to a lesser extent chinook, are higher at night than during the daylight. Estimating instantaneous trap efficiency during the daylight hours, however, is probably not possible because it would require that a sufficient and known number of marked wild chinook pass the traps within a single daylight period. The traps fish only the top 4 ft of the water column, and the depth at our site is 20-30 ft, depending on discharge. If, as a function of increasing light intensity, juvenile chinook migrate at greater depth and/or their ability to avoid the trap increases, then trap efficiency during daylight hours would be lower. The behavior of juvenile chinook and the biases imposed by releasing marked fish immediately upstream of the traps precludes estimating instantaneous efficiency within such a limited time interval as a single daylight period. Catches during daylight hours appear to be positively affected by turbidity. If true, this results either from increased migration rate and/or from an increase in trap efficiency because avoidance is reduced.

3. **Day vs. night migration**. Efficiency-based estimates rely on trapping either continuously or randomly throughout the time strata that migration is estimated. We developed our experimental design for estimating coho production to avoid the requirement of continuous trapping in the mainstem. Therefore, trapping in previous years was conducted almost entirely at night.

4. **Migration interval**. Skagit River 0+ chinook emigrate over a wider season than coho smolts. Chinook begin their downstream migration in January or earlier, and continue through the summer or even into the fall. In most years, we operated the traps over the coho smolt migration period, early-April through mid-June. Beginning in 1994, and continuing through 1996, we extended trapping longer, as late as mid-July. In 1997, we began trapping in mid-February and continued into September.

5. **Incidence of hatchery-produced fish**. Prior to 1994, releases of hatchery-produced 0+ chinook in the Skagit River were unmarked. Consequently, our estimates of wild chinook production for the first four years rely on an assumption for the number of hatchery-produced fingerlings we caught. Estimating both components of the migration relies on assumptions of how many hatchery fish survived to pass the trap during the interval trapped. Beginning with the 1993 brood, (released in 1994) all hatchery-produced zero age chinook released into the Skagit River have been marked with an adipose fin-clip (ad-mark) and coded-wire tagged.

Study Plan for 1998

The study plan for the 1998 trapping season was directed at improving the estimates of Skagit River chinook production through achieving a better understanding of the sources of variation. In addition to continuing our analysis of the chinook and coho trapping data collected over the previous eight years, the 1998 work plan included the following six operational elements.

1. **Trapping Season**
   A critical uncertainty in estimating Skagit River wild 0+ chinook production is their emigration timing. In 1998 we began trapping in mid-January and continued into September. This is a month earlier than in 1997.

2. **Nightly Trap Operation**
   Nightly trapping with both the scoop trap and screw trap was continued throughout the season.

3. **Daytime Trap Operation**
   Daytime trapping occurred every third day. We made concerted efforts to enumerate catches shortly after dawn and around dusk to enable separating day and night catches.

4. **Trap Efficiency**
   In addition to the marked wild coho released from the tributary traps, the groups of hatchery fingerlings released from the two production facilities, we marked and released above the trap four groups of hatchery chinook, two groups of dye-marked pink fry and one dye marked group of chum fry.

5. **Day:Night Trap Efficiency**
   In 1997, we attempted to assess diel differences in the vertical migration pathway with a net fished deeper than our traps which fish from the surface to a depth of four feet. This attempt failed, however, due to excessive drag in the fast current. In an attempt to directly assess day:night trap efficiency, in 1998, on two separate dates we released a group of fin-marked chinook in the morning and at night.

6. **Measuring Visibility**
   To better understand the influence of water clarity on migration behavior, we measured visibility each day over most of the season. Visibility data will be correlated with flow and fish catch data.

METHODS

Trapping Gear and Operation

We installed two floating downstream migrant traps in the lower Skagit River (R.M. 17) on January 18. With the permission of Burlington Northern, we attached the four anchor lines to the bridge support structures. The traps were positioned side by side in the zone of highest water velocity, which is just south of the southernmost pier, approximately 70 ft from the south bank. Velocity at this site varies as a function of discharge. At low flows it averages around 5 fps, and increases to around 7 fps at high flows.

Two trap types were used: a floating inclined-plane screen trap (scoop trap), (*Seiler et al.* 1981) and a screw trap (*Busack* 1991). Both traps are contained in steel pontoon barges, outfitted with two five-ton bow-mounted anchor winches loaded with up to 600 ft of ⅜ inch aircraft cable. Overall, the scoop trap barge measures 13 ft x 38 ft, while the screw trap barge is 15 ft x 30 ft. The inclined-screen of the scoop trap is 6 ft wide, and we fish it only 3.5 ft deep to maintain an oblique angle to the flow. We have found that the angle formed by the 16 ft-long screen, set 3.5 ft deep at the entrance, precludes impinging even such small migrants as pink and chum fry, as there is sufficient sweep across the surface relative to the flow through it. At this depth, the scoop trap screens a rectangular cross-sectional area of 21 ft^2. The 8 ft-diameter screw trap screens a cross-sectional area of 25 ft^2, in the shape of a semi-circle.

The traps were fished every night and every third day unless flows and associated debris loads were excessive. All captured fish were enumerated by species and age and examined for appropriate external marks. Samples of wild chinook were measured (fork length) over the season.

Environmental Parameters

In addition to fish counts for intervals trapped, we also measured water temperature and turbidity daily using two devices; a standard secchi disk and a black disc viewed horizontally through a periscope *(Davies-Colley* 1988) (*Steel* in press). Mean daily flow data was provided by the USGS gauge at Mount Vernon.

Estimating Migration

Estimating migration for any period, whether a short time interval or an entire season, requires a catch and an estimate of capture rate or trap efficiency. Catch is the product of abundance and capture rate (Equation #1). As our objective is to estimate abundance, and catch is simply a count within a time period, estimating capture rate is the primary challenge. We directed our analyses of the catch data at correlating day and night catch rates with flow and visibility data. These correlations were employed to project catches of wild 0+ chinook and selected groups of

marked fish to the standard of continuous trapping. Relating the projected numbers of marked fish recovered to the numbers released provides estimates of capture rates.

Equation #1: Basic formulas

$$C=Me \qquad M=\frac{C}{e}$$

where: M = migration
C = catch
e = trap efficiency

To assess catch rates of wild coho smolts and wild and hatchery 0+ chinook for light and dark periods, we selected sunrise and sunset as the strata breaks. For each trap, we sorted through the trapping interval database to select daytime fishing periods which were preceded and followed by night fishing intervals. Catch rates from the nights before and after the day fished were averaged to account for changing migration rates. Catch data were standardized by time fished in each interval and expressed as fish/hour rates. The ratio of day catch rate-to-night catch rate (d:n) was used to indicate relative catch rates as a function of daylight (Equation #2). We also computed season average day:night (d:n) catch ratios (Equation #3).

Equation #2: Comparing day catch rates to night catch rates:

$$R_i=C_{h_{di}} \div \frac{C_{ni-1}+C_{ni}}{h_{ni-1}+h_{ni}}$$

where: i = 24-hour period (from sunrise to sunrise)
R_i = ratio of day to night catch rates for period i
$C_{h(di)}$ = catch/hour during daylight for period i
C_{ni-1} = catch during night before period i
C_{ni} = catch during night for period i
h_{ni-1} = hours fished the night before period i
h_{ni} = hours fished during the night for period i

Equation #3: Season average ratio of day:night catch rates

$$\overline{\chi}R_i=\frac{\Sigma R_i}{n}$$

where: n = total number of comparisons over the season

Catch data was expanded to the standard of continuous trapping. For minor intervals of fishing time missed at night, we used straight-line interpolation of catch rates before and after the interval missed. To estimate catches for the several contiguous nights that the screw trap did not fish

during the spring, we expanded catches in the scoop trap with the ratio of scoop to screw trap catches before and after the outage. Catch during the day light intervals that we did not fish were estimated from night catches and the d:n ratio correlations with the environmental parameter that best explained variation in d:n catch ratios.

An estimate of instantaneous capture rate for both day and night intervals as a function of flow would be optimal. As discussed above, however, this may not be feasible with chinook. We have several indicators of trap efficiency in 1998: recaptures of the wild coho marked at the tributary traps over the season, recaptures of the four groups of fin-marked hatchery chinook that we released, recoveries of the hatchery chinook fingerlings released from Skagit Hatchery and the Countyline Ponds, and recoveries of the pink and chum fry dye mark groups. While the hatchery chinook are the same species and age, because they may behave significantly different than wild fish, their capture rate may not represent that of wild chinook. In addition, because the mortality and residualism of hatchery chinook between release and passing the trap is unknown, but probably significant, the resultant unadjusted estimates of capture rate are biased low. While wild coho are a different species, age, and somewhat larger size, because they are actively migrating smolts released over an extended period, their recaptures may actually represent season average trap efficiency for wild chinook better than the hatchery chinook groups.

We released the four groups of fin-marked chinook and two groups of dye-marked pink fry and one group of dye marked chum fry approximately one mile upstream of the traps. Each of these groups were released in the same manner; distributed evenly across the channel from a skiff, via buckets.

To project recapture rates for both hatchery chinook and the LV-marked wild coho to the standard of continuous trapping, we expanded mark recoveries with the process described above. Recaptures of ad-marked chinook were complicated by the release of two different groups/stocks with the same external mark. Following release of the chinook acclimated at Countyline Ponds beginning on May 29, we sacrificed a sample of ad-marked 0+ chinook over a number of days to recover tags and thereby estimate catches of each group.

RESULTS

Trap Operation and Flow

Flow is the dominant factor affecting downstream migrant trapping operations in any system. This is particularly true in the lower Skagit River due to the quantity of large woody debris this system transports during rising and high flows. Throughout the 1998 season, flows were moderate, ranging from around 10,000 to just over 20,000 cfs. Beginning in June, flows generally declined. These near-average flows contrasted sharply with the extraordinary high flows we experienced in 1997 (Figure 1, USGS data-Mount Vernon).

We began trapping on the night of January 18, and ceased trapping on September 11. Given the mild flows, we were able to operate the traps every night. Over the 236-day season, we operated the scoop trap every night except for four nights in September, when catches were zero, we elected to not fish. We also fished the scoop trap throughout the daytime on 81days, usually at a frequency of every third day. In total, this trap fished 3,599 hours of a total elapsed time of 5,640 hours, 63.8% of the time. The screw trap fished on nearly the same schedule although for slightly fewer hours. We had to remove this trap for repairs which required five days (April 24 through April 29). Mechanical problems recurred late in the season so we discontinued fishing the screw trap on August 1. In total, the screw trap fished 2,992 hours, 53% of the elapsed time in the season. In 1998, the traps were operated for more total time and for a higher proportion of the season than in any previous year (Table 1).

Catch

Chinook fry were moving downstream when we began trapping in mid-January, although catch rates were low. Over the first three days of trapping the scoop and screw traps captured an average of just under 1 chinook fry/hour. Catches increased throughout the month and by the last three days of January the traps were averaging just over 3 chinook fry/hour. The highest average catch rates of wild chinook over a night, 156 and 118 fish /hour in the scoop and screw traps, respectively, occurred on the night of March 22. These catch rates, which are 3-4 times higher than peak catches in 1997, coincided with a moderate flow increase (Figure 1 and 2). Over the remaining season, wild 0+ chinook catch rates fluctuated but generally declined beginning in early-May. For the last month of the trapping season, August 8 through September 11, wild chinook catch rates averaged less than 1 fish/hour.

Day-to-day variation in wild chinook catch rates was nearly identical between traps. The scoop trap, however, consistently outfished the screw trap (Figure 2). For the season through August 1, the scoop and screw traps captured wild 0+ chinook at average rates of 13 and 8.7 fry per hour fished. These rates are simply the ratio of total night catches to the total night hours fished for each trap.

For the season, we captured 53,699 wild and 7,964 hatchery zero age chinook. This is the highest catch of wild 0+ chinook in the nine years trapped (Table 2). The hatchery 0+ chinook catch includes the numbers of fin-marked chinook that we released above the trap on two dates to estimate trap efficiency.

Two other species of migrants were more abundant than wild 0+ chinook in our catches; chum (55,660 fry) and pinks (440,858 fry). This record high catch of pink fry indicates that these were by far more the most abundant migrant in 1998. An additional reason this catch is so high relative to that of previous years is the higher proportion of daylight periods that we fished in 1998. Pink fry catches during daylight are often higher than respective nights.

Other notable catches included the record high number of wild coho (22,895 smolts and 1,625 fry) and wild chinook (1,226 yearlings).

In contrast, to these high catches, we caught only 36 yearling hatchery chinook, a record low. Following release of the 115,465 ad-marked and coded-wire tagged yearling chinook from Skagit Hatchery on April 1, we first observed, on April 4, schools of these fish jumping in quiet water along the shoreline in the vicinity of our gear. Numerous avian predators (gulls and mergansers), attracted by this jumping activity, were observed feeding on these fish. On April 22, we surveyed the shoreline approximately one mile upstream of the traps and observed jumping smolts throughout this reach. On this day, we also confirmed their origin by capturing 12 smolts via angling, all of which were sacrificed for stomach content analysis. We undertook this sampling to determine if these fish were feeding on the abundant populations of pink, chum and or chinook fry migrating through the lower river at this time. None of these fish contained fish remains; eleven fish had empty stomachs and one had a small quantity of organic material we identified as wood particles. We attribute the low catch of hatchery yearling chinook in our traps to their distribution in the slow water near shore.

Day:Night Catch Ratios

We compared wild 0+ chinook catch rates during daylight hours on 70 and 44 days, with respective night rates for the scoop and screw traps (Tables 3a-b). Day:night catch rate ratios varied from zero to over 150% in the scoop trap, and up to 113% in the screw trap. For the season, the ratio of summed day catch rates to summed night catch rates averaged 46% and 35% for the scoop and screw traps. Mean d:n catch rate ratios were lower, 30% and 29%, respectively. Both of these rates are not directly comparable between traps because they were estimated from trapping different days. Over the 42 days that both traps were operated throughout the daylight hours, d:n ratios averaged 35% and 29% for the scoop and screw trap.

Flows on the dates we computed d:n ratios ranged just over two-fold (9,860 cfs to 22,000 cfs) for the screw trap and over four-fold (5,670 cfs to 24,400 cfs) for the scoop trap. Regression analysis determined that flow explained around 40% of the variation in d:n ratios in the scoop trap and less (26%) in the screw trap (Figure 3).

For the 1998 season, we caught wild 0+ chinook during the daytime at rates that averaged around a third of those in the preceding and following nights. While these ratios are considerably lower than the nearly equal d:n ratios observed in 1997 when flows were high, they are consistent with the rates that we have measured in other previous years with moderate flows.

Analysis of d:n catch ratios for hatchery chinook (27 for the scoop and 24 for the screw trap) were limited by release timing and low abundance (Tables 4a and 4b). In both traps, hatchery chinook 0+ were consistently caught at lower rates during the daylight relative to respective nights than wild chinook. Overall, d:n ratios for hatchery chinook averaged 16% and 13% in the scoop and screw traps, about half the rates for wild chinook which averaged 37% and 24%, respectively, on these same days. As with wild chinook, relating d:n ratios for hatchery chinook to flows indicated weak positive correlations (Figure 4). Hatchery 0+ chinook d:n ratios did track wild ratios indicating that these fish responded to the same stimuli as wild migrants (Figure 5).

Day:night catch ratios for wild coho smolts averaged 12% and 9% in the scoop and screw traps, around a third of the rates estimated for wild 0+ chinook (Table 5a-b). As with chinook, d:n ratios for hatchery coho averaged around half the rates measured with wild coho. Flows during the coho migration which varied just over two-fold, from 10,000 to 22,000 cfs, and averaged 15,000 cfs, explained some of the variation in d:n ratios for wild and hatchery coho (Figures 6 and 7). Although flows during 1997 were considerably higher, the relationship between flow and d:n ratios in that season indicated that relatively few coho would be caught during the daytime at flows <20,000 cfs. This finding is consistent with our results in 1998 when flows were considerably lower and also matches our experience in other previous years when flows averaged below 20,000 cfs.

Visibility

We measured visibility daily from February 24 through August 18. Over the season, we recorded values as high and low as 130 cm and 10 cm. Day-to-day variation rarely exceeded a factor of two. Visibility generally declined over the season. Monthly averages ranged from a high of 81 cm in April to 18 cm in August (Table 6). Flow explained a significant portion (71%) of the daily variation through June (Figure 8). After June, however, visibility did not correlate with flow. This difference is due to the extremely turbid glacial melt through the summer.

We correlated d:n ratios for wild chinook 0+ with the daily visibility data through June, and found that daytime migration rates were negatively correlated with visibility, although the relationships were even weaker than with flow (Figure 9). Visibility data explained only 33% and 14% of the variation in d:n ratios for the scoop and screw traps.

Wild Coho Smolt Production Evaluation

Over the season, we captured 720 of the 55,227 wild LV-marked coho smolts released from the eight tributary traps, a recovery rate of 1.30%. This rate is not an estimate of season average trap efficiency because we did not fish the traps continuously throughout each day. In addition, although we believe survival of these fish past the traps is high, we expect that some mortality occurs.

The incidence of these fin-marks in the wild coho smolt population is estimated at 3.1% from the ratio of 720 marked fish in a total wild catch of 22,895 smolts. Relating this rate to the 55,227 smolts marked and released from the tributary traps estimates system production at 1,759,597 wild coho smolts (Table 7).

Capture Rate Indicators

Wild coho. Projecting night catches of LV-marked wild coho smolts on the basis of d:n catch ratios of wild coho as a function of flow for the scoop trap (Figure 6) and using the season

average rate for the screw trap, estimates we would have caught 51 and 84 additional marks in the scoop and screw traps, respectively, had we operated both traps continuously. Relating the sum of actual and projected catches (855 smolts) to the 55,227 wild coho smolts marked at the tributaries, estimates season average combined scoop and screw trap capture rates at 1.5%. This estimate assumes that all of the marked wild coho smolts survived and passed the scoop and screw traps during the season. At survival rates from release at the tributary traps to passing the mainstem traps of 90% and 80%, recovery rates increase to 1.7% and 1.9%, respectively, for both traps combined.

Fin-marked hatchery 0+ chinook. In the first four days following release, recoveries of the two groups of hatchery fin-marked chinook (Ad-marks and Ad/LV), we released in the morning and evening of May 22, accounted for 0.76% and 1.44% in the scoop trap and 0.76% and 1.00% in the screw trap, respectively, of the 2,500 marks per group. The exact number of the daytime group that were recovered is uncertain because the chinook reared at Countyline Ponds were released on May 26. This production group was also ad-marked and therefore, outwardly indistinguishable from the group that we released on the morning of May 22, to calibrate the traps. On May 29, when we became aware that the Countyline production had been released, we began sampling ad-marked chinook to recover tags. Of the 8 fish we sampled (5 on the night of May 29, and 3 on the night of May 30), 3 were the Skagit Hatchery spring stock from our calibration test, and 5 were the summer stock released from Countyline Ponds. Consequently, the origin of the ad-marked chinook caught from the night of May 26 through the day on May 29 is unknown. Interpolating from the rates observed on May 26 and May 29, we assumed a ratio of 50:50 Skagit Hatchery and Countyline Ponds fish.

Another unknown is the number of marked chinook from both groups that passed the traps during the five daytime intervals that we did not fish from May 24 through May 30. Using the tag recovery results to apportion the projected catches of ad-marked chinook (Tables 8 and 9), we estimate that, had we fished continuously, we would have recovered 1.7% and 1.2% of the morning and 1.4% and 1.2% of the night groups in the scoop and screw traps, respectively (Table 10).

Recovery rates of the second pair of groups (released on June 4) totaled 2.7% and 3.4%, nearly identical to the first releases (Table 10). As with the first pair of releases, the morning group emigrated slower than the night group. While the bulk of the recoveries for both day and night releases occurred during the first night, recoveries of the morning group continued over the next thirty days.

Combining projected recoveries in both traps of the morning and evening releases, we estimate recovery rates of 2.8% to 3.1% for the May 22 and June 4 releases of fin-marked hatchery chinook, respectively.

Hatchery 0+ chinook production groups. Over the season, we caught 7,709 ad-marked hatchery 0+ chinook, 5,677 in the scoop trap and 2,032 in the screw trap. These totals do not include recoveries of the 9,412 chinook that we released in four groups on two dates (May 22 and June 4). On May 26, the volitional release of 202,211 summer chinook from Countyline Ponds

began. Observations indicated that by May 30, all fish had emigrated from the pond. On June 15 at 0900 hours, Skagit Hatchery released 263,017 spring chinook fingerlings.

All hatchery chinook were ad-marked and coded-wire tagged. Consequently, estimating our catch of each group required recovering tags. On the four nights from May 29 through June 1, we killed 65 ad-marked chinook and recovered 60 tags to separate the Countyline fish from the ad-marked only calibration group that we released on May 22. Based on the high proportion of Countyline Ponds tags in the June 1 sample (47÷48), from June 2 until June 15, we assumed that all ad-marked chinook were from this release. On June 15, following release of the Skagit Hatchery production, we resumed sampling ad-marked fish which we continued through July 22. Over this interval, we killed another 389 ad-marked chinook from which we recovered 382 tags (7 fish did not contain tags) (Table 8).

Applying tag recovery results to the daily sum of projected and actual catches of hatchery chinook estimates combined catches of 6,807 and 3,217 Skagit Hatchery 0+ spring chinook and Countyline Ponds summer chinook, respectively (Table 9). Relating these catches to the numbers released, yields capture rates of 2.6% and 1.6% (Table 10). These rates underestimate trap efficiency for hatchery fingerlings because no adjustment was made for mortality or residualism.

Pink fry. Our first release of dye-marked pink fry, on April 21, was a failure because fry were not reliably marked. The next day, we repeated the experiment after increasing the duration in the dye to insure mark recognition. At 2130 hrs we released 3,078 dyed pink one mile upstream of the trap. By 0640 hrs, we had recovered 24 and 13 marked pink fry in the scoop and screw trap, respectively. Although we operated the traps continuously over the next 24 hours, through dawn on April 24, we did not catch anymore dye-marked pink fry. The recovery rate for this experiment is estimated at 0.8% and 0.4% in the scoop and screw traps for a combined rate of 1.2%.

Chum fry. On May 22, we released 3,000 hatchery-produced dye-marked chum fry at 0930 hrs. By noon we had recovered 69 and 17 of these marked fry in the scoop and screw traps. Through 0630 hrs the next morning, we recovered another 7 marked chum in the scoop trap and 6 in the screw trap. Recovery rates are estimated at 2.5% and 0.8% in the scoop and screw traps for a combined rate of 3.3%.

Wild 0+ Chinook Estimates

Catch projection. Expansion of catch rates for the intervals not fished estimate an additional 12,027 and 6,167 wild 0+ chinook in the scoop and screw traps, respectively (Table 11a-b). Combined with the actual catches (33,698 and 20,001), these projections estimate that had we fished continuously from January 18, through September 11, we would have caught around 72,000 wild 0+ chinook in the two traps. Actual catches comprise 75% of the total estimated catches.

Production. We selected a value of 3% to represent season average trap efficiency. This rate is the average of the six 0+ chinook mark groups expanded to account for a mortality rate of 10% (2.7%÷0.9). Expansion of the projected season catch in both traps by this rate yields a system production estimate of 2.4 million zero-age chinook.

Migration timing. Wild 0+ chinook were caught on January 18, the first night of trap operation, indicating that the migration was under way before we began trapping. Based on the low initial catches, however, we believe that relatively few chinook fry had passed the trap before we started. Similarly, extremely low catches beginning in mid-August indicated the chinook migration was virtually over. While catch data exhibited considerable day to day variation, the months of March, April, May, and June accounted for 80% of the season total migration (Figures 10 and 11). The median migration date in 1998 (May 2) occurred two days later than we estimated in 1997 (April 30).

Hatchery Chinook Migration Timing

The ad-marked hatchery 0+ chinook groups released into the Skagit River from the Skagit Hatchery (springs) and Countyline acclimation ponds (summers) emigrated at different rates. This is the same pattern we have observed in previous years: the Skagit Hatchery fish migrate faster than the Countyline fish. Fifty-percent of the total projected catches of Skagit Hatchery chinook catches occurred within the first 10 days following release. In comparison, 19 days elapsed before half of the Countyline Ponds releases passed the trap (Figure 12).

Wild 0+ Chinook Size

Over the season, 0+ chinook captured in the traps increased in size from an average around 40 mm through the end of March, to around 90 mm by early-August (Table 12, Figure 13). The lower end of the weekly size range did not exceed 40 mm until early-June, indicating protracted emergence and/or slow growth for a component of the population. No difference in size at time between traps was evident (Figure 14).

Egg-to Migrant Survival

Relating our estimate of 2.4 million chinook to a potential deposition of 11.2 million eggs, results in an average survival-to-migration of 21%. This estimate of potential egg deposition (P.E.D.) is the product of 2,500 females and a fecundity of 4,500.

ASSUMPTIONS

Every estimate relies on assumptions. Although we know that trap efficiency is not constant, because we presently have no flow based correlation model to indicate its variation, we selected a value, indicated by the recapture rates of several groups of marked chinook, to represent a season average rate. Therefore, the overall assumption is that, catch is a constant fraction of abundance. Component assumptions for estimating the numbers of wild 0+ chinook migrating from the Skagit River follow.

1. Catch Expansion

   Because we fished at least one trap every night, expansion of catch up to the standard of continuous trap operation involved primarily estimating catch for the daytime periods that we did not fish. We assumed that the d:n catch ratio relationship with flow applied to night catch provides an unbiased estimate of the number of fish that we would have caught had the traps fished each day.

2. Trap Efficiency

   Estimating trap efficiency also involves the expansion for daytime catch for all marked fish categories used to indicate capture rates. Inherent in this approach is the assumption that trap efficiency during the daytime is identical to that during the night.

   a. Basic assumptions for every trap calibration group of marked fish include:
      1) The number passing the gear is known (survival from release to the trap is 100%);
      2) All marked fish captured are identified and enumerated.

   b. Marked hatchery chinook were captured at the same rate as wild 0+ chinook

   c. Instantaneous trap efficiency is not a function of light.

Discussion of Assumptions

Although direct assessment of these assumptions is not possible, we have some intuition as to how important they are and in which direction some of them may be violated. These beliefs and their effects on our estimate of the 0+ chinook production from the Skagit River follows.

Assumption #1: catch projection. We have no reason to believe that the catch projections for the day light periods not fished are biased. Although the relationship between flow and d:n ratios is weak, it should produce unbiased estimates. We believe that the catch projection for the season is a reasonable estimate of the numbers of wild 0+ chinook we would have caught in both traps had we fished continuously from mid-January to early-September.

Assumption #2A1: 100% survival of calibration fish. It is doubtful that all of the fish released in each group survived to pass the trap. For this reason, we selected a trap efficiency rate that represented the average 0+ hatchery recovery rate, adjusted higher to account for a mortality factor of 10%. If, on average, mortality was higher than 10%, then we have underestimated trap efficiency which results in overestimating production. Capture rates of the pink (1.2%) and chum (3.3%) dye groups probably are not very biased by mortality between release and passing the trap given their rapid migration. Though different species, these capture rates, along with that for wild coho (1.5%), indicate that capture rates for wild 0+ chinook are probably not much higher than 3%, if at all. It appears that survival of the Countyline Ponds summer chinook production was lower than that of the spring chinook released from Skagit Hatchery.

Assumption # 2A2: complete identification/enumeration of all marked fish captured. We are confident that virtually every marked fish captured was identified and recorded. The 1998 trap crew was comprised of experienced Scientific Technicians dedicated to collecting the highest quality data. Consequently, we don't consider this potential bias to be significant.

Assumption # 2B: marked hatchery chinook were captured at the same rate as wild chinook. The degree to which the hatchery chinook represented wild 0+ chinook is unknown. The similarity of d:n ratios over the season (Figure 5) provides some evidence that hatchery fish are responding to the river conditions in a manner similar to that of the wild chinook. Presently, we do not have any indication that hatchery produced 0+ chinook are caught at higher or lower rates than wild chinook.

Assumption #2c: trap efficiency is not affected by light. If this assumption is not correct, then it is likely that efficiency during the day is lower relative to the night rate; trap avoidance enhanced by daylight is the likely reason, if a difference exists. Another factor that would contribute to lower capture rates during the daylight could be any shifting in the migration path to deeper water as a function of light. To assess this potential bias we are investigating employing hydro-acoustics at the trap site. In an attempt to measure trap efficiency during the day and night we released the paired groups of hatchery chinook. As we expected, however, these fish did not pass the gear within their release strata so these tests provided no insight into this potential problem. If the hatchery calibration groups have the same diel migration behavior as wild fish, then different capture rates for day and night would not constitute a source of bias. Therefore, this assumption is really the same as #2B, for which we have little intuition.

Conclusion

We conclude that the critical assumption for producing unbiased estimates of wild 0+ chinook production is how well hatchery fish represent their wild cohorts in every aspect that affect capture rate. Based on this assumption, we believe that the number of wild 0+ chinook passing the traps in the Skagit River in 1998 is in the range of 2 to 3 million fish. Relating our projected catch of 72,000 wild chinook to these estimates yields season average capture rates of 2.4% to 3.6%.

DISCUSSION

Unlike the 1997 season, in which high flows frequently interrupted trapping, moderate flows throughout the 1998 season enabled continuous trapping. As a result, this second year of extended trapping provided our best measure of the "shape" of the 0+ chinook migration from the Skagit River. Despite the differences in flow, timing of our migration estimates were very similar between the two years. Timing was somewhat earlier in 1998 over the first portion of the migration, but identical thereafter (Figure 15). The influence of flow on migration timing may become more evident by comparing results from subsequent seasons which will include a range of flow patterns. It is important to remember, however, that these estimates are based on catch and the assumption of constant trap efficiency within each season.

The record high catches of 0+ chinook in 1998 resulted from two factors: higher trap efficiency, and operating the traps a higher proportion of the time. Consequently, actual catches accounted for 75% of the total projected catch of 72,000 chinook in 1998, a higher rate than in the previous year. In 1997 the actual catch comprised 41% of the projected catch of 115,000 chinook.

Trap efficiency is the link between catch and production. The accuracy of all of our within-season estimates and interannual comparisons depend on the veracity of each season's estimate of this most critical parameter. In 1998, we conducted several test releases in an attempt to improve our understanding of capture rate. The relatively consistent recovery rates of the hatchery chinook provided an indication that, at least in this season, variation appeared low. Hatchery chinook were caught at almost twice the rate of the wild fin-marked coho smolts released from the tributary traps (2.7% vs 1.5%). However, the recovery rate of these marked coho is lower than we expected given the moderate flows. In other years we have caught up to 2.5% of the marked coho released. This discrepancy may be due in part to the record high proportion of the coho mark group which originated from traps located high in the system. In all other previous years, over half the mark group emigrated from tributaries located lower in the system. High flows throughout Summer 1997, provided abundant rearing habitat in the upper basin. These optimal conditions continued through the winter, with relatively moderate flows, which enabled over-wintering coho to remain high in the system. In-river mortality is probably some function of the distance traveled: therefore, release location is a source of bias in our estimates of capture rate. This is also the likely explanation for at least some of the difference between the recovery rates for the Countyline Ponds and Skagit Hatchery production (1.6% and 2.6%, respectively).

