

Exxon Valdez Oil Spill
State/Federal Natural Resource Damage Assessment Final Report

Injury to Spawning Areas and an Evaluation of Spawning Escapement Enumeration of
Pink Salmon in Prince William Sound, Alaska

Fish/Shellfish Study Number 1,
Restoration Study Number 9, and
Restoration Study Number 60B
Final Report

Stephen M. Fried
Brian G. Bue
Daniel Sharp
Samuel Sharr

State of Alaska
Alaska Department of Fish and Game
Commercial Fisheries Division
333 Raspberry Road
Anchorage, Alaska 99518

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Study History: Fish/Shellfish Natural Resource Damage Assessment Study 1, "Injury to Salmon Spawning Areas in Prince William Sound", was initiated in 1989 as part of the original suite of investigations into damages caused by *T/V Exxon Valdez* oil spill. This work was modified and continued, both to monitor recovery as well as to provide more accurate estimates of spawning populations, under Restoration Study Number 9 in 1990 and Restoration Study Number 60B in 1991.

Abstract: Fish/Shellfish Study Number 1 was designed to document oil contamination of intertidal spawning habitat and changes in the number and distribution of pink salmon spawning in intertidal and upstream areas relative to oil contamination resulting from the *Exxon Valdez* oil spill. Although the presence of oil was documented on intertidal substrate in anadromous streams both visually and through analysis of mussel *Mytilus sp.* samples, no obvious effects on adult pink salmon abundance, distribution, or histology were found. As other damage assessment studies established injury to pink salmon embryos and juveniles, adult pink salmon restoration studies were initiated to evaluate and improve escapement enumeration techniques to ensure that injured populations were adequately protected. Restoration Studies 9 and 60B focused on the main sources of error affecting accuracy and precision of escapement estimates generated by area-under-the-curve calculations, stream life and observer efficiency. Ground observer counts were found to tend to be more accurate than aerial observer counts, but both methods underestimated actual numbers of spawners. We obtained strong evidence that escapement estimates based on appropriate stream-life and observer efficiency values were more accurate and always greater than those based on the currently used 17.5 day stream-life value and no observer efficiency adjustment.

Key Words: Aerial survey, area-under-the-curve, escapement, *Exxon Valdez* oil spill, observer efficiency, *Oncorhynchus gorbuscha*, pink salmon, Prince William Sound, run timing, spawning, stream life, weirs.

Project Data: *Description of data* - Most collected data consisted of counts of pink salmon made at weirs, during ground surveys, and from fixed wing aircraft. Information on recaptures of pink salmon marked with external tags was collected to examine stream life. Data collections also resulted from biological sampling of mussels and pink salmon to document presence or absence of hydrocarbon contamination and visual observation of study sites to document presence or absence of oil. *Format* - Counts of pink salmon have been entered into Lotus and Excel spreadsheets, as have data on marking and recapture of pink salmon. Much of the data has also been included in paper format in the appendices of this report. Information on results of laboratory analyses of mussel and pink salmon tissues is contained in contractor reports. A catalog of aerial photographs

and maps of pink salmon spawner distribution was developed and is solely available in paper format. *Custodian* - Excel and Lotus spreadsheets of pink salmon counts reside on the ADF&G server in Anchorage. Original data forms and the catalog of aerial photographs and maps of pink salmon spawner distribution resides in the ADF&G Prince William Sound area office in Cordova. Hydrocarbon data should be available from the NMFS Auke Bay Laboratory. *Availability* - Data is available upon written request. It may be necessary to provide Zip disks, depending upon the amount of data requested and availability of email distribution.

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EXECUTIVE SUMMARY

This report details methods and results of damage assessment and restoration projects conducted on Prince William Sound pink salmon *Oncorhynchus gorbuscha* spawning populations which were exposed to oil from the *T/V Exxon Valdez* spill in 1989. Natural Resource Damage Assessment Fish/Shellfish Study 1 (NRDA F/S 1) was designed to document oil contamination of intertidal spawning habitat and changes in the number and distribution of pink salmon spawning in intertidal and upstream areas relative to oil contamination. Oil was seen on intertidal substrate at the mouths of 43 of 441 anadromous streams surveyed in 1989 and at two of 30 sites surveyed in 1990. Analysis of mussel *Mytilus sp.* samples obtained from the vicinity of several pink salmon spawning streams agreed with visual observations of oil presence or absence in 25 of 28 streams examined in 1989. By 1990 only trace amounts of or no hydrocarbons were detected in mussels collected from sites contaminated the previous year. No obvious differences in distribution or abundance of pink salmon spawners was seen between oil contaminated and uncontaminated streams. Also, no evidence of oil induced histopathology in liver, spleen, kidney or olfactory tissues was evident in adult pink salmon samples obtained from four streams in 1990. However, since other NRDA studies established injury to pink salmon embryos and juveniles, adult pink salmon restoration studies were initiated to evaluate and improve escapement enumeration techniques to ensure that injured populations were adequately protected. Restoration Studies 9 (R9) and 60B (R60B) focused on the main sources of error affecting the accuracy and precision of escapement estimates generated by area-under-the-curve calculations, stream life and observer efficiency. Observer efficiency and survey frequency errors both lead to direct errors in estimating the area under the curve (i.e. total number of fish days), while stream life errors lead to under- or overestimating the total number of spawners.

Most streams included in NRDA F/S 1, R9 and R60B were a subset of the 208 streams (referred to as index streams) included in the routine Alaska Department of Fish and Game (ADF&G) aerial survey program in Prince William Sound. Aerial survey counts of pink salmon within these index streams have been made weekly from mid-June to mid-September each year since 1961. Total annual spawning escapements into each index stream are made using area-under-the-curve calculations, a 17.5 day stream life, and no adjustment for observer efficiency. We hoped to improve escapement estimates by providing better estimates of stream life, including estimates of observer efficiency, and determining whether the 208 index streams accounted for most spawners entering the estimated 1,000 anadromous streams present in Prince William Sound. This was done over a three year period by placing weirs on four to 10 streams, conducting ground surveys and marking experiments on 17 to 42 streams, continuing annual aerial surveys of 208 index streams, and including 148 non-index streams in routine ADF&G survey flights made in 1991. We used our stream-life and observer efficiency estimates to recalculate escapements for the years 1963-1992 and to reexamine biological escapement goals. We also developed run timing curves for each index stream, using 1963-1992 aerial survey data, to assist ADF&G managers in tracking escapements and regulating fisheries.

Total counts of pink salmon entering streams having weirs ranged from 4,927 to 44,900 in 1990, 9,629 to 95,034 in 1991, and 911 to 10,658 in 1992. Total ground survey counts of dead pink salmon ranged from 534 to 45,786 in 1990, 702 to 94,618 in 1991, and 123 to 10,661 in 1992. Peak aerial

counts of live pink salmon in streams on which daily ground surveys were also conducted ranged from 500 to 24,500 in 1990, 90 to 18,000 in 1991, and 30 to 5,700 in 1992. For most streams examined, weir, ground, and aerial counts in 1991 were much greater than those made in either 1990 or 1992.

Total counts of live pink salmon passing weirs and dead pink salmon from ground surveys were usually very similar, and the data sets were positively correlated ($r=0.992$). Total weir live counts were always much greater than peak aerial survey counts, but these data sets were also positively correlated ($r=0.792$). The mean ratio of peak aerial to total weir live counts was 0.36. Mean date of pink salmon passage through weirs (i.e. the date when about 50% of the total run had been counted) was generally later during 1991 (range: 14-30 August) than during 1990 (range: 11-23 August) and 1992 (range: 3-29 August).

Observer efficiency values for aerial and ground surveys were calculated for 18 of the 24 individual data sets for streams with weirs. Observer efficiency values were not calculated for the remaining five weir data sets because large differences occurred between total weir live and ground survey dead counts, and a relatively large proportion of counts were missing and had to be interpolated. Both aerial and ground observers tended to under-count pink salmon in Prince William Sound spawning streams, although ground observer counts tended to be more accurate. Mean observer efficiency during ground surveys was 0.703 (range: 0.450 to 0.969), while mean observer efficiency during aerial surveys was 0.436 (range: 0.177 to 0.888).

Stream-life values were calculated using six methods. Two were based on recoveries of pink salmon marked with Peterson disk tags (S1 and S2). Method S2, which could be done only on streams with weirs, included an adjustment for salmon that did not immediately enter streams after marking. The other four methods were based on visual counts of pink salmon for streams with weirs. Two of these methods estimated stream life as fish days, from either weir (S3) or ground (S4) survey live counts, divided by total ground survey counts of dead pink salmon. The remaining two calculated stream life as mean date of pink salmon arrival into each stream (run timing), from either weir (S5) or ground (S6) survey live counts, divided by mean date of death from ground survey dead counts.

When comparing estimates only for streams with weirs, mean stream-life values based on run timing (S5: 6.8 days; S6: 8.3 days) were generally shorter than values based on marking (S1: 9.9 days; S2: 14.2 days) and fish days (S3: 11.1 days; S4: 12.6 days). We felt stream-life values obtained from method S3 (i.e. fish days method based on weir live counts and ground survey dead counts) were more accurate than values obtained from other methods, and used these stream-life values in all our area-under-the-curve calculations. Stream-life values obtained with this method ranged from 6.8 days to 21.5 days.

We assigned stream-life and observer efficiency values calculated for streams with weirs to every stream in the routine ADF&G aerial survey program in 1991 and 1992. We made assignments based on similarities in stream size, gradient, water clarity, forest canopy, and extent of upstream spawning to streams with weirs. Stream-life and observer efficiency values used for index streams in 1991, were also used to estimate escapement for all odd years within the period 1963-1992, while values used for index streams in 1992 were used to calculate estimates for all even years within the same period.

Escapement estimates from individual index stream were grouped and summed to produce estimates for each management district and all of Prince William Sound for these years.

Total Prince William Sound pink salmon annual escapement estimates calculated with our methods ranged from 578,093 (1974) to 13,543,263 in (1979). Escapements calculated with our methods were always greater than existing estimates. For the four most recent years examined, 1989-1992, differences between our and existing estimates were less for even than for odd years. While some existing district estimates were only about one tenth of our estimates, most were about one third to one fifth of our estimates. Due to these differences, existing biological escapement goals, which were calculated as the mean of even or odd year district escapement estimates for 1966-1989, were less than goals recalculated with our estimates. The existing total odd year goal was 19% of our recalculated total goal, while the existing total even year goal was 60% of our recalculated total goal.

While we found that accuracy of escapement estimates could be improved by use of better stream-life values and inclusion of an observer efficiency adjustment, existing survey coverage and frequency appeared to be adequate. We examined survey coverage by adding non-index streams to routine surveys in 1991. That year, index streams accounted for about 80% of the total Prince William Sound pink salmon escapement estimate and, in most cases, at least 75% of the total escapement into districts. The worse coverage occurred in Southwestern District where only 39% of the total escapement was attributed to index streams. To better represent district escapements, a few index streams were added to routine surveys, beginning in 1994. An examination of effects of survey frequency, conducted for and reported in a technical publication using NRDA F/S 1 data, showed that average error of escapement estimates increased when the interval between surveys exceeded 7 days. Since index streams are usually surveyed each week, allocation of survey effort is adequate and probably provides estimates of area under curve for most streams that are within 10% of actual values (unadjusted for observer efficiency).

Two run timing curves were developed for all 208 index streams using aerial survey data from 1963-1992. One curve shows mean percent of the total aerial survey escapement count achieved each day, and the other shows cumulative percent of the total count achieved for each day. These curves are used in a computer program which compares actual aerial counts made during the season, to expected aerial counts based on curves.

While our evaluation of methods was not unbiased, since weir counts were used to measure total escapement as well as to estimate stream life and observer efficiency, we obtained strong evidence that use of appropriate stream-life and aerial observer efficiency values, while maintaining 7 day or shorter intervals between aerial survey flights, will provide more accurate aerial estimates of pink salmon spawning populations than are currently being obtained. Treating stream life and aerial observer efficiency as constants, however, will introduce unknown errors into escapement estimates. To avoid this, we recommend that weirs be maintained on a subset of index streams to calibrate aerial observers and to track changes in stream life more closely. Ground surveys to count dead pink salmon should also be done on these streams to provide an independent check on weir integrity. Weir projects need not be done every year, but particular care should be taken when changes in aerial observers occur.

INTRODUCTION

Annual wild pink salmon *Oncorhynchus gorbuscha* runs to Prince William Sound have ranged between 2.2 million and 21.2 million between 1977 and 1996 (Morstad et al. 1997). These salmon play a major role in Prince William Sound as a food source for many fish, bird, and mammal species; as a link in transferring nutrients from marine to estuarine, freshwater, and terrestrial ecosystems; and as a component of local cash economies. Pink salmon are harvested within nine commercial fishing districts and spawn in over one thousand freshwater systems within Prince William Sound. To ensure continued viability of runs, district spawning goals have been set and spawning populations have been monitored by aerial surveyors in a collection of 208 index streams (Fried 1994; Pirtle 1977). Although unadjusted survey counts are used to monitor spawning escapements during the fishing season, estimates of the total number of spawners within each surveyed stream are calculated after the season using area-under-the-curve calculations (e.g. English, Bocking, and Irvine 1992; Johnson and Barrett 1988; Pirtle 1977). The accuracy of total escapement estimates based on aerial surveys depends upon accuracy of counts (which we refer to as observer efficiency), the amount of time salmon entering survey areas were visible to observers (usually termed stream life; e.g. Cousens et al. 1982), and the frequency with which surveys are repeated during the spawning season (e.g. Hill 1997).

This report details methods and results of damage assessment and restoration projects conducted on Prince William Sound pink salmon *O. gorbuscha* spawning populations which were exposed to oil from the *Exxon Valdez* oil spill in 1989. Natural Resource Damage Assessment Fish/Shellfish Study 1 (NRDA F/S 1) was designed to identify population level injuries from oil exposure (EVOSTC 1989 and 1990). Restoration Studies 9 (R9) and 60B (R60B) were designed to develop estimation techniques and provide spawning escapement information needed to protect and restore injured populations (EVOSTC 1991 and 1992).

The overall goal of all these investigations was to provide accurate in- and postseason estimates of total pink salmon escapement. This information was essential in investigating population level impacts of the *Exxon Valdez* oil spill on Prince William Sound pink salmon populations and in restoring injured populations by more closely regulating human use. Also, other *Exxon Valdez* oil spill damage assessment and restoration studies conducted in Prince William Sound required information on pink salmon escapements. NRDA F/S Study 2 and R60C, which examined injury to pink salmon eggs and pre-emergent fry (EVOSTC 1989, 1990, 1991 and 1992), needed spawner density and distribution information from NRDA F/S 1 and R9 and 60B to properly design and plan sampling efforts. Both NRDA F/S 3 (EVOSTC 1989, 1990, 1991 and 1992) and R60B (EVOSTC 1991 and 1992), which estimated wild stock total return and survival, depended upon wild stock escapement estimates as well as coded-wire tag recoveries in creeks accomplished during NRDA F/S 1, R9, and R60B. Finally, NRDA F/S Study 28 (EVOSTC 1991 and 1992), which reconstructed stock-specific runs to estimate the extent of population injuries, needed stock-specific escapement estimates from NRDA F/S 1, R9, and R60B, as well as stock-specific harvest estimates from NRDA F/S Study 3, to estimate total wild stock returns. Stream life and observer efficiency estimates from NRDA F/S 1, R9 and R60B would

have been used in the run reconstruction model developed under NRDA F/S 28, if it was possible to develop a more detailed model.

All streams included in NRDA F/S 1, R9 and R60B were a subset of the 208 pink salmon spawning streams (referred to as index streams) routinely monitored by an ongoing Alaska Department of Fish and Game (ADF&G) aerial survey program in Prince William Sound (e.g. Fried 1994, Donaldson et al. 1993). Our investigations provided 1) documentation of oil contamination of pink salmon spawning streams; 2) examination of effects of oil contamination upon abundance, distribution, and histology of spawning pink salmon; 3) total annual counts of pink salmon escapement into four to 10 streams with weirs; 2) observer efficiency adjustment factors for aerial and ground pink salmon escapement survey estimates; 3) estimates of pink salmon stream life; 4) an estimate of the proportion of the total escapement accounted for through surveys of index streams; 5) revised estimates of pink salmon escapements for the period 1963-1997; 6) a comparison of current biological escapement goals with goals based on revised escapement estimates; and 7) run timing curves for all index streams.

The most important results of these investigations were obtained from observations conducted on streams with intertidal weirs. Our findings indicated that both ground and aerial observers tended to undercount actual numbers of pink salmon, and that stream life for pink salmon in most of these streams, while quite variable, appeared to be less than the 17.5 day estimate currently used to calculate escapement numbers. This showed that current methods used to estimate pink salmon spawning populations in Prince William Sound provide values that are less than the actual number of spawners. Although use of appropriate stream-life and aerial observer efficiency values, while maintaining seven day or shorter intervals between aerial survey flights, will provide more accurate aerial estimates of pink salmon spawning populations, continuing treatment of stream life and observer efficiency as constants will introduce unknown errors into annual population estimates. To avoid this, funding should be sought for continued or periodic use of weirs on a subset of streams to calibrate aerial observers and to track changes in stream life more closely. Ground surveys to count dead pink salmon should also be done on these streams to provide an independent check on weir integrity.

OBJECTIVES

The overall goal of this series of investigations was to determine whether Prince William Sound pink salmon spawning populations were injured by the T/V *Exxon Valdez* oil spill (NRDA F/S 1) and, once injuries were documented, to provide information needed for restoration of injured populations (R9 and R60B). NRDA F/S 1 sought to document changes in the number and distribution of salmon spawning in streams relative to oil contamination. R9 and R60B sought to improve spawning escapement estimates so that fishery managers could protect injured wild salmon populations while still allowing some harvest of other wild and hatchery populations. All three of these studies had several methods and specific objectives in common.

Although obvious injuries to spawning adult salmon were not observed during NRDA F/S 1 investigations, increased embryo mortality in oil contaminated streams was documented by Bue et al. (1996) and decreased growth of fry rearing in oil contaminated nearshore areas was found by Willette, (1996) as well as Wertheimer and Celewycz (1996). Therefore, spawning escapement studies R9 and R60B were continued as part of the restoration program, and a greater number of streams were included to provide information needed for protection of injured populations. We originally intended to study chum *O. keta* and sockeye *O. nerka* salmon as well as pink salmon populations. However, chum salmon were never abundant in any of the intensively studied creeks with weirs, and sockeye salmon escapement studies done in 1989 consisted only of weir counts which have since been conducted and funded through the State of Alaska operating budget.

NRDA F/S 1, R9, and R60B had several specific primary as well as secondary objectives. Primary objectives were:

1. Documentation of presence and physical extent, or absence, of oil on intertidal pink salmon spawning habitat through a) visual observation of sites during ground surveys, b) examination of aerial photographs, and c) hydrocarbon analysis of tissue samples obtained from mussels *Mytilus* sp. collected from the intertidal zone of creek mouths.
2. Documentation of presence or absence of oil-induced morphological, histological, and cytogenetic injuries in adult pink salmon through examination of tissue samples obtained from spawning populations in both oiled and unoled creeks/areas.
3. Estimation of accuracy of aerial survey pink salmon counts for all 208 index streams by comparing, for a subset of these creeks, a) paired aerial and ground survey counts on the same or adjacent survey dates, and b) paired aerial survey and weir counts.
4. Estimation of average stream life of pink salmon in several representative streams in Prince William Sound using a variety of techniques.
5. Estimation of total annual pink salmon escapements into the 208 index streams for the period 1963 through 1992 using a) aerial survey counts, b) average observer error, and c) average stream life values.
6. Estimation of the proportion of the total pink salmon spawning escapement represented by the 208 streams so that an estimate of the total pink salmon escapement into all Prince William Sound creeks could be made.
7. Increasing accuracy, precision and timeliness of aerial escapement estimates of pink salmon in the 208 index streams to allow fishery managers to regulate human use and protect injured stocks while harvesting other wild and hatchery stocks.
8. Evaluation of current spawning goals and development of run timing curves for pink salmon in the 208 index streams to improve inseason stock specific management and allow rebuilding of injured stocks.

Secondary objectives, which provided information required for other EVOS studies, were:

1. Collection and cryopreservation of tissue samples from spawning pink salmon for later studies on the genetic structure of salmon stocks in oiled and unoled areas.
2. Development of a catalog of aerial photographs and detailed maps of pink salmon spawner distribution within streams included in embryo and fry studies.
3. Selection of streams to be used to enumerate and mark pink salmon fry.
4. Enumeration of adult pink salmon returning to streams where fry were marked.
5. Assistance in recovery of adult marked pink salmon in streams where tags were applied and in neighboring streams to estimate fry survival and examine the incidence of straying.

Information collected for secondary objectives is not documented in this report. Some samples collected for secondary objective 1 were used by Seeb et al. (1996 and 1998). Original photographs and maps developed for secondary object 2 are currently housed in the ADF&G Cordova office, while embryo and fry data have been reported by Sharr et al. (1994) and Bue et al. (1996 and 1998a). Finally, information collected for secondary objectives 3-5 have been reported by Sharr et al. (1995).

METHODS

Hydrocarbon Contamination

Visual Evidence.--In 1989 a two-person crew conducted aerial and foot surveys to document the presence of oil in intertidal spawning and rearing areas of all known anadromous salmon spawning streams in western and central Prince William Sound (ADF&G 1990). Most important salmon streams in the northern and eastern portions of Prince William Sound, which were included in the present suite of studies as well as in NRDA F/S 2 (Sharr et al. 1994), were also surveyed.

Mussel Tissue Analyses.--In 1989 and 1990 composite samples of mussels *Mytilus sp.* were collected at the mouths of 135 salmon spawning streams, about 1.8 m above mean low water, for hydrocarbon analysis. Mussels were not collected at some streams which were obviously heavily contaminated by oil (e.g. Chenega, Bjorne, and Sleepy Bay creeks). Each sample consisted of about 30 mussels, enough to provide about 10 grams of tissue. Samples from each stream were stored in separate glass jars that had previously been pre-rinsed three times with dicloromethane before being dried and stored for use. Each sample jar was marked by taping a printed label on the outside and

inserting an identical label inside with the specimens. Each label consisted for the following information: species, ADF&G anadromous stream number, stream name, geographic location, latitude, and longitude of the stream mouth, tide stage, date, time, and sampler(s). This same information was then entered on chain-of-custody forms. All samples were sealed with evidence tape and stored in a secure (locked) freezer. Frozen samples were shipped to Carol-Ann Manon, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, Auke Bay Laboratory, for analysis. Results of these analyses were used to corroborate visual evidence of oil contamination.

Pink Salmon Tissue Analyses.--Tissue samples were obtained from pink salmon adults for histological, cytogenetic, and genetic analyses. Adult populations sampled were a subset of those studied in NRDA F/S 2 (Sharr et al. 1994) and NRDA F/S 3 (Sharr et al. 1995). Equal numbers of populations were sampled in oiled and unoiled areas. Streams classified as "oiled" represented a wide range of contamination ranging from areas where large amounts of oil were visible to those where the presence of oil was only suspected.

Twenty-two pink salmon populations were sampled in both 1990 and 1991. Twelve were from streams suspected of having oil contamination, and 10 were from unoiled streams in close geographic proximity. Adult salmon were sampled within each stream before gross morphological changes or obvious tissue deterioration associated with spawning had occurred. Twenty individuals of each sex were sampled from each population. Salmon were caught with beach seines, immediately stored on ice, and usually sampled in the ADF&G office/laboratory complex in Cordova within six hours after capture.

Thin sections of liver, spleen, and posterior kidney tissue, as well as one entire nare (i.e. olfactory tissue) were removed from each pink salmon sampled for histological analysis. All tissue samples from the same individual were stored in a single jar filled with 10% phosphate buffered Formalin. Each sample jar was marked by taping a printed label on the outside and inserting an identical label inside with the specimens. Each label consisted for the following information: species, sex, ADF&G anadromous stream number, stream name, geographic location, latitude, and longitude of the stream mouth, date, time, tissue type, preservative, and sampler(s). This same information was then entered on chain-of-custody forms. All samples were sealed with evidence tape and stored in a secure (locked) office. A subset of tissue samples from two obviously oiled, one possibly oiled, and two unoiled streams were remitted to the custody of Dr. David Hinton, University of California Davis, for analysis.

To examine the genetic structure of Prince William Sound pink salmon populations, tissue samples were obtained from pink salmon collected at 13 spawning streams and three hatcheries. One hundred pink salmon were captured at each location with beach seines, killed by a blow to the head, placed on ice, and transported to the ADF&G office/laboratory complex in Cordova for sampling. A piece of dorsal skeletal muscle, liver and heart were dissected from each pink salmon and placed in separate, pre-labeled cryogenic vials. Ocular fluid was drawn from an eye with a syringe and injected into a pre-labeled cryogenic vial. All vials were placed in racks which were suspended in metal containers holding liquid nitrogen. Containers were shipped to the ADF&G genetics laboratory in Anchorage for storage in freezers maintained at -80°C.

Visual Counts of Pink Salmon in Individual Streams

Most streams included within our investigations were selected from the 208 index streams monitored under the ADF&G aerial survey program (Appendix A). These streams are a subset of about 1,000 anadromous streams, all of which support pink salmon spawning, that have been cataloged within Prince William Sound (ADF&G 1990). Aerial survey counts of pink salmon within these index streams have been made since 1961 by ADF&G biologists stationed in Cordova. Methods used in conducting these surveys were described by Pirtle (1977). Surveys are flown weekly from mid-June to mid-September each year. Based on past observations of run timing, surveys for Eastern and Northern Districts begin mid- to late June, surveys for Coghill, Northwestern and Eshamy Districts begin early July, and surveys for Southwestern, Montague and Southeastern Districts begin late July. During each survey, observers record counts of salmon by species for the bay at the terminus of each stream, the mouth of each stream, and within the stream. Only counts within the stream are used to estimate spawning escapements, and these were the counts for our analyses.

All visual stream counts of salmon made during aerial and ground surveys, as well as during weir operations, were recorded on mechanical hand tallies for each stream, stream zone, or stream section. These counts were then entered, along with other survey data, on standardized, pre-printed forms. Data from these forms were entered and stored electronically on microcomputers in a relational database (RBASE). Database records were stratified by stream number, survey date, tide zone, section, replicate counts, and species. Counts which were replicated by more than one observer were coded for later analysis of differences between observers.

Weirs.--Intertidal counting weirs were installed in four streams in 1990 and 10 streams in both 1991 and 1992 (Figure 1). All weirs were placed in the intertidal zone because approximately 75% of pink salmon spawn within this area in Prince William Sound (Helle et al. 1964). This appears to have been the first time that intertidal weirs were used in Alaska. Weirs were installed on two moderate sized streams in eastern Prince William Sound (Irish and Hawkins creeks) and eight small to medium size streams in western Prince William Sound (Totemoff, Herring, Chenega, Point Countess, O'Brien, Hayden, Herring, and Cathead creeks). Seven of these 10 streams were selected from the list of streams included in both the aerial and ground survey programs, while the remaining three (Point Countess, Herring, and Cathead creeks) were selected because they were located within the heavily oil-impacted Southwestern District.

Each weir consisted of a fence-like arrangement of tubular metal pickets that fit vertically into openings on horizontal metal stringers. Each weir was placed either at the six-foot tide level or as close as possible to the downstream limit of intertidal spawning. Salmon were visually counted as they swam upstream through a small opening in the weir made by raising a few pickets. No live boxes or traps were used. Salmon were passed through the weir several times each day in response to tides and salmon movement patterns. Total escapement was defined as the sum of daily counts of pink salmon passed upstream through the weir minus any salmon that had not spawned and which moved downstream through the weir.

Ground Surveys.--ADF&G field crews attempted to survey as many as 57 pink salmon spawning streams each day, including all streams having a weir (Figure 1). Crews were stationed in Cordova and

Valdez as well as at 11 remote field camps in Prince William Sound. As time and conditions allowed, weekly, semi-weekly or less frequent ground surveys were also performed on an additional 28 streams during the spawning season. All streams with weirs were surveyed daily. Only data from streams consistently surveyed each day were examined.

Each field crew used a skiff to travel between base camps and survey streams in a systematic order. During each survey the following data were recorded on printed forms:

1. Anadromous stream number and, if available, name;
2. Date and time (24 hour military time);
3. Tide stage;
4. Observer names;
5. Counts of live and dead salmon by species within four intertidal zones (between elevations of 0.0-1.8 m, 1.8-2.4 m, 2.4-3.0 m, and 3.0-3.7 m above mean low water) and one upstream zone (the entire stream above 3.7 m mean low water);
6. Information on tagged pink salmon (tag color, tag number, location of tagged individual, whether it was dead or alive);
7. Information on recovered carcasses with external tags or adipose fin clips (time recovered and location of carcass);
8. A survey condition factor for each zone, based on weather, water clarity, glare, and other survey conditions, assigned a number from 1 (excellent) to 5 (very poor);
9. A survey rating factor for each zone, based on survey conditions as well as other problems (e.g. lapses of concentration, difficulties associated with counting huge, mobile schools), ranging from 1 (excellent) to 3 (poor);
10. A code indicating which sections were counted by both observers and which were counted by only one of the observers.

The sequence of zones surveyed within each stream was based on computer generated tide tables. If tide height at the beginning of the survey was at or below 1.8 m, the survey was started at the stream mouth (i.e. the point where a clearly recognizable stream channel disappeared or was submerged by salt water). Pink or chum salmon seen below the stream mouth were recorded separately as a comment on the data form. If the intertidal portion of the stream above the 1.8 m level was submerged, the crew started the survey at the upstream limit of salmon migration (delineated by barriers such as waterfalls), the end of the stream, or the upstream limit of observed spawning.

Counts of live and dead pink and chum salmon were made by a two-person crew. On medium size streams with a single channel, crewmembers walked together and independently recorded their counts of salmon in each stream zone. To isolate and quantify bias, crewmembers were not permitted to compare or discuss counts at any time. The count for a zone could be replicated a maximum of three times at the request of either observer. Long upstream zones were frequently subdivided into sections at convenient stopping points (e.g. log jams or other natural markers). On large braided or branched streams, duplicate counting was not possible, and each crewmember counted separate channels or upstream forks. The tail was removed from each dead salmon, and its carcass thrown out of the stream to avoid counting an individual salmon more than once. To avoid errors in counting live salmon, counts of dead and tagged salmon were only recorded on the return leg of the stream walk or

by an independent third observer. Whenever possible, crew personnel rotated creek surveying assignments each day.

Maps of all streams surveyed daily were originally prepared in 1989 from aerial photographs. Maps were then amended during the 1989 and 1990 field seasons using information obtained on the ground. Maps were again modified and updated at the beginning of 1991 stream surveys to include information from earlier surveys on 1) the location of stakes and landmarks used to identify tide zones, 2) typical spawner distribution within each zone, and 3) the upstream limit of spawning. Spawner density and distribution observations were used when sampling streams included within NRDA F/S 2 (Sharr et al. 1994)

Missing Counts.--During periods of high stream flows, caused by heavy rains, weir pickets had to be raised to avoid weir destruction. Often these high water events also precluded ground surveys. In these instances, missing weir live (W), ground survey live (G), and ground survey dead (D) counts for day j were estimated by,

$$\hat{W}_j = \left[\frac{G_j - G_{(j-1)}}{O} \right] + D_j \quad , \quad (1)$$

$$\hat{G}_j = \left[\frac{G_{(j+m)} - G_{(j-1)}}{(m+1)} \right] + G_{(j-1)} \quad , \quad (2)$$

$$\hat{D}_j = \frac{D_{(j+m)}}{m} \quad , \quad (3)$$

where O was the slope of the linear regression, fitted through the origin, of ground survey live counts (dependent variable) against the estimated number of live salmon above the weir (\hat{L}_j ; independent variable) each day of the season prior to the day of the first missing count, and m was the number of consecutive days of missed observations.

Most study streams had missing daily weir and ground survey counts. The effect of missed observations on final pink salmon escapement estimates depended on the proportion of daily counts missed and on the time within the run when daily counts could not be made. Data from streams for which more than 35% of the total up-and downstream count or total net upstream passage had been estimated from missed daily counts were flagged for closer scrutiny before being used for other calculations such as stream life and observer efficiency.

In designing the project, we assumed (1) errors made in counting pink salmon past weirs due to breaches in weirs or mistakes in counting were small, and (2) errors made in counting dead salmon above weirs due to removals by predators or mistakes in counting were also small. If both assumptions were valid, we expected the total weir count of live pink salmon to equal the total ground survey count of dead pink salmon within each stream. We used the ratio of weir live to ground survey dead counts (R) for each stream (i) to determine whether our assumptions were violated,

$$R_i = \frac{\sum_{j=1}^n W_{ji}}{\sum_{j=1}^n D_{ji}} \quad , \quad (4)$$

where n was the last day for which counts were available during the season for stream i .

If the ratio of weir live to ground survey dead counts was not close to one, we assumed that at least one of these assumptions had been violated and that escapement, stream life, and aerial observer efficiency estimates based on these data were not accurate. Data from streams for which $R < 0.90$ were not used to calculate stream life and observer efficiency. In these cases, we felt too many pink salmon had traveled undetected past a weir site. Data from streams for which $R > 1.10$ were flagged for closer scrutiny before being used to calculate stream life or observer efficiency. In these cases, we felt lower than expected carcass counts could be caused by factors other than errors in counting, such as removal of salmon by bears.

Number of salmon upstream of weir.--The combination of total weir live counts and total ground survey dead counts by day allowed the number of live pink salmon in the stream to be estimated on a daily basis. We estimated the number alive (\hat{L}_j) for day j of the run by,

$$\hat{L}_j = \sum_{k=1}^j (W_k - D_k) \quad , \quad (5)$$

where W_k was the number of live pink salmon counted through the weir on day k , and D_k was the number of newly dead pink salmon counted on day k . Counts of live pink salmon were also made during the ground surveys.

Aerial Surveys.--Aerial surveys were flown at least weekly, weather permitting, from mid-June to mid-September by biologists stationed in Cordova. Four observers were used each year. In 1990 and 1991, funding was obtained from the fishing industry and private non-profit aquaculture associations to increase the frequency of ADF&G survey flights. For most weeks during these two seasons, at least two aerial counts were made for each stream within the program.

In 1989, eight streams from areas of Prince William Sound contaminated by *TV Exxon Valdez* oil were added to the 208 streams routinely surveyed during the ADF&G aerial survey program. Beginning in 1991, aerial survey counts made for streams with weirs were recorded separately above and below the weir, while aerial counts for streams that were also surveyed on foot were recorded separately for intertidal and upstream areas. The tide level 3.7 m above mean low water was chosen as the boundary between intertidal and upstream sections of these streams, and was marked by a large orange buoy which was easily seen by aerial surveyors. Trips to define tide zones were conducted in June, prior to the return of pink salmon. Sea level at each site was referenced to mean low water with site specific, computer generated tide tables which predicted tidal heights at five minute intervals. Tide levels 1.8,

2.4, 3.0, and 3.7 m above mean low water were measured from sea level using a surveyor's level and stadia rod, and were then marked with color-coded steel stakes.

Area-Under-the-Curve Estimates of Total Pink Salmon Spawners from Surveys

Three components are required to estimate total salmon escapement using periodic visual counts from surveys: (1) counts collected systematically throughout the time salmon are present in the study area; (2) an estimate of observer efficiency; and (3) an estimate of the average time an individual salmon remains in the survey area, commonly called stream life. The area-under-the-curve is a commonly applied method of estimating salmon escapement (\hat{E}) when periodic visual counts are used (e.g. English, Bocking, and Irvine 1992, Johnson and Barrett 1988),

$$\hat{E} = \frac{\hat{A}}{\hat{S}\hat{B}} \quad , \quad (6)$$

where \hat{A} is an estimate of the area under the escapement curve, \hat{S} is an estimate of stream life, and \hat{B} is an estimate of observer efficiency.

We used a trapezoidal approximation procedure similar to that described in English, Bocking, and Irvine (1992), to estimate area-under-the-curve (\hat{A}) as

$$\hat{A} = \sum_{i=2}^n \frac{(t_i - t_{i-1})(c_i + c_{i-1})}{2} \quad , \quad (7)$$

where t_i was the coded date (referenced each year as 1 January=1, 1 February=32, etc.) for the i^{th} ground or aerial survey, and c_i was the number of salmon observed for the i^{th} ground or aerial survey. Attempts were made to initiate surveys prior to the presence of pink salmon in the stream. When pink salmon were present for the first survey, the parameter A prior to the first survey was estimated as,

$$\hat{A}_{first} = \frac{c_1\hat{S}}{2} \quad . \quad (8)$$

We also made an effort to continue surveys until all pink salmon had died. When this was not possible, we estimated A after the final survey as,

$$\hat{A}_{last} = \frac{c_n\hat{S}}{2} \quad . \quad (9)$$

Observer Efficiency.--Calibration regression (Neter et al. 1990) was used to estimate observer efficiency, a measure of observer accuracy. This method was based on assumptions that (1) the relationship between survey counts and actual numbers of live pink salmon in a stream was linear, and (2) the observer would not see salmon in the stream when none were present (i.e. the line was constrained to pass through the origin). Observer efficiency was represented by the slope of the linear fit constrained to pass through the origin, of either aerial or ground survey counts regressed against daily estimates of live salmon above weirs.

Stream Life.--To estimate total spawning escapement from a series of visual aerial or ground counts, one must also have an estimate of the amount of time, usually in days, salmon entering the survey area were visible to observers. For our purposes, residence time or survey life of pink salmon was also considered to be its stream life: the number of days that elapsed between stream entry and post-spawning death. Stream life was estimated using results of marking as well as visual counts of pink salmon.

Streams included as part of stream-life investigations were a subset of those streams surveyed daily from the ground and included all streams on which weirs were installed. We used data based on tagging and visual counts to generate six different estimates of stream life. We compared these six estimates for all streams with weirs to examine how they differed. We assumed that estimates of stream life based on visual counts of salmon at a weir might be more accurate than estimates based on the fate of tagged salmon. We made this assumption since we felt that, in general, 1) errors made in counting salmon past the weirs were small (i.e. few salmon were able to pass through the weirs undetected due to either breaches in the weir or errors in counting), and 2) errors made in counting carcasses above weirs were also small (i.e. most carcasses were found and counted by ground survey crews). Counts of carcasses above each weir were compared to counts of live salmon passed through that weir to determine whether our assumption of accurate weir counts was correct. We assumed that estimates of stream life based on the fate of marked salmon might be less accurate since we did not know 1) how long salmon had been holding off stream mouths prior to marking, 2) when marked salmon entered the stream (in streams without weirs), and 3) whether handling and marking affected stream life.

Marking experiments were similar to those described by McCurdy (1984) and Helle et al. (1964). Once a week, pink salmon entering 38 streams were captured in beach seines fished at stream mouths and marked with Peterson disk tags. We attempted to mark 100-200 pink salmon each week at each study site. If less than the desired number of pink salmon to be marked were available, all pink salmon captured were marked.

Tags were uniquely colored to identify each marking event, uniquely lettered to identify the stream where tags were applied, and uniquely numbered to identify individual pink salmon. Ground survey crews counted all marked live and dead pink salmon by tag color within each tide zone, and also recorded individual alphabetic and numeric codes for all dead pink salmon, as well as for live pink salmon whenever possible. Daily counts of dead pink salmon only included those that had died since the last survey. To identify carcasses that had already been counted, crews removed the caudal fin, as well as any tags, from all dead pink salmon at the time they were first counted.

Two methods were used to estimate stream life from marking data. For the first method (Marking:Mean), stream-life values were calculated as

$$SI = \frac{1}{w} \sum_{e=1}^w \left[\frac{\sum_{l=1}^{g_e} (t_{el} - t_e)}{g_e} \right] , \quad (10)$$

where $S1$ was mean stream life of individual marked salmon, t_e was the coded date of marking event e , t_{el} was the coded date when the carcass of pink salmon l marked during week e was recovered, w was number of weekly marking events, and g_e was the number of tags recovered for marking event e .

A second method (Marking:Milling) of calculating stream life from marking data was examined to try and account for effects of marked pink salmon which delayed their upstream migration and milled about at stream mouths. Milling behavior would lead us to overestimate actual stream life based on tag application data for individual salmon. To reduce the effects associated with delayed stream entry, stream-life estimates were calculated as the difference between the mean day of death and the mean day of entry for tagged fish by

$$S2 = \frac{1}{w} \sum_{e=1}^w \left[\frac{\sum_{j=1}^n (D_{ej} t_j)}{\sum_{j=1}^n D_{ej}} - \frac{\sum_{j=1}^n [(G_{ej} - G_{e(j-1)}) + D_{ej}] (t_j)}{\sum_{j=1}^n (G_{ej} - G_{e(j-1)}) + D_{ej}} \right], \quad (11)$$

where $S2$ was the stream life estimate adjusted for milling, G_{ej} was the number of live pink salmon observed on day j which were marked during week e , D_{ej} was the number of dead pink salmon recovered during the survey on day j and marked during week e , and t_j was coded date of day j .

Estimates of stream life were also obtained with four methods that did not rely on marking. These methods incorporated either a combination of daily visual weir counts of live pink salmon with ground survey counts of dead pink salmon, or ground survey counts of both live and dead pink salmon.

The first visual count method (Visual:Weir Mean) estimated mean stream life using daily counts of live pink salmon passing through a weir and daily ground survey counts of dead pink salmon in the stream ($S3$) as

$$S3 = \frac{\sum_{j=1}^n \hat{L}_j}{\sum_{j=1}^n W_j}, \quad (12)$$

The second visual count method (Visual:Ground Mean) estimated mean stream life using live and dead ground survey counts ($S4$) as

$$S4 = \frac{\sum_{j=1}^n G_j}{\sum_{j=1}^n D_j}, \quad (13)$$

The third visual count method (Visual:Weir Run Timing) estimated mean stream life as the difference between mean date of passage through the weir and mean date of death ($S5$) as

$$S5 = \frac{\sum_{j=1}^n (D_j t_j)}{\sum_{j=1}^n D_j} - \frac{\sum_{j=1}^n (W_j t_j)}{\sum_{j=1}^n W_j} \quad (14)$$

The last visual count method (Visual:Ground Run Timing) estimated mean stream life as the difference between mean date of abundance of newly arrived pink salmon in the stream and mean date of death (S6) as

$$S6 = \frac{\sum_{j=1}^n D_j t_j}{\sum_{j=1}^n D_j} - \frac{\sum_{j=1}^n [(G_j - G_{(j-1)} + D_j)(t_j)]}{\sum_{j=1}^n (G_j - G_{(j-1)} + D_j)} \quad (15)$$

Pink Salmon Spawning Escapement into Index Streams

Stream Classification.--Streams with weirs were used as standards to define stream categories based on stream size, gradient, water clarity, forest canopy, and extent of upstream spawning. Each of the streams with a weir was considered to be a unique stream category. Each remaining stream in the aerial and ground survey programs was subjectively placed into one of these categories. To estimate total escapements, the observer efficiency and stream-life values calculated for each stream with a weir were applied to aerial and ground counts for all streams within that same category. To help account for differences in upstream and intertidal spawning components that occur in odd- and even-years for some systems, a separate set of observer efficiency and stream-life values was used for odd- and even-year escapements that were based on estimates made for streams with weirs in 1991 and 1992. We hoped this would make escapement estimates more accurate, since differences in pink salmon spawner distribution could affect observer efficiency as well as stream life.

Escapement Estimates.--We generated pink salmon escapement estimates for all 208 index streams using aerial counts, the stream classifications described above, and the trapezoidal method of estimating area-under-the-curve. Although our work only spanned three years, 1990-1992, we applied the information obtained on stream life and observer efficiency, to historic aerial survey data to generate escapement estimates for 1963-1995. The estimates were summarized by fishing district and all of Prince William Sound.

Proportion of Prince William Sound Escapement Accounted for by Routine Aerial Survey Program

There are about 1,000 anadromous salmon streams in Prince William Sound (ADF&G 1990), and pink salmon spawn in most of these. The routine ADF&G aerial survey program examines 208 streams that are thought to be major contributors to Prince William Sound pink salmon production. A stratified random sample of non-index streams was used to estimate the total escapement into non-index streams. This estimate was then used to estimate the proportion of the total Prince William Sound escapement accounted for by the routine ADF&G aerial survey program.

A computer listing of anadromous streams in Prince William Sound (ADF&G 1990) was obtained and the 208 index streams were removed. The remaining non-index streams were stratified by commercial salmon fishing districts. Non-index streams were randomly selected from the district-lists with the number of streams selected approximately proportional to the number of streams in the strata.

The number of non-index streams selected, 148, was based on the maximum number of streams we believed could be surveyed while still maintaining the routine ADF&G aerial survey program. This number was arrived at through discussions with aerial observers and pilots, and was divided approximately proportional to the number of non-index streams in the strata.

Each selected non-index stream was assigned a stream-life and observer efficiency value corresponding to the district in which it was located. These values were the means of stream-life and observer efficiency values assigned to index streams within each district.

Escapement to all non-index streams (EN_d) in each fishing district (d) was estimated as

$$\hat{EN}_d = \frac{N_d}{s_d} \sum_{i=1}^s \hat{EN}_{di} \quad , \quad (16)$$

where N_d was the total number of non-index streams in district d , and s_d was the total number of non-index streams surveyed in district d .

The total escapement into all non-index streams in Prince William Sound (EN) was calculated by summing individual district estimates. The proportion of the total Prince William Sound escapement accounted for by index streams surveyed in the routine ADF&G aerial survey program (P) could then be estimated as

$$\hat{P} = \frac{\hat{EI}}{\hat{EI} + \hat{EN}} \quad , \quad (17)$$

where EI was the total escapement into index streams.

Biological Spawning Escapement Goals

A primary ADF&G salmon management objective is achievement of predetermined biological spawning escapement goals which produce high sustained yields (Fried 1994). For Prince William Sound, separate even- and odd-year biological escapement goals have been set for each management district. These goals were calculated as the mean of all available even- or odd-year routine ADF&G aerial survey escapement estimates for the period 1966 through 1989. We recalculated means for these same sets of years using escapement estimates based on stream life and observer efficiency values obtained during the present study. These recalculated means were then compared to those currently used as the basis for biological escapement goals.

Pink Salmon Run Timing for Index Streams

Pink salmon run timing was estimated for each of the 208 index streams using aerial survey data from 1963 through 1992 and methods similar to those described by Mundy (1982). Since aerial surveys generally occur at three to 10 day intervals throughout the run, and survey-dates are not the same from years to year, escapement was assumed to occur linearly between surveys. For example, if 100 pink salmon were observed on day 1 and 200 pink salmon were observed on day 5, then our estimate for days 2-4 would be 125, 150, and 175, respectively. Each daily count or estimate was then divided by the total for all days in that year to obtain an estimated percent run by day. The percent run for each day was then averaged across years to obtain an estimate of the average percent run for each day.

RESULTS

Hydrocarbon Contamination

Visual Evidence.--The visual presence of oil on intertidal substrate was documented at the mouths of 43 of 441 anadromous streams surveyed in 1989 (Table 1). The oil survey included 183 of 221 streams that were surveyed for salmon escapements in 1989, as well as eight of the 10 streams with weirs used in our investigations. The two streams with weirs not included in the 1989 oil survey, Irish and Hawkins creeks, are located in the eastern portion of Prince William Sound and were not contaminated by oil. All photographs, maps and data sheets resulting from 1989 oil surveys are stored in the ADF&G Cordova office.

Mussel Tissue Analyses.--Analysis of mussel samples agreed with visual observations of oil presence or absence in 25 of 28 streams where comparable data were collected in 1989 (Table 2). Six streams showed both visual and mussel tissue evidence of oil contamination: Junction, Point Countess, Shelter Bay, Hayden, Snug Harbor, and Herring Creeks. Mussel samples from three other streams which showed definite visual evidence of oil contamination tested negative for oil contamination: Loomis, Hogan Bay and Cathead Creeks.

In 1990, oil could still be detected in mussel samples from two of 30 sites sampled (Table 2). These two streams, Sleepy Bay and Herring Creeks, also showed evidence of oiling in 1989. Mussel samples obtained in 1990 from three other sites which showed evidence of oiling in 1989, Loomis, Shelter Bay, and Bjorne Creeks, had only trace amounts of hydrocarbons which could not be linked to the 1989 spill. Mussel samples collected from seven other creeks which had been visually identified as being contaminated with oil in 1989 tested negative for hydrocarbon contamination in 1990: Junction, Chenega, Point Countess, Hayden, Hogan Bay, Snug Harbor and Cathead Creeks.