Improving our estimates of 0+ chinook production from the Skagit River largely depends on calibrating the traps for a range of conditions. Instantaneous trap efficiency is not constant over the season; it varies as a function of flow, velocity, turbidity, light, water temperature (possibly), and fish size. Flow is undoubtedly the most important variable because it integrates other physical parameters which affect fish behavior and trap operation. At the site we have placed the traps, velocity is a positive function of flow, as evidenced by the rotational speed of the screw trap. Even for a given discharge, however, velocity and flow vectors can be altered by large woody debris upstream of the railroad bridge, and locally at the trap site. Turbidity also appears to be an important parameter that may affect the rate that chinook migrate during the day, their vertical and lateral locations in the channel, and their ability to avoid the gear. Using hatchery fish to

represent the responses of wild fish to the complex interactions of these variables with fish size, their physiological status, and the traps may present incalculable biases. Despite these uncertainties, because the numbers of wild fish captured at any one time are inadequate for trap calibration, releasing groups of marked hatchery 0+ chinook offer the only option other than the wild marked-coho we release over the entire season.

Over the previous eight seasons, flow during egg incubation has explained virtually all of the interannual variation in our estimates of egg-to-migrant survival rates (Figure 16). For the first seven broods in which trapping was limited to the coho migration interval (April-June), we have generated two sets of estimates using somewhat different assumptions. Originally, the estimates for the 1989-1995 broods were based on trapping primarily at night through the coho emigration period, expanding these catches to 24-hour estimates, applying a season average trap efficiency (indicated by the wild coho mark-recapture rate), and extrapolating migration rates to assumed starting and ending dates to estimate the migration occurring before and after trapping began (Table 13a). These estimates may be biased high because they are based on the assumption that daytime catch/hour rates were equal to night catch/hour rates, and because we used the trap efficiency estimated with wild coho, which are caught at a lower daytime rate than chinook. To address these potential biases, we recalculated the survival rates for the first seven broods with the following simple methodology:

1. Expand season total 0+ chinook catch (scoop trap) with the season average capture rate of wild LV-marked coho; and
2. Expand this migration by 67%, the proportion of the season migration that we estimate occurred April through June 1997.

Relating these estimates to the peak flows during egg incubation produces a fit comparable to that of the original estimates, but survival rates which are two thirds as high (Table 13b). This outcome corroborates the relative value of these migration estimates because it relies primarily on catch and the same indicator of capture rate (wild coho) with a minimum of assumptions.

In 1997, our first season of extended trapping, we estimated 4.5 million 0+ chinook. Egg-to-migrant survival, relative to flow for this brood, appears to be in the range of our "original" estimates. Freshwater survival of the 1997 brood (1998 outmigrants) is higher than the original regression model predicts (21% vs. 16%). This positive deviation likely results from the excellent spawning conditions provided by the abundant flows during Summer/Fall 1997 (Pete Castle, pers comm.).

RECOMMENDATIONS

The following recommendations which were taken from the 1997 report, are listed here so that an accounting of the progress we made implementing them in the 1998 season can be assessed. As noted in last year's report these measures include actions that we may reasonably and cost-

effectively implement within the current scope and funding level of our trapping program in the lower Skagit River.

1. Continue the extended season trapping over a sufficient span of years and flow conditions to gain an understanding of the interannual variation in migration timing.

2. Count catches at or near sunrise and sunset to increase the data base for day:night catch comparisons.

3. For a sample of dates, over the season, count catches in two-hour increments over 24-hour periods to determine the variation in diel migration.

4. Investigate the potential of using hydro-acoustics to assess whether downstream migrants alter their vertical pathways as a function of light and/or turbidity. Although such gear cannot discriminate among species, this may be inferred by catches, depending on the extent that shifts occur.

5. Measure turbidity and assess the correlation with flow.

6. Release several paired groups (2,000/group) of marked hatchery 0+ chinook to assess the feasibility of using these fish to calibrate the traps.

7. Engage a biometrician to optimize sampling design and analytical methods, assess assumptions, and compute variance estimates.

Progress in 1998

1. **Accomplished**. Aided by moderate flows, we trapped each night from January 18-September 11.

2. **Accomplished**. On most dates over the season, we counted catches near dusk and dawn.

3. **Not accomplished**. We did not conduct the two hour interval catch accounting because the high catches often precluded completing counting all the fish captured in both traps within such short intervals.

4. **Accomplished**. We have consulted with Norm Lemburg, WDFW hydro-acoustic expert, at the trap site and collaboratively devised a plan to conduct a field trial in the 1999 season.

5. **Accomplished**. Under the direction of Ashley Steel, UW Ph.D., candidate, we collected turbidity data throughout the 1998 season.

6. **Accomplished**. As documented in this report, we released four groups of marked chinook, and three groups of dye-marked pink and chum fry.

7. **Not accomplished**. Over the course of this season, the WDFW biometrician which we had hoped to collaborate with resigned. Due to agency budget constraints, this position has not been filled.

Recommendations for 1999

Our study plan for the 1999 season includes continuing all of the above recommendations except number 3.

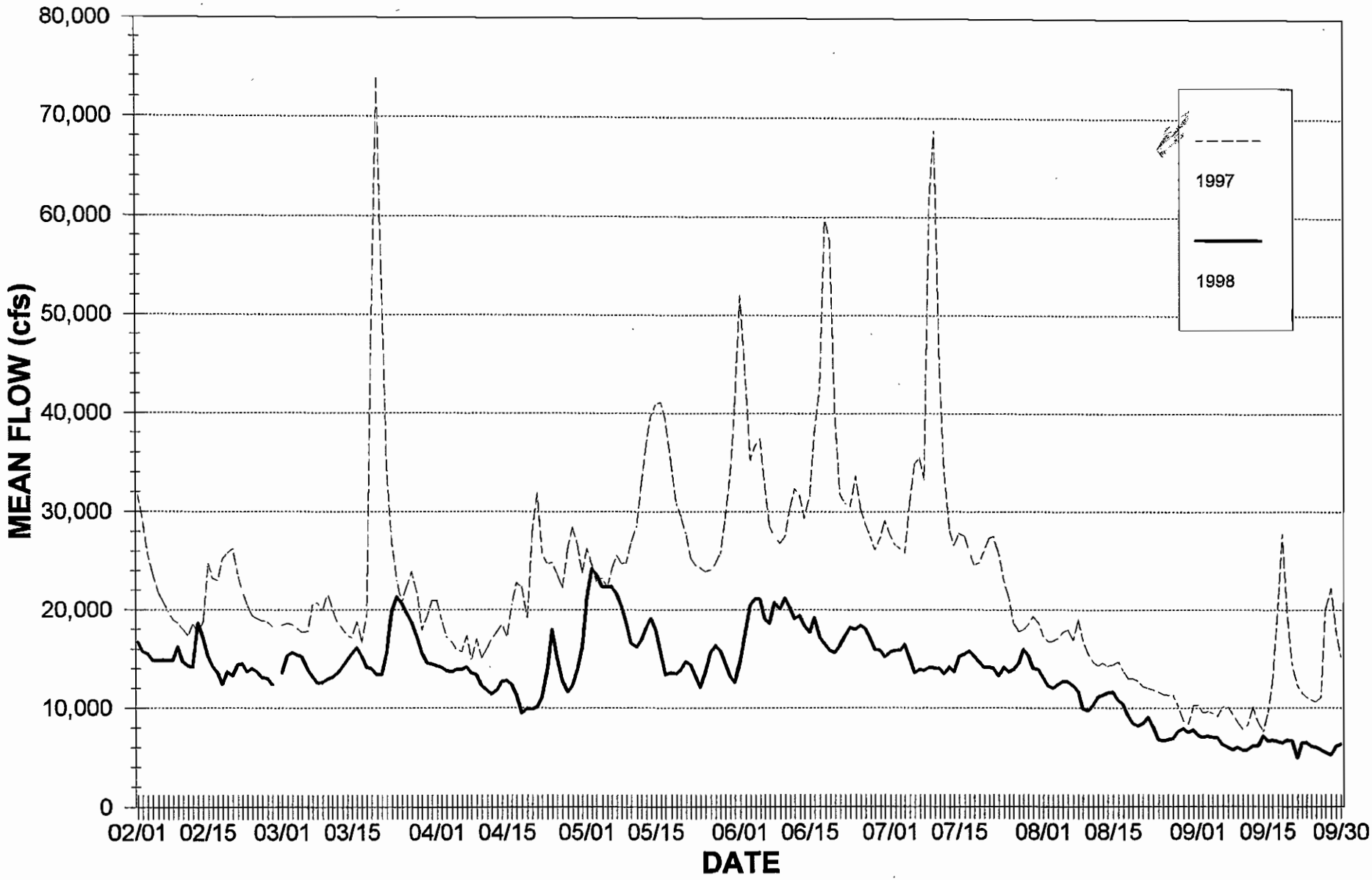

Figure 1. Comparison of 1997 and 1998 daily mean flows, Skagit River near Mt. Vernon, February through September.

Table 1. Record of downstream migrant trap operations, Skagit River, all years.

Year	Gear Type	TRAPPING INTERVAL Date Start	Date End	Season Total Days	Number of Days Fished Nighttime Full	Nighttime Partial	Daytime Full	Daytime Partial	Trap Out	HOURS Total	HOURS Trapped	Percent Fished
1990	Scr/Scp	04/13	06/19	66	50	1	5	10	11	1,602.5	590.5	36.8%
1991	Scoop	04/08	06/20	73	72	1	4	18	0	1,741.5	858.0	49.3%
1992	Scoop	04/10	06/21	72	65		3	5	7	1,717.0	667.0	38.8%
1993	Scoop	04/11	06/07	57	53	2	0	8	2	1,355.5	539.5	39.8%
	Screw	04/22	06/07	46	32	0	4	5	14	1,095.0	366.5	33.5%
1994	Scoop	04/09	06/29	81	78	3	5	4	0	1,931.0	828.0	42.9%
	Screw	04/09	06/29	81	78	1	10	6	2	1,931.0	917.0	47.5%
1995	Scoop	03/25	07/15	112	112	0	5	8	0	2,724.0	1,189.0	43.6%
	Screw	03/25	07/17	114	110	2	8	8	2	2,729.5	1,207.0	44.2%
1996	Scoop	04/12	07/18	97	95	0	6	28	2	2,321.5	1,110.5	47.8%
	Screw	04/12	07/18	97	91	3	7	25	3	2,321.5	1,112.0	47.9%
1997	Scoop	02/14	09/10	208	182	9	58	26	17	4,996.0	2,719.0	54.4%
	Screw	02/14	09/10	208	174	11	56	21	23	4,996.0	2,667.0	53.4%
1998	Scoop	01/18	09/11	236	231	0	85	3	5	5,640.0	3,599.0	63.8%
	Screw	01/18	09/11	236	188	0	69	1	48	5,640.0	2,992.0	53.0%

Note: In 1990, we initially started trapping with a screw trap, but because of constant problems, replaced it with a scoop trap on May 7.
Trap time past 0830 hrs is considered a partial day-fish.

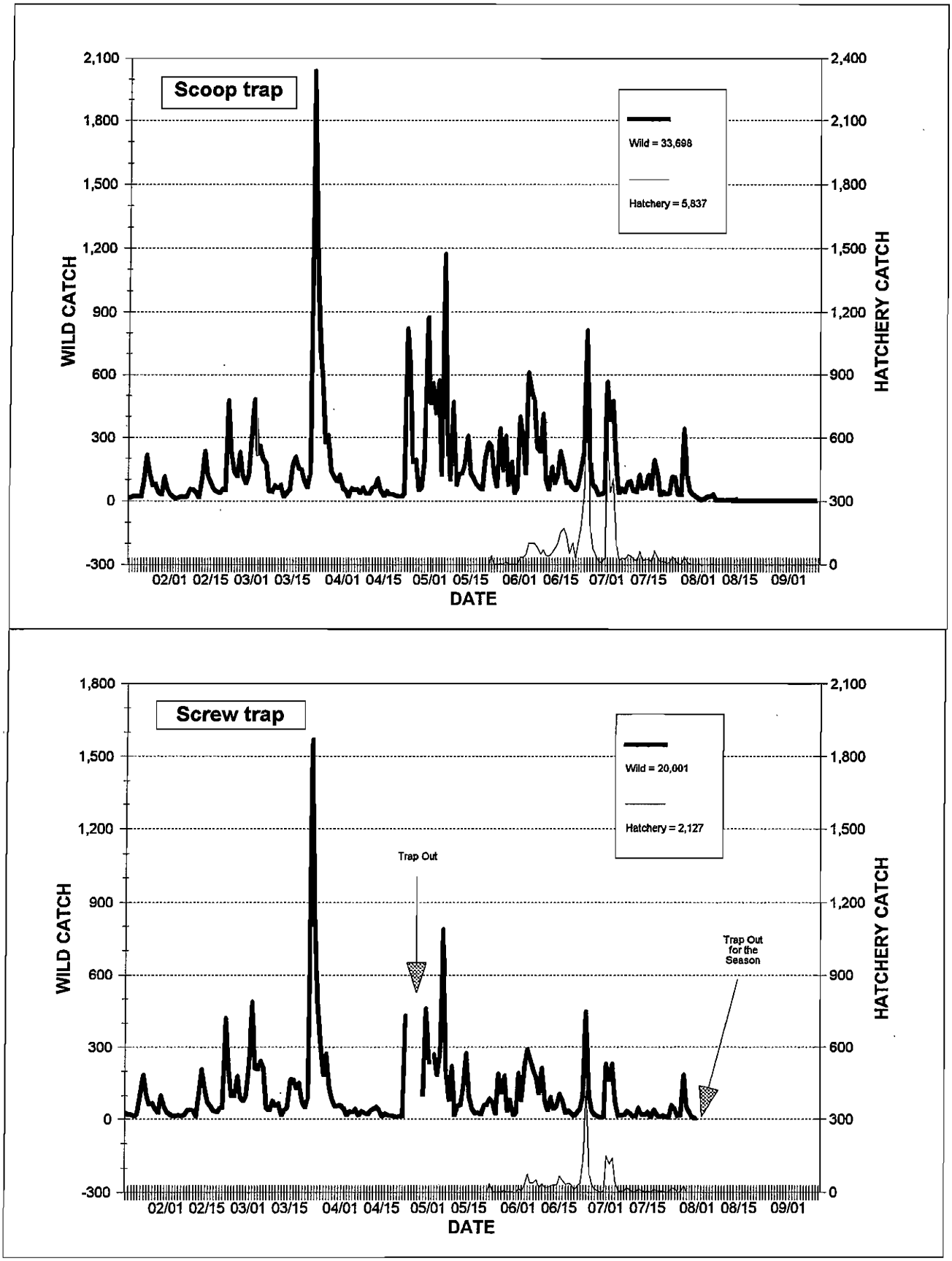

Figure 2. Raw hatchery & wild 0+ chinook catches, Skagit River mainstem traps, 1998.

Table 2. Downstream migrant salmonids captured in the Skagit River mainstem scoop and screw traps, all years.

Species/age	1990 Scoop	1991 Scoop	1992 Scoop	1993		1994		1995		1996		1997		1998	
				Scoop	Screw	Scoop	Screw	Scoop	Screw	Scoop	Screw	Scoop	Screw	Scoop	Screw
Coho 1+ Wild	10,204	6,904	8,620	3,636	3,690	10,767	10,211	8,861	8,824	11,520	9,134	6,437	5,975	13,879	9,076
Hatchery	234	382	596	[a]714	[a]723	1,880	1,873	4,800	5,274	973	1,208	334	362	623	1,028
Coho 0+	48	22	64	79	4	57	5	204	57	246	50	364	220	1,216	409
Chinook 1+ Wild	[b]45	[b]1,132	[b]299	[b]3,567	[b]262	308	212	184	112	80	32	46	52	876	350
Hatchery								1,754	570	415	117	376	249	24	12
Chinook 0+ Wild	[c]8,528	[d]1,706	[e]8,812	[f]7,463	[f]3,415	9,721	4,743	10,536	5,767	2,834	1,731	26,798	20,780	33,698	20,001
Hatchery						2,320	1,098	6,083	2,022	4,165	2,888	1,163	684	5,837	2,127
Sockeye 1+	2	21	2	32	16	106	45	31	17	36	56	59	48	111	84
Chum 0+	617	48,505	3,081	66,790	13,939	5,113	7,689	66,139	55,824	10,578	5,384	38,243	39,174	37,162	18,498
Pink 0+	697	0	18,682	0	0	48,532	22,952	0	0	27,482	9,778	9	17	338,520	102,338
Steelhead 1+ Wild	198	301	332	304	663	601	1,297	532	1,184	364	778	319	531	389	1,100
Hatchery	223	66	124	658	2,381	670	3,107	1,282	4,579	751	1,751	982	2,401	446	2,325
Steelhead adult	0	0	0	0	0	0	0	4	1	1	0	3	4	1	3
Cutthroat 1+	117	60	153	45	91	198	437	107	263	165	332	58	89	98	401
Cutthroat adult	0	0	0	0	0	0	0	1	0	0	2	2	13	2	5
Dolly Varden	130	112	132	76	74	197	255	189	179	142	102	65	77	153	206
Trout parr	N/A	N/A	N/A	12	7	47	69	56	47	110	68	40	61	90	83

[a] Estimated by proportion of total catch.
[b] Includes both hatchery and wild.
[c] 1989 brood released from Clark Creek = 1,728,100: Fall = 1,170,800 Samish stock + 236,600 Clark Creek stock, released on June 8, 1990; and Summer = 73,800 + 246,900 Clark Creek stock released on June 28, 1990.
[d] Clark Creek stock released on June 18, 1991: 1,144,500 Fall and 111,120 Summer.
[e] Clark Creek stock: 786,100 Fall, released February 25, 1992; 483,280 Summer, released April 20, 1992; and 120,000 released May 21, 1992.
[F] Clark Creek stock: 1,588,800 Fall released in February 1993, and 250,000 Fall released on March 16, 1993; and 160,000 Summer released on May 16, 1993.

Table 3a. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME Start	End	Time Fished	Catch	Catch/ Hour	NIGHTTIME Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	DAY:NIGHT Diff (D-N)	Ratio (D/N)	Flow (cfs)
01/20	9.17	16.58	7.42	1	0.13	01/19	16.83	01/20	9.00	16.17	17	1.05			
						01/20	16.75	01/21	9.25	16.50	16	0.97			
	Total Wild		7.42	1	0.13					32.67	33	1.01	-0.88	13.35%	20,600
01/22	8.75	17.58	8.83	4	0.45	01/21	17.17	01/22	8.58	15.42	21	1.36			
						01/22	17.75	01/23	8.92	15.17	15	0.99			
	Total Wild		8.83	4	0.45					30.58	36	1.18	-0.72	38.47%	17,600
01/24	8.50	16.75	8.25	53	6.42	01/23	16.75	01/24	8.25	15.50	92	5.94			
						01/24	16.92	01/25	9.00	16.08	162	10.07			
	Total Wild		8.25	53	6.42					31.58	254	8.04	-1.62	79.88%	24,400
01/26	8.25	16.75	8.50	29	3.41	01/25	17.17	01/26	8.08	14.92	126	8.45			
						01/26	16.92	01/27	8.92	16.00	45	2.81			
	Total Wild		8.50	29	3.41					30.92	171	5.53	-2.12	61.68%	22,000
02/05	8.17	17.83	9.67	1	0.10	02/04	17.33	02/05	8.00	14.67	13	0.89			
						02/05	18.00	02/06	8.83	14.83	18	1.21			
	Total Wild		9.67	1	0.10					29.50	31	1.05	-0.95	9.64%	14,800
02/12	9.33	17.92	8.58	8	0.93	02/11	18.08	02/12	9.00	14.92	14	0.94			
						02/12	18.08	02/13	8.83	14.75	95	6.44			
	Total Wild		8.58	8	0.93					29.67	109	3.67	-2.74	25.37%	14,200
02/19	9.17	18.50	9.33	17	1.82	02/18	18.00	02/19	9.00	15.00	35	2.33			
						02/19	18.67	02/20	7.50	12.83	38	2.96			
	Total Wild		9.33	17	1.82					27.83	73	2.62	-0.80	69.45%	13,700
02/22	8.25	18.50	10.25	66	6.44	02/21	18.00	02/22	8.00	14.00	475	33.93			
						02/22	18.67	02/23	8.50	13.83	166	12.00			
	Total Wild		10.25	66	6.44					27.83	641	23.03	-16.59	27.96%	14,500
02/25	9.67	18.00	8.33	15	1.80	02/24	18.50	02/25	9.50	15.00	115	7.67			
						02/25	18.17	02/26	9.25	15.08	213	14.12			
	Total Wild		8.33	15	1.80					30.08	328	10.90	-9.10	16.51%	13,700
03/02	9.67	17.75	8.08	71	8.78	03/01	18.33	03/02	9.50	15.17	303	19.98			
						03/02	17.92	03/03	8.25	14.33	409	28.53			
	Total Wild		8.08	71	8.78					29.50	712	24.14	-15.35	36.39%	15,300
03/04	9.17	18.25	9.08	33	3.63	03/03	18.25	03/04	9.00	14.75	222	15.05			
						03/04	18.42	03/05	9.00	14.58	226	15.50			
	Total Wild		9.08	33	3.63					29.33	448	15.27	-11.64	23.79%	15,400
03/10	9.25	19.50	10.25	12	1.17	03/09	19.00	03/10	9.00	14.00	72	5.14			
						03/10	19.67	03/11	9.50	13.83	47	3.40			
	Total Wild		10.25	12	1.17					27.83	119	4.28	-3.10	27.38%	12,900
03/15	9.50	20.00	10.50	13	1.24	03/14	19.33	03/15	9.33	14.00	53	3.79			
						03/15	20.17	03/16	9.50	13.33	155	11.63			
	Total Wild		10.50	13	1.24					27.33	208	7.61	-6.37	16.27%	15,500
03/25	8.08	17.75	9.67	285	29.48	03/24	19.92	03/25	7.83	11.92	738	61.93			
						03/25	18.00	03/26	9.08	15.08	300	19.89			
	Total Wild		9.67	285	29.48					27.00	1,038	38.44	-8.96	76.69%	20,700
03/27	8.42	18.50	10.08	81	8.03	03/26	19.50	03/27	8.25	12.75	276	21.65			
						03/27	18.67	03/28	9.50	14.83	230	15.51			
	Total Wild		10.08	81	8.03					27.58	506	18.34	-10.31	43.79%	18,800
03/31	7.75	18.42	10.67	24	2.25	03/30	19.08	03/31	7.50	12.42	92	7.41			
						03/31	18.58	04/01	7.25	12.67	99	7.82			
	Total Wild		10.67	24	2.25					25.08	191	7.61	-5.36	29.55%	14,500
04/04	7.00	18.25	11.25	10	0.89	04/03	19.25	04/04	6.83	11.58	19	1.64			
						04/04	18.42	04/05	8.00	13.58	47	3.46			
	Total Wild		11.25	10	0.89					25.17	66	2.62	-1.73	33.89%	13,700
04/06	7.67	19.50	11.83	9	0.76	04/05	20.00	04/06	7.50	11.50	48	4.17			
						04/06	19.67	04/07	7.25	11.58	45	3.88			
	Total Wild		11.83	9	0.76					23.08	93	4.03	-3.27	18.88%	13,900
04/07	7.33	19.33	12.00	2	0.17	04/06	19.67	04/07	7.25	11.58	45	3.88			
						04/07	19.50	04/08	6.75	11.25	35	3.11			
	Total Wild		12.00	2	0.17					22.83	80	3.50	-3.34	4.76%	14,200
04/12	7.42	20.33	12.92	15	1.16	04/11	20.58	04/12	7.25	10.67	61	5.72			
						04/12	20.50	04/13	7.00	10.50	51	4.86			
	Total Wild		12.92	15	1.16					21.17	112	5.29	-4.13	21.95%	11,400

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Table 3a. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME Start	End	Time Fished	Catch	Catch/ Hour	NIGHTTIME Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	DAY:NIGHT Diff (D-N)	Ratio (D/N)	Flow (cfs)
04/14	7.17	18.50	11.33	18	1.59	04/13	20.00	04/14	7.00	11.00	105	9.55			
						04/14	19.00	04/15	6.25	11.25	30	2.67			
	Total Wild		11.33	18	1.59					22.25	135	6.07	-4.48	26.18%	12,700
04/17	7.17	19.67	12.50	11	0.88	04/16	20.33	04/17	7.00	10.67	45	4.22			
						04/17	19.83	04/18	6.92	11.08	18	1.62			
	Total Wild		12.50	11	0.88					21.75	63	2.90	-2.02	30.38%	11,300
04/21	7.42	19.33	11.92	1	0.08	04/20	19.58	04/21	7.25	11.67	17	1.46			
						04/21	19.50	04/22	7.00	11.50	16	1.39			
	Total Wild		11.92	1	0.08					23.17	33	1.42	-1.34	5.89%	10,100
04/23	7.75	14.00	6.25	3	0.48	04/22	20.50	04/23	6.67	10.17	34	3.34			
04/23	14.42	20.33	5.92	11	1.86	04/23	20.67	04/24	5.67	9.00	806	89.56			
	Total Wild		12.17	14	1.15					19.17	840	43.83	-42.68	2.63%	13,800
04/26	7.75	20.00	12.25	94	7.67	04/25	20.50	04/26	7.50	11.00	181	16.45			
						04/26	20.50	04/27	6.75	10.25	100	9.76			
	Total Wild		12.25	94	7.67					21.25	281	13.22	-5.55	58.03%	12,800
04/29	6.75	20.08	13.33	23	1.73	04/28	20.75	04/29	6.50	9.75	67	6.87			
						04/29	20.58	04/30	6.50	9.92	174	17.55			
	Total Wild		13.33	23	1.73					19.67	241	12.25	-10.53	14.08%	13,900
05/06	7.17	20.50	13.33	513	38.48	05/05	20.58	05/06	0.25	3.67	121	33.00			
						05/06	0.50	05/06	7.00	6.50	295	45.38			
						05/06	20.67	05/07	6.42	9.75	363	37.23			
	Total Wild		13.33	513	38.48					19.92	779	39.11	-0.64	98.37%	22,400
05/09	6.25	20.50	14.25	184	12.91	05/08	20.75	05/09	0.67	3.92	99	25.28			
						05/09	0.83	05/09	6.00	5.17	138	26.71			
						05/09	20.67	05/10	6.00	9.33	147	15.75			
	Total Wild		14.25	184	12.91					18.42	384	20.85	-7.94	61.93%	18,800
05/12	7.00	20.92	13.92	67	4.81	05/11	21.00	05/12	6.83	9.83	126	12.81			
						05/12	21.25	05/13	6.67	9.42	63	6.69			
	Total Wild		13.92	67	4.81					19.25	189	9.82	-5.00	49.04%	16,900
05/16	6.25	20.50	14.25	57	4.00	05/15	21.08	05/16	6.00	8.92	128	14.36			
						05/16	20.67	05/17	5.50	8.83	52	5.89			
	Total Wild		14.25	57	4.00					17.75	180	10.14	-6.14	39.44%	15,500
05/19	5.67	21.33	15.67	17	1.09	05/18	21.00	05/19	5.50	8.50	62	7.29			
						05/19	21.50	05/20	5.50	8.00	38	4.75			
	Total Wild		15.67	17	1.09					16.50	100	6.06	-4.98	17.90%	13,500
05/22	6.67	12.00	5.33	2	0.38	05/21	20.50	05/22	6.50	10.00	275	27.50			
05/22	12.17	20.67	8.50	35	4.12	05/22	21.00	05/23	6.50	9.50	222	23.37			
	Total Wild		13.83	37	2.67					19.50	497	25.49	-22.81	10.49%	14,400
05/23	6.75	20.75	14.00	12	0.86	05/22	21.00	05/23	6.50	9.50	222	23.37			
						05/23	20.92	05/24	6.00	9.08	117	12.88			
	Total Wild		14.00	12	0.86					18.58	339	18.24	-17.39	4.70%	13,300
05/29	6.50	21.17	14.67	46	3.14	05/28	21.33	05/29	6.00	8.67	75	8.65			
						05/29	21.33	05/30	5.50	8.17	138	16.90			
	Total Wild		14.67	46	3.14					16.83	213	12.65	-9.52	24.79%	14,600
06/01	6.00	20.83	14.83	60	4.04	05/31	21.50	06/01	5.75	8.25	62	7.52			
						06/01	21.00	06/02	6.00	9.00	335	37.22			
	Total Wild		14.83	60	4.04					17.25	397	23.01	-18.97	17.58%	14,800
06/04	5.33	12.83	7.50	62	8.27	06/03	21.50	06/04	5.00	7.50	131	17.47			
06/04	13.00	21.67	8.67	459	52.96	06/04	21.83	06/05	1.50	3.67	87	23.73			
						06/05	1.67	06/05	6.00	4.33	92	21.23			
	Total Wild		16.17	521	32.23					15.50	310	20.00	12.23	161.13%	21,100
06/05	6.17	17.67	11.50	140	12.17	06/04	21.83	06/05	1.50	3.67	87	23.73			
06/05	17.83	21.17	3.33	70	21.00	06/05	1.67	06/05	6.00	4.33	92				
						06/05	21.33	06/06	2.00	4.67	219	46.93			
						06/06	2.17	06/06	6.00	3.83	104	27.13			
	Total Wild		14.83	210	14.16					16.50	502	30.42	-16.27	46.53%	21,100
06/06	6.17	20.75	14.58	109	7.47	06/05	21.33	06/06	2.00	4.67	219	46.93			
						06/06	2.17	06/06	6.00	3.83	104				
						06/06	21.00	06/07	6.00	9.00	260	28.89			
	Total Wild		14.58	109	7.47					17.50	583	33.31	-25.84	22.44%	19,100