Of the eight weir sites located in western Prince William Sound, three streams, Point Countess, Hayden and Herring Creeks, showed both visual and mussel tissue evidence of hydrocarbon contamination, two showed only visual evidence of contamination, Loomis and Chenega Creeks, and two showed no evidence of oiling, Totemoff and O'Brien Creeks.

Pink Salmon Tissue Analyses.--Little evidence of oil induced histopathology was evident in adult pink salmon collected at four sites in 1990 (Table 3). Histopathology scores for selected liver lesions, the most promising characteristic examined, were very similar for pink salmon collected in an unoiled stream, Windy Creek, and those collected in three oiled streams, Loomis, Sleepy Bay and Herring creeks. A detailed description of histopathology results was provided by Marty et al. (1993).

Visual Counts of Pink Salmon in Individual Streams

Total counts of pink salmon entering the four streams having weirs in 1990 ranged from 4,927 in Herring Creek to 44,900 in Irish Creek (Table 4). Total counts in the 10 streams having weirs in 1991 ranged from 9,629 in Cathead Creek to 95,034 in Irish Creek (Table 5). Total counts in the 10 streams having weirs in 1992 ranged from 911 in Herring Creek to 10,658 in Chenega Creek (Table 6; Appendices B, C, and D).

Total counts of dead pink salmon in the 24 streams on which daily ground surveys were conducted in 1990 ranged from 534 in Crooked Creek to 45,786 in Irish Creek (Table 4). Total counts of dead pink salmon in the 42 streams on which daily ground surveys were conducted in 1991 ranged from 702 in Gumboot Creek to 94,618 in Irish Creek (Table 5). Total counts of dead pink salmon in the 17 streams on which daily ground surveys were conducted in 1992 ranged from 123 in Gumboot Creek to 10,661 in Bjorne Creek (Table 6; Appendices E, F, and G).

Peak aerial counts of live pink salmon in 23 of the 24 streams on which daily ground surveys were also conducted in 1990 ranged from 500 in Gumboot Creek to 24,500 in Irish Creek (Table 4). Peak aerial

live counts of pink salmon in the 42 streams on which daily ground surveys were also conducted in 1991 ranged from 90 in Eccles Creek to 18,000 in Canoe Creek (Table 5). Peak aerial live counts of pink salmon in the 17 streams on which daily ground surveys were also conducted in 1992 ranged from 30 in Gumboot Creek to 5,700 in Irish Creek (Table 6).

For most streams examined, weir, ground, and aerial counts in 1991 were much greater than those made in either 1990 or 1992 (Table 4-6). Eight (streams 506, 621, 628, 637, 666, 677, 692, and 847) of the 10 streams with weirs had much greater weir live, ground survey dead, and aerial survey peak live counts in 1991 than in either 1990 or 1992. Irish Creek (stream 76) had both greatest weir and ground survey counts in 1991, but the greatest aerial survey count in 1990. Cathead Creek (stream 699) had both greatest weir and ground survey counts in 1991, but the greatest aerial survey count in 1992. There were 19 other streams for which both ground and aerial surveys were made for two or three years. Of these, 10 (streams 80, 145, 601, 604, 610, 612, 613, 633, 665, 673) had both greatest ground and aerial counts in 1991, two (streams 2 and 5) had both greatest ground and aerial counts in 1990, and seven had greatest ground and aerial counts in different years (streams 143, 507, 508, 510, 602, 623, and 695). Finally, there were two streams for which either ground or aerial surveys were obtained for two years. Both these streams had either greatest ground (stream 606) or aerial (stream 611) counts in 1991.

Total weir live and ground survey dead counts were usually very similar, and were positively correlated (1990-1992, $n=24$, $r=0.992$; Tables 4-6). Missing data had a much greater effect upon weir live counts than on ground survey dead counts (Table 7). More than 20% of total upstream passage had to be estimated due to missing weir data for nine of 24 year-stream data sets (Table 7). Most missing weir data resulted from high water events that required removal of weir pickets to prevent the weir from washing-out. In five instances, cumulative ground survey dead counts greatly exceeded cumulative weir live counts, with weir to ground count ratios ranging from 0.81 to 0.52 (Totemoff Creek: 0.81 in 1990, 0.73 in 1991; O'Brien Creek: 0.78 in 1991; Point Countess Creek: 0.78 in 1992; Hawkins Creek: 0.52 in 1992; Tables 4-6). These five data sets were not used in calculating stream-life or observer efficiency values. O'Brien Creek data from 1992 was also excluded from further analysis since 55% of the total up- and downstream count as well as 50% of the net upstream passage was estimated from missing data (Table 7). However, while 50% of the total up- and downstream count was estimated from missing data for Irish Creek in 1992, we chose to use these data to estimate stream life and observer efficiency because cumulative ground survey dead and weir live counts were very similar and only 35% of net upstream passage was estimated from missing data.

Total weir live counts were always much greater than peak aerial survey counts, but these data were also positively correlated (1990-1992, $n=24$, $r=0.792$; Tables 4-6). The mean ratio of peak aerial to total weir live counts was 0.36 (median 0.35; range 0.13 to 0.76). Peak aerial live counts accounted for a smaller proportion of total weir counts during 1991 (ratio: mean 0.25; median 0.24) when runs were greatest (weir count: mean 26,499; median 19,344) than in 1990 (ratio: mean 0.48; median 0.55; weir count: mean 17,728; median 10,542) and 1992 (ratio: mean 0.43; median 0.37, mean weir count: mean 4,641; median 3,486).

Mean date of pink salmon passage through the weirs (i.e. the date when about 50% of the total run had been counted) was generally later during 1991 (range: 14-30 August) than during 1990 (range: 11-23

August) and 1992 (range: 3-29 August). This was most apparent when examining differences within the four creeks that had been studied all three years. Mean dates of passage for 1990, 1991, and 1992 were: 11, 14, and 3 August for Irish Creek; 12, 19, and 7 August for Totemoff Creek; 23, 23, and 17 August for Herring Creek; 8, 28; and 5 August for Cathead Creek.

Area-Under-the-Curve Estimates of Total Pink Salmon Spawners from Surveys

Observer Efficiency.--Aerial and ground survey observer efficiency was calculated for 18 of the 24 individual data sets for streams with weirs (Table 8). Observer efficiency values were not calculated for Totemoff Creek in 1990, Totemoff and O'Brien in 1991, and Point Countess, O'Brien, and Hawkins creeks in 1991. This was because large differences occurred between total weir counts and total dead counts in these data sets, and a relatively large proportion of the counts were missing and had to be interpolated (Tables 4, 5, 6, and 7). This greatly affected our ability to determine the number of live pink salmon above weirs (Equation 5), which was a key component in calculating observer efficiency values.

For all streams examined, in all years, both ground and aerial survey counts of live pink salmon were generally less than the number of live pink salmon determined to be present above weirs (Table 8). However, ground observers were usually able to count more of the pink salmon present (mean observer efficiency 0.703; mean R^2 0.930) than aerial observers (mean observer efficiency 0.436; mean R^2 0.498).

Stream Life.--Six methods were used to calculate pink salmon stream life (Table 9). Two of these were based on recoveries of marked pink salmon (Marking:Mean, S1, and Marking:Milling, S2), while the remaining four were based on visual counts of pink salmon (Visual:Weir Mean, S3; Visual:Ground Mean, S4; Visual:Weir Mean Timing, S5; and Visual:Ground Mean Timing, S6). Stream life estimates based on visual counts of pink salmon were made only for streams with weirs. All methods based on visual counts used ground survey counts of dead pink salmon along with either weir counts or ground survey counts of live pink salmon. For streams with weirs, stream-life values based on run timing (mean: S5 6.8 days; S6 8.3 days) were generally lower than values based on either marking (mean: S2, 9.9 ; S1 14.2 days) or fish days (mean: S4 11.1 days; S3 12.6 days).

Temporally stratified marking experiments to estimate stream life were conducted in 21 streams in 1990, 39 streams in 1991, and 10 streams in 1992 (Appendix H). Uniquely marked Peterson disk tags were applied to approximately 8,500 pink salmon in 1990, 27,000 pink salmon in 1991, and 5,700 in 1992. The number of weekly tagging strata ranged from 4 to 5 in 1990, 1 to 8 in 1991, and 2 to 6 in 1992. Mean annual recovery rates were 41% (range: 3.5%-64.3%) in 1990, 38% (range: 0.7%-64.2%) in 1991, and 43% (range: 12.6%-63.1%) in 1992. Stream-life values based solely on tag recovery data (Equation 10) ranged from 7.9 days to 23.1 days for experiments in which more than 50 tags were recovered.

For streams with weirs, it was possible to adjust tag recovery data to account for pink salmon that milled about stream mouth marking sites rather than entering streams immediately after marking.

When adjustments for milling were made, stream-life values decreased for all but one of the streams with weirs examined in 1991 and 1992 (Table 9). For the remaining stream (Hawkins Creek, 1991), stream life was not changed by a milling adjustment. For all 15 stream-year data sets, stream-life values unadjusted for milling (S1; Equation 10) ranged from 10.0 days to 21.5 days, while stream-life values adjusted for milling (S2; Equation 11) ranged from 6.9 days to 14.9 days. Mean decrease in stream life for the 14 cases changed by the milling adjustment was 4.0 days, but changes ranged from 1.5 days (Irish Creek, 1991) to 6.9 days (Totemoff Creek, 1992). No trend in the magnitude of the milling adjustment was evident between the two years examined. In the six streams examined both years, the milling adjustment decreased for three streams and increased for three streams.

Stream-life values using visual counts were based on either fish days or run timing. Estimates based on fish days were calculated by dividing either fish days based on weir counts (S3; Equation 12) or fish days based on ground survey live counts (S4; Equation 13) by total weir counts or total ground survey counts of dead pink salmon. The first fish-days method (S3) produced values ranging from 6.8 days to 21.5 days (mean: 12.6 days), while the second (S4) produced values ranging from 6.0 days to 19.4 days (mean: 11.1 days; Table 9). Stream-life values based on weir counts (S3) were less than those based on ground survey live counts (S4) for 15 of the 18 stream-year data sets. Differences ranged from 0.1 to 5.3 days, and were 2.5 days or less for 14 of the 18 data set. The greatest differences between the two methods occurred in 1992.

Estimates based on run timing were calculated by dividing mean date of pink salmon arrival into each stream, based on either weir (S5; Equation 14) or ground survey (S6; Equation 15) live counts, by mean date of death from ground survey dead counts (Table 9). The first run timing method (S5) produced values ranging from 3.0 days to 10.9 days (mean: 6.3 days), while the second (S6) produced values ranging from 5.4 days to 12.6 days (mean: 8.5 days; Table 9). Stream-life values based on weir counts (S5) were less than those based on ground survey live counts (S6) for 12 of the 18 stream-year data sets. Differences ranged from 0.0 to 3.8 days, and were 2.5 days or less for 12 of the 18 data set. The greatest differences between the two methods occurred in 1991.

We chose to use stream-life values obtained from weir live and ground survey dead counts (method S3) to calculate pink salmon escapements for this report. We felt that stream-life values from method S3 would be more accurate than those from other methods. This method estimated mean stream life by dividing the total live fish days in a stream by the total escapement. Stream-life values obtained from marking experiments, methods S1 and S2, were probably affected by effects of handling and tag placement, even when we tried to take milling behavior into consideration. Stream-life values based on ground survey live counts, methods S4 and S6, were thought to be less accurate than those based on weir live counts, methods S3 and S5. Finally, we rejected stream-life values from method S5, although they were based on weir live and ground survey dead counts, because we felt assumptions needed to make valid estimates based on run timing were generally violated. Run timing curves for entry of live and death of spawned pink salmon were not always normally distributed, and the shape of plotted curves for live and dead pink salmon for the same stream were often very dissimilar.

Pink Salmon Spawning Escapement into Index Streams

Stream Classification.--Stream-life and observer efficiency values from streams with weirs (Table 10) were subjectively assigned to every stream in the routine ADF&G aerial survey program in 1991 and 1992 based on similarities in stream size, gradient, water clarity, forest canopy, and extent of upstream spawning to streams with weirs (Tables 11-18).

Escapement Estimates.--Pink salmon spawning escapement estimates were calculated, based on the area-under-the-curve method, for each of the 208 index streams whenever aerial survey counts were available during 1963-1992. Individual index stream estimates were grouped and summed to produce escapement estimates for each management district and all of Prince William Sound for these years (Table 19). Total Prince William Sound pink salmon annual escapement estimates ranged from 578,093 in 1974 to 13,543,263 in 1979. Beginning in 1965, the estimates showed a trend of larger total escapements during odd years. District escapement estimates greater than one million pink salmon were obtained during one or more years for all management districts except Eshamy. Eastern and Coghill districts were the only ones for which escapement estimates greater than four million pink salmon were obtained during one or more years during the 30-year period examined.

Escapements calculated with our methods were always greater than existing estimates, based on a 17.5 day stream life and no adjustment for observer efficiency, for all four recent years examined, 1989-1992 (Table 20). Differences between estimates were less for the two even years examined, 1990 and 1992, than for the two odd years, 1989 and 1991. While some existing estimates were only about one tenth of our estimates (e.g. Eshamy District, 1990 and 1992), most were about one third to one fifth of our estimates.

Proportion of Prince William Sound Escapement Accounted for by Routine Aerial Survey Program

Between 20% and 24% of non-index streams within most management districts were randomly selected to be surveyed. Two districts had a smaller percentage of non-index streams surveyed: only 7% were surveyed in Coghill (223) and 18% were surveyed in Montague (227) districts. Mean stream-life and observer efficiency values calculated for index streams within each commercial fishing district for 1991 were then assigned to all randomly selected non-index streams within that district (Tables 21-25; Appendix A.2).

About 80% of the total Prince William Sound pink salmon escapement estimate for 1991 was attributed to the 208 index streams surveyed during the routine aerial survey program (Table 26). For most districts, index streams accounted for at least 75% of the total escapement. For Southwestern District (226), however, only 39% of the total escapement was attributed to index streams. To improve survey coverage, an additional 10 streams within Southwestern District were included as part of the routine ADF&G aerial survey program beginning in 1994.

Biological Spawning Escapement Goals

A primary ADF&G salmon management objective is achievement of predetermined biological spawning escapement goals that produce high sustained yields. For Prince William Sound, separate even- and odd-year biological escapement goals have been set for each management district. These goals were calculated as the mean of all available even- or odd-year routine ADF&G aerial survey escapement estimates for the period 1966 through 1989. Mean values calculated from escapement estimates based on stream-life and observer efficiency values from the present study were greater than those calculated from estimates based on a 17.5 day stream life and no observer efficiency adjustment (Table 27). Differences were greater for odd-years (1967-1989), where the existing total goal was only 19% of the recalculated total goal, than for even-years (1966-1988), where the existing total goal was 60% of the recalculated total goal. Existing district odd-year goals were as little as 10% of the recalculated goal to as much as 30% of the recalculated goal. Existing district even-year goals were as little as 33% of the recalculated goal to as much as 76% of the recalculated goal.

Pink Salmon Run Timing for Index Streams

Run timing curves were developed for all 208 index streams (e.g. Figure 2; Appendix I). Two curves were developed for each stream using aerial survey data from 1963-1992: One curve shows the mean percent of the total aerial survey escapement count achieved each day, and the other shows the cumulative percent of the total count achieved each day. Run timing curves for all 208 index streams are used by ADF&G managers during the commercial fishing season to assist them in achieving district escapement goals. This is done by comparing actual aerial counts to expected counts from run timing curves.

DISCUSSION

This work was started to assess injuries to pink salmon spawning populations resulting from the *Exxon Valdez* oil spill (NRDA F/S Study 1). While the presence of oil was corroborated in many streams through both visual observations and analysis of tissue samples from mussels, no obvious differences in either the number or distribution of pink salmon spawning in oil contaminated streams were observed during these investigations. Maki et al. (1995) were also unable to detect effects on pink salmon spawning populations that could be attributed to spill hydrocarbons. Inability to detect population-level effects from the spill was not unexpected, since pink salmon populations have wide annual fluctuations due to a variety of factors, and comparisons between oiled and non-oiled or pre- and postspill populations suffer from lack of randomization and low statistical power (Hilborn 1996). Population effects from the oil spill would have to have been catastrophic to be detected. This did not

mean that pink salmon production was unaffected by the oil spill. Bue et al. (1996) and Bue et al. (1998a) documented increased mortality of pink salmon embryos in oil contaminated streams beginning in 1989 and continuing through 1993, although Brannon et al. (1995) reported finding no effects. However, results of a controlled incubation experiment, using pink salmon from oil contaminated and uncontaminated streams, suggested that differences in embryo mortality found in field studies were not caused by natural environmental effects, and that a parental effect, such as physiological or genetic damage, may have been responsible for persistent effects in post-oil generations (Bue et al. 1998a). Wiedmer et al. (1996) found evidence that pink salmon alevins developing in heavily oiled sites continued to be exposed to hydrocarbons more than two years after the spill, and that the hydrocarbons induced detectable physiological changes. Wertheimer and Celewycz (1996) as well as Willette (1996) found that juvenile pink salmon rearing in nearshore areas contaminated by oil during the spill grew more slowly than juveniles residing in uncontaminated areas. This effect was very evident during the 1989 spill year, when hydrocarbon contamination was greatest, but was either absent or difficult to detect in the two succeeding years. Geiger et al. (1996) modeled effects of oil contamination on these early life history stages, and estimated that about 10% of potential pink salmon wild stock production was lost: 1.9 million adult pink salmon in 1990, due to lowered juvenile growth which decreased survival, and less than 100,000 adults each year in 1991 and 1992, due to increased embryo mortality from continuing oil contamination of some streams. Once injury was established, investigations shifted towards evaluation and improvement of escapement enumeration techniques to ensure that affected pink salmon populations were adequately protected (restoration studies 9 and 60B).

The accuracy and precision of escapement estimates based on area-under-the-curve calculations are affected by stream life, observer efficiency, and survey frequency. We, along with other investigators, have used information collected from our studies to examine the effects of these factors on escapement estimates. Bue et al. (1998b) examined the effects of these three variables on escapement estimation (Appendix K), while Hilborn et al. (*in press*) proposed a maximum likelihood method for estimating escapement and illustrated the uncertainty associated with stream life, observer efficiency, and survey frequency (Appendix L). Quinn and Gates (1997) developed a mathematical model that used daily observations to estimate escapement (Appendix M).

Hill (1997), using data for chinook salmon *O. tshawytscha* in the Nechako River, British Columbia, Canada, found that precision of area-under-the-curve escapement estimates decreased as frequency of survey flights decreased. In his simulations, once flight intervals reached 17 days or more, precision declined rapidly for stream-life values of eight, 10, or 12 days. To adequately capture the shape of the curve, the interval between flights needs to decrease as stream life decreases. Bue et al. (1998b), using pink salmon data from our study, showed that average error of Prince William Sound pink salmon area-under-the-curve escapement estimates increased when the interval between surveys exceeded 7 days. Since the mean interval between flights has been about 7 days for routine ADF&G aerial surveys (about 5 days in 1990, 6 days in 1991, and 7 days in 1992), allocation of survey effort appears to be adequate and probably provides estimates of area-under-the-curve (i.e. fish days) that are within 10% of actual values unadjusted for observer efficiency (Bue et al. 1998b).

Hilborn et al. (*in press*) showed that year to year variability in our estimates of observer efficiency contributed the most uncertainty to our estimates of escapement using aerial surveys. Our study indicated that both aerial and ground observers tended to under-count pink salmon in Prince William Sound spawning systems, although ground observer counts tended to be more accurate. However, large differences can exist among different observers, and it is likely that each observer's efficiency changes in response to both viewing conditions and learning.

We chose to use pink salmon stream-life values calculated from weir and dead counts (method S3), which estimated mean stream life by dividing the total live fish days in a stream by the total escapement. We felt this method provided the most accurate estimate of mean stream life. Stream-life values obtained with this method ranged from 6.8 days to 21.5 days, and the mean for all stream-year data sets was 12.6 days. This mean stream life is less than the 17.5 day stream life currently used by ADF&G, but is similar to the 11.3 day mean stream life for Solf and Elishansky creeks reported by McCurdy (1984) as well as the 11.1 day mean stream life for Olsen Creek reported by Helle et al. (1964). Maki et al. (1997), using data from streams with weirs in our study to develop Weibull survival functions, obtained mean stream-life values of 12 to 13 days. The 17.5 day pink salmon stream-life value currently used for area-under-the-curve calculations to estimate pink salmon escapements in Prince William Sound was thought to be based on the Helle et al. (1964) study of the pink salmon run to Olsen Creek. However, a mean stream life of about 17.5 days was obtained only for the month of July in Helle et al. (1964; 17.7 days, if data from marking on 24 July 1961 were omitted due to milling problems), while mean stream-life values for August and September were much shorter (10.8 days and 6.1 days). Aside from stating that stream-life values of either 2.5 weeks (17.5 days) or 4.0 weeks (28 days) were used to calculate escapement estimates (e.g. Pirtle 1977), no documentation of how these values were obtained could be found. Most stream-life values for pink salmon in streams we examined were shorter than 17.5 days. However, pink salmon spawning in Irish Creek, a large system more similar to Olsen Creek, had annual stream life values similar to 17.5 days.

Our evaluation of escapement estimation methods was not unbiased because weir counts were used to measure total escapement as well as to estimate stream life and observer efficiency. Our studies, however, do provide strong evidence that escapement estimates based on appropriate stream-life values and adjusted for observer efficiency will be more accurate than those based on the currently used 17.5 day stream-life value and not adjusted for observer efficiency (also see Bue et al. 1998b). This was most clearly demonstrated for Irish and Cathead Creeks in 1990 and 1991, where escapement estimates based on the currently used method declined while total weir counts increased. Even though escapement estimates to Irish and Cathead Creeks using our stream-life and observer efficiency values were not always very accurate (e.g. 48% over-estimate for Irish Creek in 1991), they did trend in the correct direction and were closer to total weir counts than estimates based on currently used methods.

Our results suggest that the use of appropriate stream-life and aerial observer efficiency values, in conjunction with regular aerial surveys at seven day or shorter intervals between survey flights, will provide more accurate aerial estimates of pink salmon spawning populations than are currently being obtained. However, simply applying our stream life and aerial observer efficiency values as constants will still introduce unknown errors into annual spawning population estimates. To avoid this, we recommend that weirs be maintained on a subset index streams to calibrate aerial observers and to track changes in stream life more closely. Such projects need not be done every year, but particular care should be taken when changes in aerial observers occur. Weir integrity must also be evaluated and maintained so that accurate counts of spawning salmon are obtained. Large fluctuations in water level and velocity due to heavy rain, effects of which are magnified by steep gradients and loose gravel substrate, contributed to problems in maintaining weirs in various creeks used in this study. Not only did high water flow events make it necessary to remove weir pickets and miss counts, but they also caused gaps at the bottom of weirs which sometimes went unnoticed and allowed salmon to pass uncounted. We found that properly designed ground surveys to count dead salmon provided a valuable independent check on weir counts, and recommend that these be done in conjunction with future weir operations.

CONCLUSIONS

Presence of oil was corroborated in many Prince William Sound pink salmon spawning streams through both visual observations and analysis of tissue samples from mussels growing near the mouths of these streams. Tissue samples from adult pink salmon obtained from both oil contaminated and uncontaminated streams showed little evidence of injuries from oil exposure. Also, no obvious differences in either numbers or distribution of pink salmon spawners was seen between contaminated and uncontaminated streams. However, other studies found injuries to pink salmon embryos incubating in oil contaminated streams (Bue et al. 1996, Wiedmer et al. 1996, Bue et al. 1998a), and to pink salmon juveniles rearing in oil contaminated nearshore areas (Wertheimer and Celewycz 1996; Willette 1996). About 10% of potential wild pink salmon production was estimated to have been lost due to effects of oil exposure during early life history stages (Geiger et al. 1996).

The restoration components of our studies were concerned with improving accuracy, precision and timeliness of aerial escapement estimates of pink salmon to allow fishery managers to regulate human use and protect injured stocks while harvesting other wild and hatchery stocks. This was successfully accomplished largely from observations conducted on creeks with intertidal weirs. Our findings, for pink salmon in Prince William Sound, showed that 1) aerial observers tended to undercount actual numbers of spawners, 2) stream life of spawners in most streams, while variable, was generally less than the 17.5 day value currently used in area-under-the-curve calculations, and 3) the 208 index streams routinely surveyed appear to account for a large proportion of the total number of spawners. Ancillary analyses, published elsewhere, indicated that the weekly flight schedule currently used for the

routine ADF&G aerial survey program is adequate, probably providing estimates of the area-under-the-curve (i.e. fish days) for most streams within 10% of actual values unadjusted for observer efficiency. However, failure to use proper stream life values and make observer efficiency adjustments has caused actual numbers of pink salmon spawners to be considerably underestimated. The department has continued to seek funding for a weir program, and will make improvements to the aerial survey database in 1999. Changes to the existing database will include modification of associated analysis programs so that escapement estimates can be made using different stream life values and observer efficiency adjustments. Unfortunately, without funding to maintain weirs on a subset of streams, using our stream life and aerial observer efficiency values as constants in calculations will still introduce unknown errors into annual spawning population estimates. So, while we demonstrated that existing biological escapement goals are too low, since they are based on calculations which underestimate actual numbers of spawning pink salmon, existing biological escapement goals cannot be modified until escapement estimation procedures are changed.

Finally, two other important improvements to the routine ADF&G aerial survey program were also achieved through our studies. First, while we found that the 208 index streams accounted for a large proportion of all pink salmon spawning in Prince William Sound, we also discovered that distribution of survey effort among commercial fishing districts was somewhat uneven. The worse problem was encountered for the Southwestern District, where less than 50% of the escapement was accounted for by the 27 index streams. To improve survey coverage, an additional 10 streams were included in routine surveys of Southwestern District beginning in 1994. Second, we developed run timing curves for pink salmon in all index streams, and modified database programs so that actual numbers of pink salmon entering streams could be compared to numbers expected from run timing curves. This information is now routinely used as part of the inseason decision making process of opening and closing fisheries. It has improved inseason stock specific management and allowed injured stocks to be rebuilt by increasing the department's success in achieving needed spawning escapements.

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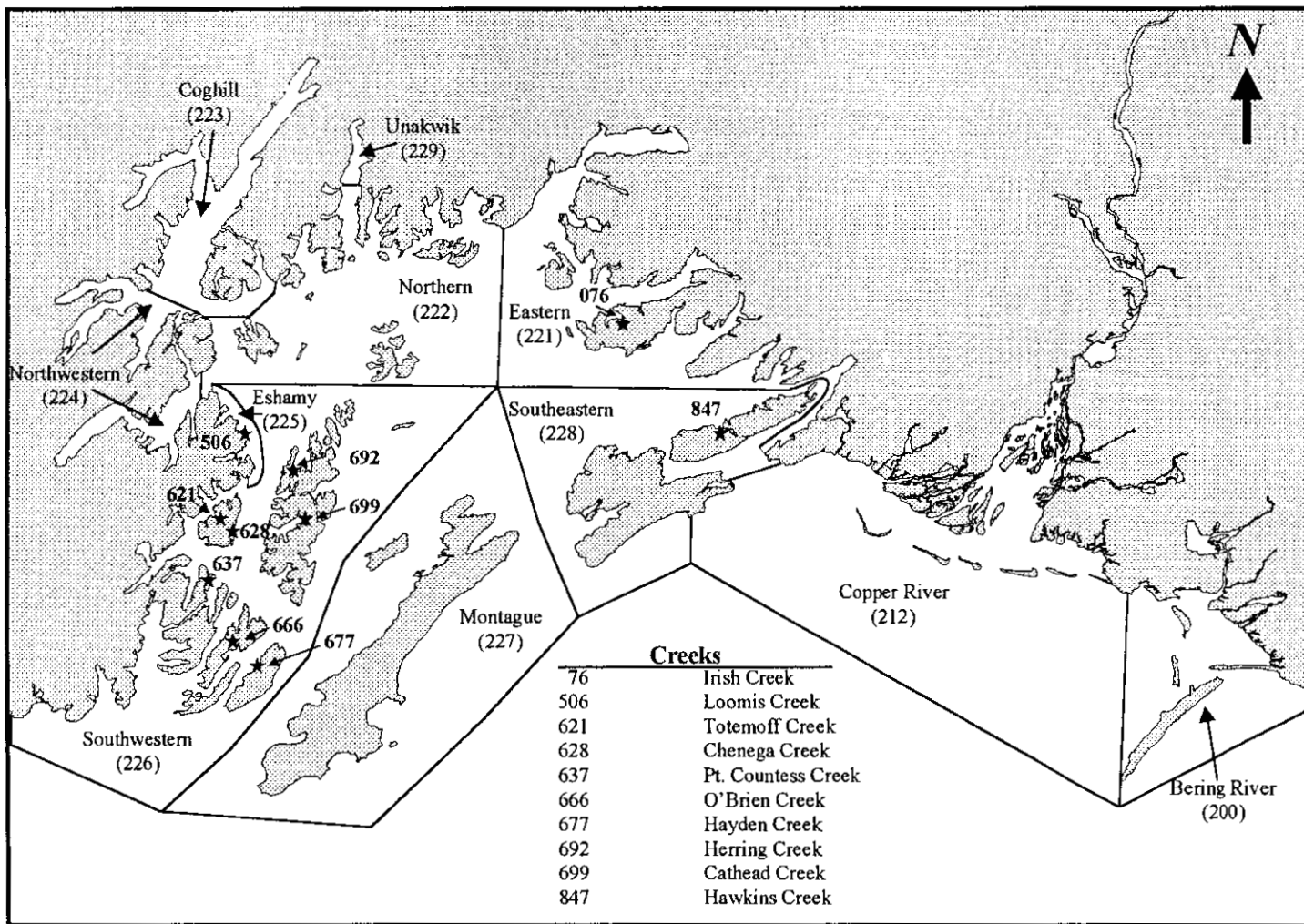


Figure 1. Location of creeks used to examine the estimation of pink salmon escapements using aerial surveys, Prince William Sound, Alaska, 1990-1992.

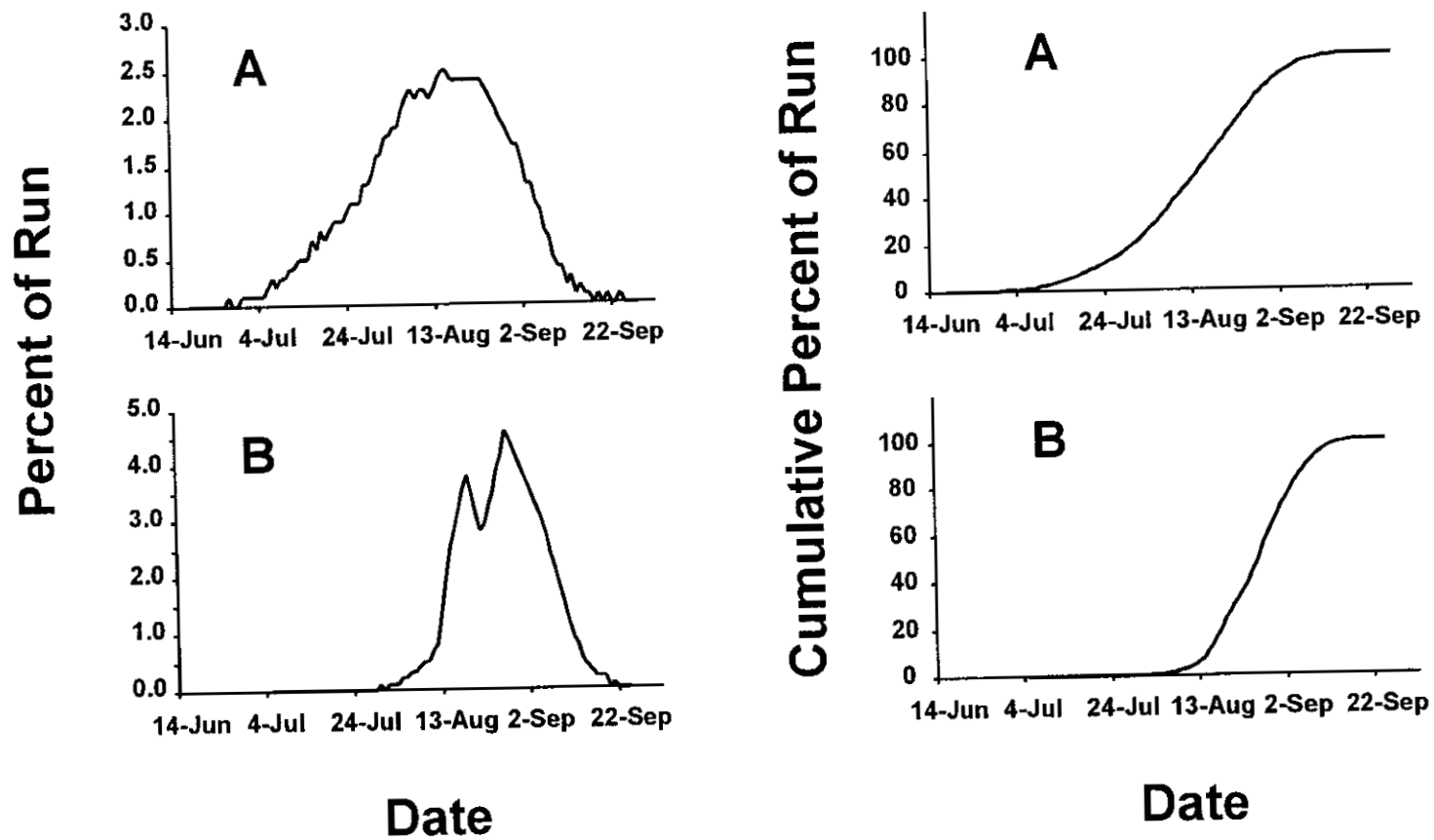


Figure 2. Run timing curves for pink salmon entering Irish (A) and Loomis (B) streams to spawn, Prince William Sound, Alaska.

Table 1. Extent of visible oil contamination of anadromous salmon streams surveyed during the *TV Exxon Valdez* oil spill, Prince William Sound, 1989.

| Survey Purpose | Visible Oil Contamination | | | | | | | | |
|------------------------|---------------------------|------------|------------------------------|-------|--------|-------|-------|--------------------|-------|
| | Number of Streams in: | | Stream Mouth/Intertidal Zone | | | | | Offshore of Stream | |
| | Each Survey | Oil Survey | None | Sheen | Mousse | Black | Total | None | Sheen |
| Oil Contamination | 441 | 441 | 398 | 7 | 9 | 42 | 43 | 27 | 12 |
| Adult Escapement: | | | | | | | | | |
| Aerial | 221 | 183 | 168 | 2 | 4 | 14 | 15 | 8 | 5 |
| Ground | 138 | 130 | 119 | 1 | 4 | 10 | 11 | 2 | 4 |
| Embryo/Preemergent Fry | 58 | 57 | 44 | 1 | 5 | 12 | 13 | 1 | 6 |

Table 2. Visual observations and mussel samples collected from 31 pink salmon spawning streams to document hydrocarbon contamination, Prince William Sound, 1989 and 1990. A question mark placed next to a result indicates that the test result was marginal. A blank space indicates no mussel sample was collected at that site.

| Stream | | Visual Survey | Mussel Tissue Analysis | |
|--------|--------------------|---------------|------------------------|------|
| No. | Name | 1989 | 1989 | 1990 |
| 035 | Koppen Creek | No | No | No |
| 480 | Mink Creek | No | No | No |
| 485 | West Finger Creek | No | No | No |
| 498 | McClure Creek | No | No | No |
| 506 | Loomis Creek | Yes | No | No? |
| 604 | Erb Creek | No | No | No |
| 618 | Junction Creek | Yes | Yes | No |
| 621 | Totemoff Creek | No | No | No |
| 623 | Brizgaloff Creek | No | No | No |
| 628 | Chenega Creek | Yes | | No |
| 630 | Bainbridge Creek | No | No | No |
| 632 | Claw Creek | No | No | No |
| 637 | Pt. Countess Creek | Yes | Yes | No |
| 653 | Hogg Creek | No | No | No |
| 656 | Halverson Creek | No | No | No |
| 663 | Shelter Bay Creek | Yes | Yes | No? |
| 665 | Bjorne Creek | Yes | | No? |
| 666 | O'Brien Creek | No | No | |
| 673 | Falls Creek | No | No | No |
| 677 | Hayden Creek | Yes | Yes | No |
| 678 | Sleepy Bay Creek | Yes | | Yes |

- continued -

Table 2. (page 2 of 2)

| Stream | | Visual Survey | Mussel Tissue Analysis | |
|--------|-------------------|---------------|------------------------|------|
| No. | Name | 1989 | 1989 | 1990 |
| 681 | Hogan Bay Creek | Yes | No | No |
| 682 | Snug Harbor Creek | Yes | Yes | No |
| 692 | Herring Creek | Yes | Yes | Yes |
| 695 | Port Audrey Creek | No | No | No |
| 699 | Cathead Creek | Yes | No | No |
| 740 | Kelez Creek | No | No | No |
| 744 | Wilby Creek | No | No | No |
| 747 | Cabin Creek | No | No | No |
| 828 | Cook Creek | No | No | No |
| 861 | Windy Creek | No | No | No |

Table 3. Summary of histopathologic scores (Mean \pm SD) for selected liver lesions from 20 male and 20 female adult pink salmon collected in one unoiled (Windy Creek) and three oiled streams, 1990. Lesions were scored as none (0), mild (1), moderate (2), or severe (3).

| Stream | | | | | | |
|--------|------------------|------|--------------------|---------------|----------------------|------------------------------|
| No. | Name | Sex | Glycogen Depletion | Fatty Change | Single Cell Necrosis | Karyomegaly or Megalocytosis |
| 861 | Windy Creek | M | 1.4 \pm 1.0 | 0.1 \pm 0.3 | 0.2 \pm 0.5 | 0.1 \pm 0.6 |
| | | F | 2.9 \pm 0.3 | 1.0 \pm 0.8 | 1.3 \pm 0.9 | 1.1 \pm 0.9 |
| | | Both | 2.1 \pm 1.1 | 0.5 \pm 0.8 | 0.7 \pm 0.9 | 0.8 \pm 0.8 |
| 506 | Loomis Creek | M | 2.4 \pm 0.9 | 0.7 \pm 1.0 | 0.2 \pm 0.4 | 0.5 \pm 0.6 |
| | | F | 2.9 \pm 0.2 | 0.7 \pm 0.8 | 0.8 \pm 0.9 | 0.6 \pm 0.5 |
| | | Both | 2.7 \pm 0.7 | 0.7 \pm 0.9 | 0.5 \pm 0.8 | 0.5 \pm 0.6 |
| 678 | Sleepy Bay Creek | M | 1.7 \pm 1.0 | 0.3 \pm 0.7 | 0.2 \pm 0.4 | 0.4 \pm 0.5 |
| | | F | 2.7 \pm 0.5 | 0.2 \pm 0.5 | 0.1 \pm 0.2 | 0.5 \pm 0.6 |
| | | Both | 2.2 \pm 0.9 | 0.2 \pm 0.6 | 0.1 \pm 0.3 | 0.4 \pm 0.6 |
| 692 | Herring Creek | M | 2.3 \pm 0.8 | 0.3 \pm 0.8 | 0.4 \pm 0.5 | 0.8 \pm 0.6 |
| | | F | 3.0 \pm 0.0 | 0.3 \pm 0.6 | 1.3 \pm 0.8 | 0.7 \pm 0.7 |
| | | Both | 2.6 \pm 0.7 | 0.3 \pm 0.7 | 0.9 \pm 0.8 | 0.7 \pm 0.6 |

Table 4. Weir, ground, and aerial counts of pink salmon in selected spawning streams, Prince William Sound, Alaska, 1990.

| Stream | | Pink Salmon Counts | | | Ratios | |
|--------|----------------------|-------------------------|----------------------------------|--------------------------|------------|------------|
| No. | Name | Total Weir (live; W) | Total Ground Survey (dead; D) | Peak Aerial (live; C) | W/ C | C/ W |
| 002 | Harney Creek | - | 5,67 | 3,500 | | |
| 005 | Eccles Creek | - | 4,56 | 700 | | |
| 076 | Irish Creek | 44,900 | 45,78 | 24,500 | 0.9 | 0.5 |
| 080 | Whalen Creek | - | 42,49 | 9,000 | | |
| 089 | Fish Creek | - | 36,61 | 10,000 | | |
| 143 | Siwash Creek | - | 2,62 | 3,000 | | |
| 145 | Crooked Creek | - | 53 | 530 | | |
| 506 | Loomis Creek | - | 8,27 | 3,000 | | |
| 507 | Gumboot Creek | - | 79 | 500 | | |
| 508 | Solf Creek | - | 21,32 | 10,000 | | |
| 510 | Elishansky Creek | - | 14,95 | 2,100 | | |
| 601 | Paddy Creek | - | 19,19 | 2,700 | | |
| 602 | Nacktan Creek | - | 21,29 | 2,900 | | |
| 604 | Erb Creek | - | 17,86 | 2,900 | | |
| 606 | unnamed | - | 2,71 | N.A. | | |
| 610 | Kompkoff | - | 3,40 | 600 | | |
| 611 | W. Arm Jackpot Creek | - | N.A. | 7,000 | | |
| 612 | Jackpot #2 Creek | - | 2,36 | 2,200 | | |
| 613 | Jackson Creek | - | 7,26 | 4,100 | | |
| 621 | Totemoff Creek | 13,112 | 16,12 | 7,500 | 0.8 | 0.5 |
| 623 | Brizgaloff Creek | - | 20,70 | 3,125 | | |
| 692 | Herring Creek | 4,927 | 4,66 | 2,700 | 0.9 | 0.5 |
| 695 | Port Audrey Creek | - | 22,41 | 5,000 | | |
| 699 | Cathead Creek | 7,971 | 7,49 | 2,100 | 1.0 | 0.2 |
| | <i>Mea</i> | <i>17,728</i> | <i>14,31</i> | <i>4,768</i> | <i>0.9</i> | <i>0.4</i> |
| | <i>Media</i> | <i>10,542</i> | <i>8,27</i> | <i>3,000</i> | <i>0.9</i> | <i>0.5</i> |

Table 5. Weir, ground, and aerial counts of pink salmon in selected spawning streams, Prince William Sound, Alaska, 1991.

| Stream | | Pink Salmon Counts | | | Ratios | |
|--------|----------------------|-------------------------|----------------------------------|--------------------------|----------|----------|
| No. | Name | Total Weir (live; W) | Total Ground Survey (dead; G) | Peak Aerial (live; A) | W/ A/ | A/ A/ |
| 002 | Hartney Creek | - | 2,88 | 2,300 | | |
| 005 | Eccles Creek | - | 99 | 90 | | |
| 011 | Humpy Creek | - | 3,34 | 3,400 | | |
| 076 | Irish Creek | 95,034 | 94,61 | 17,000 | 1.0 | 0.1 |
| 080 | Whalen Creek | - | 50,08 | 15,000 | | |
| 092 | Shale Creek | - | 5,61 | 700 | | |
| 093 | Kirkwood Creek | - | 14,86 | 1,050 | | |
| 094 | Rock Creek | - | 12,78 | 2,500 | | |
| 143 | Siwash Creek | - | 12,46 | 1,800 | | |
| 145 | Crooked Creek | - | 1,82 | 700 | | |
| 506 | Loomis | 20,315 | 18,88 | 3,000 | 1.0 | 0.1 |
| 507 | Gumboot Creek | - | 70 | 1,000 | | |
| 508 | Solf Creek | - | 25,78 | 7,000 | | |
| 510 | Elishansky Creek | - | 11,42 | 5,000 | | |
| 516 | Clemence Creek | - | 4,64 | 1,000 | | |
| 601 | Paddy Creek | - | 12,20 | 3,200 | | |
| 602 | Nacktan Creek | - | 13,62 | 5,000 | | |
| 604 | Erb Creek | - | 21,74 | 4,000 | | |
| 606 | unnamed | - | 4,99 | 740 | | |
| 610 | Kompkoff Creek | - | 5,98 | 4,025 | | |
| 611 | W. Arm Jackpot Creek | - | 3,94 | 410 | | |
| 612 | Jackpot #2 Creek | - | 3,25 | 300 | | |
| 613 | Jackson Creek | - | 31,34 | 17,000 | | |
| 621 | Totemoff Creek | 27,350 | 37,63 | 9,500 | 0.7 | 0.3 |

- continued -

Table 5. (page 2 of 2).

| Stream | | Pink Salmon Counts | | | Ratios | |
|--------|--------------------|-------------------------|----------------------------------|--------------------------|------------|------------|
| No. | Name | Total Weir (live; W) | Total Ground Survey (dead; G) | Peak Aerial (live; A) | W/ A/ | A/ W/ |
| 623 | Brizgaloff Creek | - | 19,12 | 4,100 | | |
| 628 | Chenega Creek | 49,769 | 51,79 | 7,200 | 0.9 | 0.1 |
| 632 | Claw Creek | - | 10,59 | 2,750 | | |
| 633 | Pablo Creek | - | 13,00 | 5,500 | | |
| 634 | Passover Creek | - | 7,07 | 800 | | |
| 636 | Whale Creek | - | 23,56 | 5,500 | | |
| 637 | Pt. Countess Creek | 15,028 | 14,17 | 5,400 | 1.0 | 0.3 |
| 665 | Bjorne Creek | - | 26,25 | 2,300 | | |
| 666 | O'Brien Creek | 25,762 | 33,13 | 5,100 | 0.7 | 0.2 |
| 670 | Montgomery Creek | - | 10,83 | 10,000 | | |
| 673 | Falls Creek | - | 14,74 | 8,000 | | |
| 677 | Hayden Creek | 18,372 | 16,40 | 5,000 | 1.1 | 0.2 |
| 678 | Sleepy Bay Creek | - | 2,24 | 2,000 | | |
| 692 | Herring Creek | 13,022 | 13,69 | 4,500 | 0.9 | 0.3 |
| 695 | Port Audrey Creek | - | 21,13 | 8,000 | | |
| 699 | Cathead Creek | 9,629 | 8,72 | 1,500 | 1.1 | 0.1 |
| 847 | Hawkins Creek | 40,433 | 42,35 | 12,000 | 0.9 | 0.3 |
| 850 | Canoe Creek | - | 45,15 | 18,000 | | |
| | <i>Mea</i> | <i>26,499</i> | <i>18,35</i> | <i>5,080</i> | <i>0.9</i> | <i>0.2</i> |
| | <i>Media</i> | <i>19,344</i> | <i>13,31</i> | <i>4,013</i> | <i>0.9</i> | <i>0.2</i> |

Table 6. Weir, ground, and aerial counts of pink salmon in selected spawning streams, Prince William Sound, Alaska, 1992.

| Stream | | Pink Salmon Counts | | | Ratios | |
|--------|--------------------|-------------------------|----------------------------------|--------------------------|------------|------------|
| No. | Name | Total Weir (live; W) | Total Ground Survey (dead; G) | Peak Aerial (live; A) | W/ A/ | A/ A/ |
| 076 | Irish Creek | 8,208 | 8,87 | 5,700 | 0.9 | 0.6 |
| 506 | Loomis Creek | 3,845 | 3,17 | 500 | 1.2 | 0.1 |
| 507 | Gumboot Creek | - | 12 | 30 | | |
| 508 | Solf Creek | - | 2,20 | 1,200 | | |
| 604 | Erb Creek | - | 2,85 | 900 | | |
| 621 | Totemoff Creek | 8,428 | 7,74 | 3,200 | 1.0 | 0.3 |
| 628 | Chenega Creek | 10,658 | 8,90 | 3,000 | 1.2 | 0.2 |
| 633 | Pablo Creek | - | 3,46 | 2,400 | | |
| 637 | Pt. Countess Creek | 2,720 | 3,50 | 985 | 0.7 | 0.3 |
| 665 | Bjorne Creek | - | 10,66 | 275 | | |
| 666 | O'Brien Creek | 3,127 | 3,03 | 1,050 | 1.0 | 0.3 |
| 673 | Falls Creek | - | 1,24 | 1,700 | | |
| 677 | Hayden Creek | 2,708 | 2,49 | 500 | 1.0 | 0.1 |
| 692 | Herring Creek | 911 | 73 | 500 | 1.2 | 0.5 |
| 695 | Port Audrey Creek | - | 7,92 | 1,900 | | |
| 699 | Cathead Creek | 3,937 | 3,23 | 3,000 | 1.2 | 0.7 |
| 847 | Hawkins Creek | 1,865 | 3,60 | 1,100 | 0.5 | 0.5 |
| | <i>Mea</i> | <i>4,641</i> | <i>4,43</i> | <i>1,644</i> | <i>1.0</i> | <i>0.4</i> |
| | <i>Media</i> | <i>3,486</i> | <i>3,23</i> | <i>1,100</i> | <i>1.0</i> | <i>0.3</i> |

Table 7. Effect of missed daily counts on weir live and ground survey dead counts of pink salmon in selected spawning streams, Prince William Sound, Alaska, 1990-1992.

| Stream | | Percent of Total Counts Estimated from Missed Data | | | | |
|--------|--------------------|--|--------|--------------------------|----------------------|--------|
| | | Percent of Daily Observations Missed | | Weir | | |
| | | Weir | Ground | Up- and Downstream Count | Net Upstream Passage | Ground |
| | | 1990 | | | | |
| 076 | Irish Creek | 1 | 4 | 3 | 3 | 0 |
| 621 | Totemoff Creek | 19 | 2 | 23 | 19 | 0 |
| 692 | Herring Creek | 7 | 5 | 1 | -1 | 0 |
| 699 | Cathead Creek | 6 | 9 | 5 | 5 | 0 |
| | | 1991 | | | | |
| 076 | Irish Creek | 4 | 6 | 4 | 4 | 6 |
| 506 | Loomis Creek | 1 | 15 | 3 | 33 | 0 |
| 621 | Totemoff Creek | 0 | 21 | 0 | 0 | 0 |
| 628 | Chenega Creek | 11 | 10 | 23 | 18 | 0 |
| 637 | Pt. Countess Creek | 0 | 0 | 0 | 0 | 0 |
| 666 | O'Brien Creek | 3 | 9 | 39 | 39 | 5 |
| 677 | Hayden Creek | 0 | 1 | 0 | 0 | 0 |
| 692 | Herring Creek | 4 | 0 | 17 | -25 | 0 |
| 699 | Cathead Creek | 5 | 19 | 15 | 2 | 3 |
| 847 | Hawkins Creek | 6 | 11 | 35 | 26 | 4 |
| | | 1992 | | | | |
| 076 | Irish Creek | 14 | 5 | 50 | 35 | 6 |
| 506 | Loomis Creek | 3 | 26 | 7 | 7 | 0 |
| 621 | Totemoff Creek | 3 | 1 | 1 | 1 | 6 |
| 628 | Chenega Creek | 4 | 2 | 10 | 10 | 1 |
| 637 | Pt. Countess Creek | 11 | 0 | 88 | 88 | 0 |
| 666 | O'Brien Creek | 18 | 5 | 55 | 50 | 0 |
| 677 | Hayden Creek | 13 | 3 | 37 | 31 | 0 |
| 692 | Herring Creek | 3 | 0 | 16 | 16 | 0 |
| 699 | Cathead Creek | 5 | 0 | 27 | 27 | 0 |
| 847 | Hawkins Creek | 9 | 3 | 54 | 1 | 2 |

Table 8. Calculated observer efficiency values for aerial and ground survey counts of pink salmon for spawning streams with weirs, Prince William Sound, Alaska, 1990-1992. Ground survey values in parenthesis are for data obtained on same days aerial surveys were flown.

| Stream | | Ground Survey | | | Aerial Survey | | |
|-------------|--------------------|----------------------|----------------|------------------------|---------------------|----------------|------------------------|
| | | Observer Efficiency | R ² | Number of Observations | Observer Efficiency | R ² | Number of Observations |
| No. | Name | | | | | | |
| 1990 | | | | | | | |
| 076 | Irish Creek | 0.553 (0.529) | 0.869 (0.899) | 71 (18) | 0.499 | 0.296 | 18 |
| 692 | Herring Creek | 0.894 (0.969) | 0.870 (0.983) | 56 (12) | 0.888 | 0.768 | 12 |
| 699 | Cathead Creek | 0.794 (0.818) | 0.966 (0.956) | 62 (12) | 0.825 | 0.714 | 12 |
| | <i>Mean</i> | <i>0.747 (0.772)</i> | | | <i>0.737</i> | | |
| 1991 | | | | | | | |
| 076 | Irish Creek | 0.573 (0.571) | 0.912 (0.918) | 81 (17) | 0.177 | 0.296 | 17 |
| 506 | Loomis Creek | 0.725 (0.675) | 0.971 (0.991) | 69 (10) | 0.322 | 0.550 | 10 |
| 628 | Cheneg Creek | 0.701 (0.654) | 0.959 (0.994) | 57 (5) | 0.234 | 0.338 | 5 |
| 637 | Pt. Countess Creek | 0.654 (0.601) | 0.877 (0.924) | 58 (10) | 0.456 | 0.269 | 10 |
| 677 | Hayden Creek | 0.517 (0.575) | 0.722 (0.957) | 68 (10) | 0.485 | 0.469 | 10 |
| 692 | Herring Creek | 0.727 (0.768) | 0.812 (0.920) | 54 (10) | 0.371 | 0.355 | 10 |
| 699 | Cathead Creek | 0.703 (0.784) | 0.929 (0.988) | 84 (10) | 0.246 | 0.847 | 10 |
| 847 | Hawkins Creek | 0.723 (0.756) | 0.804 (0.989) | 53 (9) | 0.406 | 0.871 | 9 |
| | <i>Mean</i> | <i>0.665 (0.673)</i> | | | <i>0.337</i> | | |
| 1992 | | | | | | | |
| 076 | Irish Creek | 0.744 (0.884) | 0.650 (0.875) | 76 (14) | 0.554 | 0.442 | 14 |
| 506 | Loomis Creek | 0.529 (0.450) | 0.856 (0.926) | 66 (10) | 0.177 | 0.813 | 10 |
| 621 | Totemoff Creek | 0.581 (0.636) | 0.874 (0.902) | 68 (9) | 0.535 | 0.728 | 9 |
| 628 | Cheneg Creek | 0.642 (0.650) | 0.929 (0.956) | 57 (6) | 0.245 | 0.425 | 6 |
| 677 | Hayden Creek | 0.709 (0.810) | 0.896 (0.921) | 62 (9) | 0.359 | 0.457 | 9 |
| 692 | Herring Creek | 0.766 (0.787) | 0.774 (0.840) | 53 (9) | 0.388 | 0.031 | 9 |
| 699 | Cathead Creek | 0.631 (0.734) | 0.686 (0.793) | 53 (9) | 0.685 | 0.286 | 9 |
| | <i>Mean</i> | <i>0.657 (0.707)</i> | | | <i>0.420</i> | | |
| | <i>Grand Mean</i> | <i>0.676 (0.703)</i> | | | <i>0.436</i> | | |

Table 9. Estimated pink salmon stream life for selected streams using data obtained from marking with Petersen disk tags (S1 and S2), weir counts (S3 and S5), and ground surveys (S4 and S6), Prince William Sound, 1990- 1992. Milling estimates not made in 1990.

| Stream | | Estimated Stream life | | | | | |
|-------------|--------------------|-----------------------|--------------|----------------|-------------|------------|-------------|
| | | Marking | | Mean Fish Days | | Run Timing | |
| | | Mean (S1) | Milling (S2) | Weir (S3) | Ground (S4) | Weir (S5) | Ground (S6) |
| No. | Name | | | | | | |
| 1990 | | | | | | | |
| 076 | Irish Creek | 21.5 | | 18.1 | 19.4 | 10.1 | 9.8 |
| 692 | Herring Creek | 12.9 | | 11.4 | 11.7 | 10.7 | 8.7 |
| 699 | Cathead Creek | 16.9 | | 9.8 | 9.5 | 8.3 | 6.9 |
| 1991 | | | | | | | |
| 076 | Irish Creek | 16.0 | 14.5 | 16.0 | 15.9 | 5.2 | 9.0 |
| 506 | Loomis Creek | 10.0 | 6.9 | 6.8 | 6.0 | 3.9 | 5.4 |
| 628 | Chenega Creek | 15.4 | 10.0 | 10.2 | 10.1 | 4.9 | 6.8 |
| 637 | Pt. Countess Creek | 14.0 | 8.7 | 9.7 | 9.0 | 4.5 | 6.6 |
| 677 | Hayden Creek | 13.8 | 9.6 | 11.7 | 9.4 | 3.3 | 6.4 |
| 692 | Herring Creek | 13.5 | 10.0 | 11.8 | 9.8 | 10.9 | 10.8 |
| 699 | Cathead Creek | 15.5 | 10.6 | 11.0 | 10.4 | 6.3 | 9.4 |
| 847 | Hawkins Creek | 14.9 | 14.9 | 15.6 | 16.2 | 7.8 | 11.0 |
| 1992 | | | | | | | |
| 076 | Irish Creek | 16.3 | 11.4 | 21.5 | 16.7 | 7.6 | 10.0 |
| 506 | Loomis Creek | 10.5 | 6.7 | 9.6 | 7.3 | 3.0 | 5.6 |
| 621 | Totemoff Creek | 16.8 | 9.9 | 14.7 | 12.6 | 9.0 | 9.0 |
| 628 | Chenega Creek | 12.5 | 10.2 | 14.2 | 10.9 | 5.5 | 8.5 |
| 677 | Hayden Creek | 10.3 | 8.4 | 9.0 | 7.8 | 5.0 | 6.9 |
| 692 | Herring Creek | 13.2 | 10.3 | 13.7 | 10.2 | 12.7 | 12.6 |
| 699 | Cathead Creek | 12.0 | 6.9 | 11.9 | 6.6 | 4.3 | 6.7 |

Table 10. Pink salmon escapement estimates based on aerial survey counts and weir counts for streams in Prince William Sound, Alaska, 1990-1992. Escapement estimates from aerial counts were based on observer efficiency, stream life, and area-under-the-curve.

| Stream | | Observer Efficiency | Stream Life | Area-Under-The-Curve | Escapement Estimate | Weir Count |
|-------------|--------------------|---------------------|-------------|----------------------|---------------------|------------|
| No. | Name | | | | | |
| 1990 | | | | | | |
| 076 | Irish Creek | 0.499 | 18.1 | 474,010 | 52,482 | 44,900 |
| 692 | Herring Creek | 0.888 | 11.4 | 43,896 | 4,336 | 4,927 |
| 699 | Cathead Creek | 0.825 | 9.8 | 58,305 | 7,212 | 7,971 |
| 1991 | | | | | | |
| 076 | Irish Creek | 0.177 | 16.0 | 397,734 | 140,442 | 95,034 |
| 506 | Loomis Creek | 0.322 | 6.8 | 51,741 | 23,630 | 20,315 |
| 628 | Chenega Creek | 0.234 | 10.2 | 140,680 | 58,941 | 49,769 |
| 637 | Pt. Countess Creek | 0.456 | 9.7 | 61,192 | 13,834 | 15,028 |
| 677 | Hayden Creek | 0.485 | 11.7 | 73,947 | 13,031 | 18,372 |
| 692 | Herring Creek | 0.371 | 11.8 | 72,337 | 16,524 | 13,022 |
| 699 | Cathead Creek | 0.246 | 11.0 | 23,007 | 8,502 | 9,629 |
| 847 | Hawkins Creek | 0.406 | 15.6 | 236,768 | 37,383 | 40,433 |
| 1992 | | | | | | |
| 076 | Irish Creek | 0.554 | 21.5 | 117,169 | 9,837 | 8,208 |
| 506 | Loomis Creek | 0.177 | 9.6 | 5,939 | 3,495 | 3,845 |
| 621 | Totemoff Creek | 0.535 | 14.7 | 61,675 | 7,842 | 8,428 |
| 628 | Chenega Creek | 0.245 | 14.2 | 38,722 | 11,130 | 10,658 |
| 677 | Hayden Creek | 0.359 | 9.0 | 8,337 | 2,580 | 2,708 |
| 692 | Herring Creek | 0.388 | 13.7 | 5,625 | 1,058 | 911 |
| 699 | Cathead Creek | 0.685 | 11.9 | 27,450 | 3,367 | 3,937 |

Table 11. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Eastern District (221), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|--------|----------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 002 | Hartney Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 005 | Eccles Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 011 | Humpback Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 019 | Twin Lakes Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 020 | Spring Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 021 | Rogue Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 023 | Chase (Raging) Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 035 | Koppen Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 036 | Sheep River | 16.0 | 0.177 | 21.5 | 0.554 |
| 037 | Allen Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 041 | Pass Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 045 | Plateau Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 046 | Comfort Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 048 | Beartrap River | 16.0 | 0.177 | 21.5 | 0.554 |
| 049 | Cataract Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 051 | Olsen Bay Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 052 | Control Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 054 | Carlsen Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 056 | St. Matthews Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 071 | Two Moon Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 073 | Tundra Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 076 | Irish Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 080 | Whalen Creek | 16.0 | 0.177 | 21.5 | 0.554 |

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Table 11. (page 2 of 3)

| Stream | | 1991 | | 1992 | |
|--------|------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 083 | Keta Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 087 | Sunny River | 16.0 | 0.177 | 21.5 | 0.554 |
| 088 | Short Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 089 | Fish Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 092 | Shale Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 093 | Kirkwood Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 094 | Rock Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 099 | Lagoon Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 106 | Gladhough Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 107 | Black Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 114 | Turner Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 115 | Millard Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 116 | Duck River | 11.7 | 0.485 | 14.7 | 0.535 |
| 117 | Indian Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 120 | Donaldson Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 121 | Levshakoff Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 122 | No Name Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 123 | Gregorieff Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 127 | Naomoff River | 16.0 | 0.177 | 21.5 | 0.554 |
| 129 | Vlasoff Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 131 | Gorge Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 133 | Sawmill Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 137 | Lowe River | 16.0 | 0.177 | 21.5 | 0.554 |
| 143 | Siwash Creek | 16.0 | 0.177 | 21.5 | 0.554 |

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Table 11. (page 3 of 3)

| Stream | | 1991 | | 1992 | |
|--------|------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 145 | Crooked Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 148 | Mineral Flats | 11.8 | 0.371 | 13.7 | 0.388 |
| 152 | Twin Falls Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 153 | Stellar Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| | <i>Mean</i> | <i>13.8</i> | <i>0.266</i> | <i>17.9</i> | <i>0.503</i> |

Table 12. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Northern (222) District, Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|------------------|------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 204 | Heather Bay | 11.8 | 0.371 | 13.7 | 0.388 |
| 208 | Granite Cove | 11.8 | 0.371 | 13.7 | 0.388 |
| 209 | Useless Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 210 | Elf Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 213 | Bench Mark Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 214 | Long Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 216 | Vanishing Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 217 | Spring Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 218 | Billy's Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 221 | Eickelberg Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 224 | Backyard Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 227 | Granite Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 229 | Cedar Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 232 | Delta Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 233 | Surplus Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 234 | Wells River | 16.0 | 0.177 | 21.5 | 0.554 |
| 242 ^a | Cowpen Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 257 | Complex Creek #1 | 16.0 | 0.177 | 21.5 | 0.554 |
| 258 | Williams Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 263 | Waterfall creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 264 | Siwash Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 265 | Unakwik Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 273 | Schoppe Creek | 10.2 | 0.234 | 14.2 | 0.245 |

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Table 12. (page 2 of 2)

| Stream | | 1991 | | 1992 | |
|--------|------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 276 | Black Bear Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 277 | Dead Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 278 | Comeback Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 279 | Canyon Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 282 | Good Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 283 | Bad Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 289 | Derickson Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 12565 | Complex Creek #2 | 16.0 | 0.177 | 21.5 | 0.554 |
| | <i>Mean</i> | <i>13.2</i> | <i>0.285</i> | <i>16.7</i> | <i>0.541</i> |

^aCowpen Creek is within Unakwik District, which was grouped with Northern District for this study.

Table 13. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Coghill District (223), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|-------------|----------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 303 | Triple Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 307 | Village Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 310 | Golden Lagoon | 16.0 | 0.177 | 21.5 | 0.554 |
| 314 | Avery River | 16.0 | 0.177 | 21.5 | 0.554 |
| 322 | Coghill River | 16.0 | 0.177 | 21.5 | 0.554 |
| 414 | Harrison Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 417 | Hobo Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 421 | Mill creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 424 | Old Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 425 | Hummer Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 428 | Pirate Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 430 | Meacham Creek | 16.0 | 0.177 | 13.7 | 0.388 |
| 432 | Swanson Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| <i>Mean</i> | | <i>14.5</i> | <i>0.252</i> | <i>18.0</i> | <i>0.511</i> |

Table 14. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Northwestern District (224), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|-------------|--------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 435 | Logging Camp Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 450 | Tebenkoff Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 451 | Blackstone Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 454 | Halferty Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 455 | Paulson Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 458 | Parks Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 461 | Cochrane Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 469 | Wickett Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 471 | Narrows Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 476 | Shrode Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 479 | Culross Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 480 | Mink Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 484 | E. Finger Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 485 | W. Finger Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 493 | Most Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 495 | Chimevisky Lagoon | 11.8 | 0.371 | 13.7 | 0.388 |
| 498 | McClure Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| <i>Mean</i> | | <i>12.0</i> | <i>0.303</i> | <i>14.2</i> | <i>0.443</i> |

Table 15. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Eshamy District (225), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|-------------|------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 506 | Loomis Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 507 | Gumboot Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 508 | Solf Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 510 | Elishansky Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 511 | Eshamy River | 11.7 | 0.485 | 14.7 | 0.535 |
| <i>Mean</i> | | <i>8.5</i> | <i>0.337</i> | <i>11.5</i> | <i>0.262</i> |

Table 16. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Southwestern District (226), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|--------|----------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 601 | Paddy Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 602 | Nacktan Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 603 | Ewan Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 604 | Erb Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 608 | Jackpot Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 610 | Kompkoff River | 11.7 | 0.485 | 14.7 | 0.535 |
| 611 | W. Arm Jackpot Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 612 | Jackpot #2 Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 613 | Jackson Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 621 | Totemoff Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 623 | Brizgaloff Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 630 | Bainbridge Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 632 | Claw Creek | 9.7 | 0.456 | 11.9 | 0.685 |
| 633 | Pablo Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 634 | Passover Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 636 | Whale Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 653 | Hogg Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 655 | Johnson Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 656 | Halverson Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 665 | Bjorne Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 666 | O'Brien Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 670 | Montgomery Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 672 | Latouche Island | 11.8 | 0.371 | 13.7 | 0.388 |

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Table 16. (page 2 of 2)

| Stream | | 1991 | | 1992 | |
|--------|-----------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 673 | Falls Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 676 | Horseshoe Creek | 6.8 | 0.322 | 9.6 | 0.177 |
| 677 | Hayden Creek | 11.7 | 0.485 | 9.0 | 0.359 |
| 682 | Snug Harbor | 11.7 | 0.485 | 9.0 | 0.359 |
| | <i>Mean</i> | <i>11.3</i> | <i>0.388</i> | <i>13.5</i> | <i>0.448</i> |

Table 17. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Montague District (227), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|--------|--------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 702 | Point Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 703 | Clam Beach Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 707 | MacLeod Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 710 | Hanning Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 711 | Quadra Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 717 | Montague Island #1 | 15.6 | 0.406 | 21.5 | 0.554 |
| 718 | Montague Island #2 | 15.6 | 0.406 | 21.5 | 0.554 |
| 719 | Montague Island #3 | 15.6 | 0.406 | 21.5 | 0.554 |
| 722 | Montague Island #4 | 15.6 | 0.406 | 21.5 | 0.554 |
| 724 | Montague Island #5 | 15.6 | 0.406 | 21.5 | 0.554 |
| 725 | Montague Island #6 | 15.6 | 0.406 | 21.5 | 0.554 |
| 726 | Montague Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 738 | Russell Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 739 | Swamp Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 740 | Kelez Creek | 16.0 | 0.177 | 21.5 | 0.554 |
| 741 | Chalmers River | 15.6 | 0.406 | 21.5 | 0.554 |
| 744 | Wilby Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 745 | Wild Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 746 | Schuman Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 747 | Cabin Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 748 | Gilmour Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 749 | Shad Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 752 | Stockdale Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 753 | Stockdale Harbor | 11.8 | 0.371 | 13.7 | 0.388 |

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Table 17. (page 2 of 2)

| Stream | | 1991 | | 1992 | |
|-------------|----------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 754 | Dry Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 758 | Rocky Bay | 10.2 | 0.234 | 14.2 | 0.245 |
| 759 | Rocky Creek | 11.7 | 0.485 | 14.7 | 0.535 |
| 766 | Carr Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 770 | Udall Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 771 | McKernan Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 774 | Rosswog Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 775 | Pautzke Creek | 11.8 | 0.371 | 13.7 | 0.388 |
| 788 | Green Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| <i>Mean</i> | | <i>14.0</i> | <i>0.359</i> | <i>18.6</i> | <i>0.512</i> |

Table 18. Stream life and observer efficiency values used to estimate pink salmon escapement into index streams within the routine Alaska Department of Fish and Game aerial survey program, Southeastern District (228), Prince William Sound, Alaska, 1991 and 1992.

| Stream | | 1991 | | 1992 | |
|--------|----------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 805 | Port Etches-S. Shore | 15.6 | 0.406 | 21.5 | 0.554 |
| 806 | Dog Salmon Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 807 | Beaver Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 810 | Garden Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 811 | Etches Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 812 | Nuchek Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 815 | Constantine Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 817 | Deer Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 818 | Juania Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 821 | Brown Bear Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 827 | Captain Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 828 | Cook Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 829 | King Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 831 | Double Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 833 | Bates Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 834 | Honker Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 835 | Cutoff Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 836 | Dans Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 837 | Dans Bay | 15.6 | 0.406 | 21.5 | 0.554 |
| 839 | Goose Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 844 | Makaka Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 847 | Hawkins Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 849 | Rollins Creek | 10.2 | 0.234 | 14.2 | 0.245 |

- continued -

Table 18. (page 2 of 2)

| Stream | | 1991 | | 1992 | |
|--------|-------------------|-------------|---------------------|-------------|---------------------|
| No. | Name | Stream Life | Observer Efficiency | Stream Life | Observer Efficiency |
| 850 | Canoe Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 851 | Canyon Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 856 | Cedar Bay W. | 10.2 | 0.234 | 14.2 | 0.245 |
| 857 | Cedar Bay E. | 10.2 | 0.234 | 14.2 | 0.245 |
| 858 | Cedar Creek N. | 10.2 | 0.234 | 14.2 | 0.245 |
| 861 | Windy Creek | 15.6 | 0.406 | 21.5 | 0.554 |
| 862 | Clamdiggers Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| 863 | Orca Creek | 10.2 | 0.234 | 14.2 | 0.245 |
| | <i>Mean</i> | <i>14.6</i> | <i>0.373</i> | <i>20.1</i> | <i>0.494</i> |

Table 19. Pink salmon spawning escapement estimates within management districts, Prince William Sound, Alaska, 1963-1992. Estimates based on area-under-the-curve calculations using 208 streams included within routine Alaska Department of Fish and Game aerial survey program. Not all 208 streams were surveyed each year. Mean stream life and observer efficiency values calculated for 1991 and 1992, based on data from streams with weirs, used for all odd and even years, respectively.

| Year | District | | | | | | | | Total |
|------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|------------|
| | Eastern | Northern | Coghill | Northwest | Eashamy | Southwest | Montague | Southeast | |
| 1963 | 1,141,101 | 161,570 | 368,151 | 723,837 | 26,520 | 23,744 | 197,919 | 943,719 | 3,586,561 |
| 1964 | 798,503 | 617,387 | 289,664 | 513,974 | 91,044 | 387,452 | 123,588 | 469,778 | 3,291,390 |
| 1965 | 779,387 | 235,324 | 617,890 | 556,064 | 18,497 | 263,503 | 131,453 | 502,330 | 3,104,448 |
| 1966 | 443,373 | 278,409 | 162,310 | 250,098 | 4,064 | 350,387 | 67,394 | 361,779 | 1,917,814 |
| 1967 | 1,492,024 | 546,122 | 620,160 | 544,760 | 19,017 | 321,342 | 48,000 | 735,033 | 4,326,458 |
| 1968 | 548,449 | 65,779 | 68,012 | 99,268 | 35,201 | 208,720 | 40,087 | 302,357 | 1,367,873 |
| 1969 | 1,103,777 | 378,488 | 833,520 | 105,545 | No surveys | 199,868 | 26,178 | 114,631 | 2,762,007 |
| 1970 | 367,498 | 97,405 | 79,542 | 154,362 | No surveys | 70,829 | 60,888 | 110,064 | 940,588 |
| 1971 | 647,450 | 588,096 | 1,183,530 | 1,012,895 | No surveys | 8,088 | 941,223 | 852,166 | 5,233,448 |
| 1972 | 513,142 | 159,729 | 51,496 | 102,550 | No surveys | 143,761 | 59,209 | 167,144 | 1,197,031 |
| 1973 | 1,573,518 | 269,775 | 2,946,826 | 3,416 | No surveys | 163,856 | 237,242 | 495,244 | 5,689,877 |
| 1974 | 121,573 | 169,870 | 1,840 | 120,335 | No surveys | 82,616 | 13,509 | 68,350 | 578,093 |
| 1975 | 2,339,689 | 200,763 | 4,003,489 | 55,341 | No surveys | 319,838 | 485,605 | 934,533 | 8,339,258 |
| 1976 | 930,706 | 225,766 | 89,166 | 142,563 | No surveys | 137,763 | 15,383 | 124,519 | 1,665,866 |
| 1977 | 2,476,978 | 296,410 | 2,599,190 | 427,991 | No surveys | 1,011,240 | 826,285 | 1,120,396 | 8,758,490 |
| 1978 | 587,363 | 275,437 | 118,630 | 195,151 | No surveys | 278,688 | 57,685 | 184,636 | 1,697,590 |
| 1979 | 4,720,944 | 1,676,490 | 1,069,393 | 905,200 | No surveys | 1,047,171 | 1,281,395 | 2,842,670 | 13,543,263 |
| 1980 | 554,105 | 294,299 | 244,831 | 258,510 | No surveys | 408,419 | 213,759 | 531,444 | 2,505,367 |
| 1981 | 4,040,583 | 1,311,015 | 1,030,258 | 636,298 | No surveys | 706,780 | 2,517,025 | 1,401,585 | 11,643,544 |
| 1982 | 988,991 | 421,636 | 539,525 | 395,958 | No surveys | 438,331 | 225,217 | 827,413 | 3,837,071 |
| 1983 | 2,865,845 | 867,420 | 1,793,585 | 850,203 | No surveys | 659,634 | 848,320 | 2,050,645 | 9,935,652 |
| 1984 | 2,283,026 | 965,169 | 729,017 | 1,535,350 | No surveys | 1,054,271 | 356,184 | 1,398,610 | 8,321,627 |
| 1985 | 4,113,653 | 1,035,247 | 1,615,229 | 1,357,453 | No surveys | 659,717 | 1,212,394 | 1,788,758 | 11,782,451 |
| 1986 | 709,472 | 284,541 | 184,214 | 254,778 | 34,266 | 254,402 | 98,305 | 275,110 | 2,095,088 |
| 1987 | 2,839,950 | 664,147 | 559,664 | 364,719 | 33,932 | 501,012 | 525,432 | 948,487 | 6,437,343 |
| 1988 | 696,101 | 340,746 | 70,334 | 234,646 | No surveys | 504,338 | 129,724 | 264,003 | 2,239,892 |
| 1989 | 1,963,866 | 506,642 | 310,681 | 387,819 | 139,916 | 666,003 | 602,667 | 882,287 | 5,459,881 |
| 1990 | 810,786 | 349,558 | 75,347 | 322,287 | 176,966 | 538,578 | 202,732 | 627,035 | 3,103,289 |
| 1991 | 2,376,608 | 911,825 | 501,738 | 464,862 | 100,192 | 669,790 | 935,320 | 1,590,368 | 7,550,703 |
| 1992 | 370,740 | 197,595 | 39,254 | 125,421 | 24,715 | 234,815 | 110,314 | 148,615 | 1,251,469 |

Table 20. Pink salmon spawning escapements within management districts, Prince William Sound, Alaska, 1989-1992. Estimates based on area-under-the-curve calculations using 208 streams included within routine Alaska Department of Fish and Game aerial survey program. Existing estimates (Old) based on constant stream life (17.5 days) and no adjustment for observer efficiency (1.00). New estimates based on stream life and observer efficiency values from current study.

| Series | Stream life (d) | Observer Efficiency | District | | | | | | | | Total |
|------------------------------------|-----------------|---------------------|-----------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|-----------------|
| | | | Eastern | Northern | Coghill | Northwest | Eshamy | Southwest | Montague | Southeast | |
| 1989 (202 streams surveyed) | | | | | | | | | | | |
| Old | 17.5 | 1.00 | 359,73 | 106,53 | 45,51 | 68,54 | 19,47 | 176,23 | 181,76 | 315,00 | 1,272,77 |
| New | 6.8-16.0 | 0.177-0.485 | <u>1,963,86</u> | <u>506,64</u> | <u>310,68</u> | <u>387,81</u> | <u>139,91</u> | <u>666,00</u> | <u>602,66</u> | <u>882,28</u> | <u>5,459,88</u> |
| | | Old : New | 0.18 | 0.21 | 0.15 | 0.18 | 0.14 | 0.26 | 0.30 | 0.36 | 0.23 |
| 1990 (207 streams surveyed) | | | | | | | | | | | |
| Old | 17.5 | 1.00 | 443,66 | 131,58 | 49,11 | 115,87 | 17,87 | 150,00 | 113,57 | 304,09 | 1,325,85 |
| New | 9.0-21.5 | 0.177-0.685 | <u>810,78</u> | <u>349,55</u> | <u>75,34</u> | <u>322,28</u> | <u>176,96</u> | <u>538,57</u> | <u>202,73</u> | <u>627,03</u> | <u>3,103,28</u> |
| | | Old : New | 0.55 | 0.38 | 0.65 | 0.36 | 0.10 | 0.28 | 0.56 | 0.48 | 0.43 |
| 1991 (208 streams surveyed) | | | | | | | | | | | |
| Old | 17.5 | 1.00 | 474,38 | 165,93 | 98,58 | 101,32 | 18,80 | 197,09 | 247,89 | 533,17 | 1,837,16 |
| New | 6.8-16.0 | 0.177-0.485 | <u>2,376,60</u> | <u>911,82</u> | <u>501,73</u> | <u>464,86</u> | <u>100,19</u> | <u>669,79</u> | <u>935,32</u> | <u>1,590,36</u> | <u>7,550,70</u> |
| | | Old : New | 0.20 | 0.18 | 0.20 | 0.22 | 0.19 | 0.29 | 0.27 | 0.34 | 0.24 |
| 1992 (207 streams surveyed) | | | | | | | | | | | |
| Old | 17.5 | 1.00 | 204,38 | 72,91 | 23,61 | 42,30 | 2,70 | 66,95 | 47,15 | 95,07 | 555,10 |
| New | 9.0-21.5 | 0.177-0.685 | <u>370,74</u> | <u>197,59</u> | <u>39,25</u> | <u>125,42</u> | <u>24,71</u> | <u>234,81</u> | <u>110,31</u> | <u>148,61</u> | <u>1,251,46</u> |
| | | Old : New | 0.55 | 0.37 | 0.60 | 0.34 | 0.11 | 0.29 | 0.43 | 0.64 | 0.44 |

Table 21. Randomly selected pink salmon spawning streams surveyed in 1991 which were not included within the routine Alaska Department of Fish and Game aerial survey program, Eastern District (221), Prince William Sound, Alaska.

| Stream | | Stream | |
|--------|----------------------|--------|-----------|
| No. | Name | No. | Name |
| 72 | Two Moon Creek #2 | 10610 | not named |
| 85 | Fidalgo Delta | 10630 | not named |
| 86 | Fidalgo River | 10670 | not named |
| 10030 | Nicolet Creek | 10677 | not named |
| 10040 | Heney Creek | 10680 | not named |
| 10165 | Rude River Tributary | 10738 | not named |
| 10180 | Hole-in-wall | 10768 | not named |
| 10318 | not named | 10770 | not named |
| 10320 | not named | 10861 | not named |
| 10380 | not named | 10878 | not named |
| 10440 | not named | 10970 | not named |
| 10513 | not named | 11050 | not named |
| 10590 | not named | 11180 | not named |
| 10600 | not named | 11240 | not named |

Table 22. Randomly selected pink salmon spawning streams surveyed in 1991 which were not included within the routine Alaska Department of Fish and Game aerial survey program, Northern (222) and Coghill (223) Districts, Prince William Sound, Alaska.

| Stream | | Stream | |
|--------------------------|-----------|--------|---------------------------|
| No. | Name | No. | Name |
| Northern District | | | |
| 12960 | not named | 12070 | not named |
| 12950 | not named | 12200 | not named |
| 12955 | not named | 12310 | not named |
| 12965 | not named | 12800 | not named |
| 12910 | not named | 12350 | not named |
| 12450 | not named | 12710 | not named |
| 12920 | not named | 12590 | not named |
| 12460 | not named | 244 | Miners Creek ^a |
| 12900 | not named | | |
| Coghill District | | | |
| 300 | Red Creek | 13060 | not named |

^aMiners Creek is within Unakwik District, which was grouped with Northern District for this study.

Table 23. Randomly selected pink salmon spawning streams surveyed in 1991 which were not included within the routine Alaska Department of Fish and Game aerial survey program, Northwestern (224) and Eshamy (225) Districts, Prince William Sound, Alaska.

| Stream | | Stream | |
|------------------------------|----------------|--------|----------------|
| No. | Name | No. | Name |
| Northwestern District | | | |
| 14800 | not named | 14670 | not named |
| 14830 | not named | 14620 | not named |
| 14970 | not named | 14260 | not named |
| 14810 | not named | 14230 | not named |
| 14805 | not named | 14180 | not named |
| 14860 | not named | 14020 | not named |
| 14700 | not named | 478 | not named |
| 14750 | not named | 14270 | not named |
| 14720 | not named | | |
| Eshamy District | | | |
| 513 | not named | 502 | Discher Creek |
| 15163 | Clemence River | 504 | Comstock Creek |
| 15090 | not named | | |

Table 24. Randomly selected pink salmon spawning streams surveyed in 1991 which were not included within the routine Alaska Department of Fish and Game aerial survey program, Southwestern District (226), Prince William Sound, Alaska.

| Stream | | Stream | |
|--------|--------------------|--------|--------------|
| No. | Name | No. | Name |
| 609 | Head N Jackpot Bay | 16442 | not named |
| 618 | Junction Creek | 16494 | not named |
| 628 | Chenega NE | 16498 | not named |
| 637 | Pt. Countess | 16502 | not named |
| 661 | Calvert Creek | 16520 | not named |
| 663 | Shelter Creek | 16550 | not named |
| 678 | Sleepy Bay | 16680 | not named |
| 681 | Hogan Bay | 16695 | not named |
| 692 | Herring Creek | 16700 | not named |
| 695 | Port Audrey | 16740 | not named |
| 699 | Cathead Creek | 16750 | not named |
| 16000 | not named | 16782 | not named |
| 16034 | not named | 16801 | not named |
| 16036 | not named | 16803 | not named |
| 16075 | not named | 16809 | not named |
| 16106 | not named | 16830 | not named |
| 16150 | not named | 16853 | not named |
| 16181 | not named | 16855 | not named |
| 16182 | not named | 16860 | not named |
| 16272 | not named | 16880 | not named |
| 16289 | not named | 16940 | not named |
| 16322 | not named | 16963 | not named |
| 16368 | not named | 16970 | Barnes Creek |
| 16370 | not named | 16980 | not named |
| 16380 | not named | | |

Table 25. Randomly selected pink salmon spawning streams surveyed in 1991 which were not included within the routine Alaska Department of Fish and Game aerial survey program, Montague (227) and Southeastern (228) Districts, Prince William Sound, Alaska.

| Stream | | Stream | |
|------------------------------|-----------|--------|-----------|
| No. | Name | No. | Name |
| Montague District | | | |
| 17653 | not named | 17022 | not named |
| 17680 | not named | 17080 | not named |
| 17657 | not named | 17330 | not named |
| 17465 | not named | 17280 | not named |
| 17890 | not named | 17200 | not named |
| 17596 | not named | 17310 | not named |
| 17600 | not named | 17290 | not named |
| 17374 | not named | 17230 | not named |
| 17150 | not named | | |
| Southeastern District | | | |
| 18520 | not named | 18195 | not named |
| 18650 | not named | 18168 | not named |
| 18640 | not named | 18160 | not named |
| 18530 | not named | 18155 | not named |
| 18300 | not named | 18153 | not named |
| 18320 | not named | 18165 | not named |
| 18130 | not named | | |

Table 26. Estimated pink salmon spawning escapement into streams surveyed from the air in Prince William Sound, 1991. Escapement attributed to streams not included within routine Alaska Department of Fish and Game aerial survey program (non-index streams) is shown separately from that attributed to streams within the routine program (index streams).

| District | Non-Index Streams | | | | Index Streams | | | Proportion of Total within Index Steams |
|------------------|-------------------|-----------------|----------------------------|---|-----------------|---------------------|------------------|---|
| | Total Number | Number Surveyed | Surveyed Stream Escapement | Expanded Escapement Estimate ^a | Number Surveyed | Escapement Estimate | Total Escapement | |
| 221 | 135 | 28 | 81,240 | 391,693 | 51 | 2,376,608 | 2,768,301 | 0.86 |
| 222 ^b | 77 | 17 | 7,990 | 36,190 | 31 | 911,825 | 948,015 | 0.96 |
| 223 | 28 | 2 | 1,191 | 16,674 | 13 | 501,738 | 518,412 | 0.97 |
| 224 | 76 | 17 | 2,446 | 10,935 | 17 | 464,862 | 475,797 | 0.98 |
| 225 | 16 | 5 | 9,374 | 29,997 | 5 | 100,192 | 130,189 | 0.77 |
| 226 | 215 | 49 | 240,400 | 1,054,816 | 27 | 669,790 | 1,724,606 | 0.39 |
| 227 | 95 | 17 | 55,886 | 312,304 | 33 | 935,320 | 1,247,624 | 0.75 |
| 228 | 63 | 13 | 5,910 | 28,641 | 31 | 1,590,368 | 1,619,009 | 0.98 |
| <i>Total</i> | <i>705</i> | <i>148</i> | <i>404,437</i> | <i>1,881,250</i> | <i>208</i> | <i>7,550,703</i> | <i>9,431,953</i> | <i>0.80</i> |

^aTotal non-index stream escapement expanded by multiplying surveyed stream escapement by inverse proportion of streams surveyed.

^bIncludes Unakwik District .

Table 27. Mean of pink salmon spawning escapement estimates within management districts, Prince William Sound, Alaska, 1966-1989. Estimates based on area-under-the-curve calculations using 208 streams included within routine Alaska Department of Fish and Game aerial survey program. New means calculated from annual estimates based on mean stream life (range: 6.8-21.5) and observer efficiency (range: 0.177-0.685) values from current study. Old means, which represent existing biological escapement goals, calculated from annual estimates based on constant stream life (17.5 days) and no adjustment for observer efficiency (1.00).

| Series | District | | | | | | | | Total |
|-----------------------------------|----------------|----------------|----------------|----------------|--------------|----------------|----------------|----------------|------------------|
| | Eastern | Northern | Coghill | Northwest | Eashamy | Southwest | Montague | Southeast | |
| Odd Year Means: 1967-1989 | | | | | | | | | |
| New | 2,381,359 | 659,688 | 1,475,647 | 554,439 | 52,841 | 502,158 | 744,863 | 1,128,367 | 7,499,360 |
| Old | <u>422,000</u> | <u>128,000</u> | <u>178,000</u> | <u>83,000</u> | <u>5,100</u> | <u>116,000</u> | <u>162,000</u> | <u>333,000</u> | <u>1,427,100</u> |
| Old : New | 0.18 | 0.19 | 0.12 | 0.15 | 0.10 | 0.23 | 0.22 | 0.30 | 0.19 |
| Even Year Means: 1966-1988 | | | | | | | | | |
| New | 728,650 | 298,232 | 188,288 | 311,964 | 24,510 | 327,710 | 111,445 | 384,619 | 2,375,419 |
| Old | <u>474,000</u> | <u>213,000</u> | <u>143,000</u> | <u>135,000</u> | <u>8,200</u> | <u>144,000</u> | <u>70,000</u> | <u>239,000</u> | <u>1,426,200</u> |
| Old : New | 0.65 | 0.71 | 0.76 | 0.43 | 0.33 | 0.44 | 0.63 | 0.62 | 0.60 |

Appendix A. Streams Surveyed Routinely in the Aerial Survey Program to Assess Pink Salmon Spawning Escapements, Prince William Sound, Alaska..

Appendix A. Streams surveyed routinely in aerial survey program to assess pink salmon spawning escapements, Prince William Sound, Alaska. Stream numbers and names used in the aerial survey database along with the corresponding stream numbers and locations used in the anadromous waters catalog are shown. Legal descriptions include meridian, township, range and section.

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 002 Hartney Creek | 221-10-10020 | 60° 30' 9" N | 145° 50' 26" W | C 16S 4W 12 |
| | | 60° 30' 13" N | 145° 48' 43" W | C 16S 3W 6 |
| 005 Eccles Creek | 221-10-10050 | 60° 31' 59" N | 145° 47' 2" W | C 15S 3W 29 |
| | | 60° 31' 49" N | 145° 46' 19" W | C 15S 3W 33 |
| 011 Humpy Creek | 221-10-10110 | 60° 36' 50" N | 145° 40' 40" W | C 14S 3W 36 |
| | | 60° 36' 33" N | 145° 40' 24" W | C 14S 3W 36 |
| 019 Twin Lakes Creek | 221-20-10190 | 60° 38' 13" N | 145° 48' 31" W | C 14S 3W 19 |
| | | 60° 38' 5" N | 145° 47' 47" W | C 14S 3W 20 |
| 020 Spring Creek | 221-20-10200 | 60° 38' 40" N | 145° 48' 24" W | C 14S 3W 20 |
| | | 60° 38' 35" N | 145° 47' 37" W | C 14S 3W 20 |
| 021 Rogue Creek | 221-20-10210 | 60° 38' 46" N | 145° 48' 31" W | C 14S 3W 19 |
| | | 60° 39' 17" N | 145° 46' 56" W | C 14S 3W 17 |
| 023 Chase (Raging) Creek | 221-20-10230 | 60° 39' 31" N | 145° 48' 41" W | C 14S 3W 18 |
| | | 60° 40' 50" N | 145° 46' 20" W | C 14S 3W 4 |
| 035 Koppen Creek | 221-20-10350 | 60° 42' 25" N | 145° 53' 51" W | C 13S 4W 27 |
| | | 60° 42' 30" N | 145° 51' 8" W | C 13S 4W 25 |
| 036 Sheep River | 221-20-10360 | 60° 42' 56" N | 145° 53' 53" W | C 13S 4W 27 |
| | | 60° 45' 0" N | 145° 50' 41" W | C 13S 4W 12 |

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Appendix A. (page 2 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | | | |
|---|-------------------------------------|--|----------------|-------|-------------------|----|--|
| | | Latitude and Longitude | | | Legal Description | | |
| 037 Allen Creek | 221-20-10370 | 60° 40' 9" N | 146° 1' 21" W | C 14S | 5W | 12 | |
| | | 60° 40' 27" N | 146° 2' 32" W | C 14S | 5W | 11 | |
| 041 Pass Creek | 221-30-10410 | 60° 39' 59" N | 146° 12' 52" W | C 14S | 6W | 12 | |
| | | 60° 39' 1" N | 146° 11' 38" W | C 14S | 6W | 13 | |
| 045 Plateau Creek | 221-30-10450 | 60° 42' 26" N | 146° 7' 39" W | C 13S | 5W | 28 | |
| | | 60° 41' 19" N | 146° 6' 34" W | C 14S | 5W | 4 | |
| 046 Comfort Creek | 221-30-10460 | 60° 42' 36" N | 146° 4' 5" W | C 13S | 5W | 26 | |
| | | 60° 42' 38" N | 146° 2' 5" W | C 13S | 5W | 25 | |
| 048 Beartrap River | 221-30-10480 | 60° 45' 17" N | 145° 58' 20" W | C 13S | 4W | 8 | |
| | | 60° 45' 53" N | 145° 57' 9" W | C 13S | 4W | 4 | |
| 049 Cataract Creek | 221-30-10490 | 60° 45' 22" N | 146° 2' 12" W | C 13S | 5W | 12 | |
| | | 60° 45' 44" N | 146° 0' 31" W | C 13S | 4W | 7 | |
| 051 Olsen Creek (listed as two streams in anadromous stream catalog) | 221-30-10516 | 60° 45' 35" N | 146° 10' 19" W | C 13S | 5W | 7 | |
| | 221-30-10517 | 60° 46' 6" N | 146° 8' 25" W | C 13S | 5W | 5 | |
| 052 Control Creek | 221-30-10520 | 60° 45' 36" N | 146° 10' 25" W | C 13S | 5W | 7 | |
| | | 60° 47' 4" N | 146° 10' 48" W | C 12S | 5W | 31 | |
| 054 Carlsen Creek | 221-30-10540 | 60° 44' 51" N | 146° 13' 25" W | C 13S | 6W | 14 | |
| | | 60° 46' 24" N | 146° 13' 38" W | C 13S | 6W | 2 | |
| 056 St. Matthews Creek | 221-30-10560 | 60° 42' 50" N | 146° 16' 57" W | C 13S | 6W | 28 | |
| | | 60° 43' 14" N | 146° 16' 31" W | C 13S | 6W | 22 | |
| 071 Two Moon Creek | 221-40-10710 | 60° 46' 46" N | 146° 16' 13" W | C 12S | 6W | 34 | |
| | | 60° 47' 31" N | 146° 14' 22" W | C 12S | 6W | 35 | |
| | | 60° 43' 48" N | 146° 33' 58" W | C 13S | 8W | 24 | |
| | | 60° 43' 32" N | 146° 33' 5" W | C 13S | 8W | 24 | |

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Appendix A. (page 3 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 073 Tundra Creek | 221-40-10730 | 60° 44' 16" N 146° 29' 31" W | C 13S 7W 17 |
| | | 60° 43' 29" N 146° 28' 4" W | C 13S 7W 21 |
| 076 Irish Creek | 221-40-10760 | 60° 45' 20" N 146° 25' 55" W | C 13S 7W 10 |
| | | 60° 44' 14" N 146° 25' 37" W | C 13S 7W 15 |
| 080 Whalen Creek | 221-40-10800 | 60° 49' 10" N 146° 10' 59" W | C 12S 5W 19 |
| | | 60° 49' 12" N 146° 7' 51" W | C 12S 5W 21 |
| 083 Keta Creek | 221-40-10830 | 60° 52' 5" N 146° 10' 28" W | C 11S 5W 31 |
| | | 60° 52' 59" N 146° 8' 41" W | C 11S 5W 29 |
| 087 Sunny River (listed as two streams in anadromous stream catalog) | 221-40-10870 | 60° 53' 7" N 146° 14' 4" W | C 11S 6W 26 |
| | | 60° 53' 28" N 146° 14' 22" W | C 11S 6W 26 |
| | 221-40-10875 | 60° 53' 24" N 146° 13' 59" W | C 11S 6W 26 |
| | | 60° 53' 28" N 146° 15' 50" W | C 11S 6W 22 |
| 073 Tundra Creek | 221-40-10730 | 60° 44' 16" N 146° 29' 31" W | C 13S 7W 17 |
| | | 60° 43' 29" N 146° 28' 4" W | C 13S 7W 21 |
| 088 Short Creek | 221-40-10880 | 60° 51' 17" N 146° 16' 19" W | C 12S 6W 3 |
| | | 60° 51' 24" N 146° 17' 24" W | C 12S 6W 4 |
| 089 Fish Creek | 221-40-10890 | 60° 50' 30" N 146° 22' 52" W | C 12S 7W 12 |
| | | 60° 51' 23" N 146° 22' 10" W | C 12S 6W 6 |
| 092 Shale Creek | 221-40-10920 | 60° 50' 15" N 146° 24' 25" W | C 12S 7W 11 |
| | | 60° 50' 47" N 146° 24' 41" W | C 12S 7W 11 |
| 093 Kirkwood Creek | 221-40-10940 | 60° 49' 28" N 146° 25' 55" W | C 12S 7W 14 |
| | | 60° 50' 18" N 146° 26' 42" W | C 12S 7W 10 |
| 094 Rock Creek | 221-40-10950 | 60° 49' 18" N 146° 27' 3" W | C 12S 7W 15 |
| | | 60° 49' 40" N 146° 28' 13" W | C 12S 7W 16 |