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Table 3a. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
06/09	7.00	21.50	14.50	313	21.59	06/08	21.00	06/09	6.67	9.67	233	24.10			
						06/09	21.75	06/10	5.50	7.75	97	12.52			
	Total Wild		14.50	313	21.59					17.42	330	18.95	2.64	113.93%	20,100
06/12	6.17	21.08	14.92	49	3.28	06/11	21.67	06/12	6.00	8.33	54	6.48			
						06/12	21.25	06/13	6.25	9.00	110	12.22			
	Total Wild		14.92	49	3.28					17.33	164	9.46	-6.18	34.72%	19,100
06/15	6.67	21.08	14.42	57	3.95	06/14	21.58	06/15	6.50	8.92	117	13.12			
						06/15	21.25	06/16	6.00	8.75	176	20.11			
	Total Wild		14.42	57	3.95					17.67	293	16.58	-12.63	23.84%	17,700
06/18	7.00	20.92	13.92	21	1.51	06/17	21.58	06/18	6.75	9.17	84	9.16			
						06/18	21.08	06/19	5.50	8.42	67	7.96			
	Total Wild		13.92	21	1.51					17.58	151	8.59	-7.08	17.57%	16,500
06/21	6.25	21.17	14.92	6	0.40	06/20	21.58	06/21	6.00	8.42	52	6.18			
						06/21	21.33	06/22	5.67	8.33	70	8.40			
	Total Wild		14.92	6	0.40					16.75	122	7.28	-6.88	5.52%	16,400
06/24	7.00	21.00	14.00	467	33.36	06/23	21.42	06/24	6.83	9.42	232	24.64			
						06/24	21.25	06/25	5.33	8.08	344	42.56			
	Total Wild		14.00	467	33.36					17.50	576	32.91	0.44	101.35%	18,000
06/27	6.00	21.50	15.50	22	1.42	06/26	21.50	06/27	5.75	8.25	78	9.45			
						06/27	21.67	06/28	5.50	7.83	40	5.11			
	Total Wild		15.50	22	1.42					16.08	118	7.34	-5.92	19.35%	17,000
07/01	5.83	21.42	15.58	197	12.64	06/30	21.58	07/01	5.67	8.08	42	5.20			
						07/01	21.58	07/02	6.00	8.42	365	43.37			
	Total Wild		15.58	197	12.64					16.50	407	24.67	-12.02	51.25%	15,700
07/03	6.75	21.33	14.58	163	11.18	07/02	21.50	07/03	6.58	9.08	384	42.28			
						07/03	21.50	07/04	6.00	8.50	310	36.47			
	Total Wild		14.58	163	11.18					17.58	694	39.47	-28.29	28.32%	15,900
07/06	5.67	21.00	15.33	19	1.24	07/05	21.58	07/06	5.50	7.92	36	4.55			
						07/06	21.17	07/07	5.75	8.58	38	4.43			
	Total Wild		15.33	19	1.24					16.50	74	4.48	-3.25	27.63%	13,600
07/09	6.00	21.25	15.25	21	1.38	07/08	21.25	07/09	5.75	8.50	87	10.24			
						07/09	21.42	07/10	5.75	8.33	70	8.40			
	Total Wild		15.25	21	1.38					16.83	157	9.33	-7.95	14.76%	14,200
07/12	6.42	21.00	14.58	42	2.88	07/11	21.00	07/12	6.25	9.25	41	4.43			
						07/12	21.17	07/13	6.00	8.83	81	9.17			
	Total Wild		14.58	42	2.88					18.08	122	6.75	-3.87	42.69%	13,500
07/15	6.67	21.50	14.83	20	1.35	07/14	21.17	07/15	6.50	9.33	62	6.64			
						07/15	21.67	07/16	6.00	8.33	101	12.12			
	Total Wild		14.83	20	1.35					17.67	163	9.23	-7.88	14.61%	15,200
07/18	6.67	20.75	14.08	52	3.69	07/17	20.83	07/18	6.50	9.67	192	19.86			
						07/18	20.92	07/19	6.58	9.67	78	8.07			
	Total Wild		14.08	52	3.69					19.33	270	13.97	-10.27	26.44%	15,300
07/21	6.67	21.00	14.33	11	0.77	07/20	20.92	07/21	6.50	9.58	43	4.49			
						07/21	21.17	07/22	6.00	8.83	19	2.15			
	Total Wild		14.33	11	0.77					18.42	62	3.37	-2.60	22.80%	14,200
07/25	6.33	21.50	15.17	14	0.92	07/24	21.17	07/25	6.17	9.00	108	12.00			
						07/25	21.58	07/26	6.08	8.50	16	1.88			
	Total Wild		15.17	14	0.92					17.50	124	7.09	-6.16	13.03%	13,700
07/28	6.42	21.17	14.75	56	3.80	07/27	21.17	07/28	6.25	9.08	339	37.32			
						07/28	21.33	07/29	6.00	8.67	70	8.08			
	Total Wild		14.75	56	3.80					17.75	409	23.04	-19.25	16.48%	16,000
07/31	6.67	20.92	14.25	16	1.12	07/30	20.92	07/31	6.50	9.58	31	3.23			
						07/31	21.08	08/01	6.58	9.50	6	0.63			
	Total Wild		14.25	16	1.12					19.08	37	1.94	-0.82	57.91%	13,900
08/03	6.17	20.75	14.58	2	0.14	08/02	20.83	08/03	6.00	9.17	4	0.44			
						08/03	20.92	08/04	6.50	9.58	8	0.83			
	Total Wild		14.58	2	0.14					18.75	12	0.64	-0.50	21.43%	12,000
08/06	6.67	20.75	14.08	14	0.99	08/05	20.83	08/06	6.50	9.67	21	2.17			
						08/06	20.92	08/07	6.00	9.08	16	1.76			
	Total Wild		14.08	14	0.99					18.75	37	1.97	-0.98	50.38%	12,700

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Table 3a. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME Start	End	Time Fished	Catch	Catch/ Hour	NIGHTTIME Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	DAY:NIGHT Diff (D-N)	Ratio (D/N)	Flow (cfs)
08/09	6.50	20.75	14.25	0	0.00	08/08	20.75	08/09	6.25	9.50	3	0.32			
						08/09	20.83	08/10	6.17	9.33	3	0.32			
	Total Wild		14.25	0	0.00					18.83	6	0.32	-0.32	0.00%	9,950
08/12	6.50	20.50	14.00	1	0.07	08/11	20.50	08/12	6.25	9.75	3	0.31			
						08/12	20.75	08/13	6.50	9.75	2	0.21			
	Total Wild		14.00	1	0.07					19.50	5	0.26	-0.18	27.86%	11,100
08/16	7.00	20.33	13.33	0	0.00	08/15	20.50	08/16	6.50	10.00	4	0.40			
						08/16	20.33	08/17	6.50	10.17	0	0.00			
	Total Wild		13.33	0	0.00					20.17	4	0.20	-0.20	0.00%	10,800
08/19	6.75	20.75	14.00	0	0.00	08/18	20.50	08/19	6.67	10.17	0	0.00			
						08/19	20.83	08/20	7.00	10.17	0	0.00			
	Total Wild		14.00	0	0.00					20.33	0	0.00	0.00	0.00%	8,450
08/22	7.50	20.50	13.00	0	0.00	08/21	20.58	08/22	7.00	10.42	0	0.00			
						08/22	20.67	08/23	6.50	9.83	1	0.10			
	Total Wild		13.00	0	0.00					20.25	1	0.05	-0.05	0.00%	9,040
08/26	5.75	21.00	15.25	0	0.00	08/25	20.67	08/26	5.50	8.83	0	0.00			
						08/26	21.17	08/27	6.50	9.33	1	0.11			
	Total Wild		15.25	0	0.00					18.17	1	0.06	-0.06	0.00%	6,730
08/30	7.00	20.67	13.67	0	0.00	08/29	20.50	08/30	6.83	10.33	0	0.00			
						08/30	20.83	08/31	8.83	12.00	0	0.00			
	Total Wild		13.67	0	0.00					22.33	0	0.00	0.00	0.00%	7,510
09/03	6.92	20.33	13.42	0	0.00	09/02	20.25	09/03	6.75	10.50	0	0.00			
						09/03	20.50	09/04	6.67	10.17	1	0.10			
	Total Wild		13.42	0	0.00					20.67	1	0.05	-0.05	0.00%	7,100
09/04	6.83	20.25	13.42	0	0.00	09/03	20.50	09/04	6.67	10.17	1	0.10			
						09/04	21.42	09/05	7.00	9.58	0	0.00			
	Total Wild		13.42	0	0.00					19.75	1	0.05	-0.05	0.00%	6,970
09/05	7.17	20.25	13.08	0	0.00	09/04	21.42	09/05	7.00	9.58	0	0.00			
						09/05	20.33	09/06	6.75	10.42	0	0.00			
	Total Wild		13.08	0	0.00					20.00	0	0.00	0.00	0.00%	6,930
09/06	6.92	20.33	13.42	0	0.00	09/05	20.33	09/06	6.75	10.42	0	0.00			
						09/06	20.50	09/07	7.00	10.50	0	0.00			
	Total Wild		13.42	0	0.00					20.92	0	0.00	0.00	0.00%	6,280
09/10	7.25	20.00	12.75	0	0.00	09/09	19.83	09/10	7.00	11.17	0	0.00			
						09/10	20.25	09/11	8.00	11.75	1	0.09			
	Total Wild		12.75	0	0.00					22.92	1	0.04	-0.04	0.00%	5,670
TOTAL WILD			901	4,306	4.78					1,494	15,657	10.48	-5.70	45.64%	
Average wild					4.65							10.93	-6.28	29.99%	14,400

Table 3b. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME						DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
01/22	8.33	17.42	9.08	7	0.77	01/21	17.00	01/22	8.33	15.33	13	0.85			
						01/22	17.42	01/23	8.83	15.42	20	1.30			
	Total Wild		9.08	7	0.77					30.75	33	1.07	-0.30	71.81%	17,600
01/26	8.33	16.92	8.58	21	2.45	01/25	17.00	01/26	8.33	15.33	104	6.78			
						01/26	16.92	01/27	9.08	16.17	41	2.54			
	Total Wild		8.58	21	2.45					31.50	145	4.60	-2.16	53.15%	22,000
02/05	8.17	18.00	9.83	2	0.20	02/04	17.50	02/05	8.17	14.67	7	0.48			
						02/05	18.00	02/06	9.00	15.00	15	1.00			
	Total Wild		9.83	2	0.20					29.67	22	0.74	-0.54	27.43%	14,800
02/12	9.00	18.08	9.08	5	0.55	02/11	18.00	02/12	9.00	15.00	13	0.87			
						02/12	18.08	02/13	9.00	14.92	102	6.84			
	Total Wild		9.08	5	0.55					29.92	115	3.84	-3.29	14.32%	14,200
02/14	9.08	17.58	8.50	39	4.59	02/13	18.50	02/14	9.08	14.58	207	14.19			
						02/14	17.58	02/15	8.75	15.17	83	5.47			
	Total Wild		8.50	39	4.59					29.75	290	9.75	-5.16	47.07%	17,200
02/22	8.17	18.75	10.58	55	5.20	02/21	18.17	02/22	8.17	14.00	420	30.00			
						02/22	18.75	02/23	8.75	14.00	154	11.00			
	Total Wild		10.58	55	5.20					28.00	574	20.50	-15.30	25.35%	14,500
03/10	9.00	19.50	10.50	11	1.05	03/09	19.00	03/10	9.00	14.00	75	5.36			
						03/10	19.50	03/11	9.50	14.00	44	3.14			
	Total Wild		10.50	11	1.05					28.00	119	4.25	-3.20	24.65%	12,900
03/25	8.25	18.50	10.25	146	14.24	03/24	20.00	03/25	8.25	12.25	498	40.65			
						03/25	18.50	03/26	9.00	14.50	184	12.69			
	Total Wild		10.25	146	14.24					26.75	682	25.50	-11.25	55.87%	20,700
03/31	7.25	19.08	11.83	11	0.93	03/30	19.00	03/31	7.25	12.25	53	4.33			
						03/31	19.08	04/01	7.33	12.25	44	3.59			
	Total Wild		11.83	11	0.93					24.50	97	3.96	-3.03	23.48%	14,500
04/04	7.75	18.50	10.75	6	0.56	04/03	19.17	04/04	7.75	12.58	18				
						04/04	18.50	04/05	8.00	13.50	28	2.07			
	Total Wild		10.75	6	0.56					26.08	46	1.76	-1.21	31.65%	13,700
04/12	7.42	20.17	12.75	11	0.86	04/11	20.50	04/12	7.42	10.92	36	3.30			
						04/12	20.17	04/13	7.08	10.92	31	2.84			
	Total Wild		12.75	11	0.86					21.83	67	3.07	-2.21	28.11%	11,400
04/14	7.75	20.00	12.25	17	1.39	04/13	20.00	04/14	7.75	11.75	50	4.26			
						04/14	20.00	04/15	7.25	11.25	23	2.04			
	Total Wild		12.25	17	1.39					23.00	73	3.17	-1.79	43.72%	12,700
04/17	7.25	20.33	13.08	8	0.61	04/16	20.25	04/17	7.25	11.00	23	2.09			
						04/17	20.33	04/18	7.00	10.67	8	0.75			
	Total Wild		13.08	8	0.61					21.67	31	1.43	-0.82	42.74%	11,300
04/20	16.58	20.33	3.75	1	0.27	04/19	20.17	04/20	7.00	10.83	11	1.02			
						04/20	20.33	04/21	7.50	11.17	8	0.72			
	Total Wild		3.75	1	0.27					22.00	19	0.86	-0.60	30.88%	9,860
04/21	7.50	20.00	12.50	1	0.08	04/20	20.33	04/21	7.50	11.17	8	0.72			
						04/21	20.00	04/22	7.08	11.08	10	0.90			
	Total Wild		12.50	1	0.08					22.25	18	0.81	-0.73	9.89%	10,100
04/23	7.50	14.83	7.33	7	0.95	04/22	20.50	04/23	7.50	11.00	11	1.00			
04/23	15.00	21.58	6.58	15	2.28	04/23	21.58	04/24	5.75	8.17	408	49.96			
	Total Wild		13.92	22	1.58					19.17	419	21.86	-20.28	7.23%	13,800
05/09	6.92	20.92	14.00	95	6.79	05/08	20.67	05/09	1.50	4.83	80	16.55			
						05/09	1.50	05/09	6.92	5.42	77	14.22			
						05/09	20.92	05/10	6.00	9.08	48	5.28			
	Total Wild		14.00	95	6.79					19.33	205	10.60	-3.82	64.00%	18,800
05/12	5.75	21.08	15.33	28	1.83	05/11	21.00	05/12	5.75	8.75	54	6.17			
						05/12	21.08	05/13	6.75	9.67	32	3.31			
	Total Wild		15.33	28	1.83					18.42	86	4.67	-2.84	39.11%	16,900
05/16	5.50	21.00	15.50	25	1.61	05/15	21.00	05/16	5.25	8.25	97	11.76			
						05/16	21.00	05/17	5.50	8.50	18	2.12			
	Total Wild		15.50	25	1.61					16.75	115	6.87	-5.25	23.49%	15,500

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Table 3b. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
05/19	6.50	21.00	14.50	5	0.34	05/18	21.00	05/19	6.50	9.50	27	2.84			
						05/19	21.00	05/20	5.67	8.67	16	1.85			
	Total Wild		14.50	5	0.34					18.17	43	2.37	-2.02	14.57%	13,500
05/22	5.75	11.92	6.17	8	1.30	05/21	20.50	05/22	5.75	9.25	59	6.38			
05/22	11.92	21.00	9.08	15	1.65	05/22	21.00	05/23	5.75	8.75	62	7.09			
	Total Wild		15.25	23	1.51					18.00	121	6.72	-5.21	22.44%	14,400
05/23	5.75	21.00	15.25	12	0.79	05/22	21.00	05/23	5.75	8.75	62	7.09			
						05/23	21.00	05/24	6.00	9.00	55	6.11			
	Total Wild		15.25	12	0.79					17.75	117	6.59	-5.80	11.94%	13,300
05/29	5.25	21.00	15.75	9	0.57	05/28	21.25	05/29	5.25	8.00	34	4.25			
						05/29	21.00	05/30	5.50	8.50	71	8.35			
	Total Wild		15.75	9	0.57					16.50	105	6.36	-5.79	8.96%	14,600
06/01	5.75	20.83	15.08	11	0.73	05/31	21.50	06/01	5.75	8.25	29	3.52			
						06/01	20.83	06/02	6.00	9.17	180	19.64			
	Total Wild		15.08	11	0.73					17.42	209	12.00	-11.27	6.08%	14,800
06/04	6.00	13.25	7.25	32	4.41	06/03	21.50	06/04	6.00	8.50	100	11.76			
06/04	13.25	22.25	9.00	210	23.33	06/04	22.25	06/05	2.00	3.75	50	13.33			
						06/05	2.00	06/05	6.50	4.50	59	13.11			
	Total Wild		16.25	242	14.89					8.25	109	13.21	1.68	112.72%	21,100
06/06	6.75	21.25	14.50	30	2.07	06/05	21.42	06/06	2.92	5.50	107	19.45			
						06/06	2.92	06/06	6.75	3.83	57	14.87			
						06/06	21.25	06/07	6.00	8.75	120	13.71			
	Total Wild		14.50	30	2.07					18.08	284	15.71	-13.64	13.17%	19,100
06/09	5.75	21.00	15.25	124	8.13	06/08	20.83	06/09	5.75	8.92	107	12.00			
						06/09	21.00	06/10	5.50	8.50	89	10.47			
	Total Wild		15.25	124	8.13					17.42	196	11.25	-3.12	72.25%	20,100
06/12	6.50	21.42	14.92	26	1.74	06/11	21.58	06/12	6.50	8.92	37	4.15			
						06/12	21.42	06/13	6.33	8.92	65	7.29			
	Total Wild		14.92	26	1.74					17.83	102	5.72	-3.98	30.47%	19,100
06/15	6.00	20.75	14.75	15	1.02	06/14	21.50	06/15	6.00	8.50	58	6.82			
						06/15	20.75	06/16	6.08	9.33	89	9.54			
	Total Wild		14.75	15	1.02					17.83	147	8.24	-7.23	12.34%	17,700
06/18	6.00	20.58	14.58	1	0.07	06/17	21.50	06/18	6.00	8.50	26	3.06			
						06/18	20.58	06/19	5.50	8.92	34	3.81			
	Total Wild		14.58	1	0.07					17.42	60	3.44	-3.38	1.99%	16,500
06/21	6.50	21.00	14.50	3	0.21	06/20	21.50	06/21	6.50	9.00	12	1.33			
						06/21	21.00	06/22	5.50	8.50	28	3.29			
	Total Wild		14.50	3	0.21					17.50	40	2.29	-2.08	9.05%	16,400
06/24	6.00	20.50	14.50	223	15.38	06/23	21.33	06/24	6.00	8.67	95	10.96			
						06/24	20.50	06/25	5.42	8.92	224	25.12			
	Total Wild		14.50	223	15.38					17.58	319	18.14	-2.76	84.77%	18,000
06/27	5.50	21.33	15.83	5	0.32	06/26	21.50	06/27	5.50	8.00	36	4.50			
						06/27	21.33	06/28	5.50	8.17	13	1.59			
	Total Wild		15.83	5	0.32					16.17	49	3.03	-2.72	10.42%	17,000
07/01	5.50	21.25	15.75	37	2.35	06/30	21.50	07/01	5.50	8.00	10	1.25			
						07/01	21.25	07/02	6.08	8.83	193	21.85			
	Total Wild		15.75	37	2.35					16.83	203	12.06	-9.71	19.48%	15,700
07/03	6.25	20.75	14.50	61	4.21	07/02	21.42	07/03	6.25	8.83	162	18.34			
						07/03	20.75	07/04	6.08	9.33	169	18.11			
	Total Wild		14.50	61	4.21					18.17	331	18.22	-14.01	23.09%	15,900
07/06	5.42	20.67	15.25	2	0.13	07/05	21.50	07/06	5.25	7.75	12	1.55			
						07/06	20.67	07/07	5.67	9.00	13	1.44			
	Total Wild		15.25	2	0.13					16.75	25	1.49	-1.36	8.79%	13,600
07/09	5.50	20.83	15.33	7	0.46	07/08	21.08	07/09	5.50	8.42	34	4.04			
						07/09	20.83	07/10	5.83	9.00	18	2.00			
	Total Wild		15.33	7	0.46					17.42	52	2.99	-2.53	15.29%	14,200

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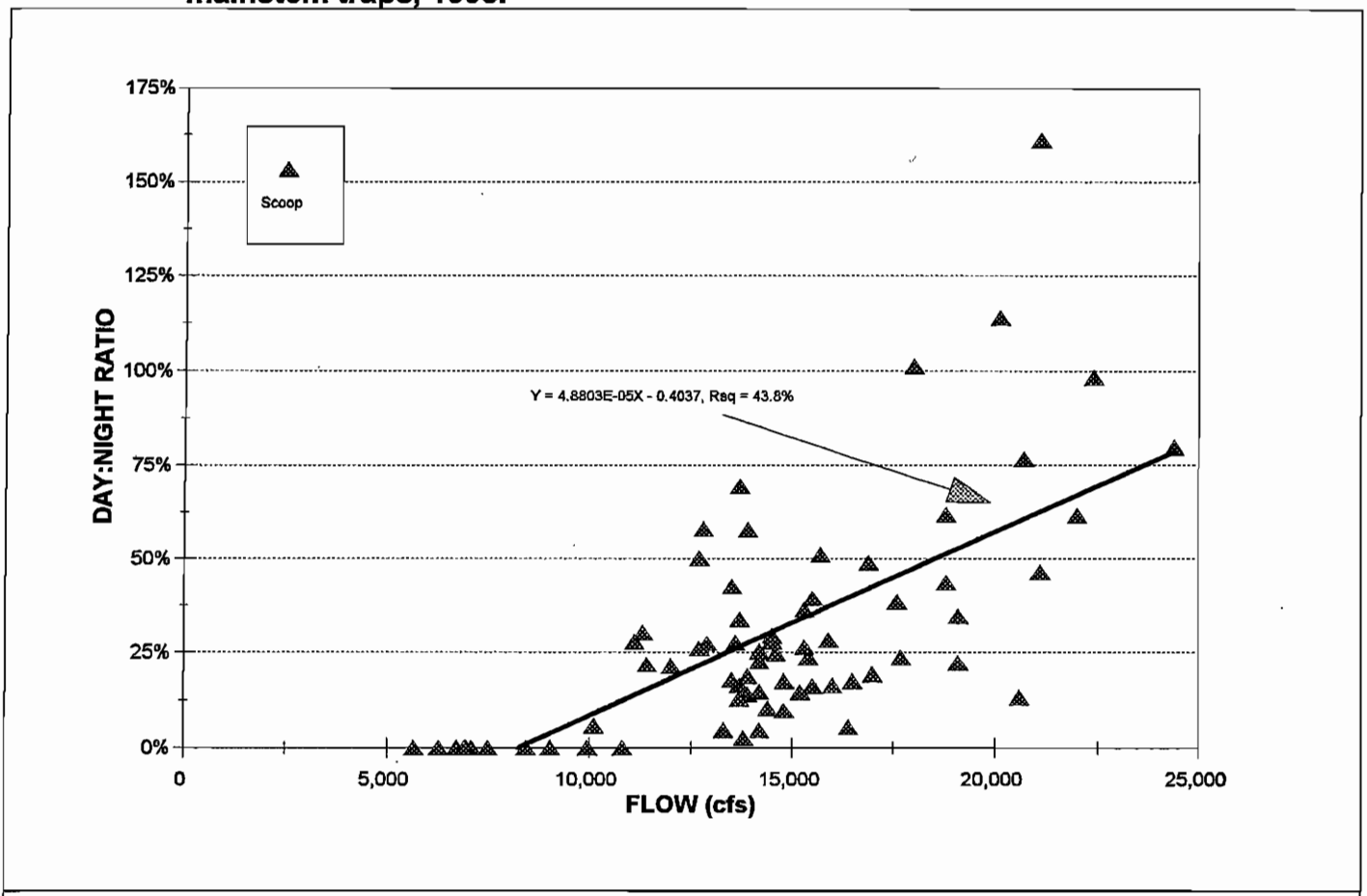
Table 3b. Catch/hour rates of WILD 0+ CHINOOK during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
07/12	6.50	20.75	14.25	15	1.05	07/11	20.83	07/12	6.50	9.67	10	1.03			
						07/12	20.75	07/13	6.08	9.33	32	3.43			
	Total Wild		14.25	15	1.05					19.00	42	2.21	-1.16	47.62%	13,500
07/15	6.00	21.50	15.50	8	0.52	07/14	21.00	07/15	6.00	9.00	18	2.00			
						07/15	21.50	07/16	6.00	8.50	21	2.47			
	Total Wild		15.50	8	0.52					17.50	39	2.23	-1.71	23.16%	15,200
07/18	6.00	20.50	14.50	3	0.21	07/17	20.75	07/18	6.00	9.25	39	4.22			
						07/18	20.50	07/19	6.50	10.00	16	1.60			
	Total Wild		14.50	3	0.21					19.25	55	2.86	-2.65	7.24%	15,300
07/21	6.75	20.75	14.00	2	0.14	07/20	20.83	07/21	6.75	9.92	16	1.61			
						07/21	20.75	07/22	6.08	9.33	5	0.54			
	Total Wild		14.00	2	0.14					19.25	21	1.09	-0.95	13.10%	14,200
07/25	6.00	21.00	15.00	2	0.13	07/24	21.00	07/25	6.00	9.00	44	4.89			
						07/25	21.00	07/26	6.00	9.00	9	1.00			
	Total Wild		15.00	2	0.13					18.00	53	2.94	-2.81	4.53%	13,700
07/28	6.08	21.08	15.00	19	1.27	07/27	21.00	07/28	6.08	9.08	185	20.37			
						07/28	21.08	07/29	6.08	9.00	33	3.67			
	Total Wild		15.00	19	1.27					18.08	218	12.06	-10.79	10.51%	16,000
07/31	6.25	20.67	14.42	1	0.07	07/30	20.83	07/31	6.25	9.42	10	1.06			
						07/31	20.67	08/01	6.50	9.83	2	0.20			
	Total Wild		14.42	1	0.07					19.25	12	0.62	-0.55	11.13%	13,900
TOTAL WILD			586.50	1,397	2.38					904.75	6,108	6.75	-4.37	35.28%	
Average wild					2.36							6.89	-4.53	28.61%	15,400

Figure 3. Day:night catch ratios for 0+ wild chinook and daily mean flow, Skagit River mainstem traps, 1998.