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Appendix A. (page 4 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|-------|
| | | Latitude and Longitude | | Legal Description | |
| 099 Lagoon Creek | 221-40-10990 | 60° 51' 30" N | 146° 31' 6" W | C 12S | 7W 5 |
| | | 60° 52' 23" N | 146° 28' 56" W | C 11S | 7W 33 |
| 106 Gladhaugh Creek | 221-50-11060 | 60° 53' 56" N | 146° 41' 57" W | C 11S | 8W 19 |
| | | 60° 53' 56" N | 146° 40' 1" W | C 11S | 8W 21 |
| 107 Black Creek | 221-50-11070 | 60° 54' 44" N | 146° 43' 34" W | C 11S | 8W 18 |
| | | 60° 54' 29" N | 146° 42' 23" W | C 11S | 8W 19 |
| 114 Turner Creek | 221-50-11140 | 60° 55' 29" N | 146° 37' 15" W | C 11S | 8W 10 |
| | | 60° 55' 20" N | 146° 37' 14" W | C 11S | 8W 15 |
| 115 Millard Creek | 221-50-11150 | 60° 55' 29" N | 146° 35' 28" W | C 11S | 8W 11 |
| | | 60° 55' 18" N | 146° 35' 17" W | C 11S | 8W 14 |
| 116 Duck River | 221-50-11160 | 60° 56' 32" N | 146° 33' 48" W | C 11S | 8W 1 |
| | | 60° 56' 53" N | 146° 33' 9" W | C 11S | 8W 1 |
| 117 Indian Creek | 221-50-11170 | 60° 57' 17" N | 146° 37' 43" W | C 10S | 8W 34 |
| | | 60° 58' 26" N | 146° 35' 28" W | C 10S | 8W 26 |
| 120 Donaldson Creek | 221-50-11200 | 60° 59' 23" N | 146° 41' 33" W | C 10S | 8W 20 |
| | | 60° 59' 28" N | 146° 40' 16" W | C 10S | 8W 20 |
| 121 Levshakoff Creek | 221-50-11210 | 61° 1' 28" N | 146° 38' 37" W | C 10S | 8W 4 |
| | | 61° 0' 26" N | 146° 37' 52" W | C 10S | 8W 15 |
| 122 No Name Creek | 221-50-11220 | 61° 1' 19" N | 146° 36' 50" W | C 10S | 8W 10 |
| | | 61° 0' 24" N | 146° 37' 3" W | C 10S | 8W 15 |
| 123 Gregorieff Creek | 221-50-11230 | 61° 1' 11" N | 146° 36' 11" W | C 10S | 8W 11 |
| | | 61° 0' 21" N | 146° 34' 43" W | C 10S | 8W 13 |
| 127 Naomoff River | 221-50-11270 | 61° 0' 10" N | 146° 29' 20" W | C 10S | 7W 16 |
| | | 61° 0' 0" N | 146° 28' 33" W | C 10S | 7W 16 |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | | |
|---|-------------------------------------|--|----------------|-------|-------------------|--|
| | | Latitude and Longitude | | | Legal Description | |
| 129 Vlasof Creek | 221-50-11290 | 61° 2' 13" N | 146° 33' 6" W | C 10S | 8W 1 | |
| | | 61° 2' 5" N | 146° 30' 43" W | C 10S | 7W 5 | |
| 131 Gorge Creek | 221-60-11310 | 61° 4' 39" N | 146° 29' 34" W | C 9S | 7W 20 | |
| | | 61° 3' 53" N | 146° 28' 36" W | C 9S | 7W 28 | |
| 133 Sawmill Creek | 221-60-11330 | 61° 5' 3" N | 146° 25' 48" W | C 9S | 7W 14 | |
| | | 61° 4' 33" N | 146° 23' 46" W | C 9S | 7W 24 | |
| 137 Lowe River | 221-60-11370 | 61° 5' 24" N | 146° 14' 47" W | C 9S | 6W 14 | |
| | | 61° 6' 9" N | 145° 48' 42" W | C 9S | 3W 8 | |
| 143 Siwash Creek (listed as two streams in anadromous stream catalog) | 221-60-11430 | 61° 7' 43" N | 146° 17' 39" W | C 8S | 6W 34 | |
| | | 61° 8' 26" N | 146° 15' 0" W | C 8S | 6W 26 | |
| | 221-60-11425 | 61° 7' 32" N | 146° 17' 17" W | C 8S | 6W 34 | |
| | | 61° 7' 54" N | 146° 16' 58" W | C 8S | 6W 34 | |
| 145 Crooked Creek | 221-60-11450 | 61° 8' 12" N | 146° 19' 53" W | C 8S | 6W 32 | |
| | | 61° 8' 28" N | 146° 19' 47" W | C 8S | 6W 29 | |
| 148 Mineral Flats (listed as three streams in anadromous stream catalog) | 221-60-11475 | 61° 7' 55" N | 146° 24' 23" W | C 8S | 7W 36 | |
| | | 61° 8' 17" N | 146° 23' 25" W | C 8S | 7W 36 | |
| | 221-60-11480 | 61° 8' 2" N | 146° 24' 32" W | C 8S | 7W 36 | |
| | | 61° 8' 19" N | 146° 23' 39" W | C 8S | 7W 36 | |
| | 221-60-11482 | 61° 8' 10" N | 146° 24' 40" W | C 8S | 7W 36 | |
| | | 61° 8' 24" N | 146° 24' 4" W | C 8S | 7W 25 | |
| 152 Twin Falls Creek | 221-50-11520 | 61° 4' 13" N | 146° 47' 11" W | C 9S | 9W 23 | |
| | | 61° 4' 44" N | 146° 46' 26" W | C 9S | 9W 23 | |
| 153 Stellar Creek | 221-50-11530 | 61° 3' 10" N | 146° 48' 35" W | C 9S | 9W 27 | |
| | | 61° 2' 45" N | 146° 50' 7" W | C 9S | 9W 33 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 204 Heather Bay | 222-10-12030 | 60° 59' 39" N | 146° 58' 11" W | C 10S 10W 22 |
| | | 60° 59' 45" N | 146° 57' 7" W | C 10S 10W 14 |
| 208 Granite Cove | 222-10-12080 | 60° 59' 17" N | 147° 10' 9" W | C 10S 11W 22 |
| | | 60° 59' 30" N | 147° 10' 17" W | C 10S 11W 22 |
| 209 Useless Creek | 222-10-12090 | 60° 56' 59" N | 147° 10' 45" W | C 11S 11W 4 |
| | | 60° 57' 12" N | 147° 10' 5" W | C 10S 11W 34 |
| 210 Elf Creek | 222-10-12100 | 60° 56' 54" N | 147° 11' 30" W | C 11S 11W 4 |
| | | 60° 57' 31" N | 147° 11' 41" W | C 10S 11W 33 |
| 213 Bench Mark Creek | 222-10-12130 | 60° 59' 56" N | 147° 12' 26" W | C 10S 11W 17 |
| | | 61° 0' 8" N | 147° 12' 2" W | C 10S 11W 16 |
| 214 Long Creek | 222-10-12140 | 61° 0' 47" N | 147° 13' 32" W | C 10S 11W 8 |
| | | 61° 2' 24" N | 147° 13' 40" W | C 9S 11W 32 |
| 216 Vanishing Creek | 222-10-12157 | 61° 0' 24" N | 147° 16' 7" W | S 11N 12E 35 |
| | | 61° 1' 29" N | 147° 16' 21" W | S 11N 12E 23 |
| 217 Spring Creek | 222-10-12170 | 60° 59' 50" N | 147° 16' 51" W | S 11N 12E 35 |
| | | 61° 0' 24" N | 147° 17' 41" W | S 11N 12E 34 |
| 218 Billy's Creek | 222-10-12180 | 60° 58' 3" N | 147° 16' 48" W | S 10N 12E 11 |
| | | 60° 58' 44" N | 147° 18' 52" W | S 10N 12E 10 |
| 221 Eickelberg Creek | 222-10-12210 | 60° 56' 0" N | 147° 19' 27" W | S 10N 12E 28 |
| | | 60° 56' 16" N | 147° 19' 11" W | S 10N 12E 21 |
| 224 Backyard Creek | 222-20-12242 | 60° 54' 1" N | 147° 22' 46" W | S 9N 12E 6 |
| | | 60° 54' 17" N | 147° 22' 12" W | S 9N 12E 5 |
| 227 Granite Creek | 222-20-12270 | 60° 56' 5" N | 147° 23' 7" W | S 10N 12E 30 |
| | | 60° 56' 30" N | 147° 21' 56" W | S 10N 12E 20 |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 229 Cedar Creek | 222-20-12290 | 60° 58' 36" N | 147° 22' 22" W | S 10N 12E 8 |
| | | 60° 58' 44" N | 147° 21' 32" W | S 10N 12E 8 |
| 232 Delta Creek | 222-20-12335 | 61° 0' 20" N | 147° 24' 8" W | S 11N 12E 31 |
| | | 61° 0' 42" N | 147° 23' 10" W | S 11N 12E 30 |
| 233 Surplus Creek | 222-20-12338 | 61° 0' 51" N | 147° 24' 14" W | S 11N 12E 30 |
| | | 61° 1' 2" N | 147° 23' 15" W | S 11N 12E 30 |
| 234 Wells River | 222-20-12340 | 61° 1' 6" N | 147° 24' 53" W | S 11N 11E 25 |
| | | 61° 2' 10" N | 147° 22' 30" W | S 11N 12E 20 |
| 242 Cowpen Creek | 222-50-12420 | 61° 2' 50" N | 147° 31' 4" W | S 11N 11E 16 |
| | | 61° 3' 12" N | 147° 29' 10" W | S 11N 11E 10 |
| 257 Complex Creek #1 | 222-50-12570 | 61° 1' 24" N | 147° 39' 43" W | S 11N 10E 22 |
| | | 61° 2' 12" N | 147° 40' 42" W | S 10N 10E 21 |
| 258 Williams Creek | 222-50-12580 | 61° 0' 44" N | 147° 40' 28" W | S 11N 10E 28 |
| | | 60° 59' 33" N | 147° 42' 41" W | S 10N 10E 5 |
| 263 Water Falls Creek | 222-20-12638 | 60° 57' 36" N | 147° 40' 22" W | S 10N 10E 16 |
| | | 60° 57' 43" N | 147° 40' 10" W | S 10N 10E 15 |
| 264 Siwash Creek (listed as four streams in anadromous stream catalog) | 222-20-12640 | 60° 57' 31" N | 147° 40' 53" W | S 10N 10E 16 |
| | | 60° 57' 55" N | 147° 43' 33" W | S 10N 10E 8 |
| | 222-20-12642 | 60° 57' 20" N | 147° 40' 51" W | S 10N 10E 16 |
| | | 60° 57' 19" N | 147° 41' 7" W | S 10N 10E 16 |
| | 222-20-12643 | 60° 57' 14" N | 147° 40' 48" W | S 10N 10E 16 |
| | | 60° 57' 13" N | 147° 41' 8" W | S 10N 10E 16 |
| | 222-20-12644 | 60° 57' 6" N | 147° 40' 51" W | S 10N 10E 16 |
| | | 60° 57' 8" N | 147° 41' 11" W | S 10N 10E 16 |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|--|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 265 Unakwik Creek | 222-20-12650 | 60° 57' 1" N | 147° 36' 44" W | S 10N 10E 13 | |
| | | 60° 56' 29" N | 147° 36' 59" W | S 10N 10E 23 | |
| 273 Schoppe Creek | 222-30-12730 | 60° 54' 8" N | 147° 39' 3" W | S 9N 10E 3 | |
| | | 60° 54' 17" N | 147° 39' 22" W | S 9N 10E 3 | |
| 276 Black Bear Creek | 222-30-12760 | 60° 54' 19" N | 147° 42' 34" W | S 9N 10E 5 | |
| | | 60° 54' 24" N | 147° 41' 23" W | S 9N 10E 4 | |
| 277 Dead Creek | 222-30-12770 | 60° 55' 17" N | 147° 43' 16" W | S 10N 10E 29 | |
| | | 60° 55' 30" N | 147° 42' 8" W | S 10N 10E 29 | |
| 278 Comeback Creek | 222-30-12780 | 60° 55' 37" N | 147° 43' 9" W | S 10N 10E 29 | |
| | | 60° 55' 35" N | 147° 41' 42" W | S 10N 10E 28 | |
| 279 Canyon Creek | 222-30-12790-2008 | 60° 56' 24" N | 147° 41' 5" W | S 10N 10E 21 | |
| | | 60° 56' 17" N | 147° 41' 4" W | S 10N 10E 21 | |
| 282 Good Creek | 222-30-12825 (north channel) | 60° 56' 6" N | 147° 45' 13" W | S 10N 10E 30 | |
| | | 60° 56' 7" N | 147° 46' 11" W | S 10N 9E 25 | |
| 283 Bad Creek | 222-30-12825 (south channel) | 60° 56' 6" N | 147° 45' 13" W | S 10N 10E 30 | |
| | | 60° 56' 7" N | 147° 46' 11" W | S 10N 9E 25 | |
| 289 Derickson Creek | 222-30-12890 | 60° 52' 38" N | 147° 49' 49" W | S 9N 9E 15 | |
| | | 60° 52' 46" N | 147° 50' 52" W | S 9N 9E 10 | |
| 12565 Complex Creek #2 | 222-50-12565 | 61° 1' 27" N | 147° 39' 6" W | S 11N 10E 22 | |
| | | 61° 1' 53" N | 147° 39' 1" W | S 11N 10E 22 | |
| 303 Triple Creek (listed as three streams in anadromous stream catalog) | 223-20-13020 | 60° 54' 12" N | 147° 55' 48" W | S 9N 9E 6 | |
| | | 60° 54' 5" N | 147° 55' 7" W | S 9N 9E 6 | |
| | 223-20-13030 | 60° 54' 25" N | 147° 55' 48" W | S 10N 9E 31 | |
| | | 60° 54' 33" N | 147° 55' 22" W | S 10N 9E 31 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 303 Triple Creek (cont.) | 223-20-13040 | 60° 54' 22" N | 147° 56' 15" W | S 9N 9E 6 |
| | | 60° 54' 39" N | 147° 56' 17" W | S 10N 8E 36 |
| 307 Village Creek | 223-20-13070 | 60° 55' 47" N | 148° 1' 25" W | S 10N 8E 27 |
| | | 60° 55' 55" N | 148° 0' 59" W | S 10N 8E 27 |
| 310 Golden Lagoon | 223-30-13100 | 60° 57' 57" N | 147° 59' 52" W | S 10N 8E 10 |
| | | 60° 57' 42" N | 147° 59' 24" W | S 10N 8E 14 |
| 314 Avery River | 223-30-13140 | 60° 59' 47" N | 147° 57' 42" W | S 11N 8E 36 |
| | | 60° 59' 34" N | 147° 57' 44" W | S 10N 8E 1 |
| 322 Coghill River | 223-30-13220 | 61° 4' 25" N | 147° 54' 28" W | S 11N 9E 5 |
| | | 61° 8' 14" N | 147° 43' 4" W | S 12N 10E 17 |
| 414 Harrison Creek | 224-10-14140 | 60° 59' 30" N | 148° 11' 44" W | S 10N 7E 30 |
| | | 60° 59' 51" N | 148° 11' 53" W | S 11N 7E 34 |
| 417 Hobo Creek | 224-10-14170 | 60° 57' 37" N | 148° 14' 19" W | S 10N 7E 17 |
| | | 60° 58' 54" N | 148° 16' 5" W | S 10N 7E 6 |
| 421 Mill Creek | 224-10-14210 | 60° 57' 14" N | 148° 19' 41" W | S 10N 6E 14 |
| | | 60° 57' 27" N | 148° 20' 5" W | S 10N 6E 14 |
| 424 Old Creek | 224-10-14240 | 60° 54' 38" N | 148° 18' 54" W | S 10N 6E 36 |
| | | 60° 55' 0" N | 148° 19' 59" W | S 10N 6E 35 |
| 425 Hummer Creek | 224-10-14250 | 60° 54' 23" N | 148° 19' 4" W | S 9N 6E 1 |
| | | 60° 54' 11" N | 148° 19' 49" W | S 9N 6E 2 |
| 428 Pirate Creek | 224-10-14280 | 60° 51' 40" N | 148° 18' 26" W | S 9N 6E 24 |
| | | 60° 51' 24" N | 148° 18' 36" W | S 9N 6E 24 |
| 430 Meacham Creek | 224-10-14300 | 60° 51' 39" N | 148° 23' 2" W | S 9N 6E 21 |
| | | 60° 52' 10" N | 148° 22' 35" W | S 9N 6E 15 |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 432 Swanson Creek | 224-10-14320 | 60° 50' 55" N | 148° 24' 36" W | S 9N 6E 28 | |
| | | 60° 51' 57" N | 148° 25' 50" W | S 9N 6E 17 | |
| 435 Logging Camp Creek | 224-10-14350 | 60° 49' 45" N | 148° 25' 4" W | S 9N 6E 32 | |
| | | 60° 49' 49" N | 148° 24' 50" W | S 9N 6E 32 | |
| 450 Tebenkoff Creek | 224-10-14500 | 60° 45' 32" N | 148° 28' 25" W | S 8N 6E 30 | |
| | | 60° 45' 4" N | 148° 29' 0" W | S 8N 5E 25 | |
| 451 Blackstone Creek | 224-10-14510 | 60° 45' 18" N | 148° 27' 11" W | S 8N 6E 30 | |
| | | 60° 44' 44" N | 148° 27' 4" W | S 8N 6E 32 | |
| 454 Halferty Creek | 224-10-14540 | 60° 43' 3" N | 148° 24' 50" W | S 7N 6E 9 | |
| | | 60° 42' 18" N | 148° 25' 45" W | S 7N 6E 8 | |
| 455 Paulson Creek | 224-10-14550 | 60° 42' 4" N | 148° 23' 43" W | S 7N 6E 16 | |
| | | 60° 40' 48" N | 148° 25' 30" W | S 7N 6E 20 | |
| 458 Parks Creek (listed as two streams in anadromous stream catalog) | 224-10-14580 | 60° 39' 6" N | 148° 26' 46" W | S 7N 6E 32 | |
| | | 60° 39' 20" N | 148° 27' 56" W | S 7N 6E 31 | |
| | 224-10-14590 | 60° 38' 49" N | 148° 26' 40" W | S 7N 6E 32 | |
| | | 60° 39' 13" N | 148° 28' 15" W | S 7N 6E 31 | |
| 461 Cochrane Creek | 224-10-14610 | 60° 36' 59" N | 148° 25' 39" W | S 6N 6E 17 | |
| | | 60° 36' 30" N | 148° 25' 16" W | S 6N 6E 16 | |
| 469 Wickett Creek | 224-10-14690 | 60° 44' 19" N | 148° 17' 0" W | S 8N 7E 31 | |
| | | 60° 44' 27" N | 148° 16' 20" W | S 8N 7E 32 | |
| 471 Narrows Creek | 224-30-14710 | 60° 43' 34" N | 148° 15' 4" W | S 7N 7E 5 | |
| | | 60° 43' 22" N | 148° 15' 36" W | S 7N 7E 5 | |
| 476 Shrode Creek | 224-30-14760 | 60° 40' 32" N | 148° 17' 31" W | S 7N 7E 30 | |
| | | 60° 39' 9" N | 148° 18' 35" W | S 7N 6E 36 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 479 Culross Creek (listed as three streams in anadromous stream catalog) | 224-30-14770 | 60° 38' 11" N | 148° 12' 11" W | S 6N 7E 3 | |
| | | 60° 38' 26" N | 148° 12' 9" W | S 6N 7E 3 | |
| | 224-30-14780 | 60° 37' 48" N | 148° 12' 26" W | S 6N 7E 10 | |
| | | 60° 38' 2" N | 148° 12' 57" W | S 6N 7E 3 | |
| | 224-30-14790 | 60° 37' 34" N | 148° 12' 20" W | S 6N 7E 10 | |
| | | 60° 36' 57" N | 148° 12' 36" W | S 6N 7E 15 | |
| 480 Mink Creek | 224-30-14800 | 60° 39' 36" N | 148° 10' 54" W | S 7N 7E 35 | |
| | | 60° 39' 35" N | 148° 10' 44" W | S 7N 7E 35 | |
| 484 E. Finger Creek | 224-40-14840 | 60° 33' 58" N | 148° 20' 28" W | S 6N 6E 35 | |
| | | 60° 34' 13" N | 148° 20' 33" W | S 6N 6E 35 | |
| 485 W. Finger Creek | 224-40-14850 | 60° 35' 46" N | 148° 23' 47" W | S 6N 6E 21 | |
| | | 60° 36' 5" N | 148° 23' 12" W | S 6N 6E 22 | |
| 493 Most Creek | 224-40-14930 | 60° 31' 3" N | 148° 13' 28" W | S 5N 7E 16 | |
| | | 60° 30' 29" N | 148° 13' 7" W | S 5N 7E 21 | |
| 495 Chimevisky Lagoon | 224-40-14960 | 60° 28' 39" N | 148° 11' 12" W | S 5N 7E 35 | |
| | | 60° 28' 23" N | 148° 11' 22" W | S 4N 7E 2 | |
| 498 McClure Creek | 224-40-14980 | 60° 29' 38" N | 148° 9' 13" W | S 5N 7E 25 | |
| | | 60° 28' 53" N | 148° 8' 38" W | S 5N 7E 36 | |
| 506 Loomis Creek | 225-30-15060 | 60° 29' 30" N | 147° 58' 18" W | S 5N 8E 25 | |
| | | 60° 29' 57" N | 147° 59' 0" W | S 5N 8E 26 | |
| 507 Gumboot Creek | 225-30-15070 | 60° 28' 28" N | 147° 59' 41" W | S 5N 8E 35 | |
| | | 60° 29' 17" N | 148° 0' 36" W | S 5N 8E 35 | |
| 508 Solf Creek | 225-30-15080 | 60° 27' 47" N | 148° 3' 6" W | S 4N 8E 3 | |
| | | 60° 28' 6" N | 148° 2' 57" W | S 4N 8E 3 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 510 Elishansky Creek | 225-30-15100 | 60° 27' 52" N | 148° 4' 30" W | S 4N 8E 4 | |
| | | 60° 28' 6" N | 148° 4' 53" W | S 4N 8E 4 | |
| 511 Eshamy River | 225-30-15110 | 60° 27' 12" N | 148° 5' 53" W | S 4N 8E 8 | |
| | | 60° 27' 9" N | 148° 6' 18" W | S 4N 8E 8 | |
| 601 Paddy Creek | 226-20-16010 | 60° 24' 52" N | 148° 3' 55" W | S 4N 8E 28 | |
| | | 60° 25' 11" N | 148° 3' 16" W | S 4N 8E 22 | |
| 602 Nacktan Creek | 226-20-16020 | 60° 25' 6" N | 148° 5' 53" W | S 4N 8E 20 | |
| | | 60° 25' 27" N | 148° 6' 2" W | S 4N 8E 20 | |
| 603 Ewan Creek | 226-20-16030 | 60° 24' 3" N | 148° 10' 14" W | S 4N 7E 35 | |
| | | 60° 24' 19" N | 148° 10' 41" W | S 4N 7E 26 | |
| 604 Erb Creek | 226-20-16040 | 60° 22' 40" N | 148° 8' 56" W | S 3N 7E 1 | |
| | | 60° 22' 24" N | 148° 9' 56" W | S 3N 7E 1 | |
| 608 Jackpot River | 226-20-16080 | 60° 21' 47" N | 148° 14' 20" W | S 3N 7E 9 | |
| | | 60° 25' 16" N | 148° 14' 13" W | S 4N 7E 21 | |
| 610 Kompoff River | 226-20-16100 | 60° 21' 47" N | 148° 15' 47" W | S 3N 7E 8 | |
| | | 60° 21' 55" N | 148° 16' 27" W | S 3N 7E 8 | |
| 611 Jackpot Bay #1 | 226-20-16110 | 60° 21' 30" N | 148° 15' 56" W | S 3N 7E 8 | |
| | | 60° 21' 11" N | 148° 17' 4" W | S 3N 7E 17 | |
| 612 Jackpot Bay #2 | 226-20-16120 | 60° 21' 24" N | 148° 15' 38" W | S 3N 7E 17 | |
| | | 60° 20' 54" N | 148° 15' 58" W | S 3N 7E 17 | |
| 613 Jackson Creek | 226-20-16130 | 60° 19' 34" N | 148° 16' 34" W | S 3N 7E 29 | |
| | | 60° 20' 10" N | 148° 18' 47" W | S 3N 7E 19 | |
| 621 Totemoff Creek | 226-20-16210 | 60° 20' 37" N | 148° 5' 8" W | S 3N 8E 17 | |
| | | 60° 20' 21" N | 148° 4' 37" W | S 3N 8E 21 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|--|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 623 Brizgaloff Creek | 226-20-16230 | 60° 19' 2" N | 148° 7' 9" W | S 3N 8E 30 | |
| | | 60° 18' 46" N | 148° 7' 9" W | S 3N 8E 31 | |
| 630 Bainbridge Creek | 226-20-16300 | 60° 12' 19" N | 148° 17' 47" W | S 1N 7E 6 | |
| | | 60° 12' 9" N | 148° 18' 5" W | S 1N 7E 6 | |
| 632 Claw Creek | 226-20-16320 | 60° 12' 53" N | 148° 12' 33" W | S 2N 7E 34 | |
| | | 60° 12' 20" N | 148° 12' 51" W | S 1N 7E 3 | |
| 633 Pablo Creek | 226-20-16330 | 60° 9' 31" N | 148° 13' 4" W | S 1N 7E 22 | |
| | | 60° 9' 50" N | 148° 13' 30" W | S 1N 7E 22 | |
| 634 Whale Bay #1 | 226-20-16340 | 60° 9' 2" N | 148° 12' 54" W | S 1N 7E 27 | |
| | | 60° 8' 29" N | 148° 13' 36" W | S 1N 7E 27 | |
| 636 Whale Creek | 226-20-16360 | 60° 10' 0" N | 148° 10' 30" W | S 1N 7E 23 | |
| | | 60° 9' 51" N | 148° 9' 47" W | S 1N 7E 24 | |
| 653 Hogg Creek | 226-50-16530 | 60° 5' 23" N | 148° 11' 4" W | S 1S 7E 14 | |
| | | 60° 5' 34" N | 148° 9' 53" W | S 1S 7E 13 | |
| 655 Johnson Creek | 226-40-16269 | 60° 7' 33" N | 148° 7' 16" W | S 1S 8E 5 | |
| | | 60° 7' 28" N | 148° 7' 30" W | S 1S 8E 5 | |
| 656 Halverson Creek (listed as two streams in anadromous stream catalog) | 226-40-16279 | 60° 7' 5" N | 148° 6' 51" W | S 1S 8E 5 | |
| | | 60° 6' 46" N | 148° 7' 5" W | S 1S 8E 5 | |
| | 226-40-16281 | 60° 7' 5" N | 148° 6' 42" W | S 1S 8E 5 | |
| | | 60° 6' 45" N | 148° 6' 46" W | S 1S 8E 5 | |
| 665 Bjerne Creek (listed as two streams in anadromous stream catalog) | 226-40-16650 | 60° 5' 10" N | 147° 56' 10" W | S 1S 9E 17 | |
| | | 60° 5' 49" N | 147° 56' 4" W | S 1S 9E 17 | |
| | 226-40-16652 | 60° 5' 3" N | 147° 56' 20" W | S 1S 9E 17 | |
| | | 60° 5' 8" N | 147° 57' 1" W | S 1S 9E 17 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|--|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 666 O'Brien Creek | 226-40-16665 | 60° 4' 46" N | 147° 59' 52" W | S 1S 8E 24 | |
| | | 60° 5' 18" N | 147° 59' 8" W | S 1S 8E 13 | |
| 670 Montgomery Creek | 226-40-16384 | 60° 10' 25" N | 148° 1' 26" W | S 1N 8E 14 | |
| | | 60° 10' 22" N | 148° 1' 17" W | S 1N 8E 14 | |
| 672 Latouche Island | 226-40-16720 | 59° 59' 38" N | 147° 59' 1" W | S 2S 8E 24 | |
| | | 59° 59' 16" N | 147° 58' 37" W | S 2S 9E 19 | |
| 673 Falls Creek | 226-40-16730 | 59° 59' 36" N | 147° 58' 43" W | S 2S 9E 19 | |
| | | 59° 59' 41" N | 147° 57' 35" W | S 2S 9E 19 | |
| 676 Horseshoe Creek | 226-40-16760 | 60° 1' 11" N | 147° 56' 5" W | S 2S 9E 8 | |
| | | 60° 1' 4" N | 147° 55' 37" W | S 2S 9E 8 | |
| 677 Hayden Creek (listed as two streams in anadromous stream catalog) | 226-40-16770 | 60° 2' 18" N | 147° 54' 33" W | S 2S 9E 4 | |
| | | 60° 2' 11" N | 147° 54' 18" W | S 2S 9E 4 | |
| | 226-40-16768 | 60° 2' 15" N | 147° 54' 41" W | S 2S 9E 4 | |
| | | 60° 2' 5" N | 147° 54' 43" W | S 2S 9E 4 | |
| 682 Snug Harbor | 226-30-16820 | 60° 15' 40" N | 147° 46' 12" W | S 2N 10E 18 | |
| | | 60° 15' 46" N | 147° 46' 48" W | S 2N 10E 18 | |
| 702 Point Creek | 227-10-17020 | 59° 52' 27" N | 147° 46' 25" W | S 3S 10E 32 | |
| | | 59° 52' 4" N | 147° 46' 33" W | S 3S 10E 32 | |
| 703 Clam Beach Creek | 227-10-17022 | 59° 52' 28" N | 147° 45' 44" W | S 3S 10E 32 | |
| | | 59° 52' 6" N | 147° 46' 3" W | S 3S 10E 32 | |
| 707 MacLeod Creek | 227-10-17060 | 59° 52' 56" N | 147° 45' 16" W | S 3S 10E 29 | |
| | | 59° 53' 41" N | 147° 41' 52" W | S 3S 10E 27 | |
| 710 Hanning Creek | 227-10-17100 | 59° 57' 0" N | 147° 41' 20" W | S 3S 10E 2 | |
| | | 59° 56' 47" N | 147° 40' 21" W | S 3S 10E 2 | |

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Appendix A. (page 15 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 711 Quadra Creek | 227-10-17110 | 59° 58' 25" N | 147° 39' 33" W | S 2S 10E 25 | |
| | | 59° 58' 40" N | 147° 37' 49" W | S 2S 11E 30 | |
| 717 Montague Island #1 | 227-10-17170 | 60° 1' 51" N | 147° 34' 10" W | S 2S 11E 4 | |
| | | 60° 1' 43" N | 147° 33' 41" W | S 2S 11E 4 | |
| 718 Montague Island #2 | 227-10-17180 | 60° 2' 3" N | 147° 34' 11" W | S 2S 11E 4 | |
| | | 60° 1' 50" N | 147° 33' 15" W | S 2S 11E 4 | |
| 719 Montague Island #3 | 227-10-17190 | 60° 2' 10" N | 147° 34' 9" W | S 2S 11E 4 | |
| | | 60° 2' 2" N | 147° 33' 17" W | S 2S 11E 4 | |
| 722 Montague Island #4 (Clearcut) | 227-10-17210 | 60° 3' 20" N | 147° 31' 58" W | S 1S 11E 27 | |
| | | 60° 3' 1" N | 147° 31' 48" W | S 1S 11E 34 | |
| 724 Montague Island #5 (Glacial) | 227-10-17240 | 60° 4' 9" N | 147° 29' 59" W | S 1S 11E 26 | |
| | | 60° 3' 52" N | 147° 30' 6" W | S 1S 11E 26 | |
| 725 Montague Island #6 | 227-10-17250 | 60° 4' 11" N | 147° 29' 25" W | S 1S 11E 24 | |
| | | 60° 3' 56" N | 147° 28' 52" W | S 1S 11E 25 | |
| 726 Montague Creek | 227-10-17260 | 60° 4' 36" N | 147° 28' 45" W | S 1S 11E 24 | |
| | | 60° 4' 22" N | 147° 27' 35" W | S 1S 12E 19 | |
| 738 Russell Creek | 227-20-17380 | 60° 10' 29" N | 147° 20' 8" W | S 1N 12E 15 | |
| | | 60° 10' 22" N | 147° 19' 36" W | S 1N 12E 14 | |
| 739 Swamp Creek | 227-20-17390 | 60° 11' 30" N | 147° 18' 14" W | S 1N 12E 11 | |
| | | 60° 11' 2" N | 147° 17' 24" W | S 1N 12E 13 | |
| 740 Kelez Creek | 227-20-17400 | 60° 12' 32" N | 147° 17' 42" W | S 1N 12E 1 | |
| | | 60° 12' 20" N | 147° 16' 39" W | S 1N 12E 1 | |
| 741 Chalmers River | 227-20-17410 | 60° 13' 10" N | 147° 15' 21" W | S 2N 13E 31 | |
| | | 60° 13' 7" N | 147° 13' 32" W | S 2N 13E 32 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 744 Wilby Creek | 227-20-17440 | 60° 14' 9" N | 147° 13' 20" W | S 2N 13E 29 |
| | | 60° 13' 48" N | 147° 11' 58" W | S 2N 13E 28 |
| 745 Wild Creek | 227-20-17450 | 60° 14' 34" N | 147° 11' 50" W | S 2N 13E 21 |
| | | 60° 14' 16" N | 147° 10' 45" W | S 2N 13E 27 |
| 746 Schauman Creek | 227-20-17460 | 60° 14' 53" N | 147° 11' 18" W | S 2N 13E 21 |
| | | 60° 14' 42" N | 147° 9' 55" W | S 2N 13E 22 |
| 747 Cabin Creek | 227-20-17464 | 60° 15' 21" N | 147° 9' 53" W | S 2N 13E 22 |
| | | 60° 15' 0" N | 147° 9' 22" W | S 2N 13E 23 |
| 748 Gilmour Creek | 227-20-17480 | 60° 16' 23" N | 147° 10' 55" W | S 2N 13E 10 |
| | | 60° 16' 18" N | 147° 10' 20" W | S 2N 13E 10 |
| 749 Shad Creek | 227-20-17490 | 60° 16' 42" N | 147° 11' 43" W | S 2N 13E 9 |
| | | 60° 16' 41" N | 147° 10' 55" W | S 2N 13E 10 |
| 752 Stockdale Creek | 227-20-17520 | 60° 18' 17" N | 147° 10' 54" W | S 3N 13E 34 |
| | | 60° 18' 1" N | 147° 10' 27" W | S 3N 13E 34 |
| ?753 Stockdale Bay/Harbor | 227-20-17530? | 60° 18' 22" N | 147° 10' 18" W | S 3N 13E 34 |
| | 227-20-17540? | 60° 18' 3" N | 147° 9' 58" W | S 3N 13E 34 |
| ?754 Dry Creek | 227-20-17540? | 60° 18' 26" N | 147° 10' 4" W | S 3N 13E 34 |
| | 227-20-17546? | 60° 18' 32" N | 147° 8' 55" W | S 3N 13E 35 |
| 758 Rocky Bay Head | 227-20-17582 | 60° 20' 26" N | 147° 8' 34" W | S 3N 13E 23 |
| | | 60° 20' 31" N | 147° 9' 16" W | S 3N 13E 23 |
| 759 Rocky Creek | 227-20-17590 | 60° 20' 7" N | 147° 7' 26" W | S 3N 13E 24 |
| | | 60° 19' 56" N | 147° 6' 46" W | S 3N 13E 24 |
| ?766 Carr Creek | 227-20-17660? | 60° 15' 36" N | 147° 6' 49" W | S 2N 13E 13 |
| | 227-20-17653? | 60° 15' 13" N | 147° 7' 36" W | S 2N 13E 24 |

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Appendix A. (page 17 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 770 Udall Creek | 227-20-17700 | 60° 15' 49" N 147° 5' 15" W | S 2N 14E 18 |
| | | 60° 15' 42" N 147° 4' 50" W | S 2N 14E 18 |
| 771 McKernan Creek | 227-30-17710 | 60° 11' 59" N 147° 5' 3" W | S 1N 14E 6 |
| | | 60° 12' 29" N 147° 5' 36" W | S 1N 14E 6 |
| 774 Rosswag Creek | 227-20-17740 | 60° 16' 48" N 147° 1' 59" W | S 2N 14E 9 |
| | | 60° 16' 23" N 147° 1' 37" W | S 2N 14E 9 |
| 775 Pautze Creek | 227-20-17750 | 60° 17' 44" N 147° 0' 25" W | S 2N 14E 3 |
| | | 60° 17' 6" N 147° 0' 29" W | S 2N 14E 10 |
| 788 Green Creek | 227-20-17880 | 60° 17' 37" N 147° 22' 44" W | S 2N 12E 4 |
| | | 60° 16' 58" N 147° 23' 26" W | S 2N 12E 8 |
| 805 Port Etches (South Shore) | 228-60-18050 | 60° 18' 3" N 146° 37' 43" W | C 18S 8W 21 |
| | | 60° 17' 26" N 146° 36' 0" W | C 18S 8W 22 |
| 806 Dog Salmon Creek | 228-60-18060 | 60° 19' 6" N 146° 34' 26" W | C 18S 8W 11 |
| | | 60° 18' 3" N 146° 33' 29" W | C 18S 8W 23 |
| 807 Beaver Creek | 228-60-18070 | 60° 19' 22" N 146° 33' 36" W | C 18S 8W 11 |
| | | 60° 18' 53" N 146° 31' 26" W | C 18S 7W 18 |
| 810 Garden Creek | 228-60-18100 | 60° 20' 31" N 146° 30' 50" W | C 18S 7W 6 |
| | | 60° 20' 55" N 146° 29' 22" W | C 17S 7W 32 |
| 811 Etches Creek | 228-60-18110 | 60° 21' 52" N 146° 28' 57" W | C 17S 7W 29 |
| | | 60° 21' 35" N 146° 27' 15" W | C 17S 7W 28 |
| 812 Nuchek Creek | 228-60-18120 | 60° 21' 57" N 146° 28' 49" W | C 17S 7W 29 |
| | | 60° 22' 38" N 146° 24' 45" W | C 17S 7W 22 |
| 815 Constantine Creek | 228-60-18150 | 60° 22' 27" N 146° 35' 29" W | C 17S 8W 22 |
| | | 60° 23' 52" N 146° 32' 13" W | C 17S 8W 13 |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|-------|
| | | Latitude and Longitude | | Legal Description | |
| 817 Deer Creek | 228-50-18170 | 60° 23' 31" N | 146° 42' 20" W | C 17S | 9W 13 |
| | | 60° 22' 47" N | 146° 41' 33" W | C 17S | 8W 19 |
| 818 Juania Creek | 228-50-18180 | 60° 24' 15" N | 146° 42' 9" W | C 17S | 9W 12 |
| | | 60° 24' 14" N | 146° 40' 19" W | C 17S | 8W 7 |
| 821 Brown Bear Creek | 228-50-18190 | 60° 25' 40" N | 146° 38' 0" W | C 17S | 8W 4 |
| | | 60° 25' 2" N | 146° 36' 5" W | C 17S | 8W 3 |
| 827 Captain Creek | 228-40-18270 | 60° 27' 32" N | 146° 33' 47" W | C 16S | 8W 25 |
| | | 60° 26' 55" N | 146° 35' 46" W | C 16S | 8W 27 |
| 828 Cook Creek | 228-40-18280 | 60° 27' 23" N | 146° 32' 3" W | C 16S | 7W 30 |
| | | 60° 26' 24" N | 146° 33' 19" W | C 16S | 8W 36 |
| 829 King Creek | 228-40-18290 | 60° 27' 19" N | 146° 28' 28" W | C 16S | 7W 28 |
| | | 60° 26' 30" N | 146° 31' 40" W | C 16S | 7W 31 |
| 831 Double Creek | 228-40-18310 | 60° 27' 35" N | 146° 26' 53" W | C 16S | 7W 27 |
| | | 60° 26' 15" N | 146° 29' 46" W | C 16S | 7W 32 |
| 833 Bates Creek | 228-20-18330 | 60° 27' 39" N | 146° 21' 59" W | C 16S | 7W 24 |
| | | 60° 27' 39" N | 146° 22' 18" W | C 16S | 7W 24 |
| 834 Hardy Creek | 228-20-18340 | 60° 26' 43" N | 146° 22' 9" W | C 16S | 7W 36 |
| | | 60° 25' 22" N | 146° 28' 11" W | C 17S | 7W 5 |
| 835 Scott Creek | 228-20-18350 | 60° 25' 36" N | 146° 21' 59" W | C 17S | 7W 1 |
| | | 60° 23' 49" N | 146° 26' 22" W | C 17S | 7W 16 |
| 836 Dan's Creek | 228-20-18360 | 60° 24' 16" N | 146° 22' 28" W | C 17S | 7W 12 |
| | | 60° 23' 58" N | 146° 23' 55" W | C 17S | 7W 14 |
| 837 Widgeon Creek | 228-20-18370 | 60° 24' 2" N | 146° 21' 47" W | C 17S | 7W 13 |
| | | 60° 23' 35" N | 146° 25' 2" W | C 17S | 7W 15 |

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Appendix A. (page 19 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|--|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 839 Goose Creek | 228-20-18390 | 60° 24' 45" N | 146° 18' 39" W | C 17S 6W 8 | |
| | | 60° 24' 31" N | 146° 17' 52" W | C 17S 6W 8 | |
| 844 Makaka Creek | 228-30-18440 | 60° 30' 31" N | 146° 17' 43" W | C 16S 6W 4 | |
| | | 60° 28' 53" N | 146° 16' 53" W | C 16S 6W 16 | |
| 847 Hawkins Creek | 228-30-18460 | 60° 30' 52" N | 146° 13' 26" W | C 16S 6W 2 | |
| | | 60° 29' 37" N | 146° 11' 21" W | C 16S 6W 12 | |
| 849 Rollins Creek (listed as two streams in anadromous stream catalog) | 228-30-18490 | 60° 31' 7" N | 146° 8' 46" W | C 15S 5W 32 | |
| | | 60° 30' 42" N | 146° 9' 52" W | C 16S 5W 6 | |
| | 228-30-18492 | 60° 31' 8" N | 146° 8' 35" W | C 15S 5W 32 | |
| | | 60° 30' 49" N | 146° 8' 2" W | C 16S 5W 5 | |
| 850 Canoe Creek | 228-30-18500 | 60° 30' 51" N | 146° 6' 52" W | C 16S 5W 4 | |
| | | 60° 30' 3" N | 146° 8' 26" W | C 16S 5W 8 | |
| 851 Zillesenoff Creek | 228-30-18510 | 60° 30' 27" N | 146° 5' 0" W | C 16S 5W 3 | |
| | | 60° 30' 18" N | 146° 4' 44" W | C 16S 5W 3 | |
| 856 W. Lagoon Creek or Cedar Bay W. (listed as two streams in anadromous stream catalog) | 228-30-18555 | 60° 32' 51" N | 146° 2' 8" W | C 15S 5W 24 | |
| | | 60° 32' 26" N | 146° 1' 59" W | C 15S 5W 25 | |
| | 228-30-18560 | 60° 32' 59" N | 146° 1' 16" W | C 15S 5W 24 | |
| | | 60° 32' 15" N | 146° 0' 49" W | C 15S 5W 25 | |
| 857 E. Lagoon Creek or Cedar Bay E. | 228-30-18570 | 60° 33' 25" N | 146° 0' 13" W | C 15S 4W 19 | |
| | | 60° 33' 0" N | 145° 59' 27" W | C 15S 4W 19 | |
| 858 N. Lagoon Creek or Cedar Bay N. (listed as two streams in anadromous stream catalog) | 228-30-18570-2015 | 60° 33' 23" N | 145° 59' 45" W | C 15S 4W 19 | |
| | | 60° 33' 12" N | 145° 58' 46" W | C 15S 4W 20 | |
| | 228-30-18560 | 60° 32' 59" N | 146° 1' 16" W | C 15S 5W 24 | |
| | | 60° 32' 15" N | 146° 0' 49" W | C 15S 5W 25 | |

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Appendix A. (page 20 of 20)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|-------|
| | | Latitude and Longitude | | Legal Description | |
| 861 Bernard Creek | 228-30-18610 | 60° 33' 33" N | 145° 55' 49" W | C 15S | 4W 21 |
| | | 60° 33' 20" N | 145° 54' 21" W | C 15S | 4W 22 |
| 862 Clamdiggers Creek | 228-30-18620 | 60° 34' 57" N | 145° 56' 14" W | C 15S | 4W 9 |
| | | 60° 34' 25" N | 145° 55' 27" W | C 15S | 4W 15 |
| 863 Orca Creek | 228-30-18630 | 60° 35' 3" N | 145° 53' 58" W | C 15S | 4W 10 |

Appendix B. Ground, Aerial and Weir Counts of Pink Salmon Spawners for Streams with Intertidal Weirs, Prince William Sound, Alaska, 1990.

Footnotes for Appendix B.

¹ Linear interpolation used to estimate missing data.

² Weir construction not completed.

³ Some weir pickets removed.

Appendix B.1. Prince William Sound pink salmon counts, stream 76, Irish Creek, 1990.

| Date | Ground Survey | | | Weir | | Total Live |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 06/25 | | | | 0 | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | 0 | 0 | 0 |
| 07/02 | | | | 0 | 0 | 0 |
| 07/03 | | | | | 0 | 0 |
| 07/04 | | | | | 0 | 0 |
| 07/05 | 0 | 0 | 0 | | 100 | 100 |
| 07/06 | 92 | 0 | 92 | | 7 | 107 |
| 07/07 | 80 | 0 | -12 | 0 | 0 | 107 |
| 07/08 | 68 | 1 | -11 | | 4 | 110 |
| 07/09 | 43 | 1 | -24 | | 8 | 117 |
| 07/10 | 51 | 0 | 8 | | 5 | 122 |
| 07/11 | 60 | 1 | 10 | | 12 | 133 |
| 07/12 | 46 | 0 | -14 | 0 | 29 | 162 |
| 07/13 | 91 | 0 | 45 | | 50 | 212 |
| 07/14 | 124 | 0 | 33 | | 0 | 212 |
| 07/15 | 127 | 2 | 5 | | 0 | 210 |
| 07/16 | 29 | 2 | -96 | 500 | 486 | 694 |
| 07/17 | 550 | 0 | 521 | | 4 | 698 |
| 07/18 | 585 | 3 | 38 | 150 | 257 | 952 |
| 07/19 | 708 | 20 | 143 | | 1,046 | 1,978 |
| 07/20 | 1,258 | 5 | 555 | | 427 | 2,400 |
| 07/21 | 1,508 | 19 | 269 | | 479 | 2,860 |
| 07/22 | 2,079 | 21 | 592 | | 581 | 3,420 |
| 07/23 | 2,722 | 22 | 665 | | 9 | 3,407 |
| 07/24 | 2,488 | 22 | -212 | 6,000 | 1,039 | 4,424 |
| 07/25 | 1,800 | 25 | -663 | | 451 | 4,850 |
| 07/26 | 2,918 | 26 | 1,144 | | 34 | 4,858 |
| 07/27 | 2,529 | 6 | -383 | | 351 | 5,203 |
| 07/28 | 2,111 | 20 | -398 | | 174 | 5,357 |
| 07/29 | 2,724 | 15 | 628 | | 52 | 5,394 |

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Appendix B.1. (page 2 of 3)

| Date | Ground Survey | | | Weir | | Total Live |
|-------|---------------|-------------|-------------|---------------|--------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 07/30 | 3,337 | 15 | 628 | 700 | 9 | 5,388 |
| 07/31 | 2,974 | 32 | -331 | | 750 | 6,106 |
| 08/01 | 3,960 | 36 | 1,022 | | 163 | 6,233 |
| 08/02 | 3,097 | 69 | -794 | 24,500 | 3,827 | 9,991 |
| 08/03 | 5,941 | 38 | 2,882 | | 1,865 | 11,818 |
| 08/04 | 6,449 | 141 | 649 | | 950 | 12,627 |
| 08/05 | 7,557 | 75 | 1,183 | | 51 | 12,603 |
| 08/06 | 7,628 | 101 | 172 | 8,000 | 297 | 12,799 |
| 08/07 | 4,697 | 74 | -2,857 | | 5,371 | 18,096 |
| 08/08 | 4,287 | 244 | -166 | 6,500 | 22 | 17,874 |
| 08/09 | 8,022 | 224 | 3,959 | | 950 | 18,600 |
| 08/10 | 8,411 | 184 | 573 | | 879 | 19,295 |
| 08/11 | 8,800 | 192 | 581 | | 385 | 19,488 |
| 08/12 | 11,960 | 240 | 3,400 | | 1,261 | 20,509 |
| 08/13 | 8,260 | 390 | -3,310 | | 0 | 20,119 |
| 08/14 | 11,886 | 490 | 4,116 | 15,310 | 5,148 | 24,777 |
| 08/15 | 13,597 | 520 | 2,231 | | 0 | 24,257 |
| 08/16 | 9,402 | 429 | -3,766 | | 6,035 | 29,863 |
| 08/17 | 17,662 | 573 | 8,833 | | 93 | 29,383 |
| 08/18 | 16,016 | 461 | -1,185 | | 1,085 | 30,007 |
| 08/19 | 18,702 | 933 | 3,619 | | 1,425 | 30,499 |
| 08/20 | 16,755 | 573 | -1,374 | 600 | 0 | 29,926 |
| 08/21 | 14,808 | 866 | -1,081 | | -13 | 29,047 |
| 08/22 | 14,129 | 768 | 89 | | 0 | 28,279 |
| 08/23 | 15,323 | 1,040 | 2,234 | 17,500 | 450 | 27,689 |
| 08/24 | 17,976 | 1,245 | 3,898 | | 0 | 26,444 |
| 08/25 | 13,214 | 1,198 | -3,564 | | 232 | 25,478 |
| 08/26 | 18,209 | 1,321 | 6,316 | | 65 | 24,222 |
| 08/27 | 13,224 | 2,104 | -2,881 | | 582 | 22,700 |
| 08/28 | 16,426 | 2,439 | 5,641 | | 2,465 | 22,726 |
| 08/29 | 13,767 | 2,916 | 257 | | 13 | 19,823 |
| 08/30 | 12,277 | 1,851 | 361 | 13,500 | 0 | 17,972 |
| 08/31 | 10,139 | 2,224 | 86 | | 638 | 16,386 |
| 09/01 | 11,782 | 2,449 | 4,092 | | 361 | 14,298 |
| 09/02 | 11,367 | 2,103 | 1,688 | | 1,688 ¹ | 13,883 |
| 09/03 | 6,762 | 2,643 | -1,962 | | 520 | 11,760 |

- combined -

Appendix B.1. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 8,258 | 1,176 | 2,672 | 4,200 | 0 | 10,584 |
| 09/05 | 9,754 | 2,326 | 3,822 | | 403 | 8,661 |
| 09/06 | 5,412 | 1,263 | -3,079 | | 843 | 8,241 |
| 09/07 | 8,021 | 826 | 3,435 | | 381 | 7,796 |
| 09/08 | 4,930 | 1,399 | -1,692 | | 244 | 6,641 |
| 09/09 | 3,169 | 1,091 | -671 | | 79 | 5,629 |
| 09/10 | 1,407 | 796 | -966 | | 92 | 4,925 |
| 09/11 | 3,034 | 2,087 | 3,714 | 2,500 | 8 | 2,846 |
| 09/12 | 335 | 1,116 | -1,583 | | 25 | 1,755 |
| 09/13 | 646 | 1,538 | 1,849 | | 5 | 222 |
| 09/14 | 814 | 103 | 270 | | | |
| 09/15 | 981 | 103 | 270 | | | |
| 09/16 | 822 | 329 | 170 | | | |
| 09/17 | 610 | 161 | -51 | | | |
| 09/18 | 392 | 61 | -157 | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 45,786 | 46,178 | | 45,252 | |

Appendix B.2. Prince William Sound pink salmon counts, stream 621, Totemoff Creek, 1990.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | 0 | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | 5 | 5 |
| 07/15 | 0 | 0 | 0 | | 2 | 7 |
| 07/16 | 2 | 0 | 2 | 0 | 1 | 8 |
| 07/17 | 8 | 0 | 6 | | 1 | 9 |
| 07/18 | 13 | 0 | 6 | 100 | 0 | 9 |
| 07/19 | 13 | 0 | 0 | | 38 | 47 |
| 07/20 | 36 | 0 | 23 | | 5 | 52 |
| 07/21 | 18 | 0 | -18 | | 2 | 54 |
| 07/22 | 62 | 0 | 44 | | 18 | 72 |
| 07/23 | 169 | 1 | 108 | 0 | 117 | 188 |
| 07/24 | 235 | 1 | 67 | | 156 | 343 |
| 07/25 | 756 | 0 | 521 | | 870 | 1,213 |
| 07/26 | 1,059 | 3 | 306 | 2,400 | 306 ¹ | 1,516 |
| 07/27 | 753 | 10 | -296 | | 537 | 2,043 |
| 07/28 | 1,267 | 0 | 514 | | 583 | 2,626 |
| 07/29 | 1,317 | 24 | 74 | | -51 | 2,551 |

- continued -

Appendix B.2. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|---------------|-------------|-------------|---------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 1,579 | 0 | 262 | | 3 | 2,554 |
| 07/31 | 1,350 | 36 | -193 | 3,700 | 0 | 2,518 |
| 08/01 | 1,430 | 39 | 119 | | 125 | 2,604 |
| 08/02 | 1,696 | 47 | 313 | | 17 | 2,574 |
| 08/03 | 3,052 | 61 | 1,417 | 1,600 | 1,152 | 3,665 |
| 08/04 | 2,560 | 126 | -366 | | 191 | 3,730 |
| 08/05 | 2,597 | 72 | 109 | | 1,679 | 5,337 |
| 08/06 | 3,539 | 476 | 1,418 | 1,400 | -144 | 4,717 |
| 08/07 | 3,831 | 142 | 434 | | 21 | 4,596 |
| 08/08 | 3,311 | 111 | -409 | | 470 | 4,955 |
| 08/09 | 5,590 | 177 | 2,456 | | 80 | 4,858 |
| 08/10 | 4,014 | 396 | -1,180 | | 0 | 4,462 |
| 08/11 | 4,805 | 280 | 1,071 | | 0 | 4,182 |
| 08/12 | 5,214 | 373 | 782 | | 60 | 3,869 |
| 08/13 | 5,224 | 394 | 404 | | 404 ¹ | 3,879 |
| 08/14 | 4,214 | 448 | -562 | 4,000 | 0 | 3,431 |
| 08/15 | 5,422 | 519 | 1,727 | | 30 | 2,942 |
| 08/16 | 4,464 | 582 | -376 | | 317 | 2,677 |
| 08/17 | 3,618 | 699 | -147 | | 958 | 2,936 |
| 08/18 | 3,728 | 395 | 505 | | 505 ¹ | 3,046 |
| 08/19 | 3,034 | 744 | 50 | | 122 | 2,424 |
| 08/20 | 2,611 | 251 | -172 | | 363 | 2,536 |
| 08/21 | 4,061 | 486 | 1,936 | | 59 | 2,109 |
| 08/22 | 3,514 | 443 | -104 | 7,500 | 32 | 1,698 |
| 08/23 | 3,261 | 454 | 201 | | 105 | 1,349 |
| 08/24 | 2,402 | 742 | -117 | | 218 | 825 |
| 08/25 | 2,793 | 670 | 1,061 | | 301 | 456 |
| 08/26 | 2,300 | 929 | 436 | | 0 | 0 |
| 08/27 | 2,342 | 829 | 871 | | 653 | 0 |
| 08/28 | 1,806 | 765 | 229 | | 859 | 0 |
| 08/29 | 1,951 | 793 | 938 | | 938 ¹ | 0 |
| 08/30 | 1,215 | 817 | 81 | | 81 ¹ | 0 |
| 08/31 | 1,040 | 345 | 170 | 1,100 | 170 ¹ | 0 |
| 09/01 | 766 | 426 | 152 | | 54 | 0 |
| 09/02 | 751 | 286 | 271 | | 0 | 0 |
| 09/03 | 356 | 260 | -135 | | 40 | 0 |

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Appendix B.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 571 | 284 | 499 | | 140 | 0 |
| 09/05 | 527 | 113 | 69 | 2,000 | 169 | 0 |
| 09/06 | 655 | 48 | 176 | | 25 | 0 |
| 09/07 | 560 | 125 | 30 | | 30 ¹ | 0 |
| 09/08 | 425 | 107 | -28 | | 134 | 0 |
| 09/09 | 497 | 86 | 158 | | 158 ¹ | 0 |
| 09/10 | 377 | 219 | 99 | | 99 ¹ | 0 |
| 09/11 | 295 | 150 | 68 | | 134 | 0 |
| 09/12 | 237 | 128 | 70 | | 70 ¹ | 0 |
| 09/13 | 155 | 78 | -4 | | 3 | 0 |
| 09/14 | 79 | 80 | 4 | | 4 ¹ | 0 |
| 09/15 | 75 | 58 | 54 | | 54 ¹ | 0 |
| 09/16 | | | | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 16,128 | 16,203 | | 13,473 | |

Appendix B.3. Prince William Sound pink salmon counts, stream 692, Herring Creek, 1990.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | 0 | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | 0 | | |
| 07/17 | | | | | | |
| 07/18 | | | | 0 | | |
| 07/19 | | | | | | |
| 07/20 | | | | | | |
| 07/21 | | | | | | |
| 07/22 | | | | | | |
| 07/23 | 0 | 0 | 0 | 0 | 0 ² | 0 |
| 07/24 | 0 | 0 | 0 | | 0 ² | 0 |
| 07/25 | 4 | 0 | 4 | | 9 | 9 |
| 07/26 | 9 | 0 | 5 | 0 | 0 | 9 |
| 07/27 | 14 | 0 | 5 | | 0 | 9 |
| 07/28 | 19 | 0 | 5 | | 83 | 92 |
| 07/29 | 24 | 0 | 5 | | 0 | 92 |

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Appendix B.3. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 46 | 0 | 22 | | 0 | 92 |
| 07/31 | 79 | 0 | 33 | 0 | 0 | 92 |
| 08/01 | 83 | 0 | 4 | | 2 | 94 |
| 08/02 | 71 | 0 | -12 | | 0 | 94 |
| 08/03 | 52 | 0 | -19 | 25 | 26 | 120 |
| 08/04 | 135 | 0 | 83 | | 109 | 229 |
| 08/05 | 205 | 0 | 70 | | 22 | 251 |
| 08/06 | 285 | 0 | 80 | 1,000 | 40 | 291 |
| 08/07 | 186 | 2 | -97 | | 7 | 296 |
| 08/08 | 401 | 4 | 219 | | 500 | 792 |
| 08/09 | 687 | 1 | 287 | | 144 | 935 |
| 08/10 | 714 | 1 | 28 | | 181 | 1,115 |
| 08/11 | 856 | 1 | 143 | | 4 | 1,118 |
| 08/12 | 921 | 5 | 70 | | 1 | 1,114 |
| 08/13 | 885 | 12 | -24 | | 6 | 1,108 |
| 08/14 | 798 | 29 | -58 | 200 | 4 | 1,083 |
| 08/15 | 929 | 42 | 173 | | 7 | 1,048 |
| 08/16 | 800 | 36 | -93 | | 28 | 1,040 |
| 08/17 | 860 | 51 | 111 | | 38 | 1,027 |
| 08/18 | 1,233 | 72 | 445 | | 673 | 1,628 |
| 08/19 | 572 | 40 | -621 | | 17 | 1,605 |
| 08/20 | 1,613 | 75 | 1,116 | | 201 | 1,731 |
| 08/21 | 1,656 | 35 | 78 | | 31 | 1,727 |
| 08/22 | 1,640 | 64 | 48 | 1,100 | 5 | 1,668 |
| 08/23 | 1,617 | 80 | 57 | | 17 | 1,605 |
| 08/24 | 1,524 | 136 | 43 | | 31 | 1,500 |
| 08/25 | 1,355 | 131 | -38 | | 11 | 1,380 |
| 08/26 | 1,333 | 74 | 52 | | 218 | 1,524 |
| 08/27 | 1,150 | 192 | 9 | | 141 | 1,473 |
| 08/28 | 1,293 | 190 | 333 | | 53 | 1,336 |
| 08/29 | 1,078 | 178 | -37 | | 43 | 1,201 |
| 08/30 | 943 | 187 | 52 | | 74 | 1,088 |
| 08/31 | 871 | 146 | 74 | 750 | 100 | 1,042 |
| 09/01 | 800 | 102 | 31 | | 175 | 1,115 |
| 09/02 | 881 | 77 | 158 | | 161 | 1,199 |
| 09/03 | 944 | 125 | 188 | | 791 | 1,865 |

- continued -

Appendix B.3. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 1,567 | 123 | 746 | | 608 | 2,350 |
| 09/05 | 2,438 | 164 | 1,035 | 2,700 | 159 | 2,345 |
| 09/06 | 2,304 | 131 | -3 | | 207 | 2,421 |
| 09/07 | 2,144 | 164 | 4 | | 1 | 2,258 |
| 09/08 | 2,092 | 204 | 152 | | 1 | 2,055 |
| 09/09 | 2,219 | 137 | 264 | | 0 | 1,918 |
| 09/10 | 2,110 | 248 | 139 | | 28 | 1,698 |
| 09/11 | 1,654 | 350 | -106 | | 8 | 1,356 |
| 09/12 | 1,256 | 304 | -94 | | 0 | 1,052 |
| 09/13 | 972 | 363 | 79 | | 1 | 690 |
| 09/14 | 644 | 182 | -146 | | 0 | 508 |
| 09/15 | 507 | 136 | -1 | | 0 ³ | 372 |
| 09/16 | 422 | 74 | -11 | | 0 ³ | 298 |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 4,668 | 5,090 | | 4,966 | |

Appendix B.4. Prince William Sound pink salmon counts, stream 699, Cathead Creek, 1990.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | 0 | 0 | 0 | | | |
| 07/04 | 0 | 0 | 0 | | | |
| 07/05 | 0 | | 0 | | | |
| 07/06 | 0 | 0 | 0 | | | |
| 07/07 | 0 | | 0 | | | |
| 07/08 | 0 | | 0 | | 0 | 0 |
| 07/09 | 0 | | 0 | | 0 | 0 |
| 07/10 | 15 | 0 | 15 | | 15 | 15 |
| 07/11 | 13 | | -3 | 60 | 0 | 15 |
| 07/12 | 10 | 1 | -2 | | 0 | 14 |
| 07/13 | 9 | 0 | -1 | | 0 | 14 |
| 07/14 | 7 | | -3 | | 1 | 15 |
| 07/15 | 4 | 0 | -3 | | 0 | 15 |
| 07/16 | 0 | 0 | -4 | 0 | 0 | 15 |
| 07/17 | 2 | 0 | 2 | | 32 | 47 |
| 07/18 | 33 | 1 | 32 | 0 | 2 | 48 |
| 07/19 | 35 | 2 | 4 | | 11 | 57 |
| 07/20 | 44 | 0 | 9 | | 35 | 92 |
| 07/21 | 102 | 2 | 60 | | 19 | 109 |
| 07/22 | 320 | 2 | 220 | | 220 | 327 |
| 07/23 | 282 | 3 | -35 | 250 | 0 | 324 |
| 07/24 | 272 | 4 | -6 | | 37 | 357 |
| 07/25 | 367 | 8 | 103 | | 60 | 409 |
| 07/26 | 319 | 15 | -33 | 300 | 223 | 617 |
| 07/27 | 456 | 2 | 139 | | 454 | 1,069 |
| 07/28 | 1,124 | 4 | 672 | | 252 | 1,317 |
| 07/29 | 1,249 | 15 | 140 | | 107 | 1,409 |

- continued -

Appendix B.4. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 1,306 | 34 | 91 | | 0 | 1,375 |
| 07/31 | 1,174 | 65 | -67 | 2,100 | -2 | 1,308 |
| 08/01 | 1,076 | 88 | -10 | | 82 | 1,302 |
| 08/02 | 1,256 | 114 | 294 | | 211 | 1,399 |
| 08/03 | 1,273 | 103 | 120 | 200 | 126 | 1,422 |
| 08/04 | 1,279 | 98 | 104 | | 295 | 1,619 |
| 08/05 | 1,270 | 117 | 108 | | 108 ¹ | 1,610 |
| 08/06 | 1,467 | 43 | 240 | 2,000 | 240 ¹ | 1,807 |
| 08/07 | 1,355 | 322 | 210 | | 322 | 1,807 |
| 08/08 | 3,200 | 152 | 1,997 | | 2,163 | 3,818 |
| 08/09 | 3,011 | 167 | -22 | | 62 | 3,713 |
| 08/10 | 2,648 | 326 | -37 | | 349 | 3,736 |
| 08/11 | 2,928 | 217 | 497 | | -97 | 3,422 |
| 08/12 | 2,287 | 428 | -213 | | 76 | 3,070 |
| 08/13 | 1,891 | 416 | 20 | | 217 | 2,871 |
| 08/14 | 1,827 | 375 | 311 | 2,000 | 13 | 2,509 |
| 08/15 | 1,892 | 168 | 233 | | -21 | 2,320 |
| 08/16 | 1,250 | 472 | -170 | | -13 | 1,835 |
| 08/17 | 1,821 | 307 | 878 | | 723 | 2,251 |
| 08/18 | 2,009 | 212 | 400 | | 1,028 | 3,067 |
| 08/19 | 2,272 | 195 | 458 | | 81 | 2,953 |
| 08/20 | 2,384 | 430 | 542 | | -54 | 2,469 |
| 08/21 | 2,039 | 290 | -55 | | 75 | 2,254 |
| 08/22 | 2,062 | 98 | 121 | 1,550 | -77 | 2,079 |
| 08/23 | 1,784 | 220 | -58 | | 1 | 1,860 |
| 08/24 | 1,634 | 137 | -13 | | 0 | 1,723 |
| 08/25 | 1,485 | 162 | 13 | | -2 | 1,559 |
| 08/26 | 1,377 | 186 | 78 | | 88 | 1,461 |
| 08/27 | 1,186 | 199 | 8 | | 4 | 1,266 |
| 08/28 | 965 | 156 | -65 | | 1 | 1,111 |
| 08/29 | 812 | 209 | 56 | | 56 ¹ | 958 |
| 08/30 | 548 | 259 | -5 | | 0 | 699 |
| 08/31 | 379 | 160 | -9 | 400 | 39 | 578 |
| 09/01 | 311 | 147 | 79 | | 53 | 484 |
| 09/02 | 271 | 83 | 43 | | 23 | 424 |
| 09/03 | 216 | 119 | 64 | | 137 | 442 |

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Appendix B.4. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 321 | 54 | 159 | | 19 | 407 |
| 09/05 | 281 | 26 | -14 | 500 | 167 | 548 |
| 09/06 | 412 | 65 | 196 | | 29 | 512 |
| 09/07 | 375 | 18 | -19 | | -19 ¹ | 475 |
| 09/08 | | | | | | |
| 09/09 | | | | | | |
| 09/10 | | | | | | |
| 09/11 | | | | | | |
| 09/12 | | | | | | |
| 09/13 | | | | | | |
| 09/14 | | | | | | |
| 09/15 | | | | | | |
| 09/16 | | | | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 7,496 | 7,871 | | 7,971 | |

Appendix C. Ground, Aerial and Weir Counts of Pink Salmon Spawners for Streams with Intertidal Weirs, Prince William Sound, Alaska, 1991.

Footnotes for Appendix C.

¹ Linear interpolation used to estimate missing data.

² No ground survey conducted; dead count from next survey equally apportioned among preceding unsurveyed days.

³ Missing counts estimated from ground survey data.

⁴ Dead count increased by 250 pink salmon to account for carcasses washed out of stream.

⁵ Dead count increased by 175 pink salmon to account for carcasses washed out of stream.

⁶ Pickets pulled on weir.

⁷ Estimated total dead count divided equally among unsurveyed days.

⁸ Ground surveys not conducted above weir.

⁹ Weir not operational; number of pink salmon passing site based on ground survey data.

¹⁰ No ground survey done.

¹¹ Some pickets removed from weir; count estimated from ground survey data.

¹² Some pickets removed from weir, but count at weir used.

¹³ Some pickets removed from weir; no pink salmon assumed to have passed weir site.

¹⁴ Several pickets removed from weir due to high water; pink salmon count assumed to be zero.

¹⁵ Weir count estimated from ground survey data from 9/3 through 9/6.

¹⁶ Hole in weir; count estimated from ground survey data.

Appendix C.1. Prince William Sound pink salmon counts, stream 076, Irish Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | 0 | 0 |
| 06/26 | | | | | 0 | 0 |
| 06/27 | | | | 0 | 0 | 0 |
| 06/28 | 0 | 0 | 0 | | 0 | 0 |
| 06/29 | 0 | 0 | 0 | | 0 | 0 |
| 06/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/01 | 0 | 0 | 0 | | 2 | 2 |
| 07/02 | 1 | 0 | 1 | | 5 | 7 |
| 07/03 | 6 | 0 | 5 | | -2 | 5 |
| 07/04 | 6 | 0 | 0 | | 4 | 9 |
| 07/05 | 9 | 0 | 3 | 0 | 63 | 72 |
| 07/06 | 52 | 0 | 43 | | 68 | 140 |
| 07/07 | 95 | 1 | 44 | | 15 | 154 |
| 07/08 | 106 | 0 | 11 | | 68 | 222 |
| 07/09 | 79 | 1 | -26 | 72 | 205 | 426 |
| 07/10 | 215 | 6 | 142 | | -131 | 289 |
| 07/11 | 250 | 1 | 36 | | 90 | 378 |
| 07/12 | 113 | 0 | -137 | | 116 | 494 |
| 07/13 | 541 | 0 | 428 | 0 | 116 | 610 |
| 07/14 | 678 | 3 | 140 | | 146 | 753 |
| 07/15 | 767 | 2 | 91 | | 104 | 855 |
| 07/16 | 611 | 3 | -153 | | 240 | 1,092 |
| 07/17 | 216 | 2 | -393 | | 616 | 1,706 |
| 07/18 | 947 | 16 | 747 | 110 | 90 | 1,780 |
| 07/19 | 982 | 18 | 53 | | 685 | 2,447 |
| 07/20 | 1,676 | 73 | 767 | | 1,021 | 3,395 |
| 07/21 | 2,395 | 46 | 765 | | 2,028 | 5,377 |
| 07/22 | 3,233 | 63 | 901 | | 841 | 6,155 |
| 07/23 | 5,102 | 86 | 1,955 | | 119 | 6,188 |
| 07/24 | 2,998 | 57 | -2,047 | | 272 | 6,403 |
| 07/25 | 3,352 | 50 | 404 | | 952 | 7,305 |
| 07/26 | 4,816 | 106 | 1,570 | | 628 | 7,827 |
| 07/27 | 3,684 | 194 | -938 | 3,900 | 816 | 8,449 |
| 07/28 | 5,071 | 138 | 1,525 | | 829 | 9,140 |
| 07/29 | 5,238 | 229 | 396 | | 490 | 9,401 |

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Appendix C.1. (page 2 of 3)

| Date | Ground Survey | | | Weir | | |
|-------|---------------------|------------------|-------------|---------------|--------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 6,119 | 277 | 1,158 | | 4,091 | 13,215 |
| 07/31 | 6,511 | 223 | 615 | | 1,489 | 14,481 |
| 08/01 | 4,115 | 61 | -2,335 | | 673 | 15,093 |
| 08/02 | 8,642 | 202 | 4,729 | 4,400 | 36 | 14,927 |
| 08/03 | 8,226 | 185 | -231 | | 43 | 14,785 |
| 08/04 | 8,345 | 157 | 276 | | 19 | 14,647 |
| 08/05 | 7,614 | 400 | -331 | 1,650 | 2,359 | 16,606 |
| 08/06 | 10,232 | 272 | 2,890 | | 1,548 | 17,882 |
| 08/07 | 9,751 | 406 | -75 | | 559 | 18,035 |
| 08/08 | 10,957 | 499 | 1,705 | 13,300 | 1,883 | 19,419 |
| 08/09 | 11,771 | 567 | 1,381 | | 1,447 | 20,299 |
| 08/10 | 13,366 | 543 | 2,138 | | 8,139 | 27,895 |
| 08/11 | 17,189 | 333 | 4,156 | | 2,496 | 30,058 |
| 08/12 | 18,050 | 344 | 1,205 | 2,450 | 2,205 | 31,919 |
| 08/13 | 9,045 | 294 | -8,711 | | 14,252 | 45,877 |
| 08/14 | 28,699 | 1,120 | 20,774 | | 1,597 | 46,354 |
| 08/15 | 15,185 | 506 | -13,008 | 4,200 | 1,362 | 47,210 |
| 08/16 | 27,674 | 957 | 13,446 | | 1,692 | 47,945 |
| 08/17 | 28,326 ¹ | 652 ⁷ | 1,304 | | 2,031 ³ | 49,324 |
| 08/18 | 28,977 ¹ | 652 ⁷ | 1,304 | 4,400 | 2,030 ³ | 50,702 |
| 08/19 | 29,629 | 652 ⁷ | 1,304 | | 202 | 50,252 |
| 08/20 | 31,070 | 1,429 | 2,870 | 9,400 | 95 | 48,918 |
| 08/21 | 26,179 | 1,819 | -3,072 | | 93 | 47,192 |
| 08/22 | 26,342 | 2,217 | 2,380 | | 1,396 | 46,371 |
| 08/23 | 26,300 | 3,000 | 2,958 | | 1,267 | 44,638 |
| 08/24 | 28,243 | 2,396 | 4,339 | | 2,023 | 44,265 |
| 08/25 | 25,807 | 2,922 | 486 | | 5,318 | 46,661 |
| 08/26 | 30,353 | 2,408 | 6,954 | 6,100 | 2,073 | 46,326 |
| 08/27 | 23,418 | 2,946 | -3,989 | | 1,975 | 45,355 |
| 08/28 | 33,811 | 3,089 | 13,482 | | 2,463 | 44,729 |
| 08/29 | 28,352 | 3,963 | -1,496 | 7,800 | 2,751 | 43,517 |
| 08/30 | 26,949 | 3,872 | 2,469 | | 3,598 | 43,243 |
| 08/31 | 29,949 | 3,908 | 6,908 | | 559 | 39,894 |
| 09/01 | 26,867 | 5,421 | 2,339 | | 2,292 | 36,765 |
| 09/02 | 22,549 | 4,160 | -158 | 17,000 | 923 | 33,528 |
| 09/03 | 23,290 | 4,285 | 5,026 | | 1,240 | 30,483 |

- continued -

Appendix C.1. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|---------------------|--------------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 19,761 | 4,150 | 621 | | 5,640 | 31,973 |
| 09/05 | 13,861 | 3,105 | -2,795 | | 244 | 29,112 |
| 09/06 | 16,749 | 3,922 | 6,810 | | 208 | 25,398 |
| 09/07 | 14,164 | 4,432 | 1,847 | | 227 | 21,193 |
| 09/08 | 10,425 ¹ | 1,102 ⁴ | -2,638 | | 0 | 20,091 |
| 09/09 | 6,685 | 2,930 ⁵ | -810 | | 0 | 17,161 |
| 09/10 | 1,938 | 1,434 | -3,313 | | 0 | 15,727 |
| 09/11 | 1,305 | 2,752 | 2,119 | | 0 | 12,975 |
| 09/12 | 2,799 | 5,030 | 6,524 | | 0 | 7,945 |
| 09/13 | 2,092 | 3,100 | 2,393 | | 0 | 4,845 |
| 09/14 | 1,460 | 2,275 | 1,643 | | 0 | 2,570 |
| 09/15 | 506 | 781 | -173 | | 0 | 1,789 |
| 09/16 | 125 | 730 ⁴ | 349 | | 0 ⁶ | 1,059 |
| 09/17 | 202 | 427 | 504 | | | |
| 09/18 | 97 | 216 | 111 | 100 | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 94,618 | 94,715 | | 95,034 | |

Appendix C.2. (page 2 of 3)

| Date | Ground Survey | | | Weir | | |
|-------|---------------|-------------|-------------|---------------|--------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 08/06 | 26 | 0 | -10 | | 0 | 87 |
| 08/07 | 17 | 1 | -8 | | 20 | 106 |
| 08/08 | 19 | 2 | 4 | | 1 | 105 |
| 08/09 | 8 | 6 | -5 | 0 | 0 | 99 |
| 08/10 | 171 | 0 | 163 | | 230 | 329 |
| 08/11 | 212 | 0 | 41 | | 3 | 332 |
| 08/12 | 237 | 4 | 29 | 0 | 97 | 425 |
| 08/13 | 261 | 4 | 28 | | 76 | 497 |
| 08/14 | 311 | 4 | 54 | | 63 | 556 |
| 08/15 | 273 | 23 | -15 | | 197 | 730 |
| 08/16 | 674 | 8 | 409 | | 420 | 1,142 |
| 08/17 | 2,181 | 8 | 1,515 | | 1,652 | 2,786 |
| 08/18 | 2,127 | 61 | 7 | | 0 | 2,725 |
| 08/19 | 1,798 | 355 | 26 | 3,000 | 25 | 2,395 |
| 08/20 | 1,984 | 909 | 1,095 | | 442 | 1,928 |
| 08/21 | 2,016 | 133 | 165 | | 14 | 1,809 |
| 08/22 | 1,839 | 238 | 61 | 1,600 | 470 | 2,041 |
| 08/23 | 1,844 | 383 | 388 | | 74 | 1,732 |
| 08/24 | 1,491 | 317 | -36 | | 1,182 | 2,597 |
| 08/25 | 1,923 | 329 | 761 | | 222 | 2,490 |
| 08/26 | 2,204 | 512 | 793 | | 154 | 2,132 |
| 08/27 | 2,029 | 221 | 46 | | 1,044 | 2,955 |
| 08/28 | 2,272 | 205 | 448 | 1,000 | 45 | 2,795 |
| 08/29 | 2,602 | 444 | 774 | | 600 | 2,951 |
| 08/30 | 2,603 | 371 | 372 | | 272 | 2,852 |
| 08/31 | 2,189 | 427 | 13 | | 150 | 2,575 |
| 09/01 | 2,528 | 508 | 847 | | 1,049 | 3,116 |
| 09/02 | 1,360 | 432 | -736 | | 1,080 | 3,764 |
| 09/03 | 2,617 | 824 | 2,081 | | 417 | 3,357 |
| 09/04 | 2,916 | 665 | 964 | | 2,475 | 5,167 |
| 09/05 | 7,467 | 555 | 5,106 | 3,000 | 6,757 ⁹ | 8,748 |
| 09/06 | 7,707 | 855 | 1,095 | | -627 | 7,266 |
| 09/07 | 6,864 | 598 | -245 | | 0 | 6,668 |
| 09/08 | 6,071 | 1,645 | 852 | | 616 | 5,639 |
| 09/09 | 5,646 | 689 | 264 | | 0 | 4,950 |
| 09/10 | 5,511 | 965 | 830 | | 830 | 4,815 |

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Appendix C.2. Prince William Sound pink salmon counts, stream 506, Loomis Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/02 | | | | | 0 | 0 |
| 07/03 | | | | | 0 | 0 |
| 07/04 | | | | | 0 | 0 |
| 07/05 | | | | | 0 | 0 |
| 07/06 | | | | | 0 | 0 |
| 07/07 | | | | | 0 | 0 |
| 07/08 | | | | | 0 | 0 |
| 07/09 | | | | | 0 | 0 |
| 07/10 | 0 | 0 | 0 | | 0 | 0 |
| 07/11 | 0 | 0 | 0 | | 0 | 0 |
| 07/12 | 1 | 0 | 1 | | 1 | 1 |
| 07/13 | 0 ⁸ | 0 | -1 | | -1 | 0 |
| 07/14 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/15 | 0 | 0 | 0 | | 0 | 0 |
| 07/16 | 0 | 0 | 0 | | 0 | 0 |
| 07/17 | 0 | 0 | 0 | | 0 | 0 |
| 07/18 | 0 | 0 | 0 | | 0 | 0 |
| 07/19 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/20 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/21 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/22 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/23 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/24 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/25 | 0 ⁸ | 0 | 0 | 0 | 0 | 0 |
| 07/26 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/27 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/28 | 0 ⁸ | 0 | 0 | 0 | 0 | 0 |
| 07/29 | 0 ⁸ | 0 | 0 | | 0 | 0 |
| 07/30 | 1 | 0 | 1 | | 0 | 0 |
| 07/31 | 0 | 0 | -1 | | 0 | 0 |
| 08/01 | 71 | 0 | 71 | | 75 | 75 |
| 08/02 | 45 | 0 | -26 | 70 | -3 | 72 |
| 08/03 | 32 | 1 | -12 | | 0 | 71 |
| 08/04 | 35 | 0 | 3 | | 5 | 76 |
| 08/05 | 36 | 2 | 3 | | 13 | 87 |

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Appendix C.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/11 | 4,996 | 734 | 219 | | 151 | 4,232 |
| 09/12 | 4,720 | 925 | 649 | | 0 | 3,307 |
| 09/13 | 3,688 | 1,017 | -15 | | 24 | 2,314 |
| 09/14 | 1,886 | 1,348 | -454 | | 0 | 966 |
| 09/15 | 1,638 | 1,022 | 774 | | 0 | 0 |
| 09/16 | 895 | 126 | -617 | | 0 | 0 |
| 09/17 | 678 | 159 | -58 | | | |
| 09/18 | 583 | 358 | 263 | | | |
| 09/19 | 375 | 137 | -71 | | | |
| 09/20 | 298 | 186 | 109 | | | |
| 09/21 | 167 | 88 | -43 | | | |
| 09/22 | 108 | 27 | -32 | | | |
| 09/23 | 84 | 26 | 2 | | | |
| 09/24 | 58 | 12 | -14 | | | |
| 09/25 | 34 | 20 | -4 | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>18,889</u> | <u>18,923</u> | | <u>20,315</u> | |

Appendix C.3. Prince William Sound pink salmon counts, stream 621, Totemoff Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|-----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/26 | | | | | 0 | 0 |
| 06/27 | | | | | 0 | 0 |
| 06/28 | 0 | 0 | 0 | | 0 | 0 |
| 06/29 | 0 | 0 | 0 | | 0 | 0 |
| 06/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/01 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/02 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/03 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/04 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/05 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/06 | 0 | 0 | 0 | | 0 | 0 |
| 07/07 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/08 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/09 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/10 | 0 | 0 | 0 | | 0 | 0 |
| 07/11 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/12 | 0 | 0 | 0 | | 0 | 0 |
| 07/13 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/14 | 0 | 0 | 0 | | 0 | 0 |
| 07/15 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/16 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/17 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/18 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/19 | 0 ¹⁰ | 0 | 0 | 50 | 0 | 0 |
| 07/20 | 0 ¹⁰ | 0 | 0 | | 0 | 0 |
| 07/21 | 0 ¹⁰ | 0 | 0 | | 2 | 2 |
| 07/22 | 0 | 0 | 0 | | 3 | 5 |
| 07/23 | 130 | 0 | 130 | | 308 | 313 |
| 07/24 | 267 | 0 | 137 | | 8 | 321 |
| 07/25 | 420 | 0 | 153 | 160 | 5 | 326 |
| 07/26 | 347 | 0 | -73 | | 6 | 332 |
| 07/27 | 484 | 0 | 137 | | 3 | 335 |
| 07/28 | 694 | 0 | 210 | 100 | 83 | 418 |
| 07/29 | 874 | 0 | 180 | | 385 | 803 |
| 07/30 | 1,317 | 2 | 445 | | 383 | 1,184 |

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Appendix C.3. (page 2 of 3)

| Date | Ground Survey | | | Weir | | |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/31 | 1,911 | 2 | 596 | | 1,200 | 2,382 |
| 08/01 | 1,892 | 2 | -17 | | 540 | 2,920 |
| 08/02 | 3,735 | 6 | 1,849 | | 263 | 3,177 |
| 08/03 | 4,008 | 26 | 299 | | 0 | 3,151 |
| 08/04 | 4,972 | 28 | 992 | 225 | 6 | 3,129 |
| 08/05 | 3,777 | 33 | -1,162 | | 59 | 3,155 |
| 08/06 | 4,850 | 43 | 1,116 | | 0 | 3,112 |
| 08/07 | 5,294 | 54 | 498 | | 0 | 3,058 |
| 08/08 | 5,389 | 64 | 159 | | 107 | 3,101 |
| 08/09 | 5,395 | 81 | 87 | 2,000 | 498 | 3,518 |
| 08/10 | 5,301 | 66 | -28 | | 2,589 | 6,041 |
| 08/11 | 7,553 | 102 | 2,354 | | 923 | 6,862 |
| 08/12 | 6,777 | 214 | -562 | | 126 | 6,774 |
| 08/13 | 6,433 | 244 | -100 | | 655 | 7,185 |
| 08/14 | 6,743 | 246 | 556 | 1,200 | 199 | 7,138 |
| 08/15 | 7,847 | 416 | 1,520 | | 878 | 7,600 |
| 08/16 | 6,555 | 369 | -923 | | 346 | 7,577 |
| 08/17 | 4,630 | 532 | -1,393 | | 1,084 | 8,129 |
| 08/18 | 9,204 | 378 | 4,952 | | 506 | 8,257 |
| 08/19 | 11,173 | 785 | 2,754 | 9,500 | 106 | 7,578 |
| 08/20 | 10,757 | 808 | 392 | | 174 | 6,944 |
| 08/21 | 15,327 | 1,037 | 5,607 | | 723 | 6,630 |
| 08/22 | 10,807 | 926 | -3,594 | 3,300 | 568 | 6,272 |
| 08/23 | 11,135 | 1,289 | 1,617 | | 473 | 5,456 |
| 08/24 | 7,829 | 1,139 | -2,167 | | 1,316 | 5,633 |
| 08/25 | 13,245 | 763 | 6,179 | | 4,282 | 9,152 |
| 08/26 | 10,506 | 1,498 | -1,241 | | 419 | 8,073 |
| 08/27 | 11,693 | 1,210 | 2,397 | | 1,204 | 8,067 |
| 08/28 | 17,932 | 1,236 | 7,475 | 5,400 | 402 | 7,233 |
| 08/29 | 10,795 | 1,042 | -6,095 | | 1,218 | 7,409 |
| 08/30 | 13,046 | 1,651 | 3,902 | | 623 | 6,381 |
| 08/31 | 16,078 | 2,123 | 5,155 | | 1,005 | 5,263 |
| 09/01 | 9,174 | 1,590 | -5,314 | | 505 | 4,178 |
| 09/02 | 10,724 | 2,159 | 3,709 | | 1,080 | 3,099 |
| 09/03 | 14,782 | 2,263 | 6,321 | | 774 | 1,610 |
| 09/04 | 5,283 | 1,581 | -7,918 | | 1,188 | 1,217 |

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| Date | Ground Survey | | | Weir | | Total Live |
|--------------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 09/05 | 7,083 | 1,739 | 3,539 | 300 | 0 | 0 |
| 09/06 | 7,145 | 2,045 | 2,107 | | 0 | 0 |
| 09/07 | 4,288 | 1,085 | -1,772 | | 109 | 0 |
| 09/08 | 2,347 | 1,122 | -819 | | 0 | 0 |
| 09/09 | 2,977 | 1,169 | 1,799 | | 8 | 0 |
| 09/10 | 1,497 | 580 | -900 | | 0 | 0 |
| 09/11 | 2,111 | 836 | 1,450 | | 0 | 0 |
| 09/12 | 1,620 | 731 | 240 | | 8 | 0 |
| 09/13 | 1,305 | 721 | 406 | | 0 | 0 |
| 09/14 | 497 | 444 | -364 | | 0 | 0 |
| 09/15 | 227 | 486 | 216 | | 0 | 0 |
| 09/16 | 136 | 221 | 130 | | 0 | 0 |
| 09/17 | 117 | 261 | 242 | | 0 | 0 |
| 09/18 | 79 | 124 | 86 | | 0 | 0 |
| 09/19 | 34 | 42 | -3 | | 0 | 0 |
| 09/20 | 18 | 19 | 3 | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 37,633 | 37,651 | | 27,350 | |

Appendix C.4. Prince William Sound pink salmon counts, stream 628, Chenega Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|--------------------|-----------------|----------------|------------------|---------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/17 | 0 | 0 | 0 | | | |
| 07/18 | 0 | 0 | 0 | | | |
| 07/19 | 0 | 0 | 0 | | | |
| 07/20 | 0 | 0 | 0 | | | |
| 07/21 | 0 | 0 | 0 | | | |
| 07/22 | 1 ¹ | 0 | 1 | | | |
| 07/23 | 1 ¹ | 0 | 0 | | | |
| 07/24 | 1 ¹ | 0 | 0 | | | |
| 07/25 | 2 | 0 | 1 | | | |
| 07/26 | 8 ¹ | 0 | 6 | | | |
| 07/27 | 8 ¹ | 0 | 0 | | 22 | 22 |
| 07/28 | 8 ¹ | 0 | 0 | | 0 | 22 |
| 07/29 | 14 | 0 | 6 | | 1 | 23 |
| 07/30 | 11 | 0 | -3 | | 6 | 29 |
| 07/31 | 10 | 0 | -1 | | 167 | 196 |
| 08/01 | 116 | 1 | 107 | | 67 | 262 |
| 08/02 | 163 | 1 | 48 | | 67 | 328 |
| 08/03 | 118 | 0 | -45 | | 13 | 341 |
| 08/04 | 251 | 1 | 134 | 50 | 81 | 421 |
| 08/05 | 166 | 4 | -81 | | 178 | 595 |
| 08/06 | 407 | 7 | 248 | | 21 | 609 |
| 08/07 | 437 | 8 | 38 | | 35 | 636 |
| 08/08 | 416 | 4 | -17 | | 35 | 667 |
| 08/09 | 634 | 15 | 233 | | 220 | 872 |
| 08/10 | 1,252 | 16 | 634 | | 1,058 ¹¹ | 1,490 |
| 08/11 | 1,430 | 20 | 198 | | 320 ¹² | 1,789 |
| 08/12 | 1,488 | 17 | 75 | | 228 | 2,000 |
| 08/13 | 1,561 | 25 | 98 | | 1,796 | 3,771 |
| 08/14 | 3,498 | 36 | 1,973 | 690 | 1,710 | 5,445 |
| 08/15 | 4,377 | 113 | 992 | | 1,513 | 6,845 |
| 08/16 | 4,364 ¹ | 89 ² | 76 | | 1,130 | 7,886 |
| 08/17 | 4,350 | 89 | 76 | | 1,878 | 9,675 |
| 08/18 | 6,717 | 222 | 2,589 | | 1,758 | 11,211 |
| 08/19 | 7,557 | 310 | 1,150 | 6,000 | 1,309 | 12,210 |
| 08/20 | 8,231 | 558 | 1,232 | | 1,076 | 12,728 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|---------------------|----------------|----------------|------------------|----------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 08/21 | 8,408 | 653 | 830 | | 239 | 12,314 |
| 08/22 | 9,471 | 864 | 1,927 | | 639 | 12,089 |
| 08/23 | 9,127 | 809 | 465 | | 469 | 11,749 |
| 08/24 | 8,058 | 1,037 | -32 | | 2,592 | 13,304 |
| 08/25 | 12,295 | 782 | 5,019 | | 2,605 | 15,127 |
| 08/26 | 12,545 | 1,010 | 1,260 | | 1,687 | 15,804 |
| 08/27 | 16,488 | 969 | 4,912 | | 3,002 | 17,837 |
| 08/28 | 13,465 | 1,081 | -1,942 | 7,200 | 2,193 | 18,949 |
| 08/29 | 13,316 | 1,383 | 1,234 | | 2,304 | 19,870 |
| 08/30 | 14,844 | 1,066 | 2,594 | | 1,833 | 20,637 |
| 08/31 | 15,570 | 1,760 | 2,486 | | 2,141 | 21,018 |
| 09/01 | 17,464 | 1,823 | 3,717 | | 890 | 20,085 |
| 09/02 | 14,829 | 1,883 | -752 | | 1,096 | 19,298 |
| 09/03 | 14,967 | 2,305 | 2,443 | | 5,200 | 22,193 |
| 09/04 | 15,248 | 1,841 | 2,122 | | 2,315 ¹¹ | 22,474 |
| 09/05 | 18,218 | 1,824 | 4,794 | 3,500 | 6,831 ¹¹ | 25,444 |
| 09/06 | 14,853 | 3,183 | -182 | | 190 | 22,451 |
| 09/07 | 17,782 | 3,615 | 6,544 | | 113 | 18,949 |
| 09/08 | 14,155 ¹ | 2,402 | -1,225 | | 145 | 16,692 |
| 09/09 | 10,528 | 3,164 | -463 | | 0 | 13,528 |
| 09/10 | 7,645 | 3,006 | 123 | | 0 | 10,522 |
| 09/11 | 8,560 | 2,958 | 3,873 | | 0 | 7,564 |
| 09/12 | 6,136 | 2,736 | 312 | | 0 | 4,828 |
| 09/13 | 5,891 | 2,191 | 1,946 | | 135 | 2,772 |
| 09/14 | 4,430 ¹ | 1,259 | -202 | | -1,204 ¹⁴ | 1,513 |
| 09/15 | 2,969 | 1,157 | -304 | | 0 | 356 |
| 09/16 | 2,347 ¹ | 714 | 92 | | -335 ¹¹ | 0 |
| 09/17 | 1,725 | 851 | 229 | | 0 | 0 |
| 09/18 | 1,406 | 652 | 333 | | 0 | 0 |
| 09/19 | 888 | 580 | 62 | | 0 | 0 |
| 09/20 | 676 | 484 | 272 | | 0 | 0 |
| 09/21 | 461 | 212 | -3 | | 0 | 0 |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| TOTAL | | 51,790 | 52,251 | | 49,769 | |

Appendix C.5. Prince William Sound pink salmon counts, stream 637, Point Countess Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/19 | | | | 0 | 0 | 0 |
| 07/20 | | | | | 0 | 0 |
| 07/21 | 0 | 0 | 0 | | 0 | 0 |
| 07/22 | 0 | 0 | 0 | | 0 | 0 |
| 07/23 | 0 | 0 | 0 | | 0 | 0 |
| 07/24 | 0 | 0 | 0 | | 0 | 0 |
| 07/25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | | 0 | 0 |
| 07/27 | 0 | 0 | 0 | | 0 | 0 |
| 07/28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/29 | 7 | 0 | 7 | | 7 | 7 |
| 07/30 | 20 | 0 | 13 | | 22 | 29 |
| 07/31 | 6 | 0 | -14 | | 135 | 164 |
| 08/01 | 157 | 0 | 151 | | 17 | 181 |
| 08/02 | 145 | 0 | -12 | | -4 | 177 |
| 08/03 | 100 | 0 | -45 | | 5 | 182 |
| 08/04 | 244 | 1 | 145 | 250 | 7 | 188 |
| 08/05 | 95 | 2 | -147 | | 0 | 186 |
| 08/06 | 36 | 0 | -59 | | 0 | 186 |
| 08/07 | 137 | 6 | 107 | | 112 | 292 |
| 08/08 | 78 | 0 | -59 | | -22 | 270 |
| 08/09 | 86 | 7 | 15 | 0 | -3 | 260 |
| 08/10 | 169 | 3 | 86 | | 865 | 1,122 |
| 08/11 | 861 | 9 | 701 | | 24 | 1,137 |
| 08/12 | 1,033 | 6 | 178 | | 59 | 1,190 |
| 08/13 | 1,178 | 52 | 197 | | 960 | 2,098 |
| 08/14 | 1,535 | 5 | 362 | 560 | -43 | 2,050 |
| 08/15 | 1,687 | 47 | 199 | | 0 | 2,003 |
| 08/16 | 2,159 | 97 | 569 | | 790 | 2,696 |
| 08/17 | 3,602 | 52 | 1,495 | | 652 | 3,296 |
| 08/18 | 2,840 | 100 | -662 | | -19 | 3,177 |
| 08/19 | 2,839 | 156 | 155 | 5,400 | -1 | 3,020 |
| 08/20 | 2,201 | 568 | -70 | | 331 | 2,783 |
| 08/21 | 2,599 | 148 | 546 | | 285 | 2,920 |