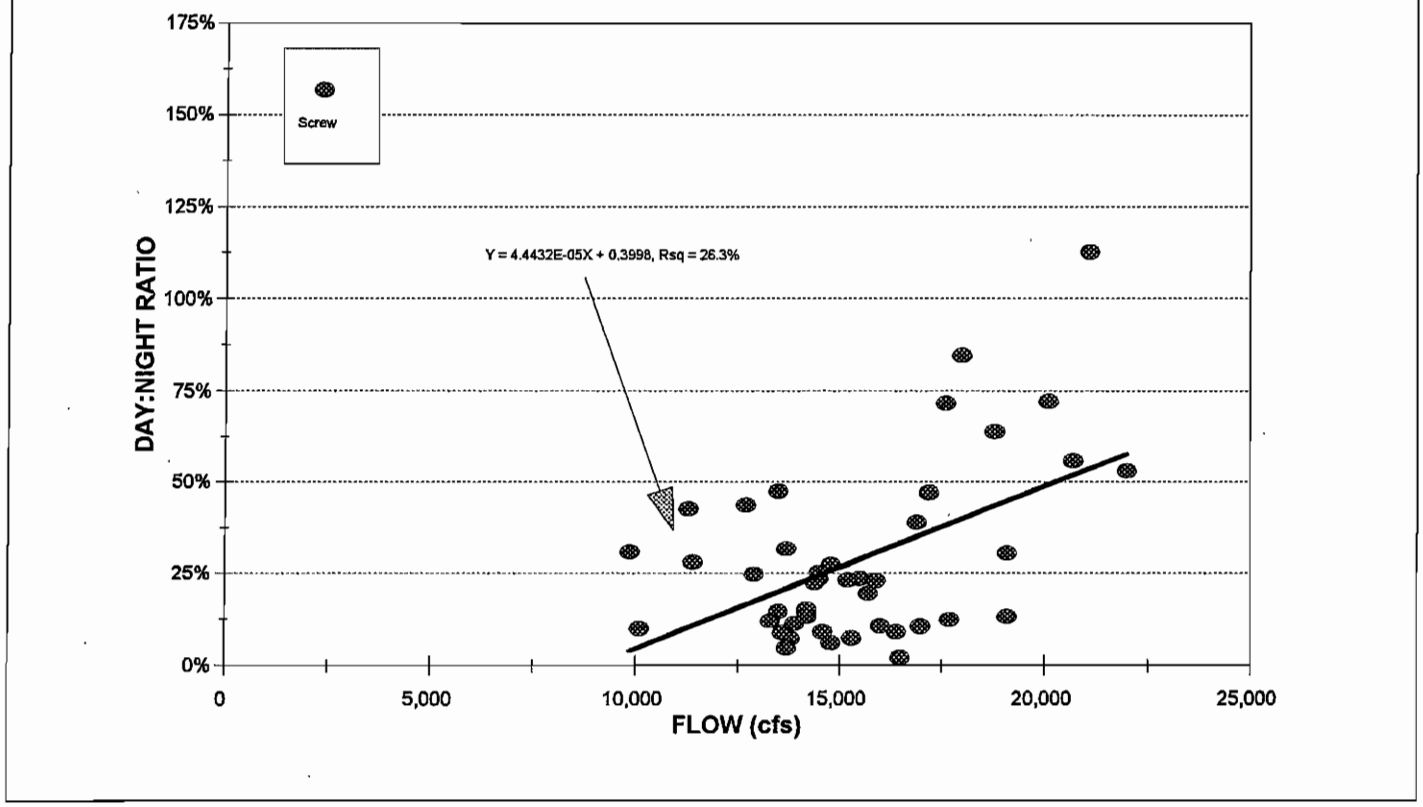


Table 4a. Catch/hour rates of HATCHERY 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME					NIGHTTIME						DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
05/22	6.67	12.00	5.33	1	0.19	05/21	20.50	05/22	6.50	10.00	0	0.00			
05/22	12.17	20.67	8.50	0	0.00	05/22	21.00	05/23	6.50	9.50	42	4.42			
	Total Hatchery		13.83	1	0.07					19.50	42	2.15	-2.08	3.36%	14,400
05/23	6.75	20.75	14.00	1	0.07	05/22	21.00	05/23	6.50	9.50	42	4.42			
						05/23	20.92	05/24	6.00	9.08	1	0.11			
	Total Hatchery		14.00	1	0.07					18.58	43	2.31	-2.24	3.09%	13,300
05/29	6.50	21.17	14.67	0	0.00	05/28	21.33	05/29	6.00	8.67	1	0.12			
						05/29	21.33	05/30	5.50	8.17	1	0.12			
	Total Hatchery		14.67	0	0.00					16.83	2	0.12	-0.12	0.00%	14,600
06/01	6.00	20.83	14.83	0	0.00	05/31	21.50	06/01	5.75	8.25	4	0.48			
						06/01	21.00	06/02	6.00	9.00	37	4.11			
	Total Hatchery		14.83	0	0.00					17.25	41	2.38	-2.38	0.00%	14,800
06/04	5.33	12.83	7.50	5	0.67	06/03	21.50	06/04	5.00	7.50	47	6.27			
06/04	13.00	21.67	8.67	62	7.15	06/04	21.83	06/05	1.50	3.67	35	9.55			
						06/05	1.67	06/05	6.00	4.33	36	8.31			
	Total Hatchery		16.17	67	4.14					15.50	118	7.61	-3.47	54.44%	21,100
06/05	6.17	17.67	11.50	8	0.70	06/04	21.83	06/05	1.50	3.67	35	9.55			
06/05	17.83	21.17	3.33	3	0.90	06/05	1.67	06/05	6.00	4.33	36	8.31			
						06/05	21.33	06/06	2.00	4.67	53	11.36			
						06/06	2.17	06/06	6.00	3.83	31	8.09			
	Total Hatchery		14.83	11	0.74					16.50	155	9.39	-8.65	7.89%	21,100
06/06	6.17	20.75	14.58	3	0.21	06/05	21.33	06/06	2.00	4.67	53	11.36			
						06/06	2.17	06/06	6.00	3.83	31				
						06/06	21.00	06/07	6.00	9.00	66	7.33			
	Total Hatchery		14.58	3	0.21					17.50	150	8.57	-8.37	2.40%	19,100
06/09	7.00	21.50	14.50	34	2.34	06/08	21.00	06/09	6.67	9.67	50	5.17			
						06/09	21.75	06/10	5.50	7.75	35	4.52			
	Total Hatchery		14.50	34	2.34					17.42	85	4.88	-2.54	48.05%	20,100
06/12	6.17	21.08	14.92	6	0.40	06/11	21.67	06/12	6.00	8.33	42	5.04			
						06/12	21.25	06/13	6.25	9.00	53	5.89			
	Total Hatchery		14.92	6	0.40					17.33	95	5.48	-5.08	7.34%	19,100
06/15	6.67	21.08	14.42	16	1.11	06/14	21.58	06/15	6.50	8.92	105	11.78			
						06/15	21.25	06/16	6.00	8.75	139	15.89			
	Total Hatchery		14.42	16	1.11					17.67	244	13.81	-12.70	8.04%	17,700
06/18	7.00	20.92	13.92	10	0.72	06/17	21.58	06/18	6.75	9.17	133	14.51			
						06/18	21.08	06/19	5.50	8.42	44	5.23			
	Total Hatchery		13.92	10	0.72					17.58	177	10.07	-9.35	7.14%	16,500
06/21	6.25	21.17	14.92	0	0.00	06/20	21.58	06/21	6.00	8.42	32	3.80			
						06/21	21.33	06/22	5.67	8.33	111	13.32			
	Total Hatchery		14.92	0	0.00					16.75	143	8.54	-8.54	0.00%	16,400
06/24	7.00	21.00	14.00	604	43.14	06/23	21.42	06/24	6.83	9.42	344	36.53			
						06/24	21.25	06/25	5.33	8.08	473	58.52			
	Total Hatchery		14.00	604	43.14					17.50	817	46.69	-3.54	92.41%	18,000
06/27	6.00	21.50	15.50	10	0.65	06/26	21.50	06/27	5.75	8.25	79	9.58			
						06/27	21.67	06/28	5.50	7.83	31	3.96			
	Total Hatchery		15.50	10	0.65					16.08	110	6.84	-6.19	9.43%	17,000
07/01	5.83	21.42	15.58	166	10.65	06/30	21.58	07/01	5.67	8.08	41	5.07			
						07/01	21.58	07/02	6.00	8.42	421	50.02			
	Total Hatchery		15.58	166	10.65					16.50	462	28.00	-17.35	38.04%	15,700
07/03	6.75	21.33	14.58	86	5.90	07/02	21.50	07/03	6.58	9.08	341	37.54			
						07/03	21.50	07/04	6.00	8.50	318	37.41			
	Total Hatchery		14.58	86	5.90					17.58	659	37.48	-31.58	15.73%	15,900
07/06	5.67	21.00	15.33	12	0.78	07/05	21.58	07/06	5.50	7.92	19	2.40			
						07/06	21.17	07/07	5.75	8.58	21	2.45			
	Total Hatchery		15.33	12	0.78					16.50	40	2.42	-1.64	32.28%	13,600
07/09	6.00	21.25	15.25	7	0.46	07/08	21.25	07/09	5.75	8.50	47	5.53			
						07/09	21.42	07/10	5.75	8.33	34	4.08			
	Total Hatchery		15.25	7	0.46					16.83	81	4.81	-4.35	9.54%	14,200
07/12	6.42	21.00	14.58	17	1.17	07/11	21.00	07/12	6.25	9.25	16	1.73			
						07/12	21.17	07/13	6.00	8.83	46	5.21			
	Total Hatchery		14.58	17	1.17					18.08	62	3.43	-2.26	34.00%	13,500

...table continued next page

Table 4a. Catch/hour rates of HATCHERY 0+ CHINOOK during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
07/15	6.67	21.50	14.83	3	0.20	07/14	21.17	07/15	6.50	9.33	24	2.57			
						07/15	21.67	07/16	6.00	8.33	21	2.52			
	Total Hatchery		14.83	3	0.20					17.67	45	2.55	-2.34	7.94%	15,200
07/18	6.67	20.75	14.08	12	0.85	07/17	20.83	07/18	6.50	9.67	65	6.72			
						07/18	20.92	07/19	6.58	9.67	22	2.28			
	Total Hatchery		14.08	12	0.85					19.33	87	4.50	-3.65	18.93%	15,300
07/21	6.67	21.00	14.33	3	0.21	07/20	20.92	07/21	6.50	9.58	18	1.88			
						07/21	21.17	07/22	6.00	8.83	5	0.57			
	Total Hatchery		14.33	3	0.21					18.42	23	1.25	-1.04	16.76%	14,200
07/25	6.33	21.50	15.17	1	0.07	07/24	21.17	07/25	6.17	9.00	22	2.44			
						07/25	21.58	07/26	6.08	8.50	1	0.12			
	Total Hatchery		15.17	1	0.07					17.50	23	1.31	-1.25	5.02%	13,700
07/28	6.42	21.17	14.75	6	0.41	07/27	21.17	07/28	6.25	9.08	38	4.18			
						07/28	21.33	07/29	6.00	8.67	6	0.69			
	Total Hatchery		14.75	6	0.41					17.75	44	2.48	-2.07	16.41%	16,000
07/31	6.67	20.92	14.25	0	0.00	07/30	20.92	07/31	6.50	9.58	0	0.00			
						07/31	21.08	08/01	6.58	9.50	0	0.00			
	Total Hatchery		14.25	0	0.00					19.08	0	0.00	0.00	0.00%	13,900
08/03	6.17	20.75	14.58	0	0.00	08/02	20.83	08/03	6.00	9.17	0	0.00			
						08/03	20.92	08/04	6.50	9.58	0	0.00			
	Total Hatchery		14.58	0	0.00					18.75	0	0.00	0.00	0.00%	12,000
08/06	6.67	20.75	14.08	0	0.00	08/05	20.83	08/06	6.50	9.67	1	0.10			
						08/06	20.92	08/07	6.00	9.08	0	0.00			
	Total Hatchery		14.08	0	0.00					18.75	1	0.05	-0.05	0.00%	12,700
TOTAL HATCHERY			396.50	1,076	2.71					474.75	3,749	7.90	-5.18	34.37%	
Average hatchery					2.75							8.04	-5.29	16.23%	15,900

Table 4b. Catch/hour rates of HATCHERY 0+ CHINOOK during day and night periods, Skagit River SCREW trap, 1998.

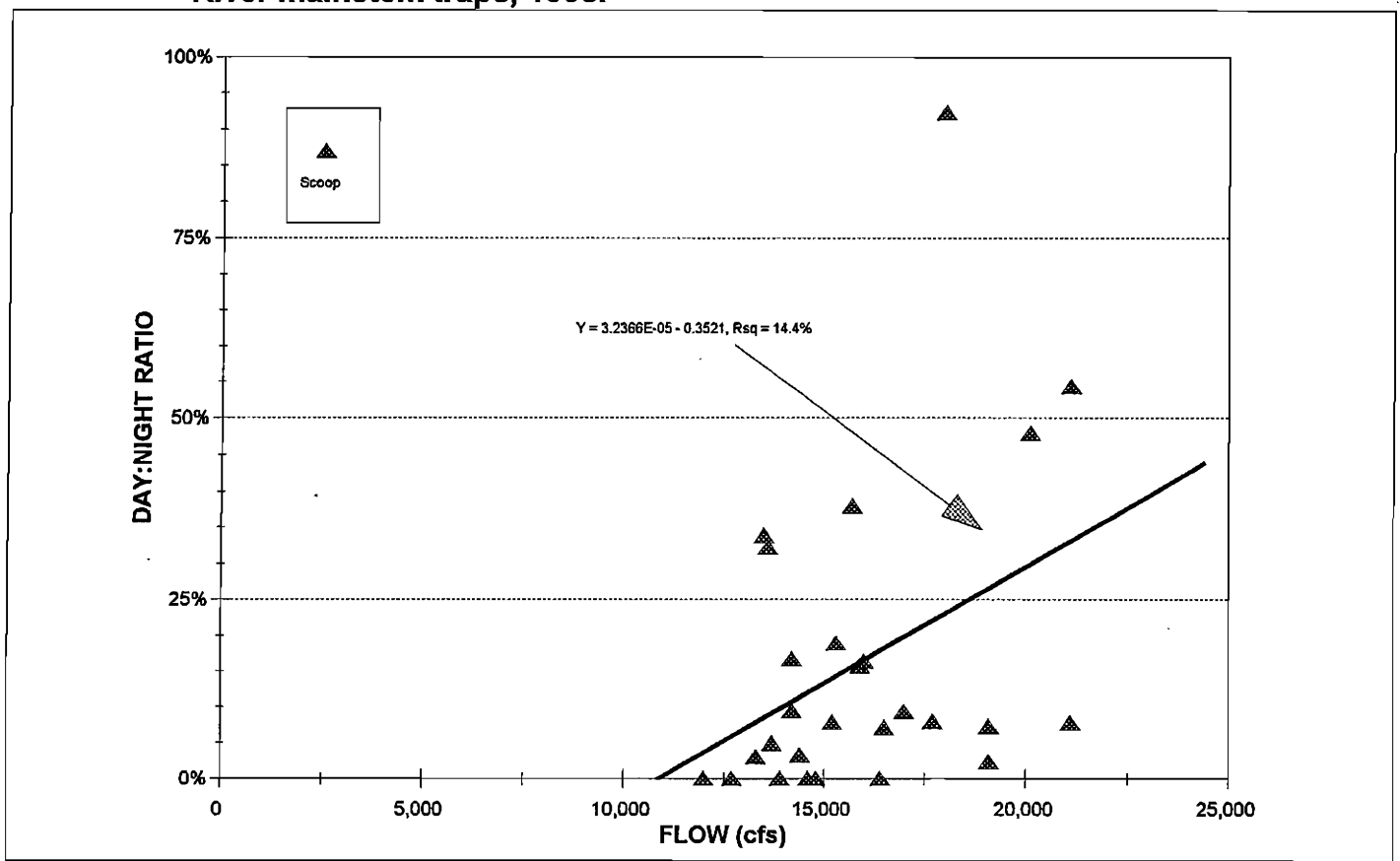
Date	DAYTIME Start	End	Time Fished	Catch	Catch/ Hour	NIGHTTIME Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	DAY:NIGHT Diff (D-N)	Ratio (D/N)	Flow (cfs)
05/22	5.75	11.92	6.17	0	0.00	05/21	20.50	05/22	5.75	9.25	0	0.00			
05/22	11.92	21.00	9.08	1	0.11	05/22	21.00	05/23	5.75	8.75	35	4.00			
	Total Hatchery		15.25	1	0.07					18.00	35	1.94	-1.88	3.37%	14,400
05/23	5.75	21.00	15.25	1	0.07	05/22	21.00	05/23	5.75	8.75	35	4.00			
						05/23	21.00	05/24	6.00	9.00	3	0.33			
	Total Hatchery		15.25	1	0.07					17.75	38	2.14	-2.08	3.06%	13,300
05/29	5.25	21.00	15.75	0	0.00	05/28	21.25	05/29	5.25	8.00	0	0.00			
						05/29	21.00	05/30	5.50	8.50	4	0.47			
	Total Hatchery		15.75	0	0.00					16.50	4	0.24	-0.24	0.00%	14,600
06/01	5.75	20.83	15.08	0	0.00	05/31	21.50	06/01	5.75	8.25	0	0.00			
						06/01	20.83	06/02	6.00	9.17	17	1.85			
	Total Hatchery		15.08	0	0.00					17.42	17	0.98	-0.98	0.00%	14,800
06/04	6.00	13.25	7.25	1	0.14	06/03	21.50	06/04	6.00	8.50	22	2.59			
06/04	13.25	22.25	9.00	52	5.78	06/04	22.25	06/05	2.00	3.75	22	5.87			
						06/05	2.00	06/05	6.50	4.50	11	2.44			
	Total Hatchery		16.25	53	3.26					8.25	33	4.00	-0.74	81.54%	21,100
06/06	6.75	21.25	14.50	3	0.21	06/05	21.42	06/06	2.92	5.50	25	4.55			
						06/06	2.92	06/06	6.75	3.83	9	2.35			
						06/06	21.25	06/07	6.00	8.75	29	3.31			
	Total Hatchery		14.50	3	0.21					18.08	63	3.48	-3.28	5.94%	19,100
06/09	5.75	21.00	15.25	8	0.52	06/08	20.83	06/09	5.75	8.92	18	2.02			
						06/09	21.00	06/10	5.50	8.50	27	3.18			
	Total Hatchery		15.25	8	0.52					17.42	45	2.58	-2.06	20.30%	20,100
06/12	6.50	21.42	14.92	1	0.07	06/11	21.58	06/12	6.50	8.92	20	2.24			
						06/12	21.42	06/13	6.33	8.92	28	3.14			
	Total Hatchery		14.92	1	0.07					17.83	48	2.69	-2.62	2.49%	19,100
06/15	6.00	20.75	14.75	1	0.07	06/14	21.50	06/15	6.00	8.50	32	3.76			
						06/15	20.75	06/16	6.08	9.33	68	7.29			
	Total Hatchery		14.75	1	0.07					17.83	100	5.61	-5.54	1.21%	17,700
06/18	6.00	20.58	14.58	2	0.14	06/17	21.50	06/18	6.00	8.50	33	3.88			
						06/18	20.58	06/19	5.50	8.92	34	3.81			
	Total Hatchery		14.58	2	0.14					17.42	67	3.85	-3.71	3.57%	16,500
06/21	6.50	21.00	14.50	1	0.07	06/20	21.50	06/21	6.50	9.00	10	1.11			
						06/21	21.00	06/22	5.50	8.50	27	3.18			
	Total Hatchery		14.50	1	0.07					17.50	37	2.11	-2.05	3.26%	16,400
06/24	6.00	20.50	14.50	199	13.72	06/23	21.33	06/24	6.00	8.67	135	15.58			
						06/24	20.50	06/25	5.42	8.92	221	24.79			
	Total Hatchery		14.50	199	13.72					17.58	356	20.25	-6.52	67.79%	18,000
06/27	5.50	21.33	15.83	1	0.06	06/26	21.50	06/27	5.50	8.00	32	4.00			
						06/27	21.33	06/28	5.50	8.17	11	1.35			
	Total Hatchery		15.83	1	0.06					16.17	43	2.66	-2.60	2.37%	17,000
07/01	5.50	21.25	15.75	18	1.14	06/30	21.50	07/01	5.50	8.00	6	0.75			
						07/01	21.25	07/02	6.08	8.83	132	14.94			
	Total Hatchery		15.75	18	1.14					16.83	138	8.20	-7.06	13.94%	15,700
07/03	6.25	20.75	14.50	28	1.93	07/02	21.42	07/03	6.25	8.83	118	13.36			
						07/03	20.75	07/04	6.08	9.33	115	12.32			
	Total Hatchery		14.50	28	1.93					18.17	233	12.83	-10.89	15.06%	15,900
07/06	5.42	20.67	15.25	1	0.07	07/05	21.50	07/06	5.25	7.75	5	0.65			
						07/06	20.67	07/07	5.67	9.00	4	0.44			
	Total Hatchery		15.25	1	0.07					16.75	9	0.54	-0.47	12.20%	13,600
07/09	5.50	20.83	15.33	0	0.00	07/08	21.08	07/09	5.50	8.42	20	2.38			
						07/09	20.83	07/10	5.83	9.00	9	1.00			
	Total Hatchery		15.33	0	0.00					17.42	29	1.67	-1.67	0.00%	14,200
07/12	6.50	20.75	14.25	2	0.14	07/11	20.83	07/12	6.50	9.67	3	0.31			
						07/12	20.75	07/13	6.08	9.33	13	1.39			
	Total Hatchery		14.25	2	0.14					19.00	16	0.84	-0.70	16.67%	13,500

...table continued next page

Table 4b. Catch/hour rates of HATCHERY 0+ CHINOOK during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME						DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
07/15	6.00	21.50	15.50	1	0.06	07/14	21.00	07/15	6.00	9.00	2	0.22			
						07/15	21.50	07/16	6.00	8.50	5	0.59			
	Total Hatchery		15.50	1	0.06					17.50	7	0.40	-0.34	16.13%	15,200
07/18	6.00	20.50	14.50	1	0.07	07/17	20.75	07/18	6.00	9.25	14	1.51			
						07/18	20.50	07/19	6.50	10.00	5	0.50			
	Total Hatchery		14.50	1	0.07					19.25	19	0.99	-0.92	6.99%	15,300
07/21	6.75	20.75	14.00	1	0.07	07/20	20.83	07/21	6.75	9.92	4	0.40			
						07/21	20.75	07/22	6.08	9.33	0	0.00			
	Total Hatchery		14.00	1	0.07					19.25	4	0.21	-0.14	34.37%	14,200
07/25	6.00	21.00	15.00	0	0.00	07/24	21.00	07/25	6.00	9.00	16	1.78			
						07/25	21.00	07/26	6.00	9.00	0	0.00			
	Total Hatchery		15.00	0	0.00					18.00	16	0.89	-0.89	0.00%	13,700
07/28	6.08	21.08	15.00	1	0.07	07/27	21.00	07/28	6.08	9.08	27	2.97			
						07/28	21.08	07/29	6.08	9.00	0	0.00			
	Total Hatchery		15.00	1	0.07					18.08	27	1.49	-1.43	4.47%	16,000
07/31	6.25	20.67	14.42	0	0.00	07/30	20.83	07/31	6.25	9.42	0	0.00			
						07/31	20.67	08/01	6.50	9.83	1	0.10			
	Total Hatchery		14.42	0	0.00					19.25	1	0.05	-0.05	0.00%	13,900
TOTAL HATCHERY			359.92	324	0.90					417.25	1,385	3.32	-2.42	27.12%	
Average hatchery					0.91							3.36	-2.45	13.11%	16,000

Figure 4. Day:night catch ratios for 0+ hatchery chinook and daily mean flow, Skagit River mainstem traps, 1998.



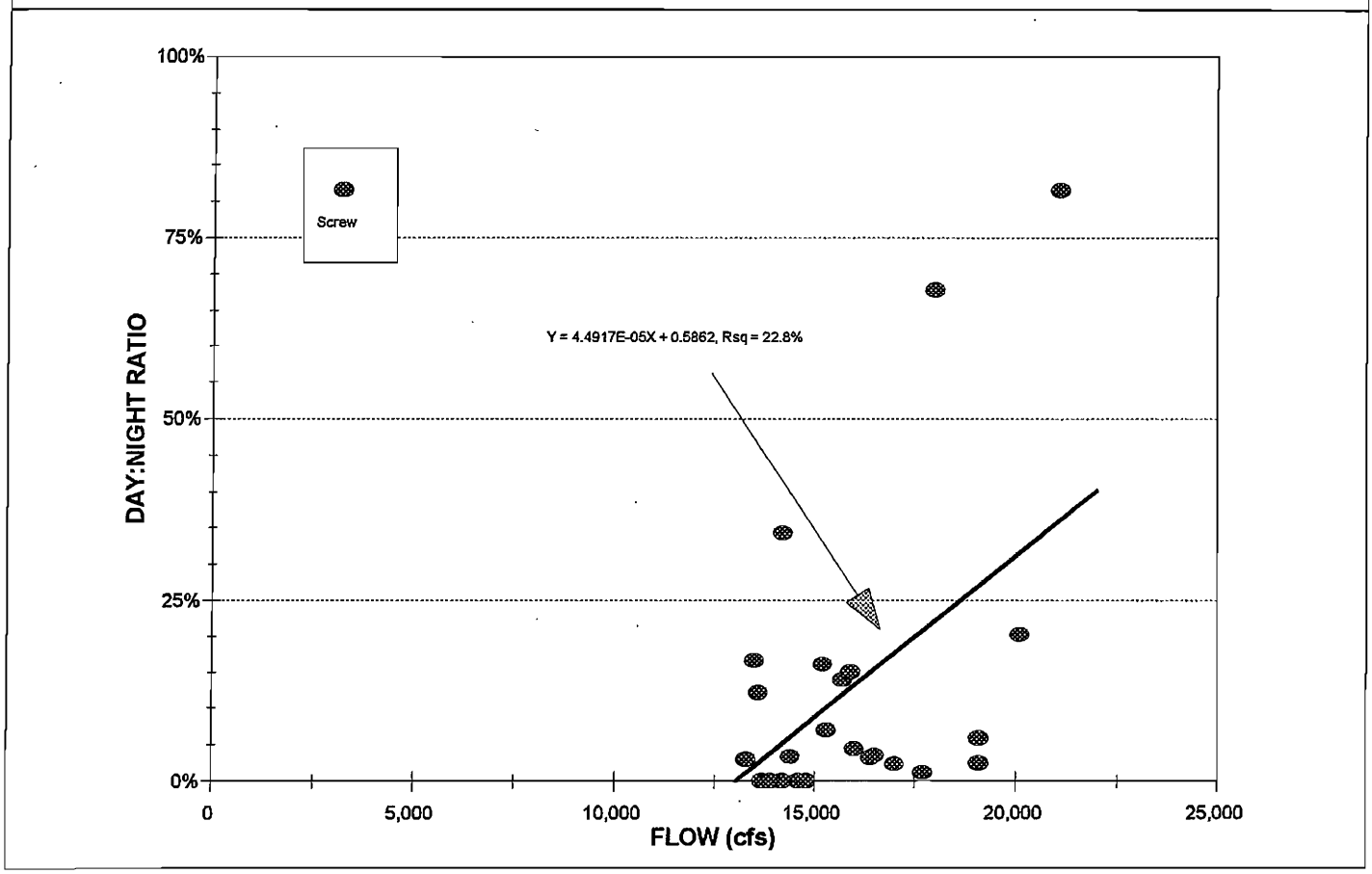


Figure 5. Comparison of day:night catch ratios for 0+ wild & hatchery chinook in the Skagit River mainstem scoop & screw traps, 1998.

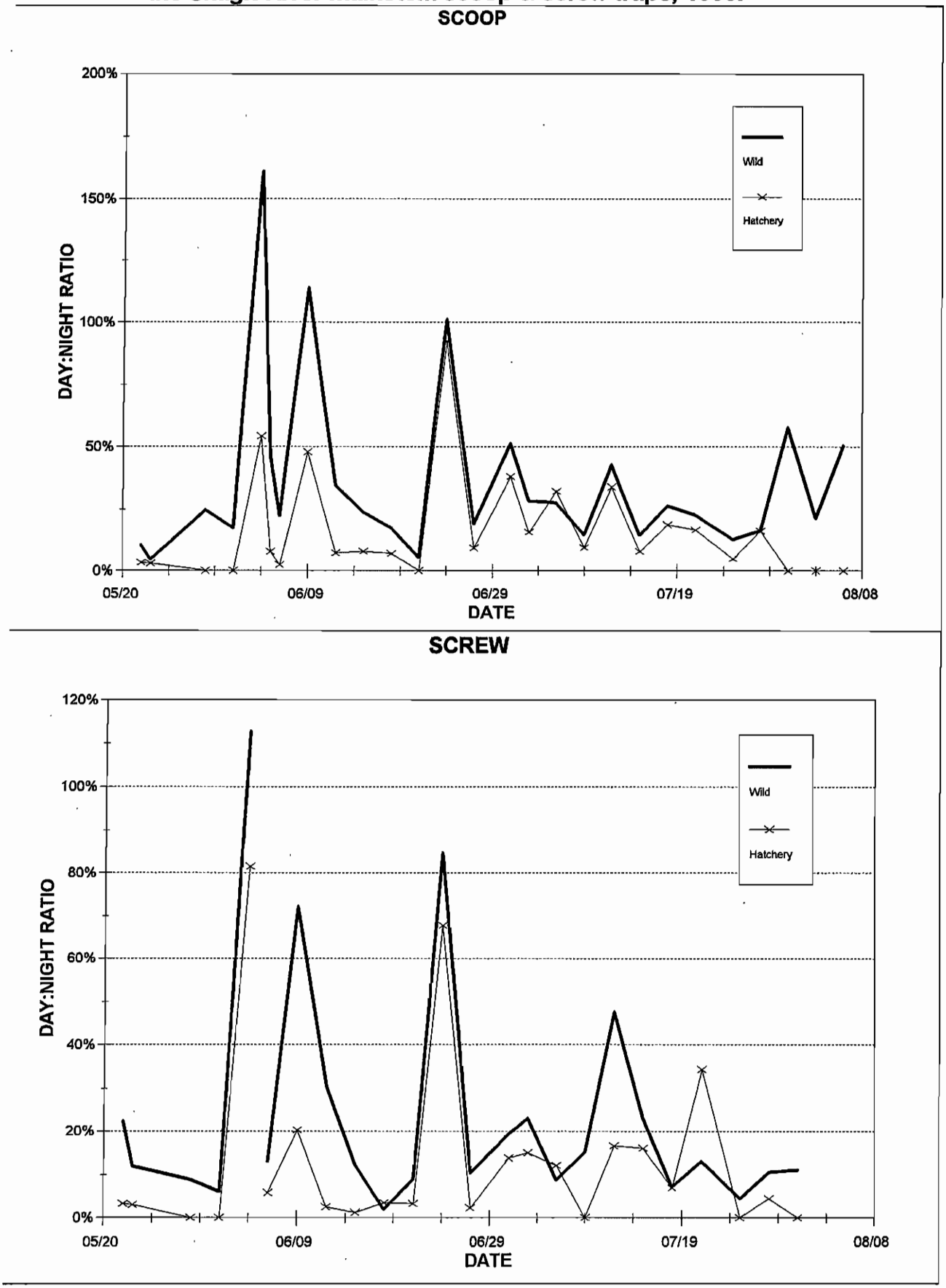


Table 5a. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
02/05	8.17	17.83	9.67	0	0.00	02/04	17.33	02/05	8.00	14.67	0	0.00			
						02/05	18.00	02/06	8.83	14.83	0	0.00			
	Total Wild		9.67	0	0.00					29.50	0	0.00	0.00	0.00%	14,800
02/12	9.33	17.92	8.58	0	0.00	02/11	18.08	02/12	9.00	14.92	1	0.07			
						02/12	18.08	02/13	8.83	14.75	0	0.00			
	Total Wild		8.58	0	0.00					29.67	1	0.03	-0.03	0.00%	14,200
02/19	9.17	18.50	9.33	0	0.00	02/18	18.00	02/19	9.00	15.00	0	0.00			
						02/19	18.67	02/20	7.50	12.83	0	0.00			
	Total Wild		9.33	0	0.00					27.83	0	0.00	0.00	0.00%	13,700
02/22	8.25	18.50	10.25	0	0.00	02/21	18.00	02/22	8.00	14.00	0	0.00			
						02/22	18.67	02/23	8.50	13.83	0	0.00			
	Total Wild		10.25	0	0.00					27.83	0	0.00	0.00	0.00%	14,500
02/25	9.67	18.00	8.33	0	0.00	02/24	18.50	02/25	9.50	15.00	0	0.00			
						02/25	18.17	02/26	9.25	15.08	0	0.00			
	Total Wild		8.33	0	0.00					30.08	0	0.00	0.00	0.00%	13,700
03/02	9.67	17.75	8.08	0	0.00	03/01	18.33	03/02	9.50	15.17	0	0.00			
						03/02	17.92	03/03	8.25	14.33	1	0.07			
	Total Wild		8.08	0	0.00					29.50	1	0.03	-0.03	0.00%	15,300
03/04	9.17	18.25	9.08	0	0.00	03/03	18.25	03/04	9.00	14.75	0	0.00			
						03/04	18.42	03/05	9.00	14.58	1	0.07			
	Total Wild		9.08	0	0.00					29.33	1	0.03	-0.03	0.00%	15,400
03/10	9.25	19.50	10.25	0	0.00	03/09	19.00	03/10	9.00	14.00	0	0.00			
						03/10	19.67	03/11	9.50	13.83	0	0.00			
	Total Wild		10.25	0	0.00					27.83	0	0.00	0.00	0.00%	12,900
03/15	9.50	20.00	10.50	0	0.00	03/14	19.33	03/15	9.33	14.00	0	0.00			
						03/15	20.17	03/16	9.50	13.33	0	0.00			
	Total Wild		10.50	0	0.00					27.33	0	0.00	0.00	0.00%	15,500
03/25	8.08	17.75	9.67	1	0.10	03/24	19.92	03/25	7.83	11.92	2	0.17			
						03/25	18.00	03/26	9.08	15.08	5	0.33			
	Total Wild		9.67	1	0.10					27.00	7	0.26	-0.16	39.90%	20,700
03/27	8.42	18.50	10.08	0	0.00	03/26	19.50	03/27	8.25	12.75	3	0.24			
						03/27	18.67	03/28	9.50	14.83	3	0.20			
	Total Wild		10.08	0	0.00					27.58	6	0.22	-0.22	0.00%	18,800
03/31	7.75	18.42	10.67	0	0.00	03/30	19.08	03/31	7.50	12.42	0	0.00			
						03/31	18.58	04/01	7.25	12.67	2	0.16			
	Total Wild		10.67	0	0.00					25.08	2	0.08	-0.08	0.00%	14,500
04/04	7.00	18.25	11.25	0	0.00	04/03	19.25	04/04	6.83	11.58	1	0.09			
						04/04	18.42	04/05	8.00	13.58	0	0.00			
	Total Wild		11.25	0	0.00					25.17	1	0.04	-0.04	0.00%	13,700
04/06	7.67	19.50	11.83	0	0.00	04/05	20.00	04/06	7.50	11.50	0	0.00			
						04/06	19.67	04/07	7.25	11.58	1	0.09			
	Total Wild		11.83	0	0.00					23.08	1	0.04	-0.04	0.00%	13,900
04/07	7.33	19.33	12.00	0	0.00	04/06	19.67	04/07	7.25	11.58	1	0.09			
						04/07	19.50	04/08	6.75	11.25	3	0.27			
	Total Wild		12.00	0	0.00					22.83	4	0.18	-0.18	0.00%	14,200
04/12	7.42	20.33	12.92	0	0.00	04/11	20.58	04/12	7.25	10.67	5	0.47			
						04/12	20.50	04/13	7.00	10.50	4	0.38			
	Total Wild		12.92	0	0.00					21.17	9	0.43	-0.43	0.00%	11,400
04/14	7.17	18.50	11.33	0	0.00	04/13	20.00	04/14	7.00	11.00	2	0.18			
						04/14	19.00	04/15	6.25	11.25	4	0.36			
	Total Wild		11.33	0	0.00					22.25	6	0.27	-0.27	0.00%	12,700
04/17	7.17	19.67	12.50	0	0.00	04/16	20.33	04/17	7.00	10.67	5	0.47			
						04/17	19.83	04/18	6.92	11.08	3	0.27			
	Total Wild		12.50	0	0.00					21.75	8	0.37	-0.37	0.00%	11,300
04/21	7.42	19.33	11.92	0	0.00	04/20	19.58	04/21	7.25	11.67	2	0.17			
						04/21	19.50	04/22	7.00	11.50	3	0.26			
	Total Wild		11.92	0	0.00					23.17	5	0.22	-0.22	0.00%	10,100
04/23	7.75	14.00	6.25	1	0.16	04/22	20.50	04/23	6.67	10.17	20	1.97			
04/23	14.42	20.33	5.92		0.00	04/23	20.67	04/24	5.67	9.00	0	0.00			
	Total Wild		12.17	1	0.08					19.17	20	1.04	-0.96	7.88%	13,800