- continued -

Appendix C.5. (page 2 of 2)

| Date | Ground Survey | | | Weir | | Total Live |
|--------------|---------------|-------------|-------------|---------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 08/22 | 1,815 | 280 | -504 | 1,200 | 166 | 2,806 |
| 08/23 | 2,146 | 608 | 939 | | 284 | 2,482 |
| 08/24 | 1,821 | 305 | -20 | | 2,490 | 4,667 |
| 08/25 | 4,269 | 351 | 2,799 | | 1,345 | 5,661 |
| 08/26 | 4,476 | 320 | 527 | | 19 | 5,360 |
| 08/27 | 3,941 | 169 | -366 | | 683 | 5,874 |
| 08/28 | 3,237 | 592 | -112 | 2,750 | 327 | 5,609 |
| 08/29 | 4,111 | 337 | 1,211 | | -19 | 5,253 |
| 08/30 | 3,570 | 508 | -33 | | 5 | 4,750 |
| 08/31 | 3,867 | 388 | 685 | | 50 | 4,412 |
| 09/01 | 2,965 | 281 | -621 | | 482 | 4,613 |
| 09/02 | 2,578 | 786 | 399 | | 520 | 4,347 |
| 09/03 | 5,494 | 554 | 3,470 | | 3,006 | 6,799 |
| 09/04 | 4,145 | 539 | -810 | | 1,069 | 7,329 |
| 09/05 | 3,501 | 860 | 216 | 1,200 | 189 | 6,658 |
| 09/06 | 4,168 | 592 | 1,259 | | 46 | 6,112 |
| 09/07 | 2,920 | 244 | -1,004 | | 114 | 5,982 |
| 09/08 | 2,095 | 819 | -6 | | 49 | 5,212 |
| 09/09 | 3,396 | 334 | 1,635 | | 19 | 4,897 |
| 09/10 | 1,870 | 241 | -1,285 | | 0 ¹⁴ | 4,656 |
| 09/11 | 2,150 | 798 | 1,078 | | 0 | 3,858 |
| 09/12 | 1,600 | 1,048 | 498 | | 0 | 2,810 |
| 09/13 | 865 | 448 | -287 | | 0 | 2,362 |
| 09/14 | 431 | 701 | 267 | | 5 | 1,666 |
| 09/15 | 510 | 299 | 378 | | 0 | 1,367 |
| 09/16 | 376 | 196 | 62 | | 0 | 1,171 |
| 09/17 | 348 | 69 | 41 | | | |
| 09/18 | 193 | 111 | -44 | | | |
| 09/19 | 121 | 97 | 25 | | | |
| 09/20 | 163 | 38 | 80 | | | |
| 09/21 | | | -163 | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| TOTAL | | 14,172 | 14,172 | | 15,028 | |

Appendix C.6. Prince William Sound pink salmon counts, stream 666, O'Brien Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | | | |
| 07/17 | | | | | | |
| 07/18 | | | | | | |
| 07/19 | | | | | 0 | |
| 07/20 | | | | | | |
| 07/21 | 0 | 0 | 0 | | | |
| 07/22 | 0 | 0 | 0 | | | |
| 07/23 | 2 | 0 | 2 | | 1 | 1 |
| 07/24 | 2 | 0 | 0 | | 1 | 2 |
| 07/25 | 0 | 0 | -2 | 0 | 0 | 2 |
| 07/26 | 0 | 0 | 0 | | 0 | 2 |
| 07/27 | 0 | 0 | 0 | | 0 | 2 |
| 07/28 | 0 ⁸ | 0 | 0 | 0 | 3 | 5 |
| 07/29 | 3 | 1 | 4 | | -1 | 3 |

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| Date | Ground Survey | | | Weir | | |
|-------|--------------------|-------------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 2 | 0 | -1 | | 24 | 27 |
| 07/31 | 35 | 0 | 33 | | 30 | 57 |
| 08/01 | 68 | 0 | 33 | | 29 | 86 |
| 08/02 | 90 | 0 | 22 | 60 | 21 | 107 |
| 08/03 | 76 | 2 | -12 | | 80 | 185 |
| 08/04 | 93 | 0 | 17 | 110 | 18 | 203 |
| 08/05 | 104 | 1 | 12 | | 0 | 202 |
| 08/06 | 90 | 1 | -13 | | 36 | 237 |
| 08/07 | 85 | 1 | -4 | | 11 | 247 |
| 08/08 | 43 | 3 | -39 | | 3 | 247 |
| 08/09 | 41 | 1 | -1 | 10 | 0 | 246 |
| 08/10 | 196 | 3 | 158 | | 264 | 507 |
| 08/11 | 164 | 5 | -27 | | 8 | 510 |
| 08/12 | 204 | 3 | 43 | | 54 | 561 |
| 08/13 | 499 | 4 | 299 | | 273 | 830 |
| 08/14 | 676 | 4 | 181 | 170 | 13 | 839 |
| 08/15 | 761 | 19 | 104 | | 57 | 877 |
| 08/16 | 880 | 15 | 134 | | 460 | 1,322 |
| 08/17 | 2,243 | 22 | 1,385 | | 940 | 2,240 |
| 08/18 | 1,951 | 55 | -237 | | 16 | 2,201 |
| 08/19 | 1,597 | 96 | -258 | 2,800 | 81 | 2,186 |
| 08/20 | 1,795 | 101 | 299 | | 673 | 2,758 |
| 08/21 | 1,680 | 69 | -46 | | 113 | 2,802 |
| 08/22 | 1,509 | 139 | -32 | 1,550 | 19 | 2,682 |
| 08/23 | 1,740 | 186 | 417 | | 194 | 2,690 |
| 08/24 | 1,570 | 156 | -14 | | 67 | 2,601 |
| 08/25 | 3,655 ¹ | 261 ¹³ | 2,346 | | 673 | 3,013 |
| 08/26 | 5,739 | 261 | 2,346 | | 2,733 | 5,485 |
| 08/27 | 5,529 | 320 | 110 | | 1,958 | 7,123 |
| 08/28 | 6,123 | 395 | 989 | 4,400 | 83 | 6,811 |
| 08/29 | 5,329 ¹ | 500 ¹³ | -295 | | 76 | 6,387 |
| 08/30 | 4,534 | 500 | -295 | | 20 | 5,907 |
| 08/31 | 5,509 | 706 | 1,681 | | 2,086 | 7,287 |
| 09/01 | 3,912 | 516 ¹³ | -1,081 | | 1,937 | 8,708 |
| 09/02 | 6,421 | 516 | 3,025 | | 605 | 8,796 |
| 09/03 | 4,763 | 516 | -1,142 | | 375 | 8,655 |

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Appendix C.6. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|---------------------|-----------------|----------------|------------------|---------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 7,993 ¹ | 681 | 3,911 | | 5,176 ¹⁵ | 13,668 |
| 09/05 | 11,222 ¹ | 303 | 3,533 | 5,100 | 4,799 ¹⁵ | 19,058 |
| 09/06 | 14,452 | 714 | 3,944 | | 237 | 18,581 |
| 09/07 | 13,004 ¹ | 3,750 | 2,302 | | 330 | 15,161 |
| 09/08 | 11,555 ¹ | 1,715 | 267 | | 216 | 13,662 |
| 09/09 | 10,107 ¹ | 2,099 | 651 | | 370 | 11,933 |
| 09/10 | 8,658 ¹ | 2,378 | 930 | | 235 | 9,790 |
| 09/11 | 7,210 ¹ | 246 | -1,203 | | 108 | 9,652 |
| 09/12 | 5,761 | 535 | -914 | | 80 | 9,197 |
| 09/13 | 4,757 ¹ | 3,373 | 2,369 | | 131 | 5,955 |
| 09/14 | 3,752 ¹ | 3,741 | 2,737 | | 8 | 2,222 |
| 09/15 | 2,748 | 1,408 | 404 | | 0 | 814 |
| 09/16 | 2,250 | 333 | -165 | | 0 | 481 |
| 09/17 | 1,752 | 1,038 | 540 | | 1 | 0 |
| 09/18 | 1,415 | 982 | 645 | | 12 | 0 |
| 09/19 | 1,078 | 1,208 | 871 | | 12 | 0 |
| 09/20 | 770 | 2,521 | 2,213 | | 11 | 0 |
| 09/21 | 561 | 453 | 244 | | 2 | 0 |
| 09/22 | 325 ¹ | 108 | -128 | | | |
| 09/23 | 89 | 48 | -188 | | | |
| 09/24 | 115 ¹ | 17 | 43 | | | |
| 09/25 | 141 | 17 | 43 | | | |
| 09/26 | 99 ¹ | 73 | 31 | | | |
| 09/27 | 58 ¹ | 7 ¹³ | -35 | | | |
| 09/28 | 16 | 7 | -35 | | | |
| TOTAL | | <u>33,133</u> | <u>33,149</u> | | <u>25,762</u> | |

Appendix C.7. Prince William Sound pink salmon counts, stream 677, Hayden Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | | | |
| 07/17 | | | | | | |
| 07/18 | | | | | | |
| 07/19 | | | | 0 | | |
| 07/20 | 0 | 0 | 0 | | 0 | 0 |
| 07/21 | 0 | 0 | 0 | | 0 | 0 |
| 07/22 | 0 | 0 | 0 | | 0 | 0 |
| 07/23 | 0 | 0 | 0 | | 0 | 0 |
| 07/24 | 0 | 0 | 0 | | 0 | 0 |
| 07/25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | | 0 | 0 |
| 07/27 | 0 | 0 | 0 | | 0 | 0 |
| 07/28 | 0 | 0 | 0 | | 0 | 0 |
| 07/29 | 1 | 0 | 1 | | 1 | 1 |

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| Date | Ground Survey | | | Weir | | |
|-------|------------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 5 | 0 | 4 | | 4 | 5 |
| 07/31 | 17 | 0 | 12 | | 123 | 128 |
| 08/01 | 100 | 0 | 83 | | 2 | 130 |
| 08/02 | 154 ¹ | 1 | 55 | 40 | 5 | 134 |
| 08/03 | 207 | 1 | 55 | | 43 | 176 |
| 08/04 | 183 | 9 | -15 | 75 | 23 | 190 |
| 08/05 | 191 | 6 | 14 | | 106 | 290 |
| 08/06 | 220 | 7 | 36 | | -2 | 281 |
| 08/07 | 225 | 11 | 16 | | 64 | 334 |
| 08/08 | 365 | 9 | 149 | | 165 | 490 |
| 08/09 | 337 | 13 | -15 | 0 | 296 | 773 |
| 08/10 | 509 | 6 | 178 | | 261 | 1,028 |
| 08/11 | 755 | 14 | 260 | | 196 | 1,210 |
| 08/12 | 788 | 9 | 42 | | 192 | 1,393 |
| 08/13 | 1,059 | 30 | 301 | | 426 | 1,789 |
| 08/14 | 1,063 | 51 | 55 | 180 | 108 | 1,846 |
| 08/15 | 1,084 | 65 | 86 | | 145 | 1,926 |
| 08/16 | 1,282 | 53 | 251 | | 583 | 2,456 |
| 08/17 | 2,290 | 37 | 1,045 | | 642 | 3,061 |
| 08/18 | 2,290 | 100 | 100 | | 275 | 3,236 |
| 08/19 | 2,341 | 163 | 214 | 5,000 | 258 | 3,331 |
| 08/20 | 2,445 | 238 | 342 | | 208 | 3,301 |
| 08/21 | 2,953 | 230 | 738 | | 949 | 4,020 |
| 08/22 | 3,517 | 181 | 745 | 1,720 | 1,006 | 4,845 |
| 08/23 | 3,060 | 147 | -310 | | 191 | 4,889 |
| 08/24 | 2,918 | 421 | 279 | | 1,008 | 5,476 |
| 08/25 | 4,839 | 305 | 2,226 | | 708 | 5,879 |
| 08/26 | 4,348 | 222 | -269 | | 45 | 5,702 |
| 08/27 | 5,815 | 340 | 1,807 | | 818 | 6,180 |
| 08/28 | 4,326 | 355 | -1,134 | 5,000 | 1,865 | 7,690 |
| 08/29 | 5,685 | 365 | 1,724 | | 380 | 7,705 |
| 08/30 | 4,389 | 680 | -616 | | 2,002 | 9,027 |
| 08/31 | 3,829 | 378 | -182 | | 789 | 9,438 |
| 09/01 | 5,221 | 976 | 2,368 | | -15 | 8,447 |
| 09/02 | 7,679 | 817 | 3,275 | | 124 | 7,754 |
| 09/03 | 4,664 | 720 | -2,295 | | 1,314 | 8,348 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 3,327 | 1,252 | -85 | | 25 | 7,121 |
| 09/05 | 3,386 | 769 | 828 | 1,000 | 572 | 6,924 |
| 09/06 | 3,039 | 720 | 373 | | 994 | 7,198 |
| 09/07 | 2,756 | 129 | -154 | | 251 | 7,320 |
| 09/08 | 1,513 | 1,131 | -112 | | 0 | 6,189 |
| 09/09 | 1,111 | 395 | -7 | | 186 | 5,980 |
| 09/10 | 1,052 | 902 | 843 | | 339 | 5,417 |
| 09/11 | 1,374 | 501 | 823 | | 344 | 5,260 |
| 09/12 | 1,383 | 475 | 484 | | 121 | 4,906 |
| 09/13 | 1,196 | 481 | 294 | | 145 | 4,570 |
| 09/14 | 635 | 839 | 278 | | -4 | 3,727 |
| 09/15 | 618 | 442 | 425 | | 16 | 3,301 |
| 09/16 | 475 | 313 | 170 | | 12 | 3,000 |
| 09/17 | 446 | 120 | 91 | | 17 | 2,897 |
| 09/18 | 577 | 255 | 386 | | 13 | 2,655 |
| 09/19 | 410 | 161 | -6 | | 9 | 2,503 |
| 09/20 | 382 | 176 | 148 | | 11 | 2,338 |
| 09/21 | 169 | 137 | -76 | | 0 | 2,201 |
| 09/22 | 206 | 79 | 116 | | 13 | 2,135 |
| 09/23 | 109 | 28 | -69 | | 0 | 2,107 |
| 09/24 | 91 | 23 | 5 | | 0 | 2,084 |
| 09/25 | 64 | 81 | 54 | | 0 | 2,003 |
| 09/26 | 15 | 33 | -16 | | | |
| 09/27 | 8 | 1 | -6 | | | |
| 09/28 | | | | | | |
| TOTAL | | 16,403 | 16,411 | | 18,372 | |

Appendix C.8. Prince William Sound pink salmon counts, stream 692, Herring Creek, 1991.

| Date | Ground Survey | | | Weir | | Total Live |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | | 0 | 0 |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 0 | 0 |
| 07/19 | | | | 0 | 0 | 0 |
| 07/20 | | | | | 0 | 0 |
| 07/21 | | | | | 0 | 0 |
| 07/22 | | | | | 0 | 0 |
| 07/23 | | | | | 0 | 0 |
| 07/24 | | | | | 0 | 0 |
| 07/25 | | | | 0 | 0 | 0 |
| 07/26 | | | | | 0 | 0 |
| 07/27 | | | | | 0 | 0 |
| 07/28 | | | | | 0 | 0 |
| 07/29 | | | | | 0 | 0 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/31 | 0 | 0 | 0 | | 0 | 0 |
| 08/01 | 0 | 0 | 0 | | 0 | 0 |
| 08/02 | 0 | 0 | 0 | 160 | 0 | 0 |
| 08/03 | 0 | 0 | 0 | | 0 | 0 |
| 08/04 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08/05 | 0 | 0 | 0 | | 3 | 3 |
| 08/06 | 3 | 0 | 3 | | 2 | 5 |
| 08/07 | 3 | 0 | 0 | | 0 | 5 |
| 08/08 | 4 | 0 | 1 | | 0 | 5 |
| 08/09 | 3 | 0 | -1 | 0 | 2 | 7 |
| 08/10 | 1 | 0 | -2 | | 14 | 21 |
| 08/11 | 5 | 0 | 4 | | 23 | 44 |
| 08/12 | 15 | 4 | 14 | | 8 | 48 |
| 08/13 | 84 | 2 | 71 | | 115 | 161 |
| 08/14 | 97 | 2 | 15 | 120 | 133 | 292 |
| 08/15 | 151 | 6 | 60 | | 0 | 286 |
| 08/16 | 163 | 0 | 12 | | 1,046 | 1,332 |
| 08/17 | 1,249 | 4 | 1,090 | | 266 | 1,594 |
| 08/18 | 1,136 | 8 | -105 | | 366 | 1,952 |
| 08/19 | 1,570 | 7 | 441 | 4,500 | 263 | 2,208 |
| 08/20 | 1,731 | 18 | 179 | | 867 | 3,057 |
| 08/21 | 2,463 | 19 | 751 | | 1,136 | 4,174 |
| 08/22 | 3,159 | 43 | 739 | 1,700 | 91 | 4,222 |
| 08/23 | 3,387 | 48 | 276 | | 38 | 4,212 |
| 08/24 | 3,736 | 134 | 483 | | 2,186 | 6,264 |
| 08/25 | 6,816 | 81 | 3,161 | | 730 | 6,913 |
| 08/26 | 6,700 | 133 | 17 | | 657 | 7,437 |
| 08/27 | 8,405 | 253 | 1,958 | | 2,200 | 9,384 |
| 08/28 | 9,672 | 315 | 1,582 | 2,500 | 782 | 9,851 |
| 08/29 | 9,312 | 408 | 48 | | 0 | 9,443 |
| 08/30 | 9,738 | 326 | 752 | | 909 | 10,026 |
| 08/31 | 9,223 | 505 | -10 | | 1,604 | 11,125 |
| 09/01 | 11,097 | 516 | 2,390 | | 522 | 11,131 |
| 09/02 | 7,606 | 1,583 | -1,908 | | 226 | 9,774 |
| 09/03 | 9,314 | 921 | 2,629 | | 2,038 | 10,891 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|--------------------|----------------|----------------|------------------|----------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 5,693 | 917 | -2,704 | | -3,175 ¹⁶ | 10,910 |
| 09/05 | 6,160 ¹ | 365 | 832 | 2,800 | 2 | 10,547 |
| 09/06 | 6,627 | 1,737 | 2,204 | | 0 | 8,810 |
| 09/07 | 5,339 | 1,065 | -223 | | 0 | 7,745 |
| 09/08 | 4,806 | 883 | 350 | | 0 | 6,862 |
| 09/09 | 3,631 | 630 | -545 | | 71 | 6,303 |
| 09/10 | 2,355 | 462 | -814 | | 17 | 5,858 |
| 09/11 | 2,107 | 492 | 244 | | 0 | 5,366 |
| 09/12 | 1,486 | 452 | -169 | | 0 | 4,914 |
| 09/13 | 1,069 | 180 | -237 | | 0 | 4,734 |
| 09/14 | 797 ¹ | 201 | -72 | | -107 ¹ | 4,608 |
| 09/15 | 524 | 408 | 136 | | 0 | 4,200 |
| 09/16 | 435 ¹ | 88 | -1 | | -13 ¹ | 4,105 |
| 09/17 | 346 | 102 | 13 | | 0 | 4,003 |
| 09/18 | 193 | 117 | -36 | | 0 | 3,886 |
| 09/19 | 131 | 139 | 77 | | 0 | 3,747 |
| 09/20 | 67 | 73 | 9 | | 0 | 3,674 |
| 09/21 | 33 | 36 | 2 | | 0 | 3,638 |
| 09/22 | 17 | 8 | -8 | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>13,691</u> | <u>13,708</u> | | <u>13,022</u> | |

Appendix C.9. Prince William Sound pink salmon counts, stream 699, Cathead Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | 0 | 0 | 0 | | 0 | 0 |
| 06/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/01 | 0 | 0 | 0 | | 0 | 0 |
| 07/02 | 0 | 0 | 0 | | 0 | 0 |
| 07/03 | 0 | 0 | 0 | | 0 | 0 |
| 07/04 | 0 | 0 | 0 | | 0 | 0 |
| 07/05 | 0 | 0 | 0 | | 0 | 0 |
| 07/06 | 0 | 0 | 0 | | 0 | 0 |
| 07/07 | 0 | 0 | 0 | | 0 | 0 |
| 07/08 | 0 | 0 | 0 | | 0 | 0 |
| 07/09 | 0 | 0 | 0 | | 0 | 0 |
| 07/10 | 0 | 0 | 0 | | 0 | 0 |
| 07/11 | 0 | 0 | 0 | | 0 | 0 |
| 07/12 | 0 | 0 | 0 | | 0 | 0 |
| 07/13 | 0 | 0 | 0 | | 0 | 0 |
| 07/14 | 0 | 0 | 0 | | 0 | 0 |
| 07/15 | 0 | 0 | 0 | | 0 | 0 |
| 07/16 | 0 | 0 | 0 | | 0 | 0 |
| 07/17 | 0 | 0 | 0 | | 0 | 0 |
| 07/18 | 0 | 0 | 0 | | 0 | 0 |
| 07/19 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | | 0 | 0 |
| 07/21 | 0 | 0 | 0 | | 0 | 0 |
| 07/22 | 0 | 0 | 0 | | 0 | 0 |
| 07/23 | 0 | 0 | 0 | | 0 | 0 |
| 07/24 | 0 | 0 | 0 | | 0 | 0 |
| 07/25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | | 0 | 0 |
| 07/27 | 0 | 0 | 0 | | 0 | 0 |
| 07/28 | 0 | 0 | 0 | | 0 | 0 |
| 07/29 | 0 | 0 | 0 | | 0 | 0 |

- continued -

Appendix C.9. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/31 | 0 | 0 | 0 | | 3 | 3 |
| 08/01 | 2 | 0 | 2 | | 2 | 5 |
| 08/02 | 2 | 0 | 0 | 0 | -3 | 2 |
| 08/03 | 1 | 0 | -1 | | 0 | 2 |
| 08/04 | 2 | 0 | 1 | 1 | 5 | 7 |
| 08/05 | 5 | 0 | 3 | | 0 | 7 |
| 08/06 | 12 | 0 | 7 | | 8 | 14 |
| 08/07 | 13 | 0 | 1 | | 18 | 14 |
| 08/08 | 0 | 4 | -9 | | 0 | 10 |
| 08/09 | 0 | 0 | 0 | 0 | 0 | 10 |
| 08/10 | 0 | 0 | 0 | | 0 | 10 |
| 08/11 | 0 | 0 | 0 | | 8 | 18 |
| 08/12 | 10 | 0 | 10 | | 2 | 20 |
| 08/13 | 34 | 1 | 25 | | 27 | 46 |
| 08/14 | 29 | 0 | -5 | 0 | 6 | 52 |
| 08/15 | 53 | 1 | 25 | | 28 | 79 |
| 08/16 | 6 | 0 | -47 | | 0 | 79 |
| 08/17 | 328 | 0 | 322 | | 274 | 353 |
| 08/18 | 295 | 0 | -33 | | 0 | 353 |
| 08/19 | 280 | 2 | -13 | 200 | 50 | 401 |
| 08/20 | 692 | 6 | 418 | | 626 | 1,021 |
| 08/21 | 1,001 | 30 | 339 | | 176 | 1,167 |
| 08/22 | 960 | 22 | -19 | 700 | 424 | 1,569 |
| 08/23 | 1,250 | 49 | 339 | | 101 | 1,621 |
| 08/24 | 1,487 | 25 | 262 | | 731 | 2,327 |
| 08/25 | 2,352 | 9 | 874 | | 757 | 3,075 |
| 08/26 | 4,310 | 74 | 2,032 | | 1,317 | 4,318 |
| 08/27 | 4,390 | 195 | 275 | | 709 | 4,832 |
| 08/28 | 4,129 | 197 | -64 | 1,500 | 64 | 4,699 |
| 08/29 | 3,809 | 49 | -271 | | -771 | 4,821 |
| 08/30 | 3,026 | 103 | -680 | | 400 | 5,118 |
| 08/31 | 2,215 | 105 | -706 | | 1,000 | 6,013 |
| 09/01 | 4,594 | 247 | 2,626 | | 434 | 6,200 |
| 09/02 | 4,521 | 227 | 154 | | 256 | 6,229 |
| 09/03 | 4,535 | 323 | 337 | | 1,432 | 7,338 |

- continued -

Appendix C.9. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|------------------|------------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 4,832 | 792 | 1,089 | | 181 | 6,727 |
| 09/05 | 4,608 | 605 | 381 | 900 | 100 | 6,222 |
| 09/06 | 4,791 | 646 | 829 | | 181 | 5,757 |
| 09/07 | 4,814 | 838 | 861 | | 897 | 5,029 |
| 09/08 | 2,781 | 453 | -1,580 | | 0 | 4,576 |
| 09/09 | 2,957 | 574 | 750 | | 186 | 4,188 |
| 09/10 | 2,097 | 811 | -49 | | 0 | 3,377 |
| 09/11 | 1,951 | 207 | 61 | | 0 | 3,170 |
| 09/12 | 1,654 | 404 | 107 | | 0 | 2,766 |
| 09/13 | 1,152 | 499 | -3 | | 0 | 2,267 |
| 09/14 | 863 ¹ | 277 ² | -12 | | 0 | 1,990 |
| 09/15 | 574 | 277 | -12 | | 0 | 1,713 |
| 09/16 | 323 | 231 | -20 | | 0 | 1,482 |
| 09/17 | 185 | 145 | 7 | | 0 | 1,337 |
| 09/18 | 132 | 161 | 108 | | 0 | 1,176 |
| 09/19 | 76 | 76 | 20 | | 0 | 1,100 |
| 09/20 | 68 | 37 | 29 | | 0 | 1,063 |
| 09/21 | 26 | 15 | -27 | | | |
| 09/22 | 18 | 7 | -1 | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>8,724</u> | <u>8,742</u> | | <u>9,629</u> | |

Appendix C.10 Prince William Sound pink salmon counts, stream 847, Hawkins Creek, 1991.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|------------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | 0 | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | 0 | |
| 07/16 | | | | | | |
| 07/17 | | | | | | |
| 07/18 | | | | | | |
| 07/19 | | | | | | |
| 07/20 | | | | | | |
| 07/21 | | | | | | |
| 07/22 | | | | | | |
| 07/23 | | | | | | |
| 07/24 | 182 ¹ | 0 | 182 | | 0 | |
| 07/25 | 490 | 0 | 308 | | 84 | 84 |
| 07/26 | 798 ¹ | 0 | 308 | 0 | 117 | 201 |
| 07/27 | 893 | 0 | 95 | | 0 | 201 |
| 07/28 | 988 | 0 | 95 | | 244 | 445 |
| 07/29 | 1,032 | 0 | 44 | | 564 | 1,009 |

- continued -

Appendix C.10. (page 2 of 3)

| Date | Ground Survey | | | Weir | | |
|-------|---------------------|-------------|-------------|---------------|---------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 427 | 0 | -605 | | 5,161 | 6,170 |
| 07/31 | 2,370 ¹ | 0 | 1,943 | | 973 | 7,143 |
| 08/01 | 3,674 | 1 | 1,305 | | 730 | 7,872 |
| 08/02 | 4,977 | 1 | 1,305 | | 359 | 8,230 |
| 08/03 | 5,201 | 2 | 226 | 1,200 | 69 | 8,297 |
| 08/04 | 5,660 | 13 | 472 | | 22 | 8,306 |
| 08/05 | 5,506 | 26 | -128 | | 61 | 8,341 |
| 08/06 | 5,743 | 86 | 323 | | 21 | 8,276 |
| 08/07 | 5,302 | 73 | -368 | 2,600 | 0 | 8,203 |
| 08/08 | 5,243 | 124 | 65 | | 270 | 8,349 |
| 08/09 | 6,060 | 140 | 957 | | 1,145 | 9,354 |
| 08/10 | 6,756 | 77 | 773 | | 2,031 | 11,308 |
| 08/11 | 52 | 8 | -6,696 | | 1,972 | 13,272 |
| 08/12 | 10,626 | 170 | 10,744 | | 1,106 | 14,208 |
| 08/13 | 4,078 | 12 | -6,536 | | 1,868 | 16,064 |
| 08/14 | 15,670 | 600 | 12,192 | | 577 | 16,041 |
| 08/15 | 16,040 | 346 | 716 | | 2,376 | 18,071 |
| 08/16 | 14,023 | 297 | -1,720 | | -3,031 ³ | 14,743 |
| 08/17 | 17,797 ¹ | 492 | 4,266 | | 6,718 ³ | 20,969 |
| 08/18 | 21,570 ¹ | 492 | 4,266 | | 6,718 ³ | 27,195 |
| 08/19 | 25,344 | 492 | 4,266 | | 0 | 26,703 |
| 08/20 | 20,808 | 849 | -3,687 | | 0 | 25,854 |
| 08/21 | 18,410 | 1,269 | -1,129 | 10,000 | 645 | 25,230 |
| 08/22 | 12,733 | 1,215 | -4,462 | | 89 | 24,104 |
| 08/23 | 18,124 | 1,078 | 6,469 | | 241 | 23,267 |
| 08/24 | 18,723 | 1,356 | 1,955 | | 213 | 22,124 |
| 08/25 | 5,412 | 202 | -13,109 | | 3,592 | 25,514 |
| 08/26 | 21,554 | 1,338 | 17,480 | | 252 | 24,428 |
| 08/27 | 18,679 | 1,735 | -1,140 | 12,000 | 123 | 22,816 |
| 08/28 | 14,604 | 1,020 | -3,055 | | 572 | 22,368 |
| 08/29 | 14,268 | 1,728 | 1,392 | | 451 | 21,091 |
| 08/30 | 16,214 | 1,818 | 3,764 | | 550 | 19,823 |
| 08/31 | 13,363 | 1,669 | -1,182 | | 1,386 | 19,540 |
| 09/01 | 14,141 | 2,257 | 3,035 | | 256 | 17,539 |
| 09/02 | 11,838 | 2,475 | 172 | | 64 | 15,128 |
| 09/03 | 11,342 | 2,235 | 1,739 | | 653 | 13,546 |

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Appendix C.10. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|--------------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 10,076 | 2,044 # | 778 | | 541 | 12,043 |
| 09/05 | 7,936 ¹ | 2,250 | 110 | 1,200 | 650 | 10,443 |
| 09/06 | 5,795 | 3,556 | 1,416 | | 0 | 6,887 |
| 09/07 | 4,887 | 3,597 | 2,689 | | 0 ¹⁴ | 3,290 |
| 09/08 | 3,985 ¹ | 573 | -329 | | 0 | 2,717 |
| 09/09 | 3,084 ¹ | 573 | -329 | | 0 ¹⁴ | 2,145 |
| 09/10 | 2,182 ¹ | 610 | -292 | | 0 | 1,535 |
| 09/11 | 1,281 ¹ | 1,149 | 247 | | 0 | 386 |
| 09/12 | 379 | 1,121 | 219 | | 0 | 0 |
| 09/13 | 238 | 615 | 474 | | 0 | 0 |
| 09/14 | 70 | 197 | 29 | | 0 | 0 |
| 09/15 | 51 ¹ | 152 | 133 | | 0 | 0 |
| 09/16 | 33 ¹ | 21 | 2 | | | |
| 09/17 | 14 | 204 | 185 | | | |
| 09/18 | | | -14 | | | |
| 09/19 | | | 0 | 160 | | |
| 09/20 | | | 0 | | | |
| 09/21 | | | 0 | | | |
| 09/22 | | | 0 | | | |
| 09/23 | | | 0 | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>42,357</u> | <u>42,357</u> | | <u>40,433</u> | |

Appendix D. Ground, Aerial and Weir Counts of Pink Salmon Spawners for Streams with Intertidal Weirs, Prince William Sound, Alaska, 1992.

Footnotes for Appendix D.

- ¹ Linear interpolation used to estimate missing data.
- ² No ground survey conducted; dead count from next survey equally apportioned among preceding unsurveyed days.
- ³ Ground surveys not conducted above weir.
- ⁴ Hole in weir; number of pink salmon passing site based on ground survey data.
- ⁵ Estimated total dead count divided equally among unsurveyed days.
- ⁶ Hole in weir; weir count used since it was greater than new entries estimate.
- ⁷ Volcanic ash in stream; many sections not surveyed; linear interpolation used to estimate missing data.
- ⁸ Some weir pickets removed; new entries estimate used for weir count.
- ⁹ Hole in weir; new entries estimate used for weir count.
- ¹⁰ Some weir pickets removed; weir count used since it was greater than new entries estimate.
- ¹¹ Seventy-nine pink salmon removed for another study; added to postseason dead count.
- ¹² Some pickets removed from weir; new entries estimate used for weir count.
- ¹³ Thirty-eight pink salmon removed for another study; added to postseason dead count.
- ¹⁴ Some pink salmon may have been passed upstream through weir uncounted by unauthorized individuals.
- ¹⁵ Some pickets removed from weir; weir count used.
- ¹⁶ Sixty pink salmon removed for another study; added to postseason dead count.

Appendix D.1. Prince William Sound pink salmon counts, stream 76, Irish Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|--------------------|----------------|----------------|------------------|--------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | 0 | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | 1 | 1 |
| 07/03 | 1 | 0 | 1 | | 0 | 1 |
| 07/04 | 0 | 0 | -1 | | 0 | 1 |
| 07/05 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/06 | 0 ³ | 0 | 0 | 0 | 0 | 1 |
| 07/07 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/08 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/09 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/10 | 0 ³ | 0 | 0 | 0 | 0 | 1 |
| 07/11 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/12 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/13 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/14 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/15 | 0 ³ | 0 | 0 | 0 | 0 | 1 |
| 07/16 | 0 ³ | 0 | 0 | | 0 | 1 |
| 07/17 | 0 ³ | 0 | 0 | | 66 | 67 |
| 07/18 | 48 | 0 | 48 | | 4 | 71 |
| 07/19 | 213 | 0 | 165 | | 462 ⁴ | 236 |
| 07/20 | 224 | 1 | 12 | 50 | 32 ⁴ | 247 |
| 07/21 | 234 | 0 | 10 | | 9 | 256 |
| 07/22 | 229 | 0 | -5 | | 129 | 385 |
| 07/23 | 381 | 1 | 153 | | 69 | 453 |
| 07/24 | 352 | 0 | -29 | 20 | 95 | 548 |
| 07/25 | 616 | 3 | 267 | | 742 ⁴ | 812 |
| 07/26 | 631 | 1 | 16 | | 47 | 858 |
| 07/27 | 600 | 3 | -28 | 2,100 | 135 | 990 |
| 07/28 | 614 | 11 | 25 | | 933 | 1,912 |
| 07/29 | 1,207 ¹ | 4 ⁵ | 597 | | 1,664 ⁶ | 2,622 |

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Appendix D.1. (page 2 of 3)

| Date | Ground Survey | | | Weir | | |
|-------|--------------------|------------------|-------------|---------------|-------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 1,800 | 4 | 597 | | 97 | 2,715 |
| 07/31 | 1,772 | 18 | -10 | 877 | 16 | 2,713 |
| 08/01 | 1,788 | 30 | 46 | | 3 | 2,686 |
| 08/02 | 1,700 | 38 | -50 | 770 | 10 | 2,658 |
| 08/03 | 1,958 | 58 | 316 | | 39 | 2,639 |
| 08/04 | 358 | 14 | -1,586 | | 245 | 2,870 |
| 08/05 | 2,645 | 57 | 2,344 | | 0 | 2,813 |
| 08/06 | 2,609 | 91 | 55 | | 0 | 2,722 |
| 08/07 | 2,705 ¹ | 111 ⁵ | 207 | | 0 | 2,612 |
| 08/08 | 2,801 | 111 | 207 | 2,000 | 379 ⁴ | 2,652 |
| 08/09 | 2,914 | 140 | 253 | | 26 | 2,538 |
| 08/10 | 2,941 | 115 | 142 | | 1 | 2,424 |
| 08/11 | 3,218 | 154 | 431 | | 68 | 2,338 |
| 08/12 | 2,878 | 167 | -173 | 5,700 | 0 | 2,171 |
| 08/13 | 2,817 ¹ | 156 ⁵ | 95 | | 700 | 2,715 |
| 08/14 | 2,756 | 156 | 95 | | 289 | 2,848 |
| 08/15 | 3,105 | 181 | 530 | | 149 | 2,816 |
| 08/16 | 2,174 | 152 | -780 | | 1,014 | 3,678 |
| 08/17 | 1,242 | 218 | -714 | | 825 | 4,285 |
| 08/18 | 3,704 | 251 | 2,713 | 3,200 | 9 | 4,043 |
| 08/19 | 3,387 ⁷ | 183 | -134 | | 0 | 3,860 |
| 08/20 | 3,070 ⁷ | 229 ⁵ | -88 | | 0 | 3,631 |
| 08/21 | 2,752 ⁷ | 229 | -88 | | 175 | 3,577 |
| 08/22 | 2,435 | 363 | 46 | | -525 ⁷ | 3,366 |
| 08/23 | 898 | 243 | -1,294 | | 1 | 3,124 |
| 08/24 | 965 ¹ | 239 | 306 | | 426 ⁸ | 3,191 |
| 08/25 | 1,031 ¹ | 214 | 281 | | 401 ⁸ | 3,257 |
| 08/26 | 1,098 | 357 | 424 | | 0 | 2,900 |
| 08/27 | 2,105 | 336 | 1,343 | 2,800 | 0 | 2,564 |
| 08/28 | 2,152 | 321 | 368 | | 0 | 2,243 |
| 08/29 | 2,167 | 267 | 282 | | 120 | 2,096 |
| 08/30 | 2,182 | 267 | 282 | | 2 | 1,831 |
| 08/31 | 1,998 ¹ | 225 | 41 | | -290 ⁹ | 1,647 |
| 09/01 | 1,814 | 453 | 269 | 1,400 | 0 | 1,194 |
| 09/02 | 1,563 ¹ | 293 | 42 | | -410 [#] | 1,037 |
| 09/03 | 1,312 | 207 | -44 | | 20 | 850 |

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Appendix D.1. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 1,665 | 316 | 669 | | 2 | 536 |
| 09/05 | 1,023 | 348 | -294 | | 7 | 195 |
| 09/06 | 579 | 306 | -138 | | 0 | 0 |
| 09/07 | 578 | 207 | 206 | | 0 | 0 |
| 09/08 | 651 | 203 | 276 | | 0 | 0 |
| 09/09 | 412 | 216 | -23 | | 0 | 0 |
| 09/10 | 313 | 184 | 85 | 780 | 0 | 0 |
| 09/11 | 242 | 117 | 46 | | 0 | 0 |
| 09/12 | 168 | 108 | 34 | | 0 | 0 |
| 09/13 | 153 | 63 | 48 | | 21 ⁹ | 0 |
| 09/14 | 113 | 49 | 9 | | 0 | 0 |
| 09/15 | 62 | 55 | 4 | | 0 | 0 |
| 09/16 | 40 | 37 | 15 | | 0 | 0 |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>8,879</u> | <u>8,919</u> | | <u>8,208</u> | |

Appendix D.2. Prince William Sound pink salmon counts, stream 506, Loomis Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | 0 | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | 0 | 0 | 0 | | 0 | 0 |
| 07/16 | 0 ³ | 0 | 0 | 0 | 0 | 0 |
| 07/17 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/18 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/19 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/20 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/21 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/22 | 0 ³ | 0 | 0 | 0 | 0 | 0 |
| 07/23 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/24 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/25 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/26 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/27 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/28 | 0 ³ | 0 | 0 | | 0 | 0 |
| 07/29 | 0 ³ | 0 | 0 | 0 | 0 | 0 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 0 | 0 | 0 | | 0 | 0 |
| 07/31 | 0 ³ | 0 | 0 | | 0 | 0 |
| 08/01 | 0 ³ | 0 | 0 | | 0 | 0 |
| 08/02 | 0 ³ | 0 | 0 | | 0 | 0 |
| 08/03 | 0 ³ | 0 | 0 | | 0 | 0 |
| 08/04 | 0 | 0 | 0 | | 0 | 15 |
| 08/05 | 27 | 0 | 27 | | 27 ⁹ | 42 |
| 08/06 | 47 | 0 | 20 | 0 | 1 | 43 |
| 08/07 | 38 | 0 | -9 | | 1 | 44 |
| 08/08 | 45 | 0 | 7 | | 7 | 51 |
| 08/09 | 22 | 1 | -22 | | 2 | 52 |
| 08/10 | 18 | 0 | -4 | | 7 | 59 |
| 08/11 | 13 | 0 | -5 | | 0 | 59 |
| 08/12 | 13 | 0 | 0 | | 69 | 128 |
| 08/13 | 56 | 2 | 45 | | 53 | 179 |
| 08/14 | 90 | 2 | 36 | | 0 | 177 |
| 08/15 | 63 | 1 | -26 | | 0 | 176 |
| 08/16 | 60 | 0 | -3 | | 0 | 176 |
| 08/17 | 49 | 1 | -10 | | 0 | 175 |
| 08/18 | 49 | 1 | 1 | | 42 | 216 |
| 08/19 | 73 | 1 | 25 | | 8 | 223 |
| 08/20 | 63 | 2 | -8 | | 8 | 229 |
| 08/21 | 42 | 3 | -18 | 0 | 1 | 227 |
| 08/22 | 82 | 4 | 44 | 0 | 65 | 288 |
| 08/23 | 125 | 4 | 47 | | 183 | 467 |
| 08/24 | 468 | 5 | 348 | | 496 | 958 |
| 08/25 | 534 | 29 | 95 | | 232 [#] | 1,161 |
| 08/26 | 569 | 4 | 39 | | 153 | 1,310 |
| 08/27 | 799 | 125 | 355 | | 0 | 1,185 |
| 08/28 | 693 | 23 | -83 | 25 | 0 | 1,162 |
| 08/29 | 609 | 133 | 49 | | 0 | 1,029 |
| 08/30 | 542 | 57 | -10 | | 0 | 972 |
| 08/31 | 471 | 48 | -23 | | 635 | 1,559 |
| 09/01 | 1,032 | 56 | 617 | | 95 | 1,598 |
| 09/02 | 1,073 | 92 | 133 | 500 | 854 | 2,360 |
| 09/03 | 1,561 | 183 | 671 | | 142 | 2,319 |

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Appendix D.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 1,577 | 304 | 320 | | 124 | 2,139 |
| 09/05 | 943 | 284 | -350 | | 271 | 2,126 |
| 09/06 | 1,415 | 251 | 723 | | 164 | 2,039 |
| 09/07 | 1,375 | 204 | 164 | | 40 | 1,875 |
| 09/08 | 1,014 | 285 | -76 | | 75 | 1,665 |
| 09/09 | 694 | 263 | -57 | | 43 | 1,445 |
| 09/10 | 500 | 312 | 118 | | 36 | 1,169 |
| 09/11 | 297 | 148 | -55 | | 5 | 1,026 |
| 09/12 | 199 | 118 | 20 | | 3 | 911 |
| 09/13 | 150 | 71 | 22 | 175 | 3 | 843 |
| 09/14 | 107 | 54 | 11 | | 0 | 789 |
| 09/15 | 65 | 34 | -8 | | 0 | 755 |
| 09/16 | 63 | 20 | 18 | | 0 | 735 |
| 09/17 | 27 | 23 | -13 | | 0 | 712 |
| 09/18 | 19 | 24 | 16 | | 0 | 688 |
| 09/19 | 10 | 4 | -5 | | | |
| 09/20 | 0 | 0 | -10 | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 3,176 | 3,176 | | 3,845 | |

Appendix D.3. Prince William Sound pink salmon counts, stream 628, Chenega Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | 0 | 0 |
| 07/10 | | | | | 0 | 0 |
| 07/11 | | | | | 0 | 0 |
| 07/12 | | | | | 0 | 0 |
| 07/13 | | | | | 0 | 0 |
| 07/14 | | | | | 0 | 0 |
| 07/15 | | | | | 0 | 0 |
| 07/16 | | | | | 0 | 0 |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 0 | 0 |
| 07/19 | | | | | 0 | 0 |
| 07/20 | | | | | 0 | 0 |
| 07/21 | | | | | 0 | 0 |
| 07/22 | | | | | 2 | 2 |
| 07/23 | 3 | 0 | 3 | | 10 | 12 |
| 07/24 | 6 | 0 | 3 | | 8 | 20 |
| 07/25 | 13 | 0 | 7 | | 1 | 21 |
| 07/26 | 3 | 0 | -10 | | 7 | 28 |
| 07/27 | 10 | 0 | 7 | | 8 | 36 |
| 07/28 | 13 | 0 | 3 | | 33 | 69 |
| 07/29 | 48 | 0 | 35 | | 86 | 155 |

- continued -

Appendix D.3. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 143 | 0 | 95 | | 8 | 163 |
| 07/31 | 113 | 1 | -29 | | 11 | 173 |
| 08/01 | 136 | 0 | 23 | | 4 | 177 |
| 08/02 | 146 | 1 | 11 | | 3 | 179 |
| 08/03 | 160 | 0 | 14 | | 244 | 423 |
| 08/04 | 252 | 3 | 95 | | 324 [#] | 514 |
| 08/05 | 344 | 3 | 95 | | 20 | 531 |
| 08/06 | 462 | 6 | 124 | 600 | 419 ⁹ | 649 |
| 08/07 | 343 | 13 | -106 | | 112 | 748 |
| 08/08 | 476 | 9 | 142 | | 26 | 765 |
| 08/09 | 523 | 12 | 59 | | 5 | 758 |
| 08/10 | 530 | 14 | 21 | | 11 | 755 |
| 08/11 | 496 | 24 | -10 | | 5 | 736 |
| 08/12 | 462 | 31 | -3 | | 341 | 1,046 |
| 08/13 | 824 | 21 | 383 | 0 | 419 | 1,444 |
| 08/14 | 865 | 40 | 81 | | 56 | 1,460 |
| 08/15 | 974 | 56 | 165 | | 114 | 1,518 |
| 08/16 | 1,069 | 57 | 152 | | 151 | 1,612 |
| 08/17 | 1,145 | 95 | 171 | | 313 [#] | 1,792 |
| 08/18 | 1,217 | 60 | 132 | | 122 | 1,854 |
| 08/19 | 1,224 | 81 | 88 | | 6 | 1,779 |
| 08/20 | 1,149 | 70 | -5 | | 22 | 1,731 |
| 08/21 | 1,135 | 125 | 111 | | 622 | 2,228 |
| 08/22 | 1,842 | 70 | 777 | 200 | 348 | 2,506 |
| 08/23 | 1,749 | 84 | -9 | | 1,396 | 3,818 |
| 08/24 | 2,562 | 95 | 908 | | 1,030 | 4,753 |
| 08/25 | 3,375 | 95 | 908 | | 622 | 5,280 |
| 08/26 | 3,425 | 79 | 129 | | 871 | 6,072 |
| 08/27 | 5,340 | 206 | 2,121 | | 422 | 6,288 |
| 08/28 | 4,207 | 112 | -1,021 | 850 | 360 | 6,536 |
| 08/29 | 4,517 | 256 | 566 | | 186 | 6,466 |
| 08/30 | 4,601 | 317 | 401 | | 361 | 6,510 |
| 08/31 | 5,072 | 427 | 898 | | 673 | 6,756 |
| 09/01 | 4,334 | 412 | -326 | | 95 | 6,439 |
| 09/02 | 3,983 | 933 | 582 | 3,000 | 321 | 5,827 |
| 09/03 | 3,466 | 737 | 220 | | 52 | 5,142 |

- continued -

Appendix D.3. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 2,889 | 1,020 | 443 | | 92 | 4,214 |
| 09/05 | 2,519 | 671 | 301 | | 278 | 3,821 |
| 09/06 | 1,990 | 462 | -68 | | 22 | 3,382 |
| 09/07 | 1,460 | 462 | -68 | | 14 | 2,934 |
| 09/08 | 1,159 | 255 | -46 | | 2 | 2,681 |
| 09/09 | 836 | 282 | -41 | | 0 | 2,399 |
| 09/10 | 658 | 313 | 135 | | 0 | 2,086 |
| 09/11 | 460 | 205 | 7 | | 0 | 1,881 |
| 09/12 | 393 | 120 | 53 | | 0 | 1,761 |
| 09/13 | 294 | 145 | 46 | 175 | 0 | 1,616 |
| 09/14 | 189 | 215 | 110 | | 0 | 1,401 |
| 09/15 | 84 | 81 | -24 | | 0 | 1,320 |
| 09/16 | 41 | 49 | 6 | | 0 | 1,271 |
| 09/17 | 12 | 37 | 8 | | 0 | 1,234 |
| 09/18 | 17 | 4 | 9 | | | |
| 09/19 | | | -17 | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 8,864 | 8,864 | | 10,658 | |

Appendix D.4. Prince William Sound pink salmon counts, stream 621, Totemoff Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | 0 | 0 |
| 07/02 | | | | | 0 | 0 |
| 07/03 | | | | | 0 | 0 |
| 07/04 | | | | | 0 | 0 |
| 07/05 | | | | | 0 | 0 |
| 07/06 | | | | | 0 | 0 |
| 07/07 | | | | | 0 | 0 |
| 07/08 | | | | | 0 | 0 |
| 07/09 | | | | | 0 | 0 |
| 07/10 | 5 | 0 | 5 | | 8 | 8 |
| 07/11 | 0 | 0 | -5 | | 6 | 14 |
| 07/12 | 6 | 0 | 6 | | 1 | 15 |
| 07/13 | 6 | 0 | 0 | | 0 | 15 |
| 07/14 | 0 | 1 | -5 | | 0 | 14 |
| 07/15 | 11 | 0 | 11 | | 14 | 28 |
| 07/16 | 10 | 0 | -1 | 0 | 0 | 28 |
| 07/17 | 4 | 1 | -5 | | 0 | 27 |
| 07/18 | 0 | 0 | -4 | | -14 ⁹ | 23 |
| 07/19 | 16 | 0 | 16 | | 22 | 45 |
| 07/20 | 19 | 0 | 3 | | 26 | 71 |
| 07/21 | 38 | 1 | 20 | | 20 | 90 |
| 07/22 | 68 | 0 | 30 | 0 | 613 | 703 |
| 07/23 | 407 | 2 | 341 | | 129 | 830 |
| 07/24 | 505 | 0 | 98 | | 50 | 880 |
| 07/25 | 838 | 1 | 334 | | 187 | 1,066 |
| 07/26 | 1,092 | 3 | 257 | | 294 | 1,357 |
| 07/27 | 1,003 | 5 | -84 | | 117 | 1,469 |
| 07/28 | 1,154 | 5 | 156 | | 917 | 2,381 |
| 07/29 | 1,460 | 2 | 308 | | 143 | 2,522 |

- continued -

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| Date | Ground Survey | | | Weir | | |
|-------|---------------|-------------|-------------|---------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 1,754 | 9 | 303 | 500 | 4 | 2,517 |
| 07/31 | 1,867 | 13 | 126 | | 2 | 2,506 |
| 08/01 | 1,919 | 38 | 90 | | 62 | 2,530 |
| 08/02 | 1,993 | 46 | 120 | | 38 | 2,522 |
| 08/03 | 1,642 | 79 | -272 | | 1,039 | 3,482 |
| 08/04 | 1,155 | 123 | -364 | | 230 | 3,589 |
| 08/05 | 1,271 | 61 | 177 | | 380 | 3,908 |
| 08/06 | 1,951 | 181 | 861 | 3,200 | 164 | 3,891 |
| 08/07 | 2,515 | 151 | 715 | | 224 | 3,964 |
| 08/08 | 2,316 | 160 | -39 | | 87 | 3,891 |
| 08/09 | 2,468 | 165 | 317 | | 60 | 3,786 |
| 08/10 | 2,687 | 265 | 484 | | 40 | 3,561 |
| 08/11 | 2,304 | 243 | -140 | | 142 | 3,460 |
| 08/12 | 2,393 | 246 | 335 | | 1,625 | 4,839 |
| 08/13 | 2,679 | 277 | 563 | | 119 | 4,681 |
| 08/14 | 3,281 | 352 | 954 | 2,000 | 31 | 4,360 |
| 08/15 | 2,580 | 371 | -330 | | 16 | 4,005 |
| 08/16 | 2,317 | 410 | 147 | | 261 | 3,856 |
| 08/17 | 2,325 | 376 | 384 | | 84 [#] | 3,485 |
| 08/18 | 2,319 | 252 | 246 | | 5 | 3,238 |
| 08/19 | 2,221 | 321 | 223 | | 98 | 3,015 |
| 08/20 | 1,777 | 354 | -90 | | 11 | 2,672 |
| 08/21 | 1,416 | 338 | -23 | | 6 | 2,340 |
| 08/22 | 1,433 | 277 | 294 | 1,000 | 50 | 2,113 |
| 08/23 | 1,172 | 284 | 23 | | 116 | 1,945 |
| 08/24 | 610 | 218 | -344 | | 161 | 1,888 |
| 08/25 | 716 | 153 | 259 | | 14 | 1,749 |
| 08/26 | 716 | 178 | 178 | | 13 | 1,584 |
| 08/27 | 717 | 115 | 116 | | 86 | 1,555 |
| 08/28 | 958 | 139 | 380 | 450 | 0 | 1,416 |
| 08/29 | 586 | 115 | -257 | | 11 | 1,312 |
| 08/30 | 499 | 137 | 50 | | 417 | 1,592 |
| 08/31 | 734 | 79 | 314 | | 180 | 1,693 |
| 09/01 | 869 | 110 | 245 | | 5 | 1,588 |
| 09/02 | 767 | 108 | 6 | | 9 | 1,489 |
| 09/03 | 640 | 80 | -47 | | 7 | 1,416 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 680 | 109 | 149 | 1,000 | 74 | 1,381 |
| 09/05 | 535 | 80 | -65 | | 22 | 1,323 |
| 09/06 | 344 | 127 | -64 | | 1 | 1,197 |
| 09/07 | 345 | 93 | 94 | | 0 | 1,104 |
| 09/08 | 293 | 80 | 28 | | 1 | 1,025 |
| 09/09 | 205 | 114 | 26 | | 0 | 911 |
| 09/10 | 127 | 78 | 0 | | 0 | 833 |
| 09/11 | 83 | 63 | 19 | | 0 | 770 |
| 09/12 | 43 | 44 | 4 | | 0 | 726 |
| 09/13 | 22 | 10 | -11 | 0 | 0 | 716 |
| 09/14 | 11 | 11 | 0 | | 0 | 705 |
| 09/15 | 7 | 6 | 2 | | 0 | 699 |
| 09/16 | 0 | 2 | -5 | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 7,662 | 7,662 | | 8,428 | |

Appendix D.5. Prince William Sound pink salmon counts, stream 637, Point Countess Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | | 0 | 0 |
| 07/18 | 0 | 0 | 0 | | 0 | 0 |
| 07/19 | 0 | 0 | 0 | | 5 | 5 |
| 07/20 | 1 | 1 | 2 | | 0 | 4 |
| 07/21 | 0 | 0 | -1 | | 0 | 4 |
| 07/22 | 1 | 0 | 1 | 500 | 30 | 34 |
| 07/23 | 536 | 0 | 535 | | 535 # | 569 |
| 07/24 | 489 | 17 | -30 | | 0 | 552 |
| 07/25 | 422 | 36 | -31 | | 0 | 516 |
| 07/26 | 333 | 26 | -63 | | -1 | 489 |
| 07/27 | 317 | 27 | 11 | | 3 | 465 |
| 07/28 | 332 | 2 | 17 | | 17 # | 480 |

- continued -

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| Date | Ground Survey | | | Weir | | Total Live |
|-------|---------------|-------------|-------------|---------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | |
| 07/29 | 969 | 15 | 652 | | 3 | 468 |
| 07/30 | 1,095 | 101 | 227 | 985 | 227 ⁹ | 594 |
| 07/31 | 1,047 | 75 | 27 | | 3 | 522 |
| 08/01 | 923 | 73 | -51 | | 18 | 467 |
| 08/02 | 869 | 68 | 14 | | 0 | 399 |
| 08/03 | 766 | 65 | -38 | | 6 | 340 |
| 08/04 | 691 | 36 | -39 | | 47 | 351 |
| 08/05 | 1,358 | 53 | 720 | | 720 [#] | 1,018 |
| 08/06 | 1,444 | 200 | 286 | 800 | 7 | 825 |
| 08/07 | 1,111 | 248 | -85 | | 0 | 577 |
| 08/08 | 926 | 355 | 170 | | 0 | 222 |
| 08/09 | 731 | 193 | -2 | | 0 | 29 |
| 08/10 | 584 | 216 | 69 | | 0 | 0 |
| 08/11 | 445 | 153 | 14 | | 2 | 0 |
| 08/12 | 353 | 129 | 37 | | 4 | 0 |
| 08/13 | 724 | 81 | 452 | | 452 ⁹ | 0 |
| 08/14 | 602 | 194 | 72 | 900 | 0 | 0 |
| 08/15 | 350 | 149 | -103 | | 5 | 0 |
| 08/16 | 306 | 64 | 20 | | 0 | 0 |
| 08/17 | 290 | 45 | 29 | | 0 | 0 |
| 08/18 | 177 | 61 | -52 | | 0 | 0 |
| 08/19 | 172 | 26 | 21 | | 0 | 0 |
| 08/20 | 100 | 66 | -6 | | 0 | 0 |
| 08/21 | 62 | 21 | -17 | | 0 | 0 |
| 08/22 | 45 | 17 | 0 | 100 | 3 | 0 |
| 08/23 | 41 | 5 | 1 | | 0 | 0 |
| 08/24 | 385 | 2 | 346 | | 346 [#] | 0 |
| 08/25 | 409 | 0 | 24 | | 0 | 0 |
| 08/26 | 399 | 30 | 20 | | 29 | 0 |
| 08/27 | 340 | 82 | 23 | | 0 | 0 |
| 08/28 | 229 | 100 | -11 | 25 | 0 | 0 |
| 08/29 | 194 | 51 | 16 | | 0 | 0 |
| 08/30 | 163 | 25 | -6 | | 0 | 0 |
| 08/31 | 152 | 19 | 8 | | 0 | 0 |
| 09/01 | 120 | 23 | -9 | | 45 | 0 |
| 09/02 | 141 | 11 | 32 | | 40 | 0 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/03 | 133 | 63 | 55 | | 30 | 0 |
| 09/04 | 131 | 29 | 27 | 100 | 7 | 0 |
| 09/05 | 93 | 40 | 2 | | 41 | 0 |
| 09/06 | 168 | 21 | 96 | | 96 [#] | 0 |
| 09/07 | 168 | 16 | 16 | | 0 | 0 |
| 09/08 | 149 | 22 | 3 | | 0 | 0 |
| 09/09 | 139 | 17 | 7 | | 0 | 0 |
| 09/10 | 108 | 24 | -7 | | 0 | 0 |
| 09/11 | 97 | 9 | -2 | | 0 | 0 |
| 09/12 | 87 | 16 | 6 | | 0 | 0 |
| 09/13 | 74 | 9 | -4 | 0 | 0 | 0 |
| 09/14 | 60 | 17 | 3 | | 0 | 0 |
| 09/15 | 44 | 15 | -1 | | 0 | 0 |
| 09/16 | 5 | 38 | -1 | | | |
| 09/17 | 0 | 4 | -1 | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 3,501 | 3,501 | | 2,720 | |

Appendix D.6. Prince William Sound pink salmon counts, stream 666, O'Brien Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|-----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | 0 | 0 |
| 07/14 | | | | | 0 | 0 |
| 07/15 | | | | | 0 | 0 |
| 07/16 | | | | 0 | 0 | 0 |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 2 | 2 |
| 07/19 | 3 | 1 | 4 | | 5 | 6 |
| 07/20 | 5 | 0 | 2 | | -5 | 1 |
| 07/21 | 22 ¹ | 0 | 17 | | 0 | 1 |
| 07/22 | 39 ¹ | 0 | 17 | 3 | 50 | 51 |
| 07/23 | 55 ¹ | 0 | 17 | | 22 [#] | 68 |
| 07/24 | 72 | 0 | 17 | | 22 [#] | 85 |
| 07/25 | 79 | 3 | 10 | | -2 | 80 |
| 07/26 | 68 | 2 | -9 | | 8 | 86 |
| 07/27 | 57 | 0 | -11 | | -14 [#] | 75 |
| 07/28 | 42 | 0 | -15 | | 5 | 80 |
| 07/29 | 242 | 7 | 207 | | -14 | 59 |

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| Date | Ground Survey | | | Weir | | |
|-------|---------------|-------------|-------------|---------------|--------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 250 | 10 | 18 | 310 | 2 | 51 |
| 07/31 | 198 | 7 | -45 | | 2 | 46 |
| 08/01 | 150 | 1 | -47 | | 1 | 46 |
| 08/02 | 137 | 0 | -13 | | 69 | 115 |
| 08/03 | 120 | 1 | -16 | | 201 | 315 |
| 08/04 | 214 | 0 | 94 | | 124 # | 409 |
| 08/05 | 391 | 2 | 179 | | 234 # | 585 |
| 08/06 | 568 | 2 | 179 | 600 | 0 | 574 |
| 08/07 | 532 | 11 | -25 | | 0 | 540 |
| 08/08 | 416 | 34 | -82 | | -1 | 501 |
| 08/09 | 386 | 38 | 8 | | 0 | 460 |
| 08/10 | 303 | 41 | -42 | | 0 | 419 |
| 08/11 | 219 | 41 | -43 | | -69 # | 407 |
| 08/12 | 285 | 20 | 86 | | 107 # | 452 |
| 08/13 | 537 | 22 | 274 | | 353 # | 678 |
| 08/14 | 454 | 48 | -35 | 300 | 0 | 641 |
| 08/15 | 385 | 37 | -32 | | -54 # | 590 |
| 08/16 | 324 | 19 | -42 | | -61 # | 522 |
| 08/17 | 363 | 26 | 65 | | 2 | 506 |
| 08/18 | 289 | 18 | -56 | | 0 | 468 |
| 08/19 | 195 | 38 | -56 | | 0 | 441 |
| 08/20 | 122 | 27 | -46 | | 0 | 434 |
| 08/21 | 91 | 7 | -24 | | 126 | 547 |
| 08/22 | 160 | 13 | 82 | 25 | 6 | 548 |
| 08/23 | 207 | 5 | 52 | | 76 | 616 |
| 08/24 | 654 | 8 | 455 | | 595 # | 1,055 |
| 08/25 | 741 | 16 | 103 | | 130 # | 1,142 |
| 08/26 | 371 | 16 | -354 | | 0 | 1,086 |
| 08/27 | 759 | 56 | 444 | | 0 | 1,041 |
| 08/28 | 671 | 45 | -43 | 300 | 132 | 1,142 |
| 08/29 | 694 | 31 | 54 | | 110 | 1,200 |
| 08/30 | 764 | 52 | 122 | | 448 | 1,619 |
| 08/31 | 1,189 | 29 | 454 | | 52 | 1,603 |
| 09/01 | 1,233 | 68 | 112 | | -1 | 1,485 |
| 09/02 | 1,180 | 117 | 64 | | 0 | 1,401 |
| 09/03 | 1,157 | 84 | 61 | | 0 | 1,269 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 1,196 | 132 | 171 | 1,050 | 0 | 1,174 |
| 09/05 | 1,195 | 95 | 94 | | 0 | 1,088 |
| 09/06 | 1,254 | 86 | 145 | | 164 # | 1,097 |
| 09/07 | 1,203 | 136 | 85 | | 24 | 1,038 |
| 09/08 | 1,200 | 83 | 80 | | 31 | 824 |
| 09/09 | 1,036 | 245 | 81 | | 5 | 647 |
| 09/10 | 820 | 182 | -34 | | 2 | 575 |
| 09/11 | 745 | 74 | -1 | | 103 | 463 |
| 09/12 | 614 | 215 | 84 | | 86 | 400 |
| 09/13 | 599 | 149 | 134 | 400 | 10 | 241 |
| 09/14 | 464 | 169 | 34 | | 29 | 163 |
| 09/15 | 355 | 107 | -2 | | 0 | 84 |
| 09/16 | 273 | 79 | -3 | | 0 | 0 |
| 09/17 | 179 | 100 | 6 | | 11 | 0 |
| 09/18 | 172 | 16 | 9 | | 0 | 0 |
| 09/19 | 117 | 37 | -18 | | 0 | 0 |
| 09/20 | 37 | 94 | 14 | | 0 | 0 |
| 09/21 | 11 | 33 | 7 | | 0 | 0 |
| 09/22 | 14 | 4 | 7 | | 0 | 0 |
| 09/23 | | | -14 | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>3,038</u> | <u>3,038</u> | | <u>3,128</u> | |

Appendix D.7. Prince William Sound pink salmon counts, stream 677, Hayden Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | 0 | | |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 0 | 0 |
| 07/19 | 0 | 0 | 0 | | 0 | 0 |
| 07/20 | 0 | 0 | 0 | | 0 | 0 |
| 07/21 | 0 | 0 | 0 | | 0 | 0 |
| 07/22 | 0 | 0 | 0 | 0 | 0 [#] | 0 |
| 07/23 | 5 ¹ | 0 | 5 | | 5 [#] | 5 |
| 07/24 | 10 | 0 | 5 | | 0 | 5 |
| 07/25 | 10 | 0 | 0 | | -7 | 0 |
| 07/26 | 5 | 0 | -5 | | 0 | 0 |
| 07/27 | 6 | 0 | 1 | | 0 | 0 |
| 07/28 | 6 | 0 | 0 | | 14 | 12 |
| 07/29 | 12 | 0 | 6 | | -1 | 11 |

- continued -

Appendix D.7. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|------------------|----------------|----------------|------------------|-------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 26 | 0 | 14 | 0 | 7 | 18 |
| 07/31 | 19 | 1 | -6 | | 0 | 17 |
| 08/01 | 14 | 0 | -5 | | -7 | 10 |
| 08/02 | 10 | 0 | -4 | | 29 | 39 |
| 08/03 | 52 | 4 | 46 | | 146 | 181 |
| 08/04 | 123 | 1 | 72 | | 72 [#] | 252 |
| 08/05 | 148 | 0 | 25 | | 25 [#] | 277 |
| 08/06 | 163 ¹ | 8 ⁵ | 23 | 0 | 23 ⁴ | 289 |
| 08/07 | 178 | 8 | 23 | | 0 | 281 |
| 08/08 | 206 | 10 | 38 | | -6 | 265 |
| 08/09 | 188 | 0 | -18 | | 4 | 269 |
| 08/10 | 193 | 14 | 19 | | 0 | 255 |
| 08/11 | 178 | 16 | 1 | | -2 | 237 |
| 08/12 | 133 | 22 | -23 | | 82 | 297 |
| 08/13 | 202 | 14 | 83 | | 12 | 295 |
| 08/14 | 252 | 20 | 70 | 400 | 12 | 287 |
| 08/15 | 228 | 27 | 3 | | 0 | 260 |
| 08/16 | 335 | 25 | 132 | | 0 | 235 |
| 08/17 | 240 | 38 | -57 | | -2 | 195 |
| 08/18 | 188 | 30 | -22 | | 18 | 183 |
| 08/19 | 161 | 40 | 13 | | 1 | 144 |
| 08/20 | 168 | 32 | 39 | | 0 | 112 |
| 08/21 | 133 | 33 | -2 | | 52 | 131 |
| 08/22 | 165 | 24 | 56 | 50 | 20 | 127 |
| 08/23 | 238 | 17 | 90 | | 79 | 189 |
| 08/24 | 89 | 8 | -141 | | -141 [#] | 40 |
| 08/25 | 506 | 24 | 441 | | 441 [#] | 457 |
| 08/26 | 296 | 25 | -185 | | 26 | 458 |
| 08/27 | 487 | 42 | 233 | | 9 | 425 |
| 08/28 | 440 | 16 | -31 | 75 | 122 | 531 |
| 08/29 | 559 | 9 | 128 | | 192 | 714 |
| 08/30 | 722 | 44 | 207 | | 238 | 908 |
| 08/31 | 834 | 37 | 149 | | 179 | 1,050 |
| 09/01 | 982 | 46 | 194 | | 0 | 1,004 |
| 09/02 | 937 | 75 | 30 | | 212 | 1,141 |
| 09/03 | 856 | 118 | 37 | | 150 | 1,173 |

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Appendix D.7. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 974 | 172 | 290 | 500 | 37 | 1,038 |
| 09/05 | 605 | 75 | -294 | | 187 | 1,150 |
| 09/06 | 854 | 166 | 415 | | 415 # | 1,399 |
| 09/07 | 841 | 58 | 45 | | 30 | 1,371 |
| 09/08 | 874 | 151 | 184 | | 0 | 1,220 |
| 09/09 | 631 | 238 | -5 | | 1 | 983 |
| 09/10 | 521 | 129 | 19 | | 4 | 858 |
| 09/11 | 417 | 120 | 16 | 100 | 4 | 742 |
| 09/12 | 310 | 119 | 12 | | 6 | 629 |
| 09/13 | 268 | 114 | 72 | | 20 | 535 |
| 09/14 | 186 | 113 | 31 | | 0 | 422 |
| 09/15 | 134 | 58 | 6 | | 0 | 364 |
| 09/16 | 63 | 97 | 26 | | 0 | 267 |
| 09/17 | 17 | 45 | -1 | | 0 | 222 |
| 09/18 | 8 | 11 | 2 | | 0 | 211 |
| 09/19 | | | -8 | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 2,493 | 2,493 | | 2,708 | |

Appendix D.8. Prince William Sound pink salmon counts, stream 692, Herring Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | | |
| 07/10 | | | | | | |
| 07/11 | | | | | | |
| 07/12 | | | | | | |
| 07/13 | | | | | | |
| 07/14 | | | | | | |
| 07/15 | | | | | | |
| 07/16 | | | | 0 | | |
| 07/17 | | | | | | |
| 07/18 | | | | | | |
| 07/19 | | | | | 0 | 0 |
| 07/20 | | | | | 0 | 0 |
| 07/21 | | | | | 0 | 0 |
| 07/22 | | | | 0 | 0 | 0 |
| 07/23 | | | | | 0 | 0 |
| 07/24 | 56 | 0 | 56 | | 56 | 56 |
| 07/25 | 48 | 0 | -8 | | 0 | 56 |
| 07/26 | 34 | 10 | -4 | | 0 | 46 |
| 07/27 | 33 | 0 | -1 | | 0 | 46 |
| 07/28 | 36 | 0 | 3 | | 20 | 66 |
| 07/29 | 64 | 1 | 29 | 0 | 10 | 75 |

- continued -

Appendix D.8. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 52 | 0 | -12 | | 0 | 75 |
| 07/31 | 48 | 0 | -4 | | 6 | 81 |
| 08/01 | 40 | 4 | -4 | | 2 | 79 |
| 08/02 | 38 | 3 | 1 | | 16 | 92 |
| 08/03 | 43 | 4 | 9 | | 34 | 122 |
| 08/04 | 89 | 3 | 49 | | 49 [#] | 168 |
| 08/05 | 188 | 1 | 100 | | 100 [#] | 267 |
| 08/06 | 285 | 1 | 98 | 210 | 0 | 266 |
| 08/07 | 336 | 4 | 55 | | 0 | 262 |
| 08/08 | 295 | 8 | -33 | | 0 | 254 |
| 08/09 | 271 | 23 | -1 | | 5 | 236 |
| 08/10 | 199 | 5 | -67 | | 0 | 231 |
| 08/11 | 227 | 21 | 49 | | 0 | 210 |
| 08/12 | 217 | 13 | 3 | | 29 | 226 |
| 08/13 | 216 | 7 | 6 | 500 | 22 | 241 |
| 08/14 | 225 | 13 | 22 | | 1 | 229 |
| 08/15 | 220 | 12 | 7 | | 4 | 221 |
| 08/16 | 181 | 10 | -29 | | 35 | 246 |
| 08/17 | 212 | 15 | 46 | | 0 | 231 |
| 08/18 | 152 | 20 | -40 | | 0 | 211 |
| 08/19 | 136 | 12 | -4 | | 0 | 199 |
| 08/20 | 102 | 26 | -8 | | 0 | 173 |
| 08/21 | 94 | 20 | 12 | 0 | 5 | 158 |
| 08/22 | 93 | 17 | 16 | 50 | 5 | 146 |
| 08/23 | 98 | 12 | 17 | | 21 | 155 |
| 08/24 | 91 | 3 | -4 | | 51 | 203 |
| 08/25 | 270 | 6 | 185 | | 115 | 312 |
| 08/26 | 284 | 5 | 19 | | 32 | 339 |
| 08/27 | 314 | 7 | 37 | | 38 | 370 |
| 08/28 | 320 | 10 | 16 | | 37 | 397 |
| 08/29 | 306 | 19 | 5 | | 1 | 379 |
| 08/30 | 314 | 29 | 37 | | 61 | 411 |
| 08/31 | 343 | 16 | 45 | | 0 | 395 |
| 09/01 | 333 | 13 | 3 | | 124 | 506 |
| 09/02 | 413 | 18 | 98 | 0 | 21 | 509 |
| 09/03 | 403 | 25 | 15 | | 0 | 484 |

- continued -

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 354 | 52 | 3 | | 0 | 432 |
| 09/05 | 292 | 48 | -14 | | 4 | 388 |
| 09/06 | 251 | 44 | 3 | | 6 | 350 |
| 09/07 | 189 | 32 | -30 | | 0 | 318 |
| 09/08 | 165 | 25 | 1 | | 1 | 294 |
| 09/09 | 132 | 30 | -3 | | 0 | 264 |
| 09/10 | 87 | 26 | -19 | | 0 | 238 |
| 09/11 | 55 | 24 | -8 | | 0 | 214 |
| 09/12 | 40 | 14 | -1 | | 0 | 200 |
| 09/13 | 7 | 17 | -16 | 0 | 0 | 183 |
| 09/14 | 4 | 3 | 0 | | 0 | 180 |
| 09/15 | | | -4 | | | |
| 09/16 | | | | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | 731 | 731 | | 911 | |

Appendix D.9. Prince William Sound pink salmon counts, stream 699, Cathead Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | | |
| 07/02 | | | | | | |
| 07/03 | | | | | | |
| 07/04 | | | | | | |
| 07/05 | | | | | | |
| 07/06 | | | | | | |
| 07/07 | | | | | | |
| 07/08 | | | | | | |
| 07/09 | | | | | 0 | 0 |
| 07/10 | | | | | 0 | 0 |
| 07/11 | | | | | 0 | 0 |
| 07/12 | | | | | 0 | 0 |
| 07/13 | | | | | 0 | 0 |
| 07/14 | | | | | 0 | 0 |
| 07/15 | | | | | 0 | 0 |
| 07/16 | | | | 0 | 0 | 0 |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 0 | 0 |
| 07/19 | 0 | 0 | 0 | | 14 | 14 |
| 07/20 | 11 | 0 | 11 | | 6 | 20 |
| 07/21 | 19 | 0 | 8 | | 39 | 59 |
| 07/22 | 57 | 0 | 38 | 0 | 43 | 102 |
| 07/23 | 103 | 2 | 48 | | 108 | 208 |
| 07/24 | 204 | 0 | 101 | | 84 | 292 |
| 07/25 | 343 | 8 | 147 | | 65 | 349 |
| 07/26 | 421 | 44 | 122 | | 107 | 412 |
| 07/27 | 388 | 29 | -4 | | 100 | 483 |
| 07/28 | 436 | 58 | 106 | | 100 | 525 |
| 07/29 | 506 | 31 | 101 | | 112 | 606 |

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| Date | Ground Survey | | | Weir | | |
|-------|---------------|-------------|-------------|---------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | Aerial Counts | Daily Counts | Total Live |
| 07/30 | 552 | 52 | 98 | 800 | 98 | 652 |
| 07/31 | 622 | 28 | 98 | | 108 | 732 |
| 08/01 | 630 | 37 | 45 | | 127 | 822 |
| 08/02 | 715 | 77 | 162 | | 33 | 778 |
| 08/03 | 764 | 30 | 79 | | 286 | 1,034 |
| 08/04 | 933 | 36 | 205 | | 277 | 1,275 |
| 08/05 | 1,294 | 13 | 374 | | 466 ⁹ | 1,636 |
| 08/06 | 1,649 | 64 | 419 | 3,000 | 62 | 1,634 |
| 08/07 | 1,309 | 275 | -65 | | 128 | 1,487 |
| 08/08 | 1,141 | 301 | 133 | | 141 | 1,327 |
| 08/09 | 1,014 | 58 | -69 | | 157 | 1,426 |
| 08/10 | 982 | 240 | 208 | | 67 | 1,253 |
| 08/11 | 797 | 286 | 101 | | 21 | 988 |
| 08/12 | 688 | 80 | -29 | | 303 | 1,211 |
| 08/13 | 1,051 | 69 | 432 | 0 | 525 ⁹ | 1,574 |
| 08/14 | 859 | 272 | 80 | | 0 | 1,302 |
| 08/15 | 724 | 183 | 48 | | 146 | 1,265 |
| 08/16 | 748 | 141 | 165 | | 124 | 1,248 |
| 08/17 | 695 | 159 | 106 | | 70 [#] | 1,099 |
| 08/18 | 453 | 141 | -101 | | 0 | 958 |
| 08/19 | 304 | 136 | -13 | | 0 | 822 |
| 08/20 | 260 | 83 | 39 | | 0 | 739 |
| 08/21 | 186 | 56 | -18 | 100 | 0 | 683 |
| 08/22 | 161 | 33 | 8 | 0 | 0 | 650 |
| 08/23 | 117 | 32 | -12 | | 0 | 618 |
| 08/24 | 60 | 13 | -44 | | 0 | 605 |
| 08/25 | 78 | 19 | 37 | | 0 | 586 |
| 08/26 | 57 | 17 | -4 | | 0 | 569 |
| 08/27 | 37 | 1 | -19 | | 0 | 568 |
| 08/28 | 28 | 8 | -1 | | 0 | 560 |
| 08/29 | 24 | 9 | 5 | | 0 | 551 |
| 08/30 | 14 | 16 | 6 | | 0 | 535 |
| 08/31 | 5 | 14 | 5 | | 0 | 521 |
| 09/01 | 0 | 5 | 0 | | 0 | 516 |
| 09/02 | 0 | 3 | 3 | 0 | 0 | 513 |
| 09/03 | 0 | 0 | 0 | | 0 | 513 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 0 | 0 | 0 | | 0 | 513 |
| 09/05 | 0 | 0 | 0 | | 0 | 513 |
| 09/06 | 20 | 1 | 21 | | 20 | 532 |
| 09/07 | 13 | 6 | -1 | | 0 | 526 |
| 09/08 | 7 | 6 | 0 | | 0 | 520 |
| 09/09 | 4 | 3 | 0 | | 0 | 517 |
| 09/10 | | | | | 0 | 517 |
| 09/11 | | | | | 0 | 517 |
| 09/12 | | | | | | |
| 09/13 | | | | 0 | | |
| 09/14 | | | | | | |
| 09/15 | | | | | | |
| 09/16 | | | | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>3,175</u> | <u>3,179</u> | | <u>3,937</u> | |

Appendix D.10. Prince William Sound pink salmon counts, stream 847, Hawkins Creek, 1992.

| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 06/25 | | | | | | |
| 06/26 | | | | | | |
| 06/27 | | | | | | |
| 06/28 | | | | | | |
| 06/29 | | | | | | |
| 06/30 | | | | | | |
| 07/01 | | | | | 0 | 0 |
| 07/02 | | | | | 0 | 0 |
| 07/03 | | | | | 0 | 0 |
| 07/04 | | | | | 0 | 0 |
| 07/05 | | | | | 0 | 0 |
| 07/06 | | | | | 0 | 0 |
| 07/07 | | | | | 0 | 0 |
| 07/08 | | | | | 0 | 0 |
| 07/09 | | | | | 0 | 0 |
| 07/10 | | | | | 0 | 0 |
| 07/11 | | | | | 0 | 0 |
| 07/12 | | | | | 0 | 0 |
| 07/13 | | | | | 0 | 0 |
| 07/14 | | | | | 0 | 0 |
| 07/15 | | | | | 0 | 0 |
| 07/16 | | | | | 0 | 0 |
| 07/17 | | | | | 0 | 0 |
| 07/18 | | | | | 0 | 0 |
| 07/19 | | | | | 8 | 8 |
| 07/20 | 6 | 0 | 6 | | 0 | 8 |
| 07/21 | 5 | 0 | -1 | 0 | 17 | 25 |
| 07/22 | 15 | 0 | 10 | | 2 | 27 |
| 07/23 | 21 | 0 | 6 | | 161 | 188 |
| 07/24 | 77 | 0 | 56 | | 117 | 305 |
| 07/25 | 207 | 0 | 130 | | 0 | 305 |
| 07/26 | 258 | 0 | 51 | | 33 | 338 |
| 07/27 | 254 | 0 | -4 | | 15 | 353 |
| 07/28 | 25 | 0 | -229 | | 984 [#] | 1,337 |
| 07/29 | 807 | 0 | 782 | | 782 ¹ | 2,119 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|-------|----------------|----------------|----------------|------------------|-------------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 07/30 | 1,370 | 0 | 563 | | 151 | 2,270 |
| 07/31 | 1,247 | 0 | -123 | 290 | 0 | 2,270 |
| 08/01 | 1,216 | 1 | -30 | | 0 | 2,269 |
| 08/02 | 1,273 | 0 | 57 | | 0 | 2,269 |
| 08/03 | 1,238 | 9 | -26 | | 0 | 2,260 |
| 08/04 | 966 # | | -272 | | -272 # | 1,988 |
| 08/05 | 694 | 1 | -271 | | -272 # | 1,715 |
| 08/06 | 1,392 | 1 | 699 | | 0 | 1,714 |
| 08/07 | 1,689 | 1 | 298 | 300 | 9 | 1,722 |
| 08/08 | 1,915 | 6 | 232 | | 3 | 1,719 |
| 08/09 | 2,041 | 26 | 152 | | 0 | 1,693 |
| 08/10 | 1,976 | 65 | 0 | | 2 | 1,630 |
| 08/11 | 2,000 | 33 | 57 | | 9 | 1,606 |
| 08/12 | 876 | 37 | -1,087 | | 121 | 1,690 |
| 08/13 | 1,533 # | 24 | 681 | | 76 | 1,742 |
| 08/14 | 2,189 | 39 | 696 | 1,100 | 0 | 1,703 |
| 08/15 | 2,078 | 58 | -53 | | 0 | 1,645 |
| 08/16 | 258 | 41 | -1,779 | | 0 | 1,604 |
| 08/17 | 1,181 | 66 | 989 | | 0 | 1,538 |
| 08/18 | 1,874 | 65 | 758 | | 0 | 1,473 |
| 08/19 | 1,833 # | 69 | 28 | | 32 | 1,436 |
| 08/20 | 1,791 | 86 | 45 | | 19 | 1,369 |
| 08/21 | 1,627 | 103 | -61 | | 0 | 1,266 |
| 08/22 | 983 | 123 | -521 | | -521 ¹ | 622 |
| 08/23 | 1,013 # | 234 | 264 | | 0 | 388 |
| 08/24 | 1,042 # | 61 | 90 | | 91 ¹ | 387 |
| 08/25 | 1,072 | 61 | 90 | | 91 ¹ | 387 |
| 08/26 | 1,101 | 187 | 217 | | 25 | 225 |
| 08/27 | 1,508 | 165 | 572 | | 0 | 60 |
| 08/28 | 1,500 | 91 | 83 | | 0 | 0 |
| 08/29 | 1,477 | 143 | 120 | | 23 | 0 |
| 08/30 | 1,408 | 151 | 82 | | 4 | 0 |
| 08/31 | 658 | 148 | -602 | | 32 | 0 |
| 09/01 | 1,166 | 177 | 685 | | 11 | 0 |
| 09/02 | 1,085 # | 193 | 112 | | 112 ¹ | 0 |
| 09/03 | 1,004 | 155 | 74 | | 0 | 0 |

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| Date | Ground Survey | | | Aerial Counts | Weir | |
|--------------|----------------|----------------|----------------|------------------|-----------------|------------|
| | Live Counts | Dead Counts | New Entries | | Daily Counts | Total Live |
| 09/04 | 924 | 260 | 180 | 800 | 1 | 0 |
| 09/05 | 652 | 284 | 12 | | 0 | 0 |
| 09/06 | 379 | 159 | -114 | | 0 | 0 |
| 09/07 | 299 | 102 | 22 | | 0 | 0 |
| 09/08 | 257 | 93 | 51 | | 0 | 0 |
| 09/09 | 129 | 34 | -94 | | 0 | 0 |
| 09/10 | 78 | 42 | -9 | | 0 | 0 |
| 09/11 | 44 | 5 | -29 | 0 | 0 | 0 |
| 09/12 | 33 | 5 | -6 | | 0 | 0 |
| 09/13 | 19 | 0 | -14 | | 0 | 0 |
| 09/14 | 12 | 0 | -7 | | 0 | 0 |
| 09/15 | 6 | 0 | -6 | | | |
| 09/16 | | | | | | |
| 09/17 | | | | | | |
| 09/18 | | | | | | |
| 09/19 | | | | | | |
| 09/20 | | | | | | |
| 09/21 | | | | | | |
| 09/22 | | | | | | |
| 09/23 | | | | | | |
| 09/24 | | | | | | |
| 09/25 | | | | | | |
| 09/26 | | | | | | |
| 09/27 | | | | | | |
| 09/28 | | | | | | |
| TOTAL | | <u>3,603</u> | <u>3,609</u> | | <u>1,866</u> | |

Appendix E. Ground and Aerial Counts of Pink Salmon Spawners for streams surveyed by foot, Prince William Sound, Alaska, 1990.

Footnotes for Appendix E.

¹ Linear interpolation used to estimate missing data.

² Weir construction not completed.

³ Some weir pickets removed.

Appendix E.1. Prince William Sound pink salmon counts, stream 2, Hartney Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | 0 |
| 07/04 | 3 | 0 | 3 | |
| 07/05 | 0 | 0 | -3 | 0 |
| 07/06 | 4 | 0 | 4 | |
| 07/07 | 0 | 0 | -4 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 1 | 0 | 1 | |
| 07/10 | 6 | 0 | 5 | |
| 07/11 | 13 | 0 | 7 | |
| 07/12 | 19 | 0 | 6 | |
| 07/13 | 9 | 0 | -10 | 0 |
| 07/14 | 13 | 0 | 4 | |
| 07/15 | 86 | 0 | 73 | |
| 07/16 | 147 | 0 | 61 | 320 |
| 07/17 | 90 | 0 | -57 | 0 |
| 07/18 | 45 | 0 | -45 | |
| 07/19 | 1,503 | 0 | 1,458 | |
| 07/20 | 292 | 0 | -1,211 | |
| 07/21 | 285 | 0 | -7 | |
| 07/22 | 335 | 0 | 50 | |
| 07/23 | 292 | 0 | -43 | |
| 07/24 | 1,343 | 0 | 1,051 | 800 |
| 07/25 | 306 | 0 | -1,037 | |
| 07/26 | 357 | 0 | 51 | |
| 07/27 | 967 | 0 | 610 | |
| 07/28 | 13 | 0 | -954 | |
| 07/29 | 26 | 0 | 13 | |

- continued -

Appendix E.1. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 993 | 1 | 968 | |
| 07/31 | 2,443 | 9 | 1,459 | |
| 08/01 | 2,571 | 2 | 130 | 0 |
| 08/02 | 1,925 | 3 | -643 | |
| 08/03 | 2,111 | 6 | 192 | |
| 08/04 | 1,092 | 8 | -1,011 | |
| 08/05 | 8,869 | 89 | 7,866 | |
| 08/06 | 5,175 | 29 | -3,665 | |
| 08/07 | 2,061 | 34 | -3,080 | 1,800 |
| 08/08 | 2,930 | 39 | 908 | |
| 08/09 | 1,562 | 7 | -1,361 | |
| 08/10 | 2,869 ¹ | 13 | 1,320 | |
| 08/11 | 4,175 | 13 | 1,320 | |
| 08/12 | 5,345 | 128 | 1,298 | |
| 08/13 | 5,314 | 44 | 13 | 3,500 |
| 08/14 | 4,325 | 183 | -806 | |
| 08/15 | 4,130 | 76 | -119 | |
| 08/16 | 7,767 | 201 | 3,838 | |
| 08/17 | 3,178 | 234 | -4,355 | |
| 08/18 | 3,219 | 229 | 270 | |
| 08/19 | 2,854 ¹ | 71 | -295 | |
| 08/20 | 2,489 | 71 | -295 | |
| 08/21 | 4,614 | 189 | 2,314 | |
| 08/22 | 4,937 | 300 | 623 | 1,200 |
| 08/23 | 2,577 | 174 | -2,186 | |
| 08/24 | 4,216 | 232 | 1,871 | |
| 08/25 | 4,026 | 451 | 261 | |
| 08/26 | 3,087 | 382 | -557 | |
| 08/27 | 1,882 | 235 | -970 | |
| 08/28 | 2,849 | 332 | 1,299 | |
| 08/29 | 2,040 | 194 | -615 | |
| 08/30 | 2,257 | 163 | 380 | |
| 08/31 | 1,965 | 100 | -192 | |
| 09/01 | 1,530 | 397 | -38 | 2,150 |
| 09/02 | 1,136 | 294 | -100 | |
| 09/03 | 557 | 152 | -427 | |

- continued -

Appendix E.1. (page 3 of 3)

| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 09/04 | 915 | 132 | 490 | |
| 09/05 | 771 | 77 | -67 | |
| 09/06 | 586 | 61 | -124 | |
| 09/07 | 694 | 63 | 171 | |
| 09/08 | 666 | 106 | 78 | 300 |
| 09/09 | 172 | 48 | -446 | |
| 09/10 | 209 | 50 | 87 | |
| 09/11 | 216 | 41 | 48 | |
| 09/12 | 7 | 17 | -192 | |
| 09/13 | | | | |
| 09/14 | | | | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 5,679 | 5,686 | |

Appendix E.2. Prince William Sound pink salmon counts, stream 5, Eccles Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | 0 | 0 | 0 | 0 |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | 0 |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | 0 |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | 0 |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 4 | 0 | 4 | |
| 07/21 | 0 | 0 | -4 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | 0 |
| 07/25 | 2 | 0 | 2 | |
| 07/26 | 39 | 0 | 37 | |
| 07/27 | 174 | 0 | 135 | |
| 07/28 | 10 | 0 | -164 | |
| 07/29 | 16 | 0 | 6 | |

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Appendix E.2. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 246 | 0 | 230 | |
| 07/31 | 351 | 0 | 105 | |
| 08/01 | 301 | 1 | -49 | 0 |
| 08/02 | 348 | 0 | 47 | |
| 08/03 | 428 | 4 | 84 | |
| 08/04 | 406 | 9 | -13 | |
| 08/05 | 646 | 20 | 260 | |
| 08/06 | 876 | 17 | 247 | |
| 08/07 | 1,434 | 9 | 567 | 600 |
| 08/08 | 1,024 | 13 | -397 | |
| 08/09 | 912 | 11 | -101 | |
| 08/10 | 1,824 ¹ | 11 | 923 | |
| 08/11 | 2,736 | 11 | 923 | |
| 08/12 | 1,449 | 122 | -1,165 | |
| 08/13 | 1,497 | 66 | 114 | 700 |
| 08/14 | 1,254 | 86 | -157 | |
| 08/15 | 1,554 | 56 | 356 | |
| 08/16 | 2,473 | 140 | 1,059 | |
| 08/17 | 1,849 | 122 | -502 | |
| 08/18 | 1,556 | 83 | -210 | |
| 08/19 | 1,883 ¹ | 40 | 367 | |
| 08/20 | 2,209 | 40 | 367 | |
| 08/21 | 2,367 | 107 | 265 | |
| 08/22 | 2,763 | 176 | 572 | 0 |
| 08/23 | 1,956 | 149 | -658 | |
| 08/24 | 2,558 | 370 | 972 | |
| 08/25 | 2,267 | 268 | -23 | |
| 08/26 | 1,867 | 345 | -55 | |
| 08/27 | 1,126 | 306 | -435 | |
| 08/28 | 2,465 | 309 | 1,648 | |
| 08/29 | 1,953 | 201 | -311 | |
| 08/30 | 1,697 | 196 | -60 | |
| 08/31 | 1,652 | 156 | 111 | |
| 09/01 | 1,445 | 153 | -54 | 50 |
| 09/02 | 1,479 | 202 | 236 | |
| 09/03 | 647 | 53 | -779 | |

- continued -

Appendix E.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 744 | 95 | 192 | |
| 09/05 | 706 | 134 | 96 | |
| 09/06 | 500 | 80 | -126 | |
| 09/07 | 543 | 138 | 181 | |
| 09/08 | 458 | 119 | 34 | 60 |
| 09/09 | 103 | 43 | -312 | |
| 09/10 | 70 | 44 | 11 | |
| 09/11 | 114 | 61 | 105 | |
| 09/12 | | | | |
| 09/13 | | | | |
| 09/14 | | | | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 4,566 | 4,680 | |

Appendix E.3. Prince William Sound pink salmon counts, stream 80, Whalen Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | 0 |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | 0 |
| 07/02 | | | 0 | 0 |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | 0 |
| 07/08 | 18 ¹ | 0 | 18 | |
| 07/09 | 35 ¹ | 0 | 18 | |
| 07/10 | 53 ¹ | 0 | 18 | |
| 07/11 | 70 ¹ | 0 | 18 | |
| 07/12 | 88 ¹ | 0 | 18 | 0 |
| 07/13 | 105 ¹ | 0 | 18 | |
| 07/14 | 121 ¹ | 0 | 16 | |
| 07/15 | 140 | 0 | 19 | |
| 07/16 | 216 ¹ | 1 | 77 | 0 |
| 07/17 | 291 | 1 | 77 | |
| 07/18 | 579 ¹ | 4 | 291 | 500 |
| 07/19 | 866 ¹ | 4 | 291 | |
| 07/20 | 1,154 | 4 | 291 | |
| 07/21 | 1,201 ¹ | 6 | 53 | |
| 07/22 | 1,247 | 6 | 53 | |
| 07/23 | 1,340 ¹ | 20 | 113 | |
| 07/24 | 1,433 ¹ | 20 | 113 | 500 |
| 07/25 | 1,748 ¹ | 54 | 369 | |
| 07/26 | 2,063 ¹ | 54 | 369 | |
| 07/27 | 2,378 | 54 | 369 | |
| 07/28 | 2,968 ¹ | 54 | 643 | |
| 07/29 | 3,557 | 54 | 643 | |

- continued -

Appendix E.3. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,960 | 123 | -1,474 | 500 |
| 07/31 | 2,464 | 227 | 731 | |
| 08/01 | 2,082 | 219 | -163 | |
| 08/02 | 3,425 | 225 | 1,568 | 2,300 |
| 08/03 | 2,523 | 199 | -703 | |
| 08/04 | 3,105 | 138 | 720 | |
| 08/05 | 2,956 | 160 | 11 | |
| 08/06 | 3,985 | 155 | 1,184 | 5,000 |
| 08/07 | 3,058 | 122 | -805 | |
| 08/08 | 6,683 | 152 | 3,777 | 8,300 |
| 08/09 | 4,965 ¹ | 143 | -1,576 | |
| 08/10 | 3,246 | 143 | -1,576 | |
| 08/11 | 9,693 | 265 | 6,712 | |
| 08/12 | 8,973 | 311 | -409 | |
| 08/13 | 9,310 | 255 | 592 | |
| 08/14 | 7,420 | 832 | -1,058 | 2,300 |
| 08/15 | 9,235 | 494 | 2,309 | |
| 08/16 | 11,049 | 494 | 2,309 | |
| 08/17 | 13,802 | 472 | 3,225 | |
| 08/18 | 16,555 | 472 | 3,225 | |
| 08/19 | 11,055 | 585 | -4,915 | |
| 08/20 | 11,948 | 534 | 1,427 | 4,100 |
| 08/21 | 11,603 | 315 | -30 | |
| 08/22 | 15,032 | 543 | 3,972 | |
| 08/23 | 16,252 | 1,158 | 2,378 | |
| 08/24 | 15,691 | 818 | 257 | |
| 08/25 | 20,946 | 1,181 | 6,436 | |
| 08/26 | 15,306 | 1,228 | -4,412 | |
| 08/27 | 21,842 | 1,391 | 7,927 | |
| 08/28 | 19,371 | 1,102 | -1,369 | |
| 08/29 | 11,769 | 1,724 | -5,878 | |
| 08/30 | 14,016 | 2,256 | 4,503 | 9,000 |
| 08/31 | 21,184 | 2,010 | 9,178 | |
| 09/01 | 14,073 | 1,510 | -5,601 | |
| 09/02 | 16,074 | 3,087 | 5,088 | |
| 09/03 | 15,130 | 2,601 | 1,657 | |