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Table 5a. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME					NIGHTTIME						DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
04/26	7.75	20.00	12.25	1	0.08	04/25	20.50	04/26	7.50	11.00	59	5.36			
						04/26	20.50	04/27	6.75	10.25	66	6.44			
	Total Wild		12.25	1	0.08					21.25	125	5.88	-5.80	1.39%	12,800
04/29	6.75	20.08	13.33	2	0.15	04/28	20.75	04/29	6.50	9.75	72	7.38			
						04/29	20.58	04/30	6.50	9.92	173	17.45			
	Total Wild		13.33	2	0.15					19.67	245	12.46	-12.31	1.20%	13,900
05/06	7.17	20.50	13.33	171	12.83	05/05	20.58	05/06	0.25	3.67	179	48.82			
						05/06	0.50	05/06	7.00	6.50	321	49.38			
						05/06	20.67	05/07	6.42	9.75	366	37.54			
	Total Wild		13.33	171	12.83					19.92	866	43.48	-30.66	29.50%	22,400
05/09	6.25	20.50	14.25	54	3.79	05/08	20.75	05/09	0.67	3.92	94	24.00			
						05/09	0.83	05/09	6.00	5.17	170	32.90			
						05/09	20.67	05/10	6.00	9.33	265	28.39			
	Total Wild		14.25	54	3.79					18.42	529	28.72	-24.93	13.19%	18,800
05/12	7.00	20.92	13.92	45	3.23	05/11	21.00	05/12	6.83	9.83	161	16.37			
						05/12	21.25	05/13	6.67	9.42	175	18.58			
	Total Wild		13.92	45	3.23					19.25	336	17.45	-14.22	18.53%	16,900
05/16	6.25	20.50	14.25	12	0.84	05/15	21.08	05/16	6.00	8.92	265	29.72			
						05/16	20.67	05/17	5.50	8.83	188	21.28			
	Total Wild		14.25	12	0.84					17.75	453	25.52	-24.68	3.30%	15,500
05/19	5.67	21.33	15.67	6	0.38	05/18	21.00	05/19	5.50	8.50	241	28.35			
						05/19	21.50	05/20	5.50	8.00	173	21.63			
	Total Wild		15.67	6	0.38					16.50	414	25.09	-24.71	1.53%	13,500
05/22	6.67	12.00	5.33	0	0.00	05/21	20.50	05/22	6.50	10.00	473	47.30			
05/22	12.17	20.67	8.50	22	2.59	05/22	21.00	05/23	6.50	9.50	510	53.68			
	Total Wild		13.83	22	1.59					19.50	983	50.41	-48.82	3.15%	14,400
05/23	6.75	20.75	14.00	14	1.00	05/22	21.00	05/23	6.50	9.50	510	53.68			
						05/23	20.92	05/24	6.00	9.08	295	32.48			
	Total Wild		14.00	14	1.00					18.58	805	43.32	-42.32	2.31%	13,300
05/29	6.50	21.17	14.67	12	0.82	05/28	21.33	05/29	6.00	8.67	166	19.15			
						05/29	21.33	05/30	5.50	8.17	269	32.94			
	Total Wild		14.67	12	0.82					16.83	435	25.84	-25.02	3.17%	14,600
06/01	6.00	20.83	14.83	16	1.08	05/31	21.50	06/01	5.75	8.25	265	32.12			
						06/01	21.00	06/02	6.00	9.00	525	58.33			
	Total Wild		14.83	16	1.08					17.25	790	45.80	-44.72	2.36%	14,800
06/04	5.33	12.83	7.50	14	1.87	06/03	21.50	06/04	5.00	7.50	122	16.27			
06/04	13.00	21.67	8.67	47	5.42	06/04	21.83	06/05	1.50	3.67	44	12.00			
						06/05	1.67	06/05	6.00	4.33	59	13.62			
	Total Wild		16.17	61	3.77					15.50	225	14.52	-10.74	25.99%	21,100
06/05	6.17	17.67	11.50	21	1.83	06/04	21.83	06/05	1.50	3.67	44	12.00			
06/05	17.83	21.17	3.33	5	1.50	06/05	1.67	06/05	6.00	4.33	59				
						06/05	21.33	06/06	2.00	4.67	70	15.00			
						06/06	2.17	06/06	6.00	3.83	53	13.83			
	Total Wild		14.83	26	1.75					16.50	226	13.70	-11.94	12.80%	21,100
06/06	6.17	20.75	14.58	6	0.41	06/05	21.33	06/06	2.00	4.67	70	15.00			
						06/06	2.17	06/06	6.00	3.83	53				
						06/06	21.00	06/07	6.00	9.00	97	10.78			
	Total Wild		14.58	6	0.41					17.50	220	12.57	-12.16	3.27%	19,100
06/09	7.00	21.50	14.50	51	3.52	06/08	21.00	06/09	6.67	9.67	60	6.21			
						06/09	21.75	06/10	5.50	7.75	41	5.29			
	Total Wild		14.50	51	3.52					17.42	101	5.80	-2.28	60.65%	20,100
06/12	6.17	21.08	14.92	1	0.07	06/11	21.67	06/12	6.00	8.33	14	1.68			
						06/12	21.25	06/13	6.25	9.00	19	2.11			
	Total Wild		14.92	1	0.07					17.33	33	1.90	-1.84	3.52%	19,100
06/15	6.67	21.08	14.42	3	0.21	06/14	21.58	06/15	6.50	8.92	14	1.57			
						06/15	21.25	06/16	6.00	8.75	19	2.17			
	Total Wild		14.42	3	0.21					17.67	33	1.87	-1.66	11.14%	17,700
06/18	7.00	20.92	13.92	2	0.14	06/17	21.58	06/18	6.75	9.17	9	0.98			
						06/18	21.08	06/19	5.50	8.42	3	0.36			
	Total Wild		13.92	2	0.14					17.58	12	0.68	-0.54	21.06%	16,500

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Table 5a. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCOOP trap, 1998.

Date	DAYTIME Start	End	Time Fished	Catch	Catch/ Hour	NIGHTTIME Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	DAY:NIGHT Diff (D-N)	Ratio (D/N)	Flow (cfs)
06/21	6.25	21.17	14.92	0	0.00	06/20	21.58	06/21	6.00	8.42	8	0.95			
						06/21	21.33	06/22	5.67	8.33	11	1.32			
	Total Wild		14.92	0	0.00					16.75	19	1.13	-1.13	0.00%	16,400
06/24	7.00	21.00	14.00	4	0.29	06/23	21.42	06/24	6.83	9.42	14	1.49			
						06/24	21.25	06/25	5.33	8.08	6	0.74			
	Total Wild		14.00	4	0.29					17.50	20	1.14	-0.86	25.00%	16,000
06/27	6.00	21.50	15.50	0	0.00	06/26	21.50	06/27	5.75	8.25	0	0.00			
						06/27	21.67	06/28	5.50	7.83	1	0.13			
	Total Wild		15.50	0	0.00					16.08	1	0.06	-0.06	0.00%	17,000
07/01	5.83	21.42	15.58	2	0.13	06/30	21.58	07/01	5.67	8.08	2	0.25			
						07/01	21.58	07/02	6.00	8.42	4	0.48			
	Total Wild		15.58	2	0.13					16.50	6	0.36	-0.24	35.29%	15,700
07/03	6.75	21.33	14.58	0	0.00	07/02	21.50	07/03	6.58	9.08	3	0.33			
						07/03	21.50	07/04	6.00	8.50	0	0.00			
	Total Wild		14.58	0	0.00					17.58	3	0.17	-0.17	0.00%	15,900
07/06	5.67	21.00	15.33	0	0.00	07/05	21.58	07/06	5.50	7.92	0	0.00			
						07/06	21.17	07/07	5.75	8.58	0	0.00			
	Total Wild		15.33	0	0.00					16.50	0	0.00	0.00	0.00%	13,600
07/09	6.00	21.25	15.25	0	0.00	07/08	21.25	07/09	5.75	8.50	1	0.12			
						07/09	21.42	07/10	5.75	8.33	0	0.00			
	Total Wild		15.25	0	0.00					16.83	1	0.06	-0.06	0.00%	14,200
07/12	6.42	21.00	14.58	0	0.00	07/11	21.00	07/12	6.25	9.25	0	0.00			
						07/12	21.17	07/13	6.00	8.83	0	0.00			
	Total Wild		14.58	0	0.00					18.08	0	0.00	0.00	0.00%	13,500
07/15	6.67	21.50	14.83	1	0.07	07/14	21.17	07/15	6.50	9.33	0	0.00			
						07/15	21.67	07/16	6.00	8.33	0	0.00			
	Total Wild		14.83	1	0.07					17.67	0	0.00	0.07	0.00%	15,200
07/18	6.67	20.75	14.08	0	0.00	07/17	20.83	07/18	6.50	9.67	0	0.00			
						07/18	20.92	07/19	6.58	9.67	1	0.10			
	Total Wild		14.08	0	0.00					19.33	1	0.05	-0.05	0.00%	15,300
07/21	6.67	21.00	14.33	0	0.00	07/20	20.92	07/21	6.50	9.58	0	0.00			
						07/21	21.17	07/22	6.00	8.83	0	0.00			
	Total Wild		14.33	0	0.00					18.42	0	0.00	0.00	0.00%	14,200
07/25	6.33	21.50	15.17	0	0.00	07/24	21.17	07/25	6.17	9.00	0	0.00			
						07/25	21.58	07/26	6.08	8.50	0	0.00			
	Total Wild		15.17	0	0.00					17.50	0	0.00	0.00	0.00%	13,700
07/28	6.42	21.17	14.75	0	0.00	07/27	21.17	07/28	6.25	9.08	0	0.00			
						07/28	21.33	07/29	6.00	8.67	0	0.00			
	Total Wild		14.75	0	0.00					17.75	0	0.00	0.00	0.00%	16,000
07/31	6.67	20.92	14.25		0.00	07/30	20.92	07/31	6.50	9.58		0.00			
						07/31	21.08	08/01	6.58	9.50		0.00			
	Total Wild		14.25	0	0.00					19.08	0	0.00	0.00	0.00%	13,900
TOTAL WILD			675	514	0.76					1,087	6,954	6.40	-5.64	11.90%	
Average wild					0.70							7.33	-6.63	6.27%	15,400

Table 5b. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME						DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
01/22	8.33	17.42	9.08	0	0.00	01/21	17.00	01/22	8.33	15.33	0	0.00			
						01/22	17.42	01/23	8.83	15.42	0	0.00			
	Total Wild		9.08	0	0.00					30.75	0	0.00	0.00	0.00%	17,600
01/26	8.33	16.92	8.58	0	0.00	01/25	17.00	01/26	8.33	15.33	0	0.00			
						01/26	16.92	01/27	9.08	16.17	1	0.06			
	Total Wild		8.58	0	0.00					31.50	1	0.03	-0.03	0.00%	22,000
02/05	8.17	18.00	9.83	0	0.00	02/04	17.50	02/05	8.17	14.67	0	0.00			
						02/05	18.00	02/06	9.00	15.00	0	0.00			
	Total Wild		9.83	0	0.00					29.67	0	0.00	0.00	0.00%	14,800
02/12	9.00	18.08	9.08	0	0.00	02/11	18.00	02/12	9.00	15.00	0	0.00			
						02/12	18.08	02/13	9.00	14.92	1	0.07			
	Total Wild		9.08	0	0.00					29.92	1	0.03	-0.03	0.00%	14,200
02/14	9.08	17.58	8.50	0	0.00	02/13	18.50	02/14	9.08	14.58	0	0.00			
						02/14	17.58	02/15	8.75	15.17	1	0.07			
	Total Wild		8.50	0	0.00					29.75	1	0.03	-0.03	0.00%	17,200
02/22	8.17	18.75	10.58	0	0.00	02/21	18.17	02/22	8.17	14.00	0	0.00			
						02/22	18.75	02/23	8.75	14.00	1	0.07			
	Total Wild		10.58	0	0.00					28.00	1	0.04	-0.04	0.00%	14,500
03/10	9.00	19.50	10.50	0	0.00	03/09	19.00	03/10	9.00	14.00	0	0.00			
						03/10	19.50	03/11	9.50	14.00	0	0.00			
	Total Wild		10.50	0	0.00					28.00	0	0.00	0.00	0.00%	12,900
03/25	8.25	18.50	10.25	0	0.00	03/24	20.00	03/25	8.25	12.25	1	0.08			
						03/25	18.50	03/26	9.00	14.50	4	0.28			
	Total Wild		10.25	0	0.00					26.75	5	0.19	-0.19	0.00%	20,700
03/31	7.25	19.08	11.83	0	0.00	03/30	19.00	03/31	7.25	12.25	0	0.00			
						03/31	19.08	04/01	7.33	12.25	1	0.08			
	Total Wild		11.83	0	0.00					24.50	1	0.04	-0.04	0.00%	14,500
04/04	7.75	18.50	10.75	0	0.00	04/03	19.17	04/04	7.75	12.58	0				
						04/04	18.50	04/05	8.00	13.50	0	0.00			
	Total Wild		10.75	0	0.00					26.08	0	0.00	0.00	0.00%	13,700
04/12	7.42	20.17	12.75	0	0.00	04/11	20.50	04/12	7.42	10.92	5	0.46			
						04/12	20.17	04/13	7.08	10.92	5	0.46			
	Total Wild		12.75	0	0.00					21.83	10	0.46	-0.46	0.00%	11,400
04/14	7.75	20.00	12.25	0	0.00	04/13	20.00	04/14	7.75	11.75	9	0.77			
						04/14	20.00	04/15	7.25	11.25	7	0.62			
	Total Wild		12.25	0	0.00					23.00	16	0.70	-0.70	0.00%	12,700
04/17	7.25	20.33	13.08	0	0.00	04/16	20.25	04/17	7.25	11.00	8	0.73			
						04/17	20.33	04/18	7.00	10.67	2	0.19			
	Total Wild		13.08	0	0.00					21.67	10	0.46	-0.46	0.00%	11,300
04/20	16.58	20.33	3.75	0	0.00	04/19	20.17	04/20	7.00	10.83	3	0.28			
						04/20	20.33	04/21	7.50	11.17	3	0.27			
	Total Wild		3.75	0	0.00					22.00	6	0.27	-0.27	0.00%	9,860
04/21	7.50	20.00	12.50	0	0.00	04/20	20.33	04/21	7.50	11.17	3	0.27			
						04/21	20.00	04/22	7.08	11.08	6	0.54			
	Total Wild		12.50	0	0.00					22.25	9	0.40	-0.40	0.00%	10,100
04/23	7.50	14.83	7.33	0	0.00	04/22	20.50	04/23	7.50	11.00	25	2.27			
04/23	15.00	21.58	6.58	17	2.58	04/23	21.58	04/24	5.75	8.17	76	9.31			
	Total Wild		13.92	17	1.22					19.17	101	5.27	-4.05	23.18%	13,800
05/09	6.92	20.92	14.00	21	1.50	05/08	20.67	05/09	1.50	4.83	143	29.59			
						05/09	1.50	05/09	6.92	5.42	97	17.91			
						05/09	20.92	05/10	6.00	9.08	178	19.60			
	Total Wild		14.00	21	1.50					19.33	418	21.62	-20.12	6.94%	18,800
05/12	5.75	21.08	15.33	33	2.15	05/11	21.00	05/12	5.75	8.75	121	13.83			
						05/12	21.08	05/13	6.75	9.67	155	16.03			
	Total Wild		15.33	33	2.15					18.42	276	14.99	-12.83	14.36%	16,900
05/16	5.50	21.00	15.50	13	0.84	05/15	21.00	05/16	5.25	8.25	237	28.73			
						05/16	21.00	05/17	5.50	8.50	91	10.71			
	Total Wild		15.50	13	0.84					16.75	328	19.58	-18.74	4.28%	15,500

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Table 5b. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCREW trap, 1998.

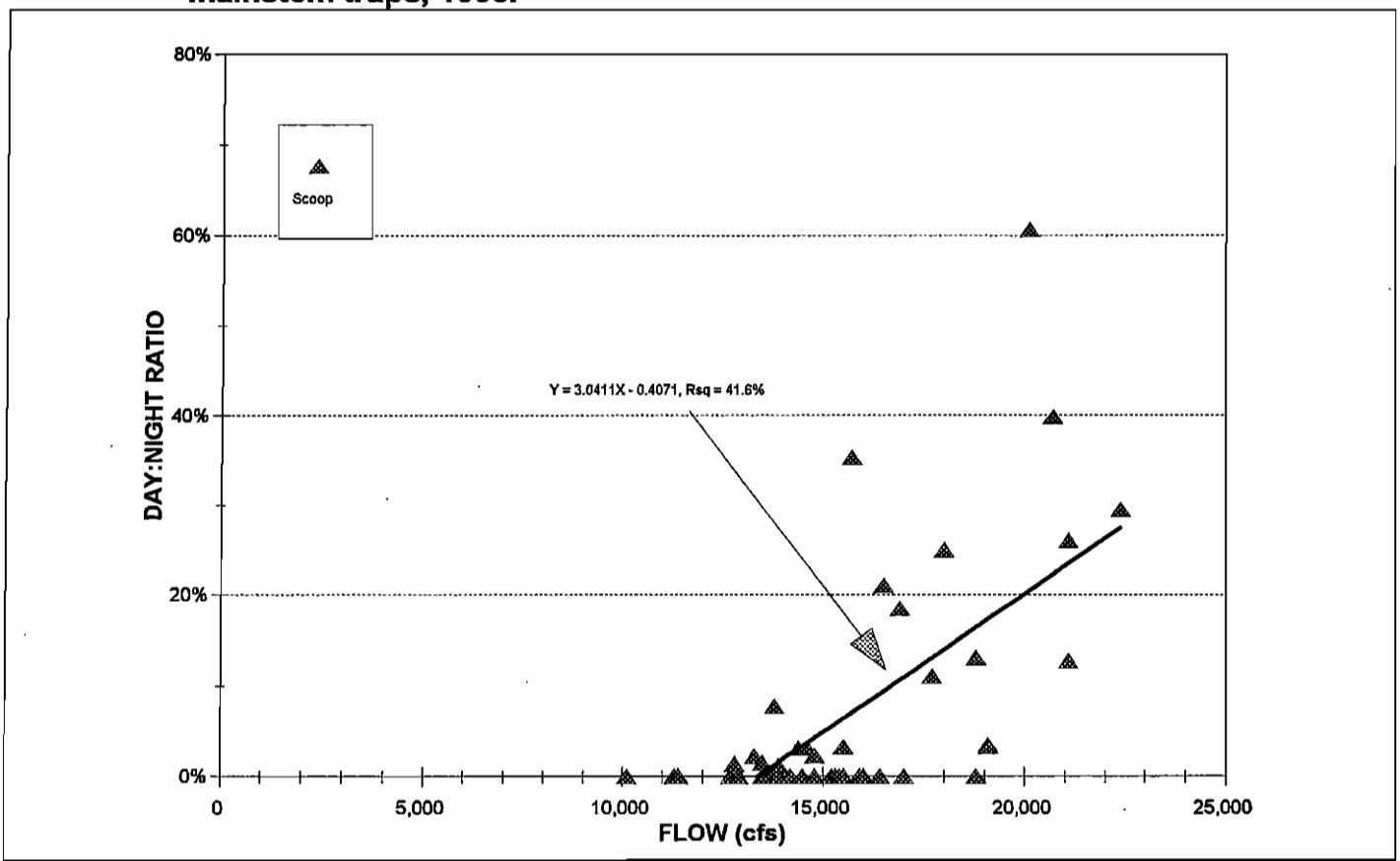
Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
05/19	6.50	21.00	14.50	1	0.07	05/18	21.00	05/19	6.50	9.50	136	14.32			
						05/19	21.00	05/20	5.67	8.67	167	19.27			
	Total Wild		14.50	1	0.07					18.17	303	16.68	-16.61	0.41%	13,500
05/22	5.75	11.92	6.17	0	0.00	05/21	20.50	05/22	5.75	9.25	209	22.59			
05/22	11.92	21.00	9.08	9	0.99	05/22	21.00	05/23	5.75	8.75	200	22.86			
	Total Wild		15.25	9	0.59					18.00	409	22.72	-22.13	2.60%	14,400
05/23	5.75	21.00	15.25	10	0.66	05/22	21.00	05/23	5.75	8.75	200	22.86			
						05/23	21.00	05/24	6.00	9.00	127	14.11			
	Total Wild		15.25	10	0.66					17.75	327	18.42	-17.77	3.56%	13,300
05/29	5.25	21.00	15.75	3	0.19	05/28	21.25	05/29	5.25	8.00	127	15.88			
						05/29	21.00	05/30	5.50	8.50	171	20.12			
	Total Wild		15.75	3	0.19					16.50	298	18.06	-17.87	1.05%	14,600
06/01	5.75	20.83	15.08	3	0.20	05/31	21.50	06/01	5.75	8.25	128	15.52			
						06/01	20.83	06/02	6.00	9.17	225	24.55			
	Total Wild		15.08	3	0.20					17.42	353	20.27	-20.07	0.98%	14,800
06/04	6.00	13.25	7.25	4	0.55	06/03	21.50	06/04	6.00	8.50	82	9.65			
06/04	13.25	22.25	9.00	34	3.78	06/04	22.25	06/05	2.00	3.75	26	6.93			
						06/05	2.00	06/05	6.50	4.50	37	8.22			
	Total Wild		16.25	38	2.34					8.25	63	7.64	5.30	30.62%	21,100
06/06	6.75	21.25	14.50	2	0.14	06/05	21.42	06/06	2.92	5.50	53	9.64			
						06/06	2.92	06/06	6.75	3.83	34	8.87			
						06/06	21.25	06/07	6.00	8.75	33	3.77			
	Total Wild		14.50	2	0.14					18.08	120	6.64	-6.50	2.08%	19,100
06/09	5.75	21.00	15.25	17	1.11	06/08	20.83	06/09	5.75	8.92	38	4.26			
						06/09	21.00	06/10	5.50	8.50	24	2.82			
	Total Wild		15.25	17	1.11					17.42	62	3.56	-2.45	31.32%	20,100
06/12	6.50	21.42	14.92	0	0.00	06/11	21.58	06/12	6.50	8.92	10	1.12			
						06/12	21.42	06/13	6.33	8.92	15	1.68			
	Total Wild		14.92	0	0.00					17.83	25	1.40	-1.40	0.00%	19,100
06/15	6.00	20.75	14.75	2	0.14	06/14	21.50	06/15	6.00	8.50	12	1.41			
						06/15	20.75	06/16	6.08	9.33	13	1.39			
	Total Wild		14.75	2	0.14					17.83	25	1.40	-1.27	9.67%	17,700
06/18	6.00	20.58	14.58	1	0.07	06/17	21.50	06/18	6.00	8.50	2	0.24			
						06/18	20.58	06/19	5.50	8.92	7	0.79			
	Total Wild		14.58	1	0.07					17.42	9	0.52	-0.45	13.27%	16,500
06/21	6.50	21.00	14.50	0	0.00	06/20	21.50	06/21	6.50	9.00	6	0.67			
						06/21	21.00	06/22	5.50	8.50	7	0.82			
	Total Wild		14.50	0	0.00					17.50	13	0.74	-0.74	0.00%	16,400
06/24	6.00	20.50	14.50	6	0.41	06/23	21.33	06/24	6.00	8.67	4	0.46			
						06/24	20.50	06/25	5.42	8.92	9	1.01			
	Total Wild		14.50	6	0.41					17.58	13	0.74	-0.33	55.97%	18,000
06/27	5.50	21.33	15.83	0	0.00	06/26	21.50	06/27	5.50	8.00	1	0.13			
						06/27	21.33	06/28	5.50	8.17	1	0.12			
	Total Wild		15.83	0	0.00					16.17	2	0.12	-0.12	0.00%	17,000
07/01	5.50	21.25	15.75	0	0.00	06/30	21.50	07/01	5.50	8.00	4	0.50			
						07/01	21.25	07/02	6.08	8.83	3	0.34			
	Total Wild		15.75	0	0.00					16.83	7	0.42	-0.42	0.00%	15,700
07/03	6.25	20.75	14.50	0	0.00	07/02	21.42	07/03	6.25	8.83	3	0.34			
						07/03	20.75	07/04	6.08	9.33	0	0.00			
	Total Wild		14.50	0	0.00					18.17	3	0.17	-0.17	0.00%	15,900
07/06	5.42	20.67	15.25	1	0.07	07/05	21.50	07/06	5.25	7.75	1	0.13			
						07/06	20.67	07/07	5.67	9.00	0	0.00			
	Total Wild		15.25	1	0.07					16.75	1	0.06	0.01	109.84%	13,600
07/09	5.50	20.83	15.33	1	0.07	07/08	21.08	07/09	5.50	8.42	0	0.00			
						07/09	20.83	07/10	5.83	9.00	0	0.00			
	Total Wild		15.33	1	0.07					17.42	0	0.00	0.07	0.00%	14,200

...table continued next page

Table 5b. Catch/hour rates of WILD COHO SMOLTS during day and night periods, Skagit River SCREW trap, 1998.

Date	DAYTIME					NIGHTTIME							DAY:NIGHT		
	Start	End	Time Fished	Catch	Catch/ Hour	Start Date	Start Time	End Date	End Time	Time Fished	Catch	Catch/ Hour	Diff (D-N)	Ratio (D/N)	Flow (cfs)
07/12	6.50	20.75	14.25	0	0.00	07/11	20.83	07/12	6.50	9.67	0	0.00			
						07/12	20.75	07/13	6.08	9.33	0	0.00			
	Total Wild		14.25	0	0.00					19.00	0	0.00	0.00	0.00%	13,500
07/15	6.00	21.50	15.50	0	0.00	07/14	21.00	07/15	6.00	9.00	1	0.11			
						07/15	21.50	07/16	6.00	8.50	1	0.12			
	Total Wild		15.50	0	0.00					17.50	2	0.11	-0.11	0.00%	15,200
07/18	6.00	20.50	14.50	0	0.00	07/17	20.75	07/18	6.00	9.25	0	0.00			
						07/18	20.50	07/19	6.50	10.00	0	0.00			
	Total Wild		14.50	0	0.00					19.25	0	0.00	0.00	0.00%	15,300
07/21	6.75	20.75	14.00	0	0.00	07/20	20.83	07/21	6.75	9.92	0	0.00			
						07/21	20.75	07/22	6.08	9.33	0	0.00			
	Total Wild		14.00	0	0.00					19.25	0	0.00	0.00	0.00%	14,200
07/25	6.00	21.00	15.00	0	0.00	07/24	21.00	07/25	6.00	9.00	0	0.00			
						07/25	21.00	07/26	6.00	9.00	0	0.00			
	Total Wild		15.00	0	0.00					18.00	0	0.00	0.00	0.00%	13,700
07/28	6.08	21.08	15.00	0	0.00	07/27	21.00	07/28	6.08	9.08	0	0.00			
						07/28	21.08	07/29	6.08	9.00	0	0.00			
	Total Wild		15.00	0	0.00					18.08	0	0.00	0.00	0.00%	16,000
07/31	6.25	20.67	14.42	0	0.00	07/30	20.83	07/31	6.25	9.42	0	0.00			
						07/31	20.67	08/01	6.50	9.83	0	0.00			
	Total Wild		14.42	0	0.00					19.25	0	0.00	0.00	0.00%	13,900
TOTAL WILD			586.50	178	0.30					904.75	3,219	3.56	-3.25	8.53%	
Average wild					0.27							4.18	-3.91	7.05%	15,400

Figure 6. Day:night catch ratios for wild coho smolts, and daily mean flow, Skagit River mainstem traps, 1998.



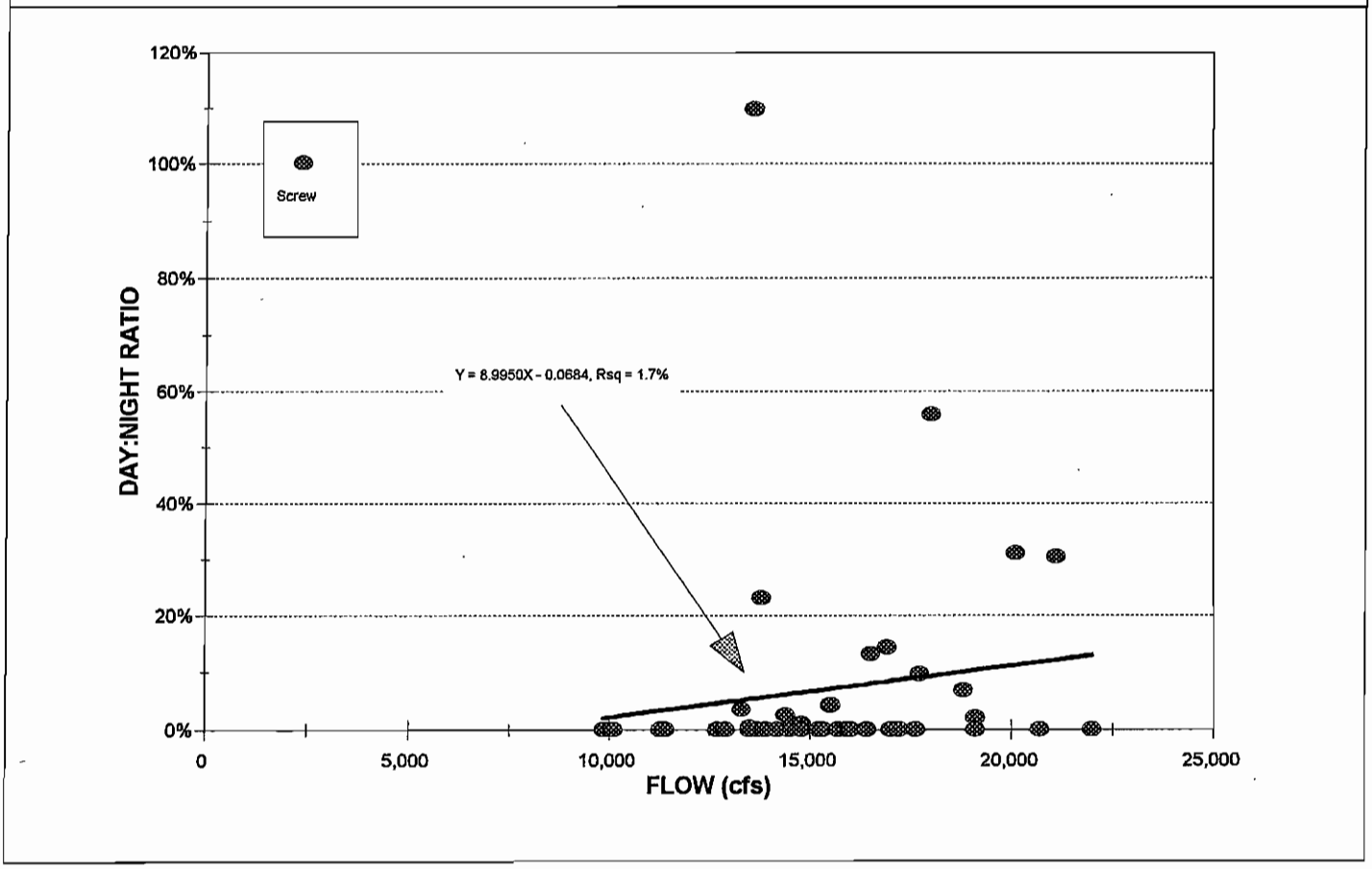
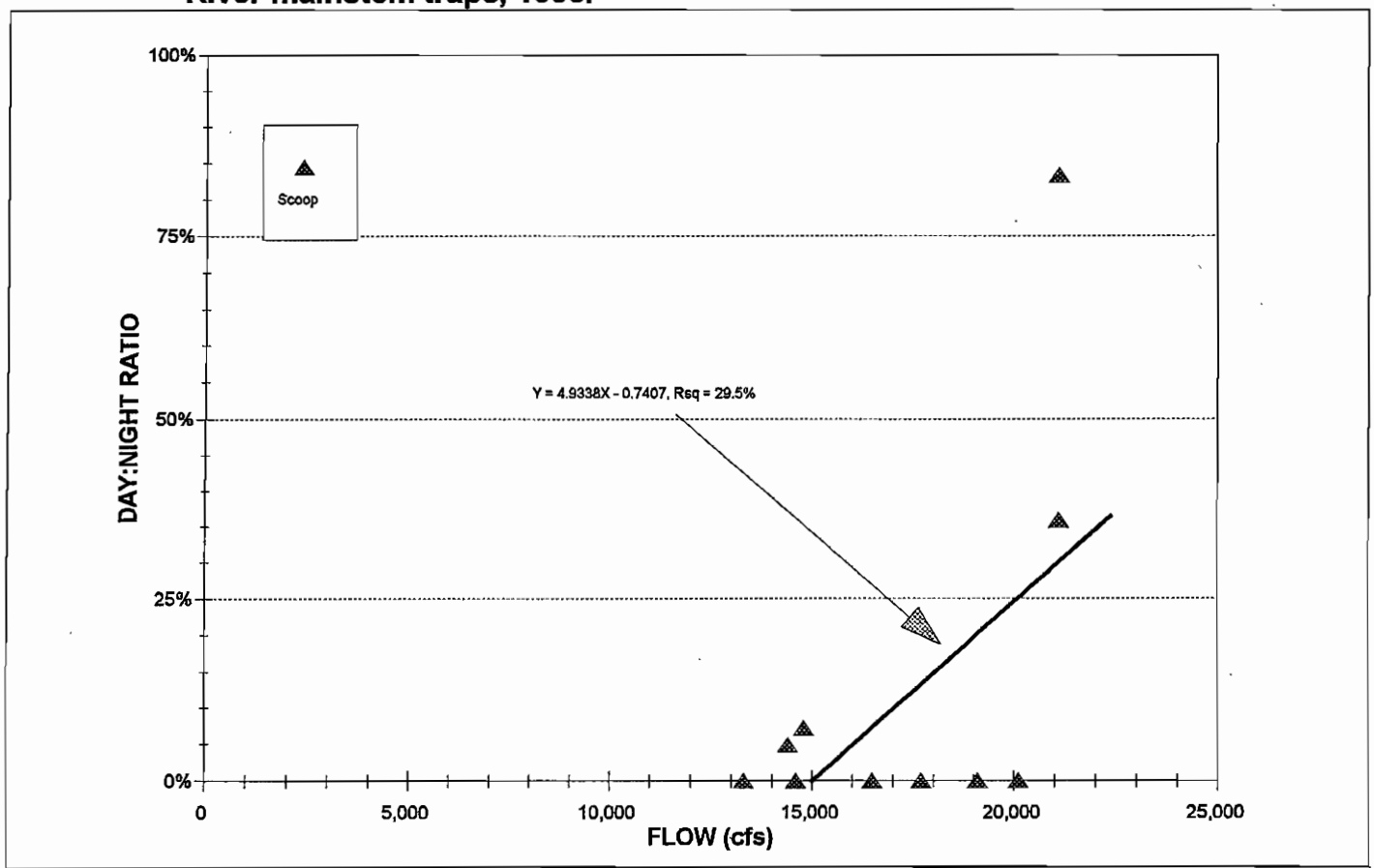


Figure 7. Day:night catch ratios for hatchery coho smolts, and daily mean flow, Skagit River mainstem traps, 1998.



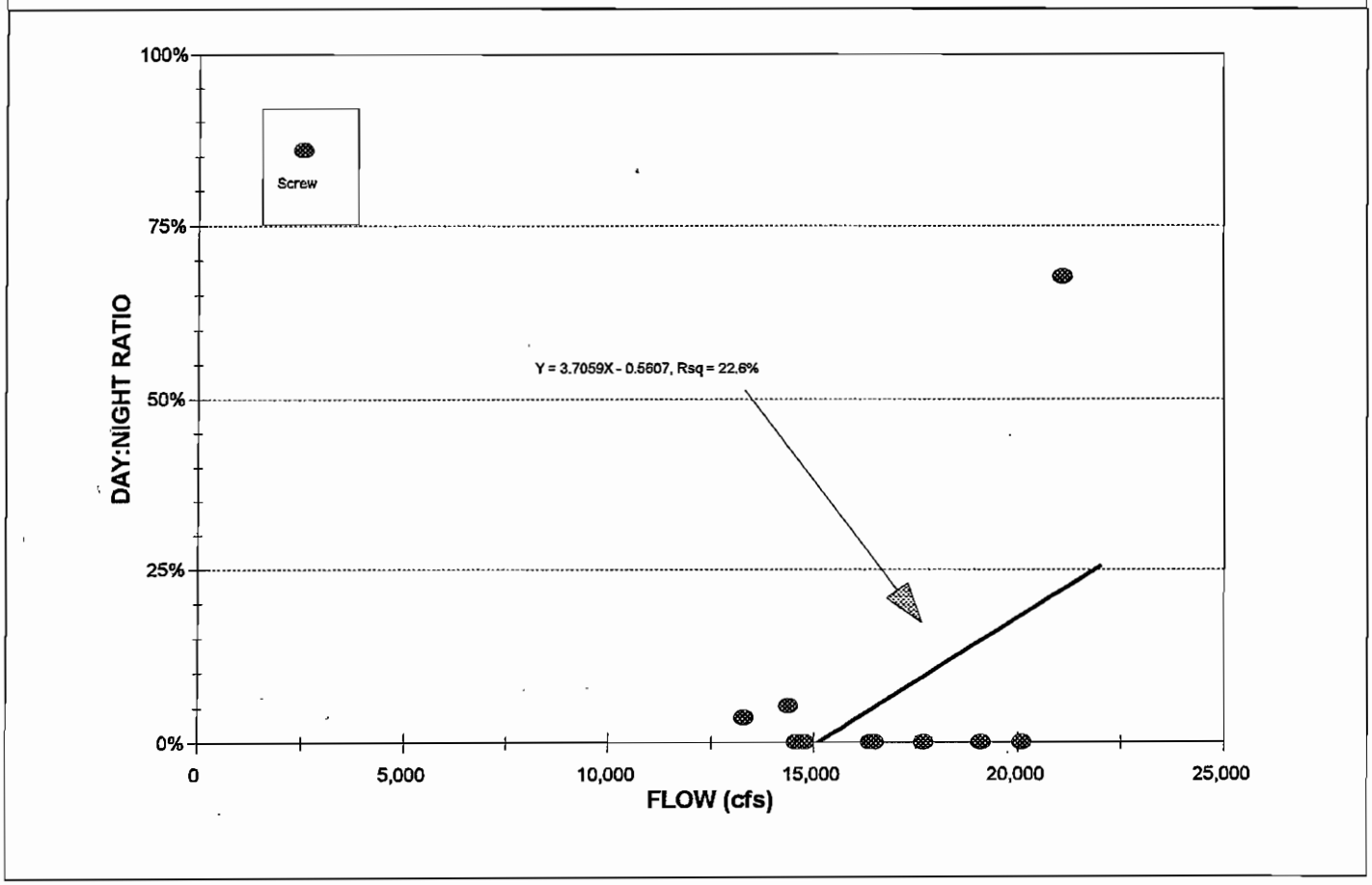


Table 6. Summary of visibility and flow data, Skagit River mainstem traps at Mt. Vernon, 1998.

Interval	FLOW			VISIBILITY (cm)			Rsq
	Min	Max	Avg	Min	Max	Avg	
February	12,400	14,000	13,125.0	55.0	84.0	72.9	n/a
March	12,500	21,300	15,386.7	25.5	102.0	65.9	44.60%
April	9,460	17,900	12,887.9	29.5	129.5	80.9	61.23%
May	12,600	24,200	17,972.7	17.0	78.0	40.6	91.47%
June	14,800	21,200	18,167.9	20.0	81.5	47.6	52.99%
February-June	9,460	24,200	15,858.0	17.0	129.5	60.6	70.53%
July	13,500	16,500	14,596.2	9.5	47.5	24.3	3.07%
August	9,220	13,100	11,331.2	13.0	29.0	18.1	54.11%
July-August	9,220	16,500	13,305.3	9.5	47.5	21.9	2.10%
All	9,220	24,200	15,154.4	9.5	129.5	49.9	11.32%

Figure 8. Skagit River visibility and flow, 1998.

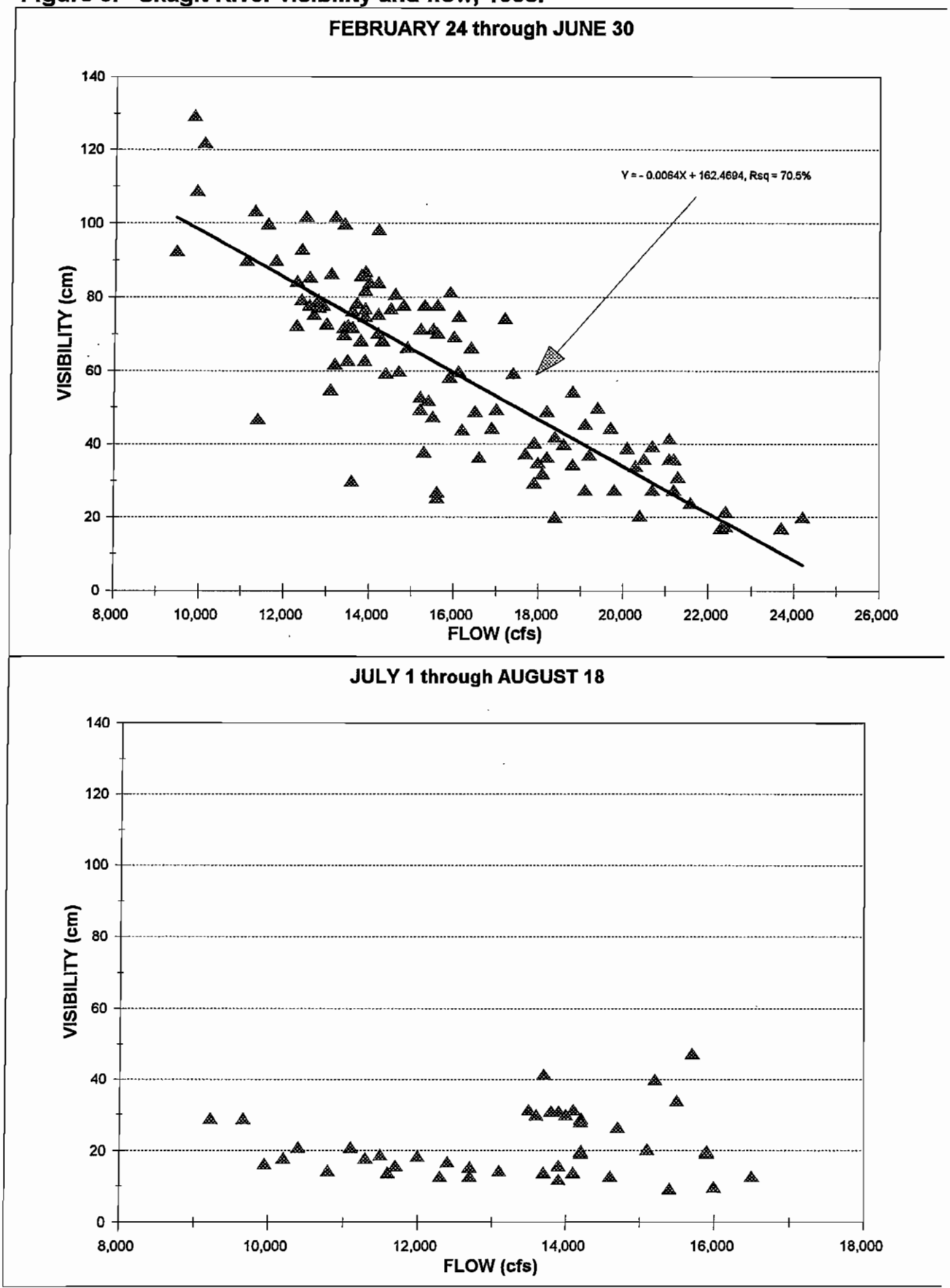


Figure 9. Day:Night wild chinook 0+ catch ratios and visibility, Skagit River mainstem traps, 1998.

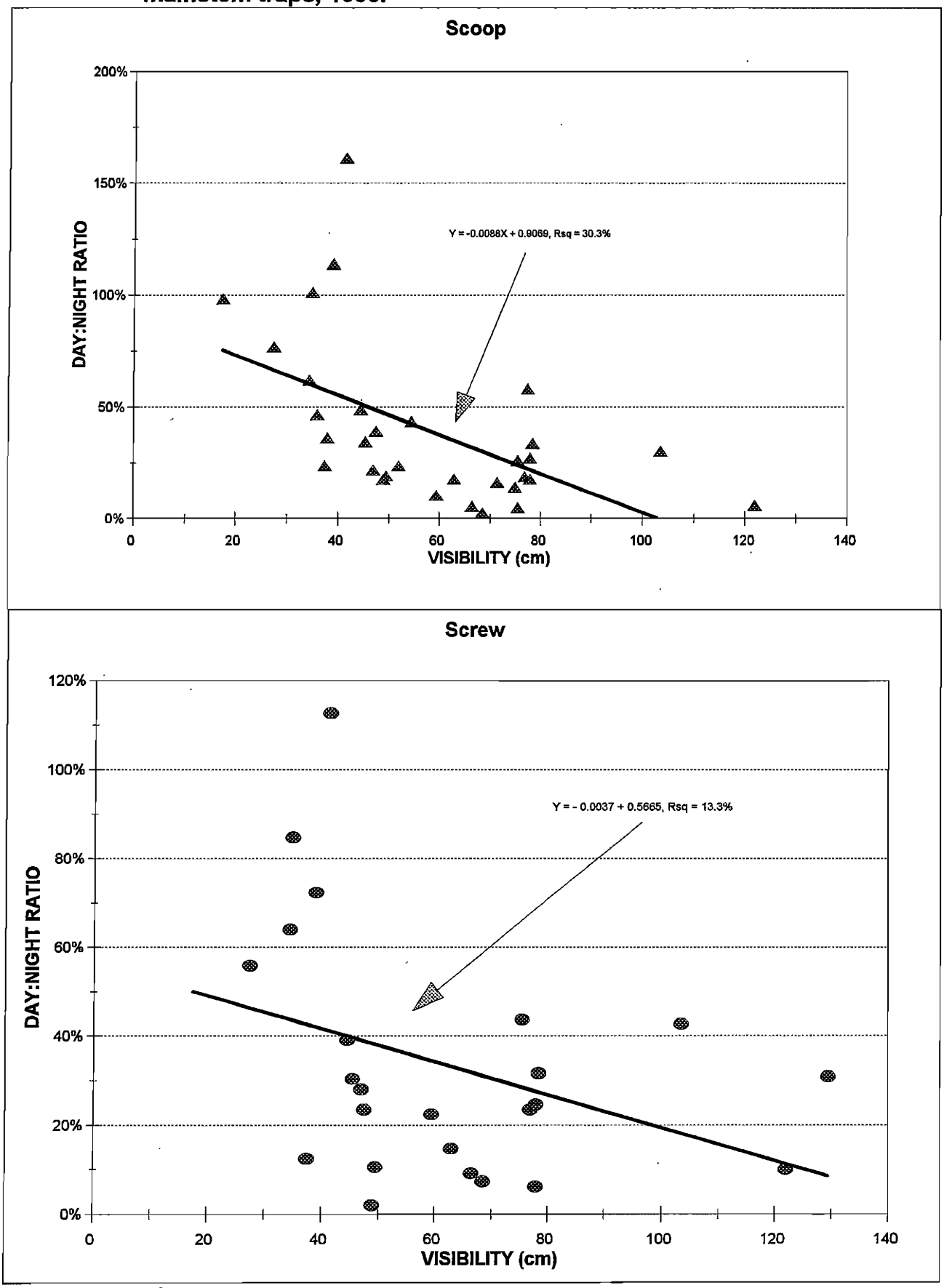


Table 7. Estimation of wild coho smolt production, Skagit River, 1998.

	Number	Formula
Total mainstem trap catches	24,546	
Baker River	[a]-603	
Skagit Hatchery/Lake Shannon	[b]-1,651	
Subtotal	-2,254	
Wild coho captured (c)	**22,292**	
LVs recaptured (r)	720	$N = \frac{(m+1)(c+1)}{(r+1)}$
LVs released (m)	55,227	
Total production (N)	**1,707,625**	
Variance (Var)	3.86e+09	$Var = \frac{(m+1)(c+1)(m-r)(c-r)}{(r+1)^2(r+1)}$
Standard deviation (sd)	62,149	
Coefficient of Var (CV)	3.64%	CV = sd ÷ N
Confidence interval (CI)	±121,812	CI = ± 1.96(sd)
Estimated coho production Skagit River	1,707,625	
Baker River	51,972	
Total Production	1,759,597	
Upper CI (95%)	1,829,437	
Lower CI (95%)	1,585,813	

[a] Estimated Baker recoveries: visually identified ad-marks (298) times the tag expansion factor (2.0229) = 603 total tagged and unmarked Baker River smolts in the catch.

[b] Hatchery ad-marked and unmarked smolt total from counts obtained by visual identification at trapping (1,638 Skagit hatchery + 13 brands from Baker Lake = 1,651).

Table 8. Breakdown of CWT recoveries from ad-marked chinook sacrificed at the Skagit River mainstem scoop and screw traps, 1998.

Date	Trap	NUMBER SAMPLED			63-02/15		63-61/31		21-30/02	
		Heads	No Tags	Tags	#	%	#	%	#	%
05/29	Scoop	1		1	1	100%		0%		0%
	Screw	4		4	1	25%		0%	3	75%
		5	0	5	2	40%	0	0%	3	60%
05/30	Scoop	3		3	1	33%		0%	2	67%
05/31	Scoop	4		4	1	25%		0%	3	75%
06/01	Scoop	37	5	32		0%		0%	32	100%
	Screw	16		16	1	6%		0%	15	94%
		53	5	48	1	2%	0	0%	47	98%
06/15	Scoop	13	1	12		0%		0%	12	100%
	Screw	6		6		0%		0%	6	100%
		19	1	18	0	0%	0	0%	18	100%
06/16	Scoop	18		18	15	83%	1	6%	2	11%
	Screw	5		5	3	60%	1	20%	1	20%
		23	0	23	18	78%	2	9%	3	13%
06/17	Scoop	14	1	13	10	77%	2	15%	1	8%
	Screw	4		4	1	25%	1	25%	2	50%
		18	1	17	11	65%	3	18%	3	18%
06/18	Scoop	4		4	2	50%	1	25%	1	25%
	Screw	3		3	3	100%		0%		0%
		7	0	7	5	71%	1	14%	1	14%
06/19	Scoop	11		11	6	55%		0%	5	45%
	Screw	3		3	1	33%		0%	2	67%
		14	0	14	7	50%	0	0%	7	50%
06/20	Scoop	3		3	2	67%		0%	1	33%
	Screw	1		1	1	100%		0%		0%
		4	0	4	3	75%	0	0%	1	25%
06/21	Scoop	11		11	6	55%	1	9%	4	36%
	Screw	3		3		0%		0%	3	100%
		14	0	14	6	43%	1	7%	7	50%
06/22	Scoop	17		17	9	53%		0%	8	47%
	Screw	4		4	3	75%		0%	1	25%
		21	0	21	12	57%	0	0%	9	43%
06/23	Scoop	34	1	33	26	79%	3	9%	4	12%
	Screw	14		14	12	86%	2	14%		0%
		48	1	47	38	81%	5	11%	4	9%
06/24	Scoop	54	2	52	41	79%	7	13%	4	8%
	Screw	21		21	17	81%	1	5%	3	14%
		75	2	73	58	79%	8	11%	7	10%
06/25	Scoop	10		10	8	80%		0%	2	20%
	Screw	4	1	3	1	33%	1	33%	1	33%
		14	1	13	9	69%	1	8%	3	23%
06/26	Scoop	8		8	6	75%	1	13%	1	13%
	Screw	3		3	1	33%		0%	2	67%
		11	0	11	7	64%	1	9%	3	27%
06/27	Scoop	4		4	4	100%		0%		0%
	Screw	1		1	1	100%		0%		0%
		5	0	5	5	100%	0	0%	0	0%
06/28	Scoop	1		1	1	100%		0%		0%
	Screw	1		1		0%		0%	1	100%
		2	0	2	1	50%	0	0%	1	50%
06/29	Scoop	1		1	1	100%		0%		0%

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Table 8. Breakdown of CWT recoveries from ad-marked chinook sacrificed at the Skagit River mainstem scoop and screw traps, 1998.

Date	Trap	NUMBER SAMPLED Heads	No Tags	Tags	63-02/15 #	%	63-61/31 #	%	21-30/02 #	%
06/30	Scoop	4		4	4	100%		0%		0%
	Screw	1		1	1	100%		0%		0%
		5	0	5	5	100%	0	0%	0	0%
07/01	Scoop	9		9	6	67%		0%	3	33%
	Screw	8		8	7	88%		0%	1	13%
		17	0	17	13	76%	0	0%	4	24%
07/02	Scoop	17		17	11	65%	2	12%	4	24%
	Screw	6		6	6	100%		0%		0%
		23	0	23	17	74%	2	9%	4	17%
07/03	Scoop	20		20	16	80%	2	10%	2	10%
	Screw	7	1	6	6	100%		0%		0%
		27	1	26	22	85%	2	8%	2	8%
07/04	Scoop	5		5	3	60%	1	20%	1	20%
	Screw	2		2	2	100%		0%		0%
		7	0	7	5	71%	1	14%	1	14%
07/05	Scoop	1		1	1	100%		0%		0%
	Screw	1		1	1	100%		0%		0%
		2	0	2	2	100%	0	0%	0	0%
07/06	Scoop	1		1	1	100%		0%		0%
07/07	Scoop	2		2	2	100%		0%		0%
07/08	Scoop	2		2	2	100%		0%		0%
	Screw	1		1	1	100%		0%		0%
		3	0	3	3	100%	0	0%	0	0%
07/09	Scoop	2		2	2	100%		0%		0%
	Screw	1		1	1	100%		0%		0%
		3	0	3	3	100%	0	0%	0	0%
07/10	Scoop	2		2	2	100%		0%		0%
07/12	Scoop	4		4	3	75%		0%	1	25%
	Screw	1		1	1	100%		0%		0%
		5	0	5	4	80%	0	0%	1	20%
07/13	Scoop	1		1	1	100%		0%		0%
07/14	Scoop	1		1	1	100%		0%		0%
07/14	Scoop	1		1	1	100%		0%		0%
07/16	Scoop	1		1	1	100%		0%		0%
07/17	Scoop	3		3	2	67%		0%	1	33%
	Screw	1		1	1	100%		0%		0%
		4	0	4	3	75%	0	0%	1	25%
07/18	Scoop	2		2	2	100%		0%		0%
07/19	Scoop	1		1	1	100%		0%		0%
07/20	Scoop	2		2	1	50%		0%	1	50%
	Screw	1		1	1	100%		0%		0%
		3	0	3	2	67%	0	0%	1	33%
07/22	Scoop	2		2	2	100%		0%		0%
Total		454	12	442	279	63%	27	6%	136	31%

Note: **Skagit Hatchery (spring)** 63-02/15
Skagit Hatchery (spring) 63-61/31
Countyline (summer) 21-30/02

Table 9. Estimated composition of actual and projected catches of ad-marked hatchery 0+ chinook, Skagit River mainstem traps, 1998.

Date	ADMKED CATCH			PROJECTED ADMKS			ADMK COMPOSITION			ESTIMATED ADMKS			
	Screw	Scoop	Total	Screw	Scoop	Total	Skagit Hatchery		Cntyline	Screw		Scoop	
							63-02/15	63-61/31	21-30/02	Sk-Hatch	Cntyline	Sk-Hatch	Cntyline
05/22	16	11	27				100%			16		11	
05/23		1	1				100%					1	
05/24		4	4		1		100%					5	
05/25	2	3	5			1	100%			2		3	
05/26	2	3	5	1	2		100%			3		5	
05/27	7	15	22	2	6	3	50%		50%	5	5	11	11
05/28		1	1	2	5	8	50%		50%	1	1	3	3
05/29	4	1	5			7	40%		60%	2	2	0	1
05/30		3	3	1	1		33%		67%	0	1	1	3
05/31		4	4		2	2	25%		75%			2	5
06/01	17	37	54			2	2%		98%	0	17	1	36
06/02	6	36	42	8	18				100%		14		54
06/03	34	47	81	11	31	26			100%		45		78
06/04	43	28	71			42			100%		43		28
06/05	35	96	131	3	1				100%		38		97
06/06	41	99	140		1	4			100%		41		100
06/07	53	84	137	19	44	1			100%		72		128
06/08	18	50	68	17	40	63			100%		35		90
06/09	34	69	103			57			100%		34		69
06/10	20	43	63	12	28				100%		32		71
06/11	20	42	62	10	30	40			100%		30		72
06/12	28	58	86			40			100%		28		58
06/13	30	79	109	13	40				100%		43		119
06/14	32	104	136	15	56	53			100%		47		160
06/15	69	155	224			71			100%		69		155
06/16	50	171	221	24	83		78%	9%	13%	64	10	221	33
06/17	33	133	166	17	78	107	65%	18%	18%	41	9	174	37
06/18	36	54	90			95	71%	14%	14%	31	5	46	8
06/19	32	104	136	17	49		50%		50%	25	25	77	77
06/20	10	32	42	11	45	66	75%		25%	16	5	58	19
06/21	28	111	139			56	43%	7%	50%	14	14	56	56
06/22	38	180	218	15	85		57%		43%	30	23	151	114
06/23	135	344	479	42	152	100	81%	11%	9%	162	15	454	42
06/24	420	1,071	1,491		9	194	79%	11%	10%	380	40	976	104
06/25	83	191	274	72	216	9	69%	8%	23%	119	36	313	94
06/26	32	79	111	29	88	288	64%	9%	27%	44	17	121	46
06/27	12	41	53		9	117	100%			12		50	

Table 9. Estimated composition of actual and projected catches of ad-marked hatchery 0+ chinook, Skagit River mainstem traps, 1998.

Date	ADMKED CATCH			PROJECTED ADMKS			ADMK COMPOSITION			ESTIMATED ADMKS			
	Screw	Scoop	Total	Screw	Scoop	Total	Skagit Hatchery		Cntyline	Screw		Scoop	
							63-02/15	63-61/31	21-30/02	Sk-Hatch	Cntyline	Sk-Hatch	Cntyline
06/28	7	16	23	5	16	9	50%		50%	6	6	16	16
06/29		10	10	2	9	21	100%			2		19	
06/30	6	41	47	2	17	11	100%			8		58	
07/01	150	584	734		2	19	76%		24%	115	35	448	138
07/02	115	341	456	58	232	2	74%	9%	17%	143	30	473	100
07/03	141	403	544		2	290	85%	8%	8%	130	11	374	31
07/04	41	102	143	33	124	2	71%	14%	14%	63	11	194	32
07/05	5	19	24	10	36	157	100%			15		55	
07/06	5	33	38			46	100%			5		33	
07/07	6	26	32	3	15		100%			9		41	
07/08	20	47	67	6	23	18	100%			26		70	
07/09	9	41	50			29	100%			9		41	
07/10	2	30	32	3	20		100%			5		50	
07/11	3	16	19	1	12	23	80%		20%	3	1	22	6
07/12	15	63	78			13	100%			15		63	
07/13	6	21	27	4	18		100%			10		39	
07/14	2	24	26	2	12	22	100%			4		36	
07/15	6	24	30			14	100%			6		24	
07/16	1	15	16	1	11		100%			2		26	
07/17	14	65	79	3	21	12	75%		25%	13	4	65	22
07/18	6	34	40			24	100%			6		34	
07/19	5	12	17	2	9		100%			7		21	
07/20	4	18	22	2	8	11	50%		50%	3	3	13	13
07/21	1	8	9			10	100%			1		8	
07/22	3	12	15	1	5		100%			4		17	
07/23	16	38	54	4	15	6	100%			20		53	
07/24	16	22	38	7	18	19	100%			23		40	
07/25		2	2			25	100%					2	
07/26	2	5	7		2		100%			2		7	
07/27	27	38	65	7	12	2	100%			34		50	
07/28	1	12	13			19	100%			1		12	
07/29	1	2	3		2		100%			1		4	
07/30					1	2	100%					1	
07/31	1		1			1	100%			1			
08/01		1	1				100%						
08/02							100%						
08/03							100%						

Table 9. Estimated composition of actual and projected catches of ad-marked hatchery 0+ chinook, Skagit River mainstem traps, 1998.