- continued -

Appendix E.3. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 22,264 | 1,588 | 8,722 | 3,800 |
| 09/05 | 15,078 | 834 | -6,352 | |
| 09/06 | 15,148 | 838 | 908 | |
| 09/07 | 11,114 | 1,705 | -2,329 | |
| 09/08 | 18,772 | 1,741 | 9,399 | |
| 09/09 | 9,563 | 1,015 | -8,194 | |
| 09/10 | 10,433 | 1,249 | 2,119 | |
| 09/11 | 12,974 | 1,324 | 3,865 | 4,900 |
| 09/12 | 9,758 ¹ | 611 | -2,606 | |
| 09/13 | 6,541 | 611 | -2,606 | |
| 09/14 | 5,461 ¹ | 624 | -457 | |
| 09/15 | 4,380 | 624 | -457 | |
| 09/16 | 3,853 | 654 | 127 | |
| 09/17 | 3,061 | 624 | -168 | |
| 09/18 | 2,685 | 480 | 104 | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 42,497 | 45,182 | |

Appendix E.4. Prince William Sound pink salmon counts, stream 89, Fish Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | 0 |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | 0 |
| 07/02 | | | 0 | 0 |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 18 ¹ | 0 | 18 | 0 |
| 07/08 | 35 ¹ | 0 | 18 | |
| 07/09 | 53 ¹ | 0 | 18 | |
| 07/10 | 71 ¹ | 0 | 18 | |
| 07/11 | 89 ¹ | 0 | 18 | |
| 07/12 | 106 ¹ | 0 | 18 | |
| 07/13 | 124 | 1 | 19 | 0 |
| 07/14 | 272 ¹ | 2 | 149 | |
| 07/15 | 419 ¹ | 2 | 149 | |
| 07/16 | 567 | 2 | 149 | 100 |
| 07/17 | 919 ¹ | 4 | 355 | |
| 07/18 | 1,270 | 4 | 355 | 0 |
| 07/19 | 1,209 ¹ | 2 | -59 | |
| 07/20 | 1,147 ¹ | 2 | -59 | |
| 07/21 | 1,086 | 2 | -59 | |
| 07/22 | 1,373 ¹ | 31 | 318 | |
| 07/23 | 1,660 | 31 | 318 | |
| 07/24 | 1,873 ¹ | 23 | 236 | 0 |
| 07/25 | 2,085 | 23 | 236 | |
| 07/26 | 2,357 | 417 | 689 | |
| 07/27 | 2,348 | 61 | 52 | |
| 07/28 | 2,345 ¹ | 153 | 150 | |
| 07/29 | 2,342 ¹ | 153 | 150 | |

- continued -

Appendix E.4. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,338 ¹ | 153 | 150 | 1,000 |
| 07/31 | 2,335 | 153 | 150 | |
| 08/01 | 3,441 | 158 | 1,264 | |
| 08/02 | 3,943 | 38 | 540 | 2,900 |
| 08/03 | 5,040 ¹ | 95 | 1,192 | |
| 08/04 | 6,137 ¹ | 95 | 1,192 | |
| 08/05 | 7,233 ¹ | 95 | 1,192 | |
| 08/06 | 8,330 | 95 | 1,192 | 9,000 |
| 08/07 | 8,404 | 1,664 | 1,738 | |
| 08/08 | 7,357 ¹ | 213 | -835 | 8,500 |
| 08/09 | 6,309 | 213 | -835 | |
| 08/10 | 6,573 ¹ | 221 | 486 | |
| 08/11 | 6,838 ¹ | 221 | 486 | |
| 08/12 | 7,102 ¹ | 221 | 486 | |
| 08/13 | 7,366 | 221 | 486 | |
| 08/14 | 7,926 ¹ | 556 | 1,115 | 4,700 |
| 08/15 | 8,485 | 556 | 1,115 | |
| 08/16 | 8,652 ¹ | 389 | 556 | |
| 08/17 | 8,818 | 389 | 556 | |
| 08/18 | 10,918 | 426 | 2,526 | |
| 08/19 | 11,967 | 1,104 | 2,153 | |
| 08/20 | 11,004 ¹ | 194 | -770 | 4,200 |
| 08/21 | 10,040 | 194 | -770 | |
| 08/22 | 18,639 ¹ | 956 | 9,555 | |
| 08/23 | 18,839 | 490 | 690 | 5,000 |
| 08/24 | 19,039 | 490 | 690 | |
| 08/25 | 15,109 | 1,056 | -2,874 | |
| 08/26 | 20,813 | 2,082 | 7,786 | |
| 08/27 | 17,847 | 1,519 | -1,447 | |
| 08/28 | 18,866 | 1,371 | 2,390 | |
| 08/29 | 14,296 | 1,279 | -3,291 | |
| 08/30 | 11,535 | 1,625 | -1,136 | 10,000 |
| 08/31 | 14,323 | 1,607 | 4,395 | |
| 09/01 | 16,471 | 1,952 | 4,100 | |
| 09/02 | 16,865 ¹ | 1,463 | 1,857 | |
| 09/03 | 17,259 | 1,463 | 1,857 | |

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Appendix E.4. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 19,720 ¹ | 746 | 3,207 | 4,800 |
| 09/05 | 22,181 | 746 | 3,207 | |
| 09/06 | 13,548 | 1,385 | -7,248 | |
| 09/07 | 4,010 | 86 | -9,452 | |
| 09/08 | 9,419 ¹ | 890 | 6,299 | |
| 09/09 | 14,828 | 890 | 6,299 | |
| 09/10 | 10,794 | 1,023 | -3,011 | |
| 09/11 | 17,407 | 1,180 | 7,793 | 8,500 |
| 09/12 | 15,393 ¹ | 177 | -1,838 | |
| 09/13 | 13,379 ¹ | 177 | -1,838 | |
| 09/14 | 11,364 ¹ | 177 | -1,838 | |
| 09/15 | 9,350 | 177 | -1,838 | |
| 09/16 | 9,290 ¹ | 1,063 | 1,003 | |
| 09/17 | 9,229 | 1,063 | 1,003 | |
| 09/18 | 5,641 | 906 | -2,682 | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 36,610 | 42,251 | |

Appendix E.5. Prince William Sound pink salmon counts, stream 143, Siwash Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | 0 | 0 | 0 | 0 |
| 06/26 | 0 | 0 | 0 | |
| 06/27 | 0 | 0 | 0 | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | 0 |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 1 | 0 | 1 | |
| 07/04 | 4 | 0 | 3 | |
| 07/05 | 31 | 0 | 27 | |
| 07/06 | 142 | 3 | 114 | |
| 07/07 | 289 | 0 | 147 | 0 |
| 07/08 | 37 | 0 | -252 | |
| 07/09 | 438 | 0 | 401 | |
| 07/10 | 746 | 0 | 308 | |
| 07/11 | 683 | 0 | -63 | |
| 07/12 | 102 | 1 | -580 | |
| 07/13 | 425 | 1 | 324 | 0 |
| 07/14 | 230 ¹ | 0 | -195 | |
| 07/15 | 997 | 0 | 767 | |
| 07/16 | 644 | 0 | -353 | 0 |
| 07/17 | 986 | 0 | 342 | |
| 07/18 | 464 | 0 | -522 | |
| 07/19 | 1,451 | 1 | 988 | 0 |
| 07/20 | 1,436 | 0 | -15 | |
| 07/21 | 2,005 | 0 | 569 | |
| 07/22 | 1,011 | 1 | -993 | |
| 07/23 | 794 | 4 | -213 | |
| 07/24 | 2,189 | 0 | 1,395 | |
| 07/25 | 3,058 | 1 | 870 | |
| 07/26 | 1,248 | 0 | -1,810 | 1,500 |
| 07/27 | 1,860 | 2 | 614 | |
| 07/28 | 1,752 | 3 | -105 | |
| 07/29 | 3,448 | 17 | 1,713 | |

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Appendix E.5. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 926 | 2 | -2,520 | 1,200 |
| 07/31 | 2,093 | 101 | 1,268 | |
| 08/01 | 1,438 | 116 | -539 | |
| 08/02 | 1,745 | 62 | 369 | 2,400 |
| 08/03 | 1,108 | 25 | -612 | |
| 08/04 | 1,378 | 20 | 290 | |
| 08/05 | 2,211 | 14 | 847 | |
| 08/06 | 2,097 | 147 | 33 | 3,000 |
| 08/07 | 2,296 | 271 | 470 | |
| 08/08 | 1,121 | 2 | -1,173 | 2,800 |
| 08/09 | 1,003 | 133 | 15 | |
| 08/10 | 1,835 | 195 | 1,027 | |
| 08/11 | 778 | 174 | -883 | |
| 08/12 | 544 | 57 | -177 | |
| 08/13 | 1,188 | 303 | 947 | |
| 08/14 | 1,128 | 175 | 115 | 670 |
| 08/15 | 318 | 81 | -729 | |
| 08/16 | 238 | 109 | 29 | |
| 08/17 | 765 | 124 | 651 | |
| 08/18 | 242 | 204 | -319 | |
| 08/19 | 264 | 37 | 59 | |
| 08/20 | 64 | 7 | -193 | |
| 08/21 | 156 | 86 | 178 | |
| 08/22 | 150 | 76 | 70 | |
| 08/23 | 41 | 48 | -61 | |
| 08/24 | 30 | 26 | 15 | 300 |
| 08/25 | | | | |
| 08/26 | | | | |
| 08/27 | | | | |
| 08/28 | | | | |
| 08/29 | | | | |
| 08/30 | | | | 25 |
| 08/31 | | | | |
| 09/01 | | | | |
| 09/02 | | | | |
| 09/03 | | | | |

- continued -

Appendix E.5. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | | | | 0 |
| 09/05 | | | | |
| 09/06 | | | | |
| 09/07 | | | | |
| 09/08 | | | | |
| 09/09 | | | | |
| 09/10 | | | | |
| 09/11 | | | | |
| 09/12 | | | | |
| 09/13 | | | | |
| 09/14 | | | | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 2,629 | 2,659 | |

Appendix E.6. Prince William Sound pink salmon counts, stream 145, Crooked Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | 0 | 0 | 0 | 0 |
| 06/26 | 0 | 0 | 0 | |
| 06/27 | 0 | 0 | 0 | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | 0 |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 6 | 0 | 6 | |
| 07/06 | 2 | 0 | -4 | |
| 07/07 | 27 | 0 | 25 | 0 |
| 07/08 | 0 | 0 | -27 | |
| 07/09 | 48 | 0 | 48 | |
| 07/10 | 23 | 0 | -25 | |
| 07/11 | 36 | 0 | 13 | |
| 07/12 | 22 | 0 | -14 | |
| 07/13 | 52 | 0 | 30 | 0 |
| 07/14 | 7 | 0 | -45 | |
| 07/15 | 62 | 0 | 55 | |
| 07/16 | 79 | 1 | 18 | 0 |
| 07/17 | 112 | 1 | 34 | |
| 07/18 | 76 | 2 | -34 | |
| 07/19 | 141 | 4 | 69 | 0 |
| 07/20 | 205 | 6 | 70 | |
| 07/21 | 207 | 1 | 3 | |
| 07/22 | 87 | 4 | -116 | |
| 07/23 | 128 | 5 | 46 | |
| 07/24 | 144 | 20 | 36 | |
| 07/25 | 239 | 13 | 108 | |
| 07/26 | 124 | 6 | -109 | 300 |
| 07/27 | 146 | 6 | 28 | |
| 07/28 | 177 | 14 | 45 | |
| 07/29 | 350 | 7 | 180 | |

- continued -

Appendix E.6. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 150 | 10 | -190 | 200 |
| 07/31 | 168 | 35 | 53 | |
| 08/01 | 185 | 53 | 70 | |
| 08/02 | 255 | 14 | 84 | 530 |
| 08/03 | 118 | 31 | -106 | |
| 08/04 | 293 | 17 | 192 | |
| 08/05 | 152 | 33 | -108 | |
| 08/06 | 99 | 43 | -10 | 0 |
| 08/07 | 110 | 13 | 24 | |
| 08/08 | 59 | 13 | -38 | 100 |
| 08/09 | 27 | 34 | 2 | |
| 08/10 | 62 | 17 | 52 | |
| 08/11 | 39 | 9 | -14 | |
| 08/12 | 40 | 10 | 11 | |
| 08/13 | 47 | 15 | 22 | |
| 08/14 | 56 | 5 | 14 | 90 |
| 08/15 | 25 | 6 | -25 | |
| 08/16 | 30 | 5 | 10 | |
| 08/17 | 29 | 0 | -1 | |
| 08/18 | 13 | 10 | -6 | |
| 08/19 | 15 | 32 | 34 | |
| 08/20 | 10 | 24 | 19 | |
| 08/21 | 35 | 3 | 28 | |
| 08/22 | 26 | 2 | -7 | |
| 08/23 | 10 | 8 | -8 | |
| 08/24 | 8 | 2 | 0 | 0 |
| 08/25 | | | | |
| 08/26 | | | | |
| 08/27 | | | | |
| 08/28 | | | | |
| 08/29 | | | | |
| 08/30 | | | | 0 |
| 08/31 | | | | |
| 09/01 | | | | |
| 09/02 | | | | |
| 09/03 | | | | |

- continued -

Appendix E.6. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | | | | 0 |
| 09/05 | | | | |
| 09/06 | | | | |
| 09/07 | | | | |
| 09/08 | | | | |
| 09/09 | | | | |
| 09/10 | | | | |
| 09/11 | | | | |
| 09/12 | | | | |
| 09/13 | | | | |
| 09/14 | | | | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 534 | 542 | |

Appendix E.7. Prince William Sound pink salmon counts, stream 506, Loomis Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | | | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 ¹ | 0 | 0 | |
| 07/14 | 0 ¹ | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | 0 |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | 0 |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 2 ¹ | 0 | 2 | |
| 07/26 | 4 ¹ | 0 | 2 | 0 |
| 07/27 | 6 ¹ | 0 | 2 | |
| 07/28 | 8 ¹ | 0 | 2 | |
| 07/29 | 10 | 0 | 2 | |

- continued -

Appendix E.7. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 61 | 0 | 51 | |
| 07/31 | 20 | 0 | -41 | 150 |
| 08/01 | 285 ¹ | 0 | 265 | |
| 08/02 | 549 | 1 | 266 | |
| 08/03 | 52 | 6 | -491 | 80 |
| 08/04 | 134 ¹ | 0 | 82 | |
| 08/05 | 215 | 0 | 82 | |
| 08/06 | 260 | 23 | 68 | 0 |
| 08/07 | 280 | 22 | 42 | |
| 08/08 | 227 | 20 | -33 | |
| 08/09 | 421 ¹ | 9 | 203 | |
| 08/10 | 616 ¹ | 9 | 203 | |
| 08/11 | 810 | 9 | 203 | |
| 08/12 | 598 | 18 | -194 | |
| 08/13 | 590 | 92 | 84 | |
| 08/14 | 502 | 78 | -10 | 1,000 |
| 08/15 | 674 | 118 | 290 | |
| 08/16 | 658 ¹ | 113 | 97 | |
| 08/17 | 642 | 113 | 97 | |
| 08/18 | 1,112 | 50 | 520 | |
| 08/19 | 1,365 ¹ | 39 | 292 | |
| 08/20 | 1,617 | 39 | 292 | |
| 08/21 | 1,944 | 78 | 405 | |
| 08/22 | 1,238 | 182 | -524 | 700 |
| 08/23 | 1,319 | 199 | 280 | |
| 08/24 | 983 | 274 | -62 | |
| 08/25 | 1,073 | 271 | 361 | |
| 08/26 | 936 | 311 | 174 | |
| 08/27 | 1,058 | 307 | 429 | |
| 08/28 | 1,523 | 388 | 853 | |
| 08/29 | 1,266 | 399 | 142 | |
| 08/30 | 788 | 302 | -176 | |
| 08/31 | 672 | 157 | 41 | 900 |
| 09/01 | 543 | 274 | 145 | |
| 09/02 | 795 | 250 | 502 | |
| 09/03 | 1,949 ¹ | 52 | 1,206 | |

- continued -

Appendix E.7. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 3,103 | 52 | 1,206 | |
| 09/05 | 3,099 | 330 | 326 | 3,000 |
| 09/06 | 3,956 | 307 | 1,164 | |
| 09/07 | 3,004 | 358 | -594 | |
| 09/08 | 2,250 | 478 | -276 | |
| 09/09 | 3,582 | 151 | 1,483 | |
| 09/10 | 2,765 | 304 | -513 | |
| 09/11 | 2,069 | 604 | -92 | |
| 09/12 | 1,970 | 212 | 113 | |
| 09/13 | 1,758 | 449 | 237 | |
| 09/14 | 1,138 | 191 | -429 | |
| 09/15 | 929 | 639 | 430 | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 8,275 | 9,204 | |

Appendix E.8. Prince William Sound pink salmon counts, stream 507, Gumboot Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 2 | 0 | 2 | |
| 07/16 | 0 | 0 | -2 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | 0 |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | 0 |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | |
| 07/26 | 12 | 0 | 12 | 0 |
| 07/27 | 23 | 0 | 12 | |
| 07/28 | 20 | 0 | -3 | |
| 07/29 | 52 | 0 | 32 | |

- continued -

Appendix E.8. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 13 | 0 | -39 | |
| 07/31 | 11 | 0 | -2 | 0 |
| 08/01 | 28 | 0 | 17 | |
| 08/02 | 45 | 0 | 17 | |
| 08/03 | 36 | 1 | -8 | 0 |
| 08/04 | 93 | 0 | 57 | |
| 08/05 | 64 | 0 | -29 | |
| 08/06 | 103 | 1 | 40 | 0 |
| 08/07 | 131 | 0 | 28 | |
| 08/08 | 67 | 0 | -64 | |
| 08/09 | 71 | 0 | 4 | |
| 08/10 | 98 | 0 | 27 | |
| 08/11 | 125 | 0 | 27 | |
| 08/12 | 170 | 0 | 45 | |
| 08/13 | 199 | 0 | 29 | |
| 08/14 | 174 | 2 | -23 | 0 |
| 08/15 | 186 | 1 | 13 | |
| 08/16 | 189 | 7 | 9 | |
| 08/17 | 191 | 7 | 9 | |
| 08/18 | 393 | 2 | 204 | |
| 08/19 | 263 | 0 | -130 | |
| 08/20 | 133 | 0 | -130 | |
| 08/21 | 350 | 3 | 220 | |
| 08/22 | 333 | 2 | -15 | 370 |
| 08/23 | 451 | 6 | 124 | |
| 08/24 | 634 | 2 | 185 | |
| 08/25 | 467 | 10 | -157 | |
| 08/26 | 466 | 21 | 20 | |
| 08/27 | 695 | 20 | 249 | |
| 08/28 | 591 | 20 | -84 | |
| 08/29 | 733 | 49 | 191 | |
| 08/30 | 756 | 83 | 106 | |
| 08/31 | 572 | 48 | -136 | 350 |
| 09/01 | 663 | 75 | 166 | |
| 09/02 | 919 | 107 | 363 | |
| 09/03 | 532 | 163 | -224 | |

- continued -

Appendix E.8. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 562 | 3 | 33 | |
| 09/05 | 592 | 3 | 33 | 500 |
| 09/06 | 1,015 | 13 | 436 | |
| 09/07 | 597 | 43 | -375 | |
| 09/08 | 756 | 20 | 179 | |
| 09/09 | 683 | 5 | -68 | |
| 09/10 | 610 | 5 | -68 | |
| 09/11 | 393 | 17 | -200 | |
| 09/12 | 290 | 14 | -89 | |
| 09/13 | 339 | 12 | 61 | |
| 09/14 | 204 | 10 | -126 | |
| 09/15 | 68 | 10 | -126 | |
| 09/16 | 42 | 10 | -16 | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 793 | 835 | |

Appendix E.9. Prince William Sound pink salmon counts, stream 508, Solf Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 11 | 0 | 11 | |
| 07/16 | 16 | 0 | 5 | |
| 07/17 | 21 | 0 | 5 | |
| 07/18 | 42 | 0 | 21 | 600 |
| 07/19 | 246 | 0 | 204 | |
| 07/20 | 39 | 0 | -207 | |
| 07/21 | 46 | 0 | 7 | |
| 07/22 | 47 | 0 | 1 | |
| 07/23 | 53 | 1 | 7 | 0 |
| 07/24 | 66 | 1 | 14 | |
| 07/25 | 401 | 0 | 335 | |
| 07/26 | 430 | 0 | 29 | 0 |
| 07/27 | 579 | 2 | 151 | |
| 07/28 | 3,005 | 9 | 2,435 | |
| 07/29 | 999 | 68 | -1,938 | |

- continued -

Appendix E.9. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,604 | 66 | 671 | |
| 07/31 | 1,710 | 128 | 234 | 3,600 |
| 08/01 | 1,749 ¹ | 132 | 171 | |
| 08/02 | 1,787 | 132 | 171 | |
| 08/03 | 2,625 | 258 | 1,096 | 5,000 |
| 08/04 | 2,066 | 194 | -365 | |
| 08/05 | 2,115 | 182 | 231 | |
| 08/06 | 2,351 | 337 | 573 | 200 |
| 08/07 | 1,743 | 315 | -293 | |
| 08/08 | 1,845 | 375 | 477 | |
| 08/09 | 2,549 | 533 | 1,237 | |
| 08/10 | 2,865 ¹ | 222 | 538 | |
| 08/11 | 3,181 | 222 | 538 | |
| 08/12 | 4,331 | 481 | 1,631 | |
| 08/13 | 3,192 | 600 | -539 | |
| 08/14 | 3,583 | 674 | 1,065 | 10,000 |
| 08/15 | 2,723 | 803 | -57 | |
| 08/16 | 2,028 | 402 | -293 | |
| 08/17 | 2,686 | 1,127 | 1,785 | |
| 08/18 | 4,002 | 342 | 1,658 | |
| 08/19 | 4,014 ¹ | 315 | 326 | |
| 08/20 | 4,025 | 315 | 326 | |
| 08/21 | 4,641 | 675 | 1,291 | |
| 08/22 | 3,383 | 654 | -604 | 3,200 |
| 08/23 | 3,407 | 677 | 701 | |
| 08/24 | 2,718 | 756 | 67 | |
| 08/25 | 2,859 | 791 | 932 | |
| 08/26 | 2,093 | 934 | 168 | |
| 08/27 | 2,379 | 789 | 1,075 | |
| 08/28 | 2,552 ¹ | 745 | 918 | |
| 08/29 | 2,725 | 745 | 918 | |
| 08/30 | 1,963 | 428 | -334 | |
| 08/31 | 1,370 | 541 | -52 | 1,500 |
| 09/01 | 1,435 | 413 | 478 | |
| 09/02 | 1,193 | 598 | 356 | |
| 09/03 | 1,357 | 179 | 343 | |

- continued -

Appendix E.9. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,879 | 151 | 1,673 | |
| 09/05 | 2,622 | 311 | 54 | 5,000 |
| 09/06 | 3,061 | 184 | 623 | |
| 09/07 | 2,642 | 224 | -195 | |
| 09/08 | 2,798 | 289 | 445 | |
| 09/09 | 2,432 | 178 | -188 | |
| 09/10 | 2,301 | 280 | 149 | |
| 09/11 | 1,853 | 538 | 90 | |
| 09/12 | 1,088 | 438 | -327 | |
| 09/13 | 1,221 | 572 | 705 | |
| 09/14 | 717 | 274 | -230 | |
| 09/15 | 848 | 258 | 389 | |
| 09/16 | 572 | 332 | 56 | |
| 09/17 | 190 | 133 | -249 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 21,320 | 21,510 | |

Appendix E.10. Prince William Sound pink salmon counts, stream 510, Eshamy River, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 4 | 0 | 4 | |
| 07/17 | 17 | 0 | 13 | |
| 07/18 | 58 | 0 | 41 | 800 |
| 07/19 | 96 | 1 | 39 | |
| 07/20 | 89 | 1 | -6 | |
| 07/21 | 124 | 0 | 35 | |
| 07/22 | 117 | 0 | -7 | |
| 07/23 | 118 | 1 | 2 | 40 |
| 07/24 | 237 | 0 | 119 | |
| 07/25 | 604 | 0 | 367 | |
| 07/26 | 559 | 1 | -44 | 30 |
| 07/27 | 613 | 10 | 64 | |
| 07/28 | 1,179 | 0 | 566 | |
| 07/29 | 1,067 | 15 | -97 | |

- continued -

Appendix E.10. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,148 | 42 | 123 | |
| 07/31 | 1,291 | 30 | 173 | 700 |
| 08/01 | 1,401 | 38 | 148 | |
| 08/02 | 1,511 | 38 | 148 | |
| 08/03 | 2,241 | 84 | 814 | 700 |
| 08/04 | 1,909 | 136 | -196 | |
| 08/05 | 1,648 | 197 | -64 | |
| 08/06 | 1,686 | 254 | 292 | 300 |
| 08/07 | 1,484 | 356 | 154 | |
| 08/08 | 1,697 | 136 | 349 | |
| 08/09 | 1,909 | 121 | 333 | |
| 08/10 | 2,145 | 140 | 376 | |
| 08/11 | 2,381 | 140 | 376 | |
| 08/12 | 2,308 | 231 | 158 | |
| 08/13 | 2,369 | 306 | 367 | |
| 08/14 | 2,410 | 516 | 557 | 2,000 |
| 08/15 | 1,826 | 1,087 | 503 | |
| 08/16 | 2,005 | 414 | 593 | |
| 08/17 | 2,219 | 489 | 703 | |
| 08/18 | 2,561 | 368 | 710 | |
| 08/19 | 2,409 | 147 | -5 | |
| 08/20 | 2,257 | 147 | -5 | |
| 08/21 | 2,611 | 400 | 754 | |
| 08/22 | 2,433 | 306 | 128 | 2,100 |
| 08/23 | 2,660 | 389 | 616 | |
| 08/24 | 1,998 | 299 | -363 | |
| 08/25 | 1,905 | 407 | 314 | |
| 08/26 | 1,669 | 512 | 276 | |
| 08/27 | 2,408 | 490 | 1,229 | |
| 08/28 | 2,142 | 415 | 149 | |
| 08/29 | 1,876 | 415 | 149 | |
| 08/30 | 1,747 | 525 | 396 | |
| 08/31 | 1,802 | 577 | 632 | 700 |
| 09/01 | 1,179 | 487 | -136 | |
| 09/02 | 1,117 | 476 | 414 | |
| 09/03 | 1,413 | 211 | 507 | |

- continued -

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| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 09/04 | 2,354 | 103 | 1,044 | |
| 09/05 | 2,031 | 244 | -79 | 1,000 |
| 09/06 | 2,104 | 233 | 306 | |
| 09/07 | 1,827 | 282 | 5 | |
| 09/08 | 1,659 | 362 | 194 | |
| 09/09 | 1,998 | 173 | 512 | |
| 09/10 | 1,681 | 339 | 22 | |
| 09/11 | 1,437 | 274 | 30 | |
| 09/12 | 1,162 | 383 | 108 | |
| 09/13 | 1,062 | 409 | 309 | |
| 09/14 | 554 | 317 | -191 | |
| 09/15 | 775 | 176 | 397 | |
| 09/16 | 478 | 202 | -95 | |
| 09/17 | 97 | 99 | -282 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 14,950 | 15,047 | |

Appendix E.11. Prince William Sound pink salmon counts, stream 601, Paddy Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | | | 0 | |
| 07/10 | | | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 78 | 1 | 79 | |
| 07/16 | 40 | 4 | -34 | 0 |
| 07/17 | 58 | 3 | 21 | |
| 07/18 | 14 | 6 | -38 | 0 |
| 07/19 | 19 | 1 | 6 | |
| 07/20 | 74 | 3 | 58 | |
| 07/21 | 37 | 2 | -35 | |
| 07/22 | 22 | 1 | -14 | |
| 07/23 | 23 | 3 | 4 | 500 |
| 07/24 | 27 | 2 | 6 | |
| 07/25 | 1,388 | 3 | 1,364 | |
| 07/26 | 845 | 3 | -540 | 700 |
| 07/27 | 1,292 | 12 | 459 | |
| 07/28 | 1,835 | 2 | 545 | |
| 07/29 | 1,790 | 61 | 16 | |

- continued -

Appendix E.11. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,069 | 65 | 344 | |
| 07/31 | 1,964 | 189 | 84 | 700 |
| 08/01 | 1,751 | 83 | -130 | |
| 08/02 | 1,600 | 201 | 50 | |
| 08/03 | 1,774 | 108 | 282 | 1,900 |
| 08/04 | 1,101 | 99 | -574 | |
| 08/05 | 1,927 | 79 | 905 | |
| 08/06 | 2,316 | 342 | 731 | 400 |
| 08/07 | 1,776 | 513 | -27 | |
| 08/08 | 1,313 | 340 | -123 | |
| 08/09 | 3,984 | 142 | 2,813 | |
| 08/10 | 1,250 | 485 | -2,249 | |
| 08/11 | 4,156 | 325 | 3,231 | |
| 08/12 | 1,283 | 36 | -2,837 | |
| 08/13 | 2,485 | 800 | 2,002 | |
| 08/14 | 2,358 | 523 | 396 | 2,000 |
| 08/15 | 1,940 | 734 | 316 | |
| 08/16 | 1,892 | 522 | 474 | |
| 08/17 | 3,751 | 627 | 2,486 | |
| 08/18 | 4,158 | 313 | 720 | |
| 08/19 | 3,760 | 173 | -225 | |
| 08/20 | 3,887 | 346 | 473 | |
| 08/21 | 4,523 | 439 | 1,075 | |
| 08/22 | 3,128 | 701 | -694 | 2,100 |
| 08/23 | 2,958 | 639 | 469 | |
| 08/24 | 2,645 | 678 | 365 | |
| 08/25 | 2,082 | 794 | 231 | |
| 08/26 | 1,211 | 904 | 33 | |
| 08/27 | 1,636 | 824 | 1,249 | |
| 08/28 | 1,825 | 695 | 884 | |
| 08/29 | 1,263 | 375 | -187 | |
| 08/30 | 747 | 686 | 170 | |
| 08/31 | 843 | 551 | 647 | 1,800 |
| 09/01 | 684 | 462 | 303 | |
| 09/02 | 639 | 390 | 345 | |
| 09/03 | 2,180 | 181 | 1,722 | |

- continued -

Appendix E.11. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,974 | 100 | 894 | |
| 09/05 | 3,017 | 264 | 307 | 2,700 |
| 09/06 | 2,950 | 255 | 188 | |
| 09/07 | 2,533 | 406 | -11 | |
| 09/08 | 2,383 | 410 | 260 | |
| 09/09 | 2,638 | 258 | 513 | |
| 09/10 | 2,601 | 542 | 505 | |
| 09/11 | 2,130 | 588 | 117 | |
| 09/12 | 1,328 | 322 | -480 | |
| 09/13 | 1,462 | 342 | 476 | |
| 09/14 | 635 | 241 | -586 | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 19,199 | 19,834 | |

Appendix E.12. Prince William Sound pink salmon counts, stream 602, Nacktan Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | | | 0 | |
| 07/10 | | | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | 0 |
| 07/19 | 4 | 1 | 5 | |
| 07/20 | 0 | 0 | -4 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 1,049 | 0 | 1,049 | |
| 07/23 | 1,006 | 4 | -39 | 0 |
| 07/24 | 1,557 | 1 | 552 | |
| 07/25 | 931 | 1 | -625 | |
| 07/26 | 1,170 | 2 | 241 | 1,700 |
| 07/27 | 1,840 | 1 | 671 | |
| 07/28 | 2,969 | 0 | 1,129 | |
| 07/29 | 2,630 | 7 | -332 | |

- continued -

Appendix E.12. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,950 | 7 | 327 | |
| 07/31 | 2,767 | 36 | -147 | 1,700 |
| 08/01 | 2,858 | 30 | 121 | |
| 08/02 | 3,151 | 24 | 317 | |
| 08/03 | 2,897 | 37 | -217 | 1,900 |
| 08/04 | 3,723 | 37 | 863 | |
| 08/05 | 3,659 | 72 | 8 | |
| 08/06 | 4,168 | 168 | 677 | 1,600 |
| 08/07 | 3,787 | 354 | -27 | |
| 08/08 | 3,447 | 220 | -120 | |
| 08/09 | 6,278 | 139 | 2,970 | |
| 08/10 | 6,882 | 427 | 1,031 | |
| 08/11 | 7,038 | 128 | 284 | |
| 08/12 | 6,446 | 332 | -260 | |
| 08/13 | 5,265 | 412 | -769 | |
| 08/14 | 4,656 | 451 | -158 | 2,900 |
| 08/15 | 4,528 | 561 | 433 | |
| 08/16 | 3,712 | 621 | -195 | |
| 08/17 | 5,220 | 553 | 2,061 | |
| 08/18 | 5,796 | 419 | 995 | |
| 08/19 | 7,383 | 215 | 1,802 | |
| 08/20 | 7,499 | 473 | 589 | |
| 08/21 | 7,230 | 576 | 307 | |
| 08/22 | 5,223 | 689 | -1,318 | 2,000 |
| 08/23 | 5,774 | 924 | 1,475 | |
| 08/24 | 5,186 | 1,087 | 499 | |
| 08/25 | 4,763 | 1,218 | 795 | |
| 08/26 | 3,759 | 983 | -21 | |
| 08/27 | 3,343 | 889 | 473 | |
| 08/28 | 3,347 | 625 | 629 | |
| 08/29 | 3,072 | 590 | 315 | |
| 08/30 | 3,105 | 778 | 811 | |
| 08/31 | 2,300 | 676 | -129 | 1,400 |
| 09/01 | 2,613 | 553 | 866 | |
| 09/02 | 2,659 | 570 | 616 | |
| 09/03 | 2,910 | 329 | 580 | |

- continued -

Appendix E.12. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 3,179 | 278 | 547 | |
| 09/05 | 2,851 | 502 | 174 | 1,500 |
| 09/06 | 2,621 | 580 | 350 | |
| 09/07 | 1,915 | 596 | -110 | |
| 09/08 | 1,516 | 819 | 420 | |
| 09/09 | 1,174 | 480 | 138 | |
| 09/10 | 1,047 | 519 | 392 | |
| 09/11 | 686 | 485 | 124 | |
| 09/12 | 556 | 330 | 200 | |
| 09/13 | 387 | 293 | 124 | |
| 09/14 | 202 | 190 | 5 | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 21,292 | 21,494 | |

Appendix E.13. Prince William Sound pink salmon counts, stream 604, Erb Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 89 | 0 | 89 | |
| 07/08 | 177 | 0 | 89 | |
| 07/09 | 95 | 0 | -82 | |
| 07/10 | 437 | 0 | 342 | |
| 07/11 | 170 | 0 | -267 | 0 |
| 07/12 | 190 | 0 | 20 | |
| 07/13 | 176 | 0 | -14 | |
| 07/14 | 229 | 1 | 54 | |
| 07/15 | 326 | 0 | 97 | |
| 07/16 | 302 | 0 | -24 | 0 |
| 07/17 | 745 | 1 | 444 | |
| 07/18 | 1,051 | 4 | 310 | 300 |
| 07/19 | 661 | 28 | -362 | |
| 07/20 | 798 | 24 | 161 | |
| 07/21 | 883 | 27 | 112 | |
| 07/22 | 833 | 44 | -6 | |
| 07/23 | 756 | 60 | -17 | 700 |
| 07/24 | 1,022 | 87 | 353 | |
| 07/25 | 2,138 | 68 | 1,184 | |
| 07/26 | 1,792 | 57 | -289 | 300 |
| 07/27 | 1,411 | 53 | -328 | |
| 07/28 | 2,493 | 57 | 1,139 | |
| 07/29 | 2,299 | 346 | 152 | |

- continued -

Appendix E.13. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,227 | 172 | 100 | |
| 07/31 | 3,379 | 146 | 1,298 | |
| 08/01 | 2,227 | 106 | -1,046 | |
| 08/02 | 2,477 | 271 | 521 | |
| 08/03 | 2,893 | 146 | 562 | 1,500 |
| 08/04 | 2,454 | 178 | -261 | |
| 08/05 | 2,904 | 10 | 460 | |
| 08/06 | 3,099 | 263 | 458 | 1,500 |
| 08/07 | 3,255 | 287 | 443 | |
| 08/08 | 2,855 | 480 | 80 | |
| 08/09 | 5,022 | 269 | 2,436 | |
| 08/10 | 5,684 | 234 | 896 | |
| 08/11 | 5,193 | 338 | -153 | |
| 08/12 | 4,378 | 608 | -207 | |
| 08/13 | 3,852 | 491 | -35 | |
| 08/14 | 3,326 | 491 | -35 | 2,500 |
| 08/15 | 2,538 | 332 | -456 | |
| 08/16 | 4,111 | 658 | 2,231 | |
| 08/17 | 3,549 | 489 | -73 | |
| 08/18 | 4,242 | 342 | 1,035 | |
| 08/19 | 5,180 | 516 | 1,454 | |
| 08/20 | 5,440 | 403 | 663 | |
| 08/21 | 4,895 | 604 | 59 | |
| 08/22 | 3,679 | 513 | -703 | 2,900 |
| 08/23 | 3,950 | 452 | 723 | |
| 08/24 | 3,871 | 343 | 264 | |
| 08/25 | 3,819 | 399 | 347 | |
| 08/26 | 3,202 | 591 | -26 | |
| 08/27 | 3,060 | 509 | 367 | |
| 08/28 | 2,290 | 557 | -213 | |
| 08/29 | 2,596 | 534 | 840 | |
| 08/30 | 2,491 | 383 | 278 | |
| 08/31 | 2,656 | 605 | 770 | 1,600 |
| 09/01 | 2,053 | 378 | -225 | |
| 09/02 | 2,155 | 586 | 688 | |
| 09/03 | 2,300 | 380 | 525 | |

- continued -

Appendix E.13. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,774 | 246 | 720 | |
| 09/05 | 2,994 | 311 | 531 | 2,000 |
| 09/06 | 2,735 | 425 | 166 | |
| 09/07 | 2,389 | 302 | -44 | |
| 09/08 | 2,452 | 177 | 240 | |
| 09/09 | 2,390 | 230 | 168 | |
| 09/10 | 2,116 | 266 | -8 | |
| 09/11 | 1,780 | 397 | 61 | |
| 09/12 | 1,082 | 154 | -544 | |
| 09/13 | 921 | 272 | 111 | |
| 09/14 | 710 | 81 | -131 | |
| 09/15 | 498 | 81 | -131 | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 17,863 | 18,361 | |

Appendix E.14. Prince William Sound pink salmon counts, stream 606, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|-----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | | | 0 | |
| 07/10 | | | 0 | |
| 07/11 | | | 0 | |
| 07/12 | | | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 3 ¹ | 0 | 3 | |
| 07/15 | 6 ¹ | 0 | 3 | |
| 07/16 | 9 | 0 | 3 | |
| 07/17 | 4 | 0 | -5 | |
| 07/18 | 10 ¹ | 0 | 6 | |
| 07/19 | 16 ¹ | 0 | 6 | |
| 07/20 | 23 ¹ | 0 | 6 | |
| 07/21 | 29 ¹ | 0 | 6 | |
| 07/22 | 35 ¹ | 0 | 6 | |
| 07/23 | 41 ¹ | 0 | 6 | |
| 07/24 | 47 ¹ | 0 | 6 | |
| 07/25 | 53 ¹ | 0 | 6 | |
| 07/26 | 60 ¹ | 0 | 6 | |
| 07/27 | 66 ¹ | 0 | 6 | |
| 07/28 | 72 | 0 | 6 | |
| 07/29 | 293 | 3 | 224 | |

- continued -

Appendix E.14. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 253 | 5 | -35 | |
| 07/31 | 260 | 22 | 29 | |
| 08/01 | 466 | 11 | 217 | |
| 08/02 | 423 ¹ | 12 | -31 | |
| 08/03 | 333 | 13 | -77 | |
| 08/04 | 243 | 13 | -77 | |
| 08/05 | 555 | 22 | 334 | |
| 08/06 | 740 | 15 | 200 | |
| 08/07 | 590 | 65 | -85 | |
| 08/08 | 523 | 64 | -3 | |
| 08/09 | 0 | 15 | -508 | |
| 08/10 | 591 | 11 | 602 | |
| 08/11 | 700 ¹ | 35 | 144 | |
| 08/12 | 809 | 35 | 144 | |
| 08/13 | 802 | 78 | 71 | |
| 08/14 | 805 | 84 | 87 | |
| 08/15 | 1,020 | 115 | 330 | |
| 08/16 | 697 | 77 | -246 | |
| 08/17 | 715 | 145 | 163 | |
| 08/18 | 431 | 56 | -228 | |
| 08/19 | 402 | 74 | 45 | |
| 08/20 | 757 | 56 | 411 | |
| 08/21 | 757 | 79 | 79 | |
| 08/22 | 852 | 39 | 134 | |
| 08/23 | 681 | 58 | -113 | |
| 08/24 | 676 | 81 | 76 | |
| 08/25 | 757 | 56 | 137 | |
| 08/26 | 523 | 124 | -110 | |
| 08/27 | 468 | 126 | 71 | |
| 08/28 | 404 | 102 | 38 | |
| 08/29 | 334 | 93 | 23 | |
| 08/30 | 348 | 58 | 72 | |
| 08/31 | 280 | 79 | 11 | |
| 09/01 | 245 | 81 | 46 | |
| 09/02 | 253 | 60 | 68 | |
| 09/03 | 257 | 30 | 34 | |

- continued -

Appendix E.14. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 427 | 20 | 190 | |
| 09/05 | 409 | 31 | 13 | |
| 09/06 | 427 | 32 | 50 | |
| 09/07 | 489 | 36 | 98 | |
| 09/08 | 445 | 84 | 40 | |
| 09/09 | 526 | 32 | 113 | |
| 09/10 | 533 | 54 | 61 | |
| 09/11 | 463 | 44 | -26 | |
| 09/12 | 173 | 37 | -253 | |
| 09/13 | 317 | 61 | 205 | |
| 09/14 | 94 | 82 | -141 | |
| 09/15 | 106 | 23 | 35 | |
| 09/16 | 83 | 37 | 14 | |
| 09/17 | 20 | 48 | -15 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 2,712 | 2,732 | |

Appendix E.15. Prince William Sound pink salmon counts, stream 610, Kompkoff River, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 ¹ | 0 | 0 | |
| 07/07 | 0 ¹ | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 1 | 0 | 1 | 60 |
| 07/12 | 18 | 0 | 17 | |
| 07/13 | 29 | 0 | 11 | |
| 07/14 | 27 | 0 | -2 | |
| 07/15 | 46 | 0 | 19 | |
| 07/16 | 94 | 0 | 48 | 0 |
| 07/17 | 176 | 0 | 82 | |
| 07/18 | 134 | 0 | -42 | 0 |
| 07/19 | 222 | 0 | 88 | |
| 07/20 | 116 | 0 | -106 | |
| 07/21 | 177 | 1 | 62 | |
| 07/22 | 299 | 0 | 122 | |
| 07/23 | 421 | 0 | 122 | |
| 07/24 | 363 | 1 | -57 | |
| 07/25 | 381 ¹ | | 18 | |
| 07/26 | 399 | 0 | 18 | 210 |
| 07/27 | 166 | 4 | -229 | |
| 07/28 | 209 ¹ | 2 | 44 | |
| 07/29 | 251 | 2 | 44 | |

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Appendix E.15. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 245 | 0 | -6 | |
| 07/31 | 481 | 4 | 240 | 200 |
| 08/01 | 740 | 22 | 281 | |
| 08/02 | 1,048 | 11 | 319 | |
| 08/03 | 595 | 4 | -449 | 0 |
| 08/04 | 471 | 15 | -109 | |
| 08/05 | 815 | 17 | 361 | |
| 08/06 | 761 | 13 | -41 | 0 |
| 08/07 | 788 | 60 | 87 | |
| 08/08 | 649 ¹ | 16 | -123 | |
| 08/09 | 511 ¹ | 16 | -123 | |
| 08/10 | 372 | 16 | -123 | |
| 08/11 | 1,048 | 53 | 729 | |
| 08/12 | 633 | 14 | -401 | |
| 08/13 | 1,121 | 79 | 567 | |
| 08/14 | 1,167 | 87 | 133 | 0 |
| 08/15 | 1,428 | 122 | 383 | |
| 08/16 | 1,480 | 129 | 181 | |
| 08/17 | 765 | 66 | -649 | |
| 08/18 | 700 ¹ | 40 | -25 | |
| 08/19 | 634 ¹ | 40 | -25 | |
| 08/20 | 569 | 86 | 21 | |
| 08/21 | 651 | 60 | 142 | |
| 08/22 | 533 | 104 | -14 | 600 |
| 08/23 | 770 | 124 | 361 | |
| 08/24 | 825 | 87 | 142 | |
| 08/25 | 653 | 96 | -76 | |
| 08/26 | 751 | 115 | 213 | |
| 08/27 | 650 | 107 | 6 | |
| 08/28 | 763 | 74 | 187 | |
| 08/29 | 779 | 64 | 80 | |
| 08/30 | 677 | 68 | -34 | |
| 08/31 | 821 | 103 | 247 | 300 |
| 09/01 | 1,222 | 132 | 533 | |
| 09/02 | 1,368 | 91 | 237 | |
| 09/03 | 1,019 | 123 | -226 | |

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Appendix E.15. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 851 | 78 | -90 | |
| 09/05 | 934 | 83 | 166 | 750 |
| 09/06 | 921 | 64 | 51 | |
| 09/07 | 893 | 66 | 38 | |
| 09/08 | 1,028 | 143 | 278 | |
| 09/09 | 687 | 128 | -213 | |
| 09/10 | 322 | 161 | -204 | |
| 09/11 | 656 | 55 | 389 | |
| 09/12 | 573 ¹ | 32 | -52 | |
| 09/13 | 489 | 116 | 33 | |
| 09/14 | 314 ¹ | 59 | -117 | |
| 09/15 | 139 | 59 | -117 | |
| 09/16 | 45 | 90 | -4 | |
| 09/17 | 4 | 6 | -35 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 3,406 | 3,410 | |

Appendix E.16. Prince William Sound pink salmon counts, stream 611, Jackpot Bay #1, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 5 | 0 | 5 | 0 |
| 07/17 | 1 | 0 | -4 | |
| 07/18 | 19 | 1 | 19 | 200 |
| 07/19 | 19 | | 0 | |
| 07/20 | 19 | 0 | 0 | |
| 07/21 | 28 | 1 | 10 | |
| 07/22 | 39 | 3 | 14 | |
| 07/23 | 49 | 3 | 14 | |
| 07/24 | 47 | 5 | 3 | |
| 07/25 | 92 | 3 | 48 | |
| 07/26 | 137 | 3 | 48 | |
| 07/27 | 214 | | 77 | |
| 07/28 | 250 | | 36 | |
| 07/29 | 352 | | 102 | |

- continued -

Appendix E.16. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 344 | | -8 | |
| 07/31 | 304 | | -41 | 300 |
| 08/01 | 263 | | -41 | |
| 08/02 | 296 | | 33 | |
| 08/03 | 329 | | 33 | 7,000 |
| 08/04 | 362 | | 33 | |
| 08/05 | 276 | | -86 | |
| 08/06 | 311 | | 35 | 70 |
| 08/07 | 243 | | -68 | |
| 08/08 | 288 | | 45 | |
| 08/09 | 332 | | 45 | |
| 08/10 | 540 | | 208 | |
| 08/11 | 418 | | -123 | |
| 08/12 | 295 | | -123 | |
| 08/13 | 199 | | -96 | |
| 08/14 | 213 | | 14 | 300 |
| 08/15 | 227 | | 14 | |
| 08/16 | 100 | | -127 | |
| 08/17 | 362 | | 262 | |
| 08/18 | 219 | | -143 | |
| 08/19 | 438 | | 219 | |
| 08/20 | 409 | | -29 | |
| 08/21 | 398 | | -11 | |
| 08/22 | 210 | | -188 | 100 |
| 08/23 | 178 | | -32 | |
| 08/24 | 171 | | -7 | |
| 08/25 | 123 | | -48 | |
| 08/26 | 58 | | -65 | |
| 08/27 | 27 | | -31 | |
| 08/28 | 4 | | -23 | |
| 08/29 | 6 | | 2 | |
| 08/30 | 26 | | 20 | |
| 08/31 | 47 | | 20 | 40 |
| 09/01 | 67 | | 20 | |
| 09/02 | 87 | | 20 | |
| 09/03 | 107 | | 20 | |

- continued -

Appendix E.16. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 128 | | 20 | |
| 09/05 | 148 | | 20 | 75 |
| 09/06 | 154 | | 6 | |
| 09/07 | 127 | | -27 | |
| 09/08 | 46 | | -81 | |
| 09/09 | 115 | | 69 | |
| 09/10 | 76 | | -39 | |
| 09/11 | 52 | | -24 | |
| 09/12 | 98 | | 46 | |
| 09/13 | 101 | | 