Date	ADMKED CATCH			PROJECTED ADMKS			ADMK COMPOSITION			ESTIMATED ADMKS			
	Screw	Scoop	Total	Screw	Scoop	Total	**Skagit Hatchery**		**Cntyline**	**Screw**		**Scoop**	
							63-02/15	63-61/31	21-30/02	Sk-Hatch	Cntyline	Sk-Hatch	Cntyline
08/04								100%					
08/05		1	1					100%					
08/06								100%					
08/07								100%					
08/08								100%					
08/09								100%					
08/10								100%					
08/11								100%					
08/12								100%					
08/13								100%					
08/14								100%					
08/15								100%					
08/16								100%					
08/17								100%					
08/18								100%					
08/19								100%					
08/20								100%					
08/21								100%					
08/22								100%					
08/23								100%					
08/24								100%					
08/25								100%					
Season	2,057	5,710	7,767	497	1,762	2,259				1,659	895	5,148	2,322

Note: For May 22-26, we assumed that all ad-marks were from the Skagit Hatchery fish we released on May 22 for trap calibration. Countyline Pond chinook were released beginning May 26. Sampling for tags did not begin until May 29. For May 27-28, we assumed that the ad-mark composition was 50:50 Skagit Hatchery:Countyline Ponds.

Table 10. Estimated capture rates of various groups of marked salmon smolts, Skagit River mainstem traps, 1998.

Stock	Species	Age	Mark	RELEASE		PROJECTED CATCH			ESTIMATED RECOVERY		
				Date	Number	Scoop	Screw	Total	Scoop	Screw	Total
Wild	Coho	1+	LV	March-June	55,227	475	380	855	0.9%	0.7%	1.5%
Hatchery/Spring	Chinook	0+	AD/CWT	May 22, 0800 hrs	2,500	43	29	72	1.7%	1.2%	2.9%
Hatchery/Spring	Chinook	0+	AD/LV	May 22, 2030 hrs	2,506	36	31	67	1.4%	1.2%	2.7%
Hatchery/Spring	Chinook	0+	AD/UC	June 4, 0800 hrs	2,170	48	11	59	2.2%	0.5%	2.7%
Hatchery/Spring	Chinook	0+	AD/LC	June 4, 2030 hrs	2,236	44	31	75	2.0%	1.4%	3.4%
Hatchery/Summer	Chinook	0+	AD/CWT	May 26-30	202,211	2,322	895	3,217	1.1%	0.4%	1.6%
Hatchery/Spring	Chinook	0+	AD/CWT	June 15, 0900 hrs	263,017	5,105	1,630	6,735	1.9%	0.6%	2.6%
Wild	Pink	0+	dye	April 22, 2130 hrs	3,078	24	13	37	0.8%	0.4%	1.2%
Hatchery	Chum	0+	dye	May 22, 0930 hrs	3,000	76	23	99	2.5%	0.8%	3.3%

Table 11a. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCOOP trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
01/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
01/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	4	21
01/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	17
01/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	5	26
01/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	19
01/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	14	106
01/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	1	216
01/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	126	61	187
01/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	0	74
01/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	16	94
01/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	14	55
01/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28
01/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112	16	128
01/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	25	84
02/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0	31
02/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	4	22
02/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	13
02/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14
02/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	19
02/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	3	17
02/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	23
02/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	5	58
02/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	10	61
02/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	38
02/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4	18
02/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	1	104
02/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	234	54	288
02/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	0	123
02/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	19	111
02/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	2	58
02/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	6	48
02/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	4	39
02/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	2	57
02/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	8	58
02/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	475	47	522
02/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	232	2	234
02/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	136	26	162
02/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	115	19	134
02/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	0	228
02/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	25	145
02/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	19	101
02/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124	14	138
03/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	303	30	333
03/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	480	2	482
03/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222	78	300
03/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	259	2	261
03/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	197	48	245
03/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174	4	178
03/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	12	57
03/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	7	47
03/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	9	81
03/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	59
03/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	11	85
03/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	10	28
03/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	8	49
03/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	11	64
03/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168	0	168
03/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	48	256
03/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	42	196
03/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	1	147
03/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	23	116
03/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	15	80

Table 11a. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCOOP trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
03/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	4	141
03/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,037	291	2,328
03/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,261	877	2,138
03/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	738	645	1,383
03/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	585	8	593
03/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	276	121	397
03/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	311	4	315
03/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	53	193
03/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	4	117
03/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	24	116
03/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	0	123
04/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	21	79
04/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	47
04/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	8	27
04/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0	57
04/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	13	61
04/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54
04/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	37
04/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	16	80
04/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	1	35
04/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	9	41
04/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	12	73
04/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	66
04/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	16	121
04/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	1	49
04/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	7	31
04/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	9	54
04/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	29
04/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	2	31
04/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	3	27
04/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	17
04/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	17
04/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	4	39
04/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	820	3	823
04/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	642	530	1,172
04/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181	184	365
04/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	194	2	196
04/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	17	69
04/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	17	84
04/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	197	9	206
04/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	873	280	1,153
05/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	464	590	1,054
05/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	560	594	1,154
05/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	413	394	807
05/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	570	519	1,089
05/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	314	435
05/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,171	15	1,186
05/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	254	288	542
05/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	207	306
05/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	469	15	484
05/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	71	147
05/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	126	59	185
05/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	2	132
05/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176	216	392
05/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	307	247	554
05/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	120	248
05/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	109	2	111
05/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	30	111
05/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	34	96
05/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	55
05/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	54	257
05/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	275	111	386

Table 11a. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCOOP trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
05/22/98	11	0	11	32	0	32	0	0	0	0	0	0	43	0	43	259	1	260
05/23/98	1	0	1	1	0	1	0	0	0	0	0	0	2	0	2	129	0	129
05/24/98	4	1	5	1	0	1	0	0	0	0	0	0	5	1	6	69	29	98
05/25/98	3	0	3	2	0	2	0	0	0	0	0	0	5	0	5	341	18	359
05/26/98	3	2	5	0	0	0	0	0	0	0	0	0	3	2	5	143	159	302
05/27/98	15	6	21	0	0	0	0	0	0	0	0	0	15	6	21	307	176	483
05/28/98	1	5	6	0	0	0	0	0	0	0	0	0	1	5	6	75	137	212
05/29/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	184	3	187
05/30/98	3	1	4	0	0	0	0	0	0	0	0	0	3	1	4	35	40	75
05/31/98	4	2	6	0	0	0	0	0	0	0	0	0	4	2	6	62	20	82
06/01/98	37	0	37	0	0	0	0	0	0	0	0	0	37	0	37	395	7	402
06/02/98	36	18	54	0	0	0	0	0	0	0	0	0	36	18	54	298	308	606
06/03/98	47	31	78	0	0	0	0	0	0	0	0	0	47	31	78	131	234	365
06/04/98	28	0	28	0	0	0	36	0	36	38	0	38	102	0	102	608	10	618
06/05/98	96	1	97	0	0	0	1	0	1	3	0	3	100	1	101	521	12	533
06/06/98	99	1	100	0	0	0	1	0	1	0	0	0	100	1	101	473	12	485
06/07/98	84	44	128	0	0	0	0	0	0	0	0	0	84	44	128	252	221	473
06/08/98	50	40	90	0	0	0	0	0	0	0	0	0	50	40	90	233	253	486
06/09/98	69	0	69	0	0	0	0	0	0	0	0	0	69	0	69	410	7	417
06/10/98	43	28	71	0	0	0	0	0	0	0	0	0	43	28	71	97	126	223
06/11/98	42	30	72	0	0	0	0	0	0	0	0	0	42	30	72	54	90	144
06/12/98	58	0	58	0	0	0	1	0	1	0	0	0	59	0	59	159	4	163
06/13/98	79	40	119	0	0	0	0	0	0	0	0	0	79	40	119	83	92	175
06/14/98	104	56	160	0	0	0	0	0	0	1	0	1	105	56	161	117	88	205
06/15/98	155	0	155	0	0	0	0	0	0	0	0	0	155	0	155	233	0	233
06/16/98	171	83	254	0	0	0	0	0	0	0	0	0	171	83	254	167	144	311
06/17/98	133	78	211	0	0	0	0	0	0	0	0	0	133	78	211	84	80	164
06/18/98	54	0	54	0	0	0	0	0	0	0	0	0	54	0	54	88	0	88
06/19/98	104	49	153	0	0	0	0	0	0	0	0	0	104	49	153	65	47	112
06/20/98	32	45	77	0	0	0	0	0	0	0	0	0	32	45	77	52	40	92
06/21/98	111	0	111	0	0	0	0	0	0	0	0	0	111	0	111	76	0	76
06/22/98	180	85	265	0	0	0	0	0	0	0	0	0	180	85	265	146	82	228
06/23/98	344	152	496	0	0	0	0	0	0	0	0	0	344	152	496	232	155	387
06/24/98	1,071	9	1,080	0	0	0	5	0	5	1	0	1	1,077	9	1,086	811	7	818
06/25/98	191	216	407	0	0	0	0	0	0	0	0	0	191	216	407	215	261	476
06/26/98	79	88	167	0	0	0	0	0	0	0	0	0	79	88	167	78	132	210
06/27/98	41	9	50	0	0	0	0	0	0	0	0	0	41	9	50	62	7	69
06/28/98	16	16	32	0	0	0	0	0	0	0	0	0	16	16	32	27	26	53
06/29/98	10	9	19	0	0	0	0	0	0	0	0	0	10	9	19	31	22	53
06/30/98	41	17	58	0	0	0	0	0	0	0	0	0	41	17	58	42	24	66
07/01/98	584	2	586	0	0	0	2	0	2	1	0	1	587	2	589	562	4	566
07/02/98	341	232	573	0	0	0	0	1	1	0	0	0	341	233	574	384	247	631
07/03/98	403	2	405	0	0	0	1	0	1	0	0	0	404	2	406	473	4	477
07/04/98	102	124	226	0	0	0	0	0	0	0	0	0	102	124	226	178	167	345
07/05/98	19	36	55	0	0	0	0	0	0	0	0	0	19	36	55	36	61	97
07/06/98	33	0	33	0	0	0	0	0	0	0	0	0	33	0	33	57	0	57
07/07/98	26	15	41	0	0	0	0	0	0	0	0	0	26	15	41	39	20	59
07/08/98	47	23	70	0	0	0	0	0	0	0	0	0	47	23	70	87	31	118
07/09/98	41	0	41	0	0	0	0	0	0	0	0	0	41	0	41	91	0	91
07/10/98	30	20	50	0	0	0	0	0	0	0	0	0	30	20	50	47	30	77
07/11/98	16	12	28	0	0	0	0	0	0	0	0	0	16	12	28	41	19	60
07/12/98	63	0	63	0	0	0	0	0	0	0	0	0	63	0	63	123	0	123
07/13/98	21	18	39	0	0	0	0	0	0	0	0	0	21	18	39	59	32	91
07/14/98	24	12	36	0	0	0	0	0	0	0	0	0	24	12	36	62	26	88
07/15/98	24	0	24	0	0	0	0	0	0	0	0	0	24	0	24	121	0	121
07/16/98	15	11	26	0	0	0	0	0	0	0	0	0	15	11	26	57	50	107
07/17/98	65	21	86	0	0	0	0	0	0	0	0	0	65	21	86	192	71	263
07/18/98	34	0	34	0	0	0	0	0	0	0	0	0	34	0	34	130	0	130
07/19/98	12	9	21	0	0	0	0	0	0	0	0	0	12	9	21	26	25	51
07/20/98	18	8	26	0	0	0	0	0	0	0	0	0	18	8	26	43	16	59
07/21/98	8	0	8	0	0	0	0	0	0	0	0	0	8	0	8	30	0	30
07/22/98	12	5	17	0	0	0	0	0	0	0	0	0	12	5	17	37	14	51

Table 11a. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCOOP trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
07/23/98	38	15	53	0	0	0	0	0	0	0	0	0	38	15	53	113	32	145
07/24/98	22	18	40	0	0	0	0	0	0	0	0	0	22	18	40	108	54	162
07/25/98	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2	30	0	30
07/26/98	5	2	7	0	0	0	0	0	0	0	0	0	5	2	7	28	10	38
07/27/98	38	12	50	0	0	0	0	0	0	0	0	0	38	12	50	339	94	433
07/28/98	12	0	12	0	0	0	0	0	0	0	0	0	12	0	12	126	0	126
07/29/98	2	2	4	0	0	0	0	0	0	0	0	0	2	2	4	44	35	79
07/30/98	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	31	17	48
07/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	22
08/01/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	11	3	14
08/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6
08/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10
08/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	4	22
08/05/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	21	7	28
08/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	30
08/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	7
08/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
08/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
08/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
08/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
08/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
08/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	7
08/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
08/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
08/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
08/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
09/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
TOTAL	5,710	1,762	7,472	36	0	36	47	1	48	44	0	44	5,837	1,763	7,600	33,698	12,027	45,725

Table 11b. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCREW trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
01/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	26
01/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	3	21
01/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	18
01/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	2	15
01/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	27
01/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	11	122
01/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	0	185
01/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	22	126
01/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	62
01/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	8	74
01/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	9	51
01/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28
01/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	9	107
01/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	16	70
02/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	29
02/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	4	26
02/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	15
02/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
02/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	17
02/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	15
02/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	21
02/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	4	41
02/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	7	45
02/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	36
02/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	4	17
02/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	0	107
02/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207	35	242
02/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	122	0	122
02/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	16	84
02/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54
02/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	7	43
02/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	6	35
02/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	47
02/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	11	60
02/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	420	50	470
02/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209	0	209
02/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	28	123
02/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	18	112
02/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	179	0	179
02/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	29	121
02/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	24	100
02/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	20	118
03/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236	32	268
03/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	487	0	487
03/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	71	284
03/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	209	0	209
03/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243	49	292
03/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	0	215
03/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	23	71
03/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	10	47
03/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	15	90
03/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	55
03/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	14	78
03/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	12	27
03/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	8	47
03/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	11	62
03/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	165	0	165
03/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	164	36	200
03/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129	33	162
03/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	151
03/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	28	96

Table 11b. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCREW trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
03/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	15	65
03/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	1	99
03/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,569	210	1,779
03/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	829	370	1,199
03/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	498	188	686
03/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330	0	330
03/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	49	233
03/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	272	0	272
03/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	138	40	178
03/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	85
03/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	20	73
03/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	55
04/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	15	70
04/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0	44
04/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	9	27
04/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	34
04/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	9	36
04/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0	44
04/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	16
04/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	9	42
04/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	5	31
04/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	10	31
04/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	14	50
04/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	42
04/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	16	66
04/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	40
04/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	7	18
04/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	7	30
04/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	16
04/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	5	18
04/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	5	16
04/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3	12
04/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
04/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	5	16
04/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	430	0	430
04/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	456
04/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	81
04/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	43
04/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	56
04/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	111
04/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	0	102
04/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	460	139	599
05/01/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	237	197	434
05/02/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	746	746
05/03/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	270	24	294
05/04/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	116	301
05/05/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	278	166	444
05/06/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	787	0	787
05/07/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	107	315
05/08/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	92	172
05/09/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220	0	220
05/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	18	34
05/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	20	74
05/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	60
05/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	89	230
05/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	274	131	405
05/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	67	164
05/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	0	43
05/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	14	39
05/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	16	43
05/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	21

Table 11b. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCREW trap 1998.

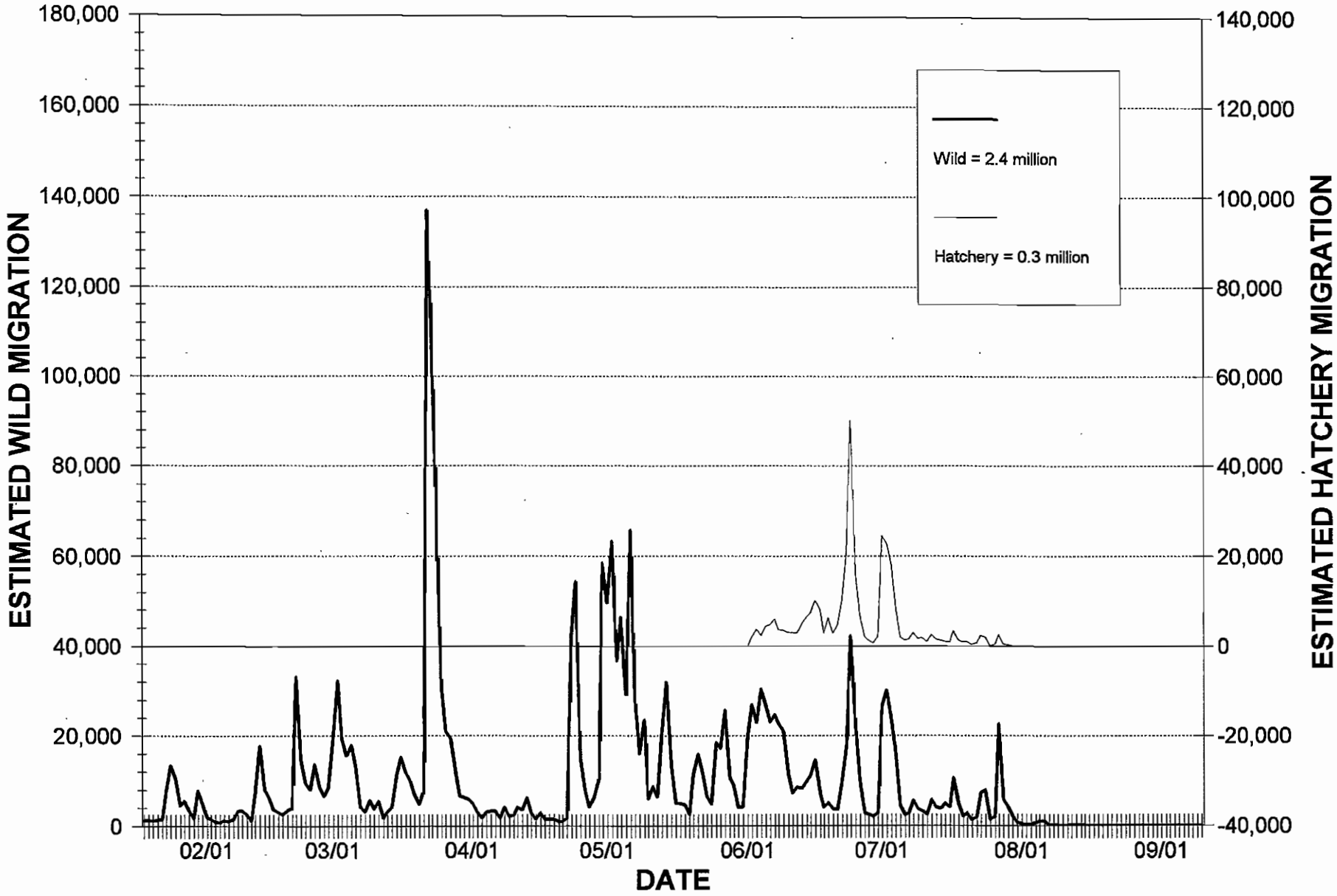
Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
05/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	21	78
05/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	32	91
05/22/98	16	0	16	20	0	20	0	0	0	0	0	0	36	0	36	85	0	85
05/23/98	0	0	0	4	0	4	0	0	0	0	0	0	4	0	4	67	0	67
05/24/98	0	0	0	1	1	2	0	0	0	0	0	0	1	1	2	24	24	48
05/25/98	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2	188	8	196
05/26/98	2	1	3	1	0	1	0	0	0	0	0	0	3	1	4	110	103	213
05/27/98	7	2	9	2	1	3	0	0	0	0	0	0	9	3	12	182	102	284
05/28/98	0	2	2	0	1	1	0	0	0	0	0	0	0	3	3	34	74	108
05/29/98	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	80	0	80
05/30/98	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	15	28	43
05/31/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	15	44
06/01/98	17	0	17	0	0	0	0	0	0	0	0	0	17	0	17	191	0	191
06/02/98	6	8	14	0	0	0	0	0	0	0	0	0	6	8	14	77	121	198
06/03/98	34	11	45	0	0	0	0	0	0	0	0	0	34	11	45	220	106	326
06/04/98	43	0	43	0	0	0	3	0	3	29	0	29	75	0	75	292	0	292
06/05/98	35	3	38	0	0	0	1	0	1	1	0	1	37	3	40	253	23	276
06/06/98	41	0	41	0	0	0	0	0	0	0	0	0	41	0	41	207	0	207
06/07/98	53	19	72	0	0	0	0	0	0	0	0	0	53	19	72	175	91	266
06/08/98	18	17	35	0	0	0	0	0	0	0	0	0	18	17	35	107	88	195
06/09/98	34	0	34	0	0	0	1	0	1	0	0	0	35	0	35	213	0	213
06/10/98	20	12	32	0	0	0	0	0	0	0	0	0	20	12	32	71	54	125
06/11/98	20	10	30	0	0	0	0	0	0	0	0	0	20	10	30	37	37	74
06/12/98	28	0	28	0	0	0	1	0	1	0	0	0	29	0	29	91	0	91
06/13/98	30	13	43	0	0	0	0	0	0	0	0	0	30	13	43	44	33	77
06/14/98	32	15	47	0	0	0	0	0	0	0	0	0	32	15	47	58	33	91
06/15/98	69	0	69	0	0	0	0	0	0	0	0	0	69	0	69	104	0	104
06/16/98	50	24	74	0	0	0	0	0	0	0	0	0	50	24	74	80	45	125
06/17/98	33	17	50	0	0	0	0	0	0	0	0	0	33	17	50	26	28	54
06/18/98	36	0	36	0	0	0	0	0	0	0	0	0	36	0	36	35	0	35
06/19/98	32	17	49	0	0	0	0	0	0	0	0	0	32	17	49	23	19	42
06/20/98	10	11	21	0	0	0	0	0	0	0	0	0	10	11	21	12	11	23
06/21/98	28	0	28	0	0	0	0	0	0	0	0	0	28	0	28	31	0	31
06/22/98	38	15	53	0	0	0	0	0	0	0	0	0	38	15	53	45	22	67
06/23/98	135	42	177	0	0	0	0	0	0	0	0	0	135	42	177	95	44	139
06/24/98	420	0	420	0	0	0	0	0	0	0	0	0	420	0	420	447	0	447
06/25/98	83	72	155	0	0	0	0	0	0	0	0	0	83	72	155	101	100	201
06/26/98	32	29	61	0	0	0	0	0	0	0	0	0	32	29	61	36	45	81
06/27/98	12	0	12	0	0	0	0	0	0	0	0	0	12	0	12	18	0	18
06/28/98	7	5	12	0	0	0	0	0	0	0	0	0	7	5	12	13	9	22
06/29/98	0	2	2	0	0	0	0	0	0	0	0	0	0	2	2	5	6	11
06/30/98	6	2	8	0	0	0	0	0	0	0	0	0	6	2	8	10	5	15
07/01/98	150	0	150	0	0	0	0	0	0	0	0	0	150	0	150	230	0	230
07/02/98	115	58	173	0	0	0	2	0	2	1	0	1	118	58	176	162	109	271
07/03/98	141	0	141	0	0	0	2	0	2	0	0	0	143	0	143	230	0	230
07/04/98	41	33	74	0	0	0	1	0	1	0	0	0	42	33	75	79	69	148
07/05/98	5	10	15	0	0	0	0	0	0	0	0	0	5	10	15	12	27	39
07/06/98	5	0	5	0	0	0	0	0	0	0	0	0	5	0	5	15	0	15
07/07/98	6	3	9	0	0	0	0	0	0	0	0	0	6	3	9	15	9	24
07/08/98	20	6	26	0	0	0	0	0	0	0	0	0	20	6	26	34	16	50
07/09/98	9	0	9	0	0	0	0	0	0	0	0	0	9	0	9	25	0	25
07/10/98	2	3	5	0	0	0	0	0	0	0	0	0	2	3	5	12	9	21
07/11/98	3	1	4	0	0	0	0	0	0	0	0	0	3	1	4	10	6	16
07/12/98	15	0	15	0	0	0	0	0	0	0	0	0	15	0	15	47	0	47
07/13/98	6	4	10	0	0	0	0	0	0	0	0	0	6	4	10	18	14	32
07/14/98	2	2	4	0	0	0	0	0	0	0	0	0	2	2	4	18	10	28
07/15/98	6	0	6	0	0	0	0	0	0	0	0	0	6	0	6	29	0	29
07/16/98	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2	7	9	16
07/17/98	14	3	17	0	0	0	0	0	0	0	0	0	14	3	17	39	13	52
07/18/98	6	0	6	0	0	0	0	0	0	0	0	0	6	0	6	19	0	19
07/19/98	5	2	7	0	0	0	0	0	0	0	0	0	5	2	7	8	6	14

Table 11b. Actual and projected wild and hatchery zero-age chinook catches, Skagit River SCREW trap 1998.

Date	HAD/CWT			AD/LV			AD/UC			AD/LC			TOTAL HATCH			WILD		
	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot	Act	Est	Tot
07/20/98	4	2	6	0	0	0	0	0	0	0	0	0	4	2	6	16	7	23
07/21/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	7	0	7
07/22/98	3	1	4	0	0	0	0	0	0	0	0	0	3	1	4	5	3	8
07/23/98	16	4	20	0	0	0	0	0	0	0	0	0	16	4	20	55	17	72
07/24/98	16	7	23	0	0	0	0	0	0	0	0	0	16	7	23	44	29	73
07/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
07/26/98	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2	15	7	22
07/27/98	27	7	34	0	0	0	0	0	0	0	0	0	27	7	34	185	58	243
07/28/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	52	0	52
07/29/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	29	19	48
07/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	11	21
07/31/98	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3
TOTAL	2,057	497	2,554	28	3	31	11	0	11	31	0	31	2,127	500	2,627	20,001	6,167	26,168

Figure 10.

ESTIMATED WILD AND HATCHERY MIGRATION AGE 0+ CHINOOK, SKAGIT RIVER 1998



D:\Datafile\CHINOOK\SKAGIT\1998\projchin.wb3 (org. 04/20/99)

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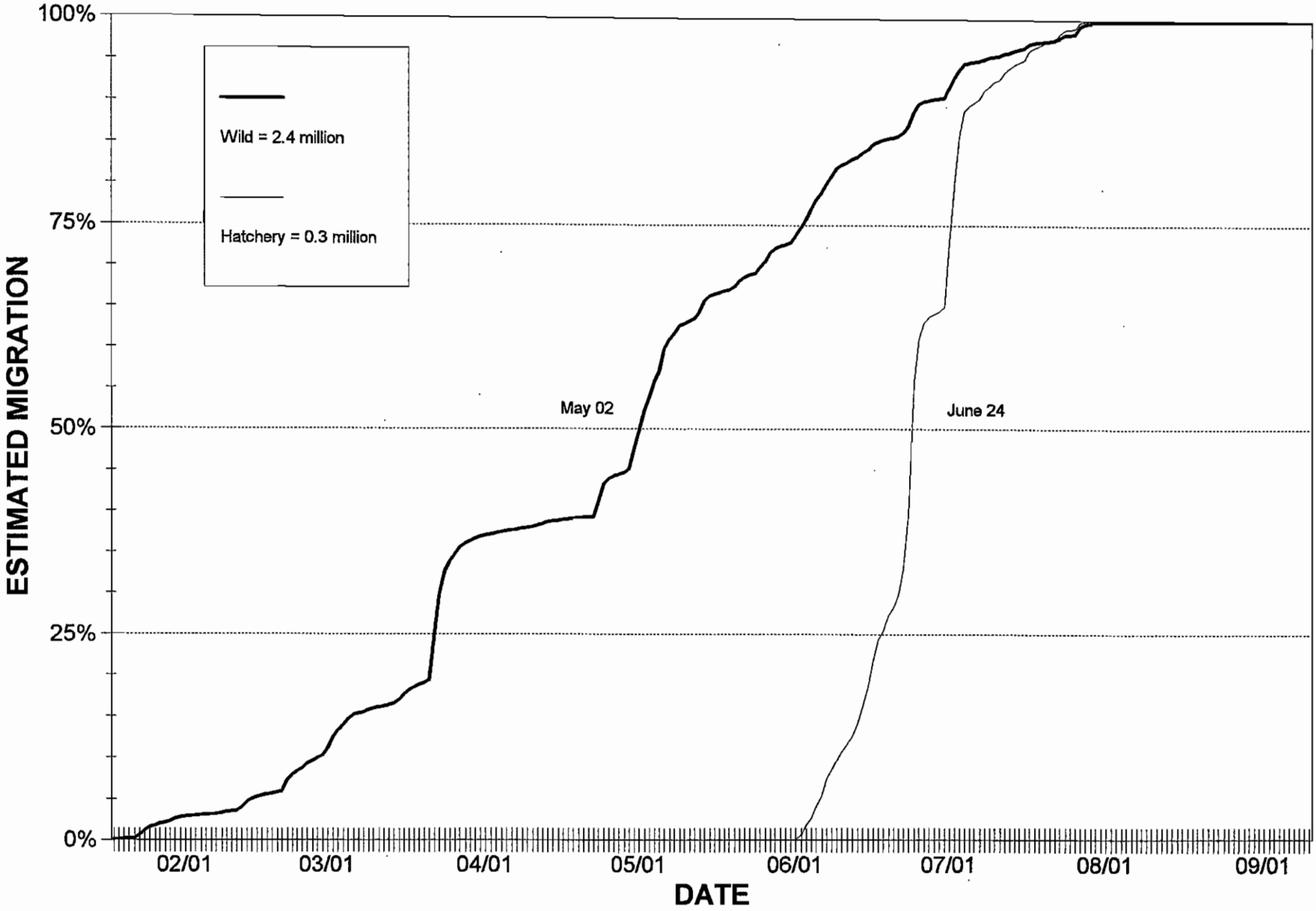
Figure 11.

WILD AND HATCHERY CHINOOK 0+ MIGRATION TIMING, SKAGIT RIVER 1998



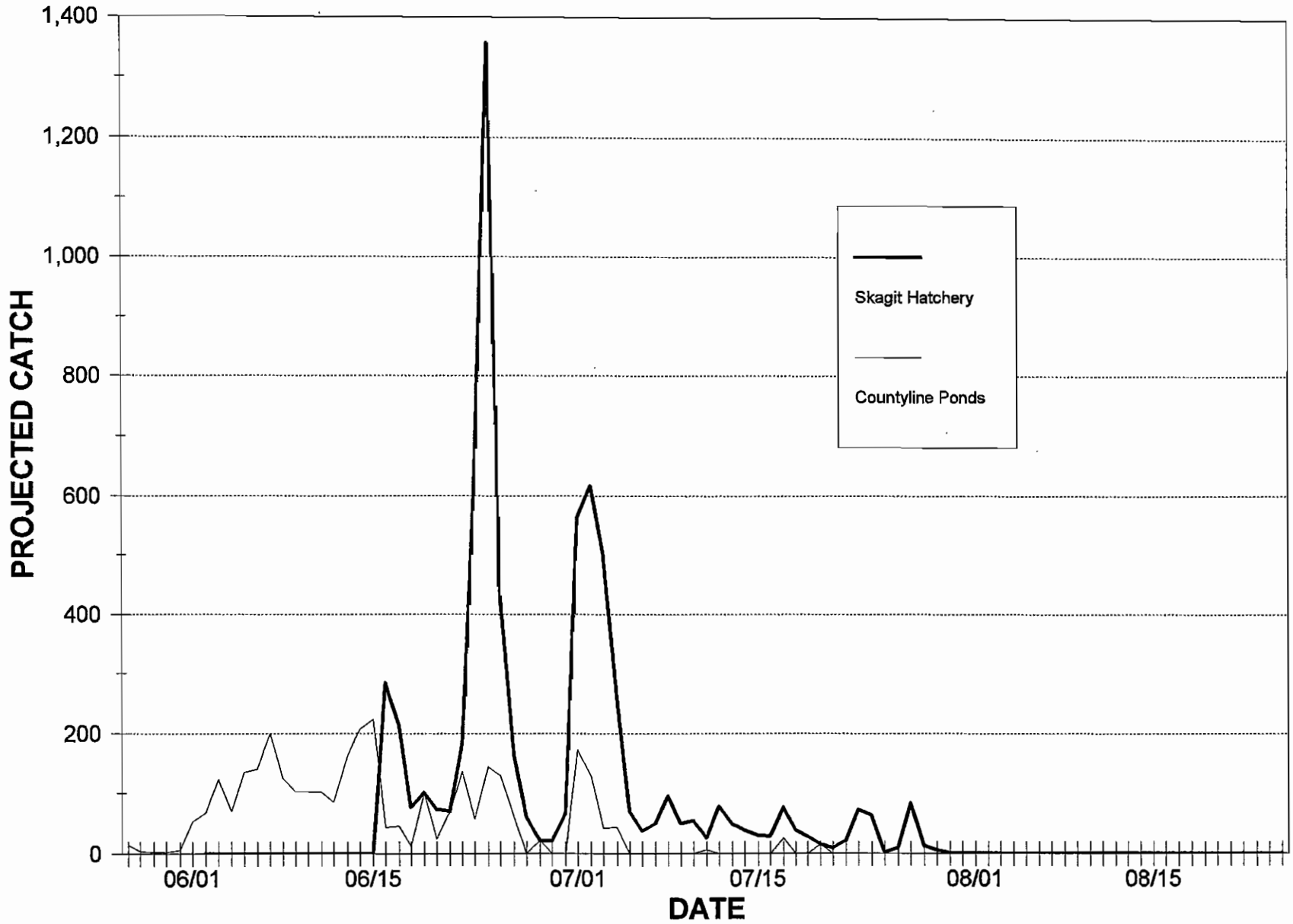


Figure 12. Estimated catches of two groups of hatchery chinook, Skagit River, 1998.

Table 12. Summary of size information for wild 0+ chinook, Skagit River mainstem traps, 1998.

STAT WEEK			SCOOP TRAP					SCREW TRAP				
No.	Begin	End	Avg	s.d.	Range Min	Range Max	n	Avg	s.d.	Range Min	Range Max	n
4	01/19	01/25	39.0	2.63	34	46	26	37.8	1.86	34	41	39
5	01/26	02/01	37.5	1.74	34	41	24	38.0	1.45	35	41	28
6	02/02	02/08	38.6	1.50	36	41	11	37.6	1.75	35	40	11
7	02/09	02/15										
8	02/16	02/22	38.8	1.05	37	41	14	39.8	2.03	36	43	13
9	02/23	03/01	38.3	2.29	35	43	20	39.5	2.23	35	43	21
10	03/02	03/08										
11	03/09	03/15	39.8	1.74	36	44	30	40.4	2.18	36	46	30
12	03/16	03/22	39.8	3.32	35	56	51	40.4	3.40	36	55	50
13	03/23	03/29	40.8	3.83	34	66	93	40.3	2.94	34	48	83
14	03/30	04/05	41.0	3.95	35	55	60	42.2	6.18	34	63	49
15	04/06	04/12										
16	04/13	04/19	41.9	7.21	35	64	65	41.0	6.49	35	60	50
17	04/20	04/26	52.7	10.00	33	75	62	53.8	11.39	38	80	13
18	04/27	05/03	53.3	8.62	34	79	94	56.6	6.50	42	72	30
19	05/04	05/10	53.8	8.86	34	74	88	57.2	6.51	39	74	90
20	05/11	05/17	56.8	7.21	41	72	152	60.1	7.59	37	80	108
21	05/18	05/24	60.9	7.35	43	80	131	61.0	6.23	47	73	85
22	05/25	05/31	60.4	7.29	39	75	146	60.5	7.48	44	82	130
23	06/01	06/07	63.9	8.48	45	86	143	65.7	7.03	51	85	75
24	06/08	06/14	66.0	8.41	42	86	145	66.4	7.77	51	85	100
25	06/15	06/21	68.5	6.98	56	84	30	67.3	8.43	51	90	20
26	06/22	06/28	72.5	6.87	57	90	80	72.6	9.13	57	96	50
27	06/29	07/05	77.9	6.80	59	92	60	79.2	8.97	62	100	60
28	07/06	07/12	79.3	6.49	65	92	56	75.7	9.36	60	95	23
29	07/13	07/19	85.8	7.38	72	108	50	81.4	8.43	55	99	35
30	07/20	07/26										
31	07/27	08/02	90.1	7.72	74	107	50	90.8	10.42	52	119	50
32	08/03	08/09										
33	08/10	08/16	90.6	11.53	59	105	14					
34	08/17	08/18	92.5	3.54	90	95	2					
Total					33	108	1,697			34	119	1,243

Figure 13. **WEEKLY RANGE AND MEAN FORK LENGTHS WILD 0+ CHINOOK, SKAGIT RIVER 1998**

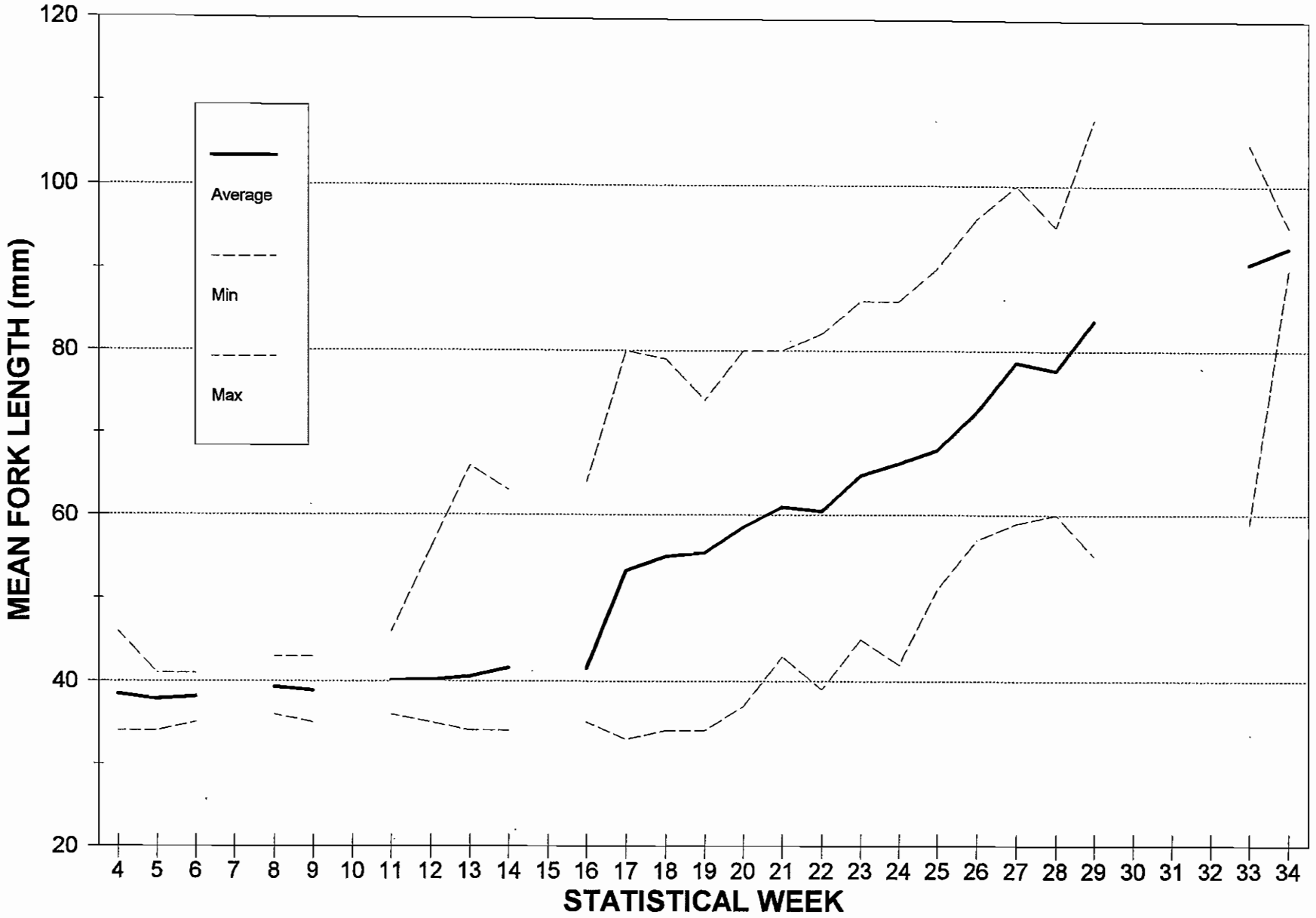


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Figure 14. COMPARISON OF WEEKLY MEAN SIZE BY TRAP, SKAGIT RIVER 0+ CHINOOK, 1998

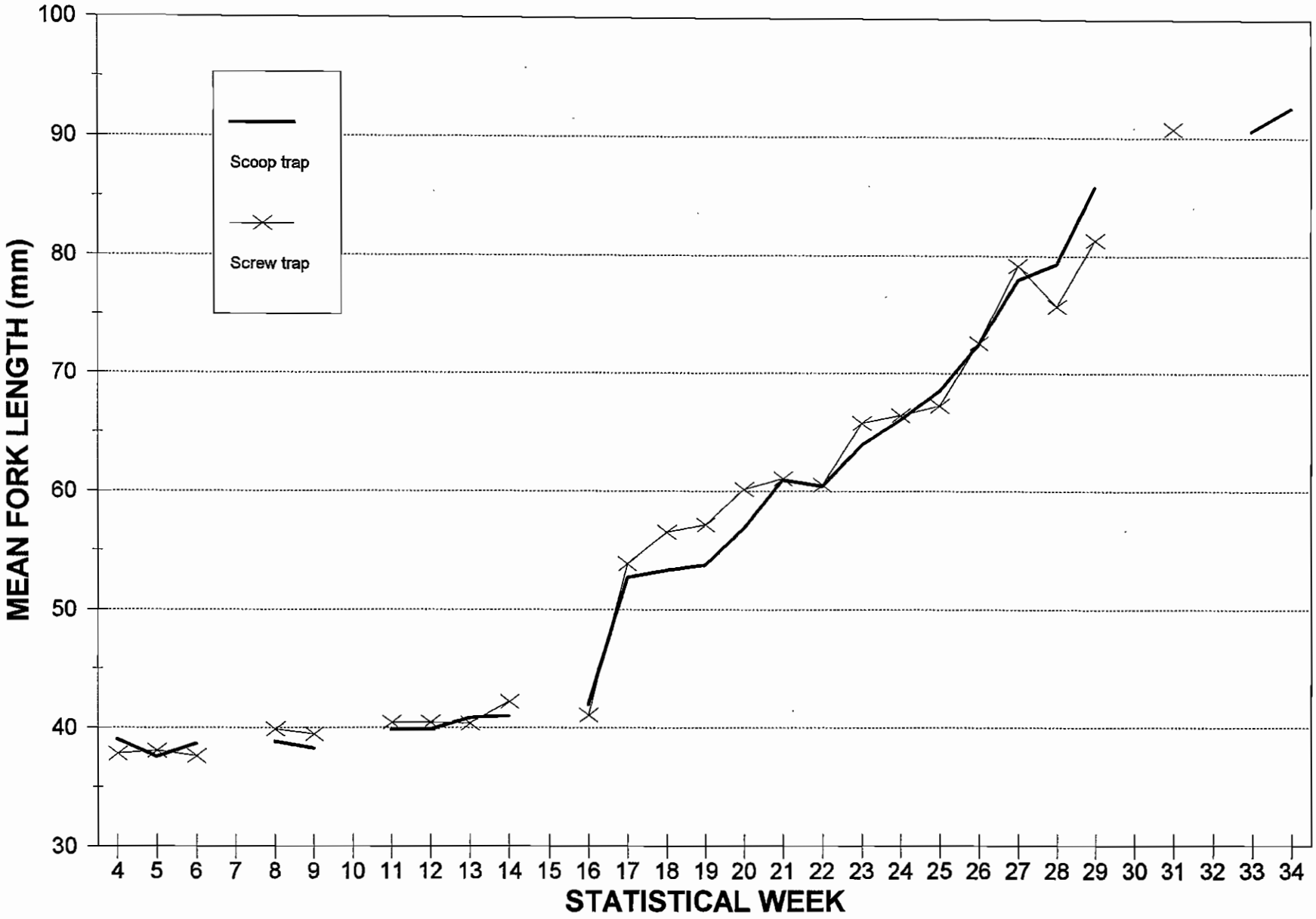

Figure 15.

WILD CHINOOK 0+ MIGRATION TIMING
SKAGIT RIVER 1997-1998

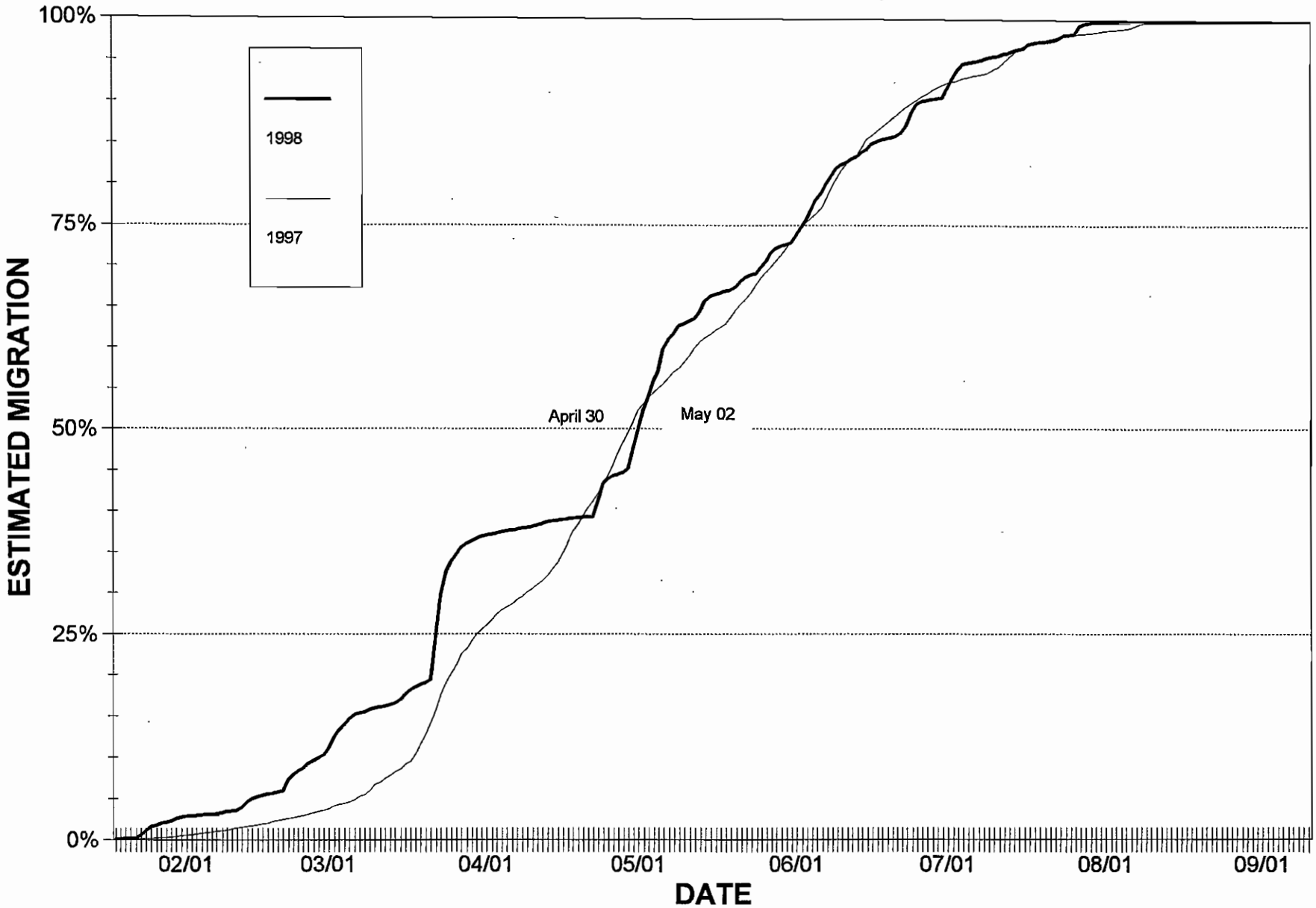

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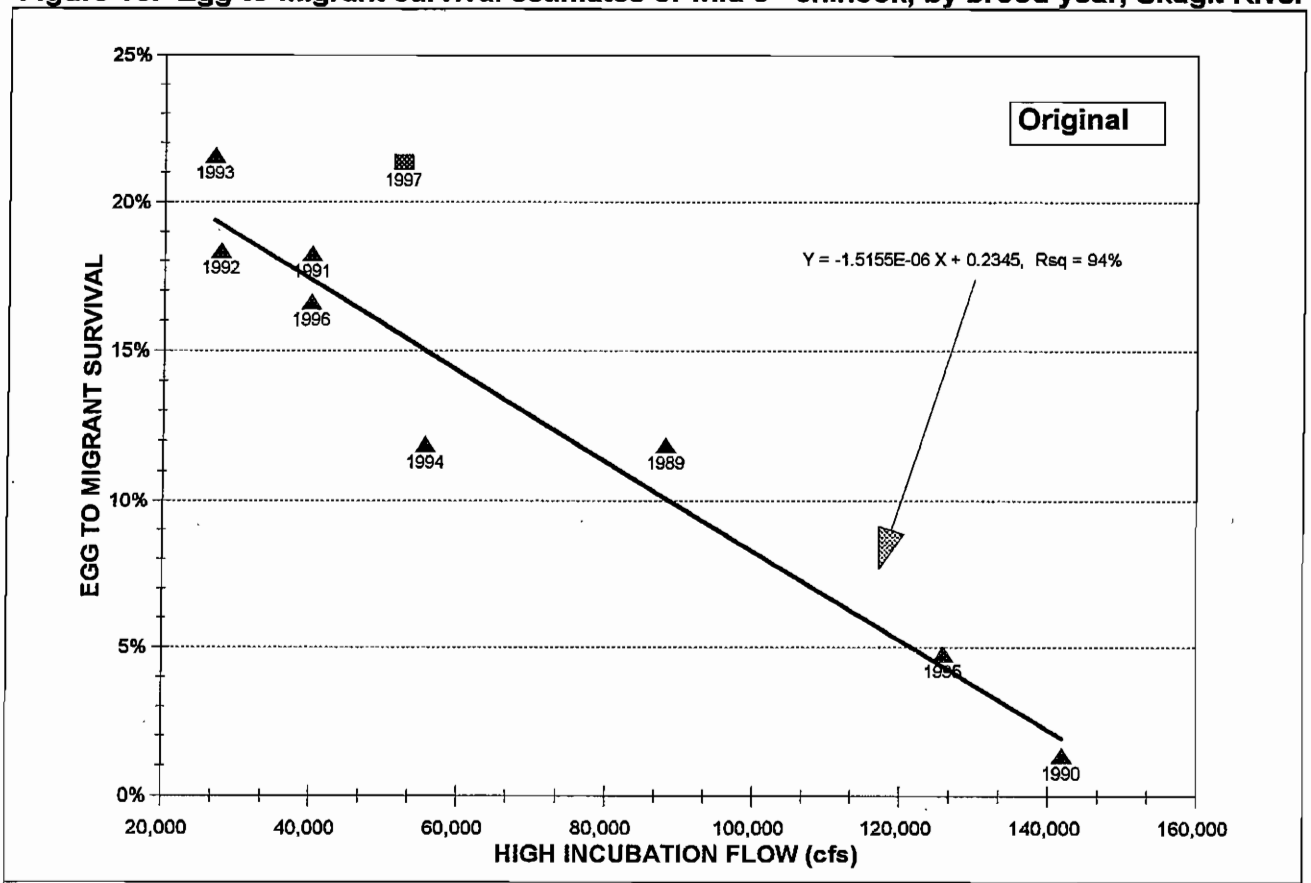
Figure 16. Egg-to-migrant survival estimates of wild 0+ chinook, by brood year, Skagit River



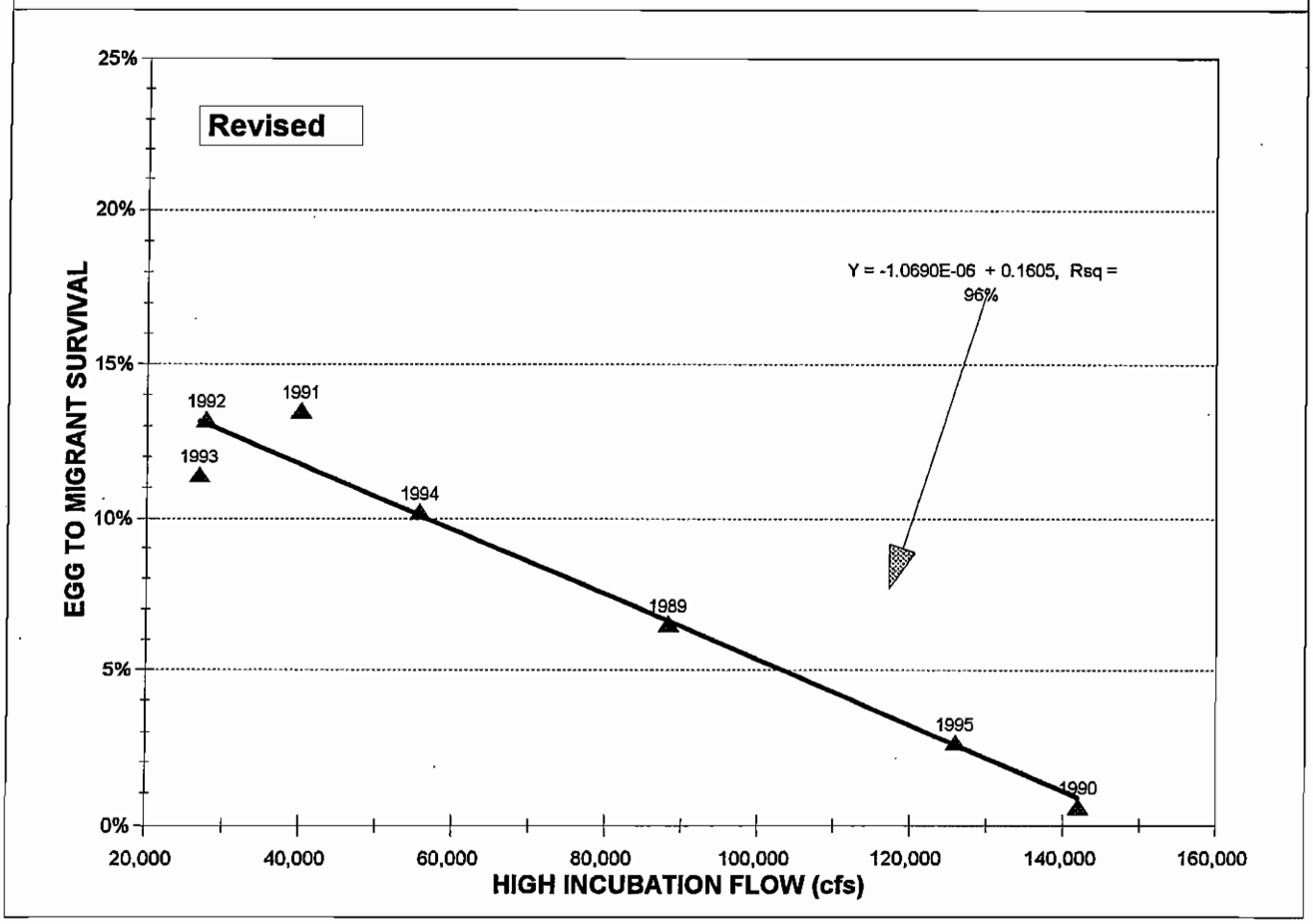


Table 13a. Estimated freshwater survival (egg deposition to migration), Skagit River wild 0+ chinook, by brood year.

A	B	C	D	E	F	G
Brood	ESTIMATED ESC.		PED	Wild	Survival	Winter
Year	Total	Females	@ 4,500	Smolts	to Migr.	Hi Flow
(i)		0.5*B	(millions)	(millions)	(E/D)	(cfs)
1989	6,547	3,274	14.7	1.7	11.9%	88,200
1990	16,935	8,468	38.1	0.5	1.4%	142,000
1991	5,845	2,923	13.2	2.4	18.3%	40,100
1992	7,196	3,598	16.2	3.0	18.4%	27,700
1993	5,585	2,793	12.6	2.7	21.6%	26,800
1994	5,694	2,847	12.8	1.5	11.9%	55,700
1995	6,930	3,465	15.6	0.7	4.8%	126,000
1996	12,025	6,013	27.1	4.5	16.6%	40,000
1997	4,996	2,498	11.2	2.4	21.4%	52,500

Note: Estimated escapement does not include returns to the Baker trap or the spring chinook component. Prior to the 1996 brood, estimates were based on trapping during the coho migration period (April-June). Full-season trapping commenced in 1997.

Table 13b. Revised estimate of freshwater survival and egg deposition-to-migration, by brood year, Skagit River wild 0+ chinook.

Brood	ESTIMATED ESC.		PED	ACTUAL		MIGRATION		SURV TO MIGR		Winter
Year	Total	Females	@ 4,500 (millions)	Catch	LV-recap	Apr-Jun	Total	New	Original	Hi-Flow
1989	6,547	3,274	14.7	8,525	1.32%	645,833	963,930	6.5%	11.9%	88,200
1990	16,935	8,468	38.1	1,706	1.09%	156,514	233,603	0.6%	1.4%	142,000
1991	5,845	2,923	13.2	8,812	0.74%	1,190,811	1,777,330	13.5%	18.3%	40,100
1992	7,196	3,598	16.2	7,463	0.52%	1,435,192	2,142,078	13.2%	18.4%	27,700
1993	5,585	2,793	12.6	9,721	1.01%	962,475	1,436,530	11.4%	21.6%	26,800
1994	5,694	2,847	12.8	10,536	1.20%	878,000	1,310,448	10.2%	11.9%	55,700
1995	6,930	3,465	15.6	2,834	1.02%	277,843	414,691	2.7%	4.8%	126,000

LITERATURE CITED

Busack, C., C. Knudsen, A. Marshall, S. Phelps, and D. Seiler. 1991. Yakima Hatchery experimental design. WA Dept. of Fish. Ann. Prog. Rpt. prepared for BPA Div. of Fish & Wildlife. Olympia, Washington. 226pp. 6

Conrad, R.H., R.A. Hayman, E. Beamer, and P.J. Goddard. 1997. Coho Salmon Escapement to the Skagit River Estimated Using a Mark-Recapture Method: 1986. Northwest Fishery Resource Bulletin. Proj. Rep. Series No. 6. NWIFC. Olympia, Washington. 1

Davies-Colley, R.J. 1988. Measuring water clarity with a black disk. Limnology and Oceanography **33**(part 1 of 4): 616-623. 6

Puget Sound Salmon Stock Review Group. 1992a. Status of five stocks of Puget Sound chinook and coho -- technical report. Pacific Fishery Management Council. Portland, Oregon. 113pp. 1

Puget Sound Salmon Stock Review Group. 1997. An assessment of the status of Puget Sound chinook and Strait of Juan De Fuca coho stocks, as required under the Salmon Fishery Management Plan. Pacific Fishery Management Council. Portland, Oregon. 1

Seber, G.A.F. 1982. *The Estimation of Animal Abundance and Related Parameters*. Charles Griffin & Co. Ltd. High Wycombe, England. 3

Seiler, D., P. Hanratty, S. Neuhauser, and M. Ackley. 1984. Upstream/Downstream Salmonid Trapping Project, 1980-1982. WA Dept.of Fish. Prog. Rpt. No. 200. Olympia, Washington. 1

Seiler, D., P. Hanratty, S. Neuhauser, P. Topping, M. Ackley, and L.E. Kishimoto. 1995. Wild Salmon Production and Survival Evaluation Annual Performance Report: October 1993 - September 1994. WA Dept. of Fish & Wildl. Progress Report. Olympia, Washington. 113pp. 2

Seiler, D., S. Neuhauser, and M. Ackley. 1981. Upstream/Downstream Salmonid Trapping Project 1977-1980. WA Dept. of Fish. Prog. Rpt. No. 144. Olympia, Washington. 195pp. 1, 6

Steel, Ashley. In press. A comparison of methods for measuring water clarity. University of Washington. Seattle, Washington. 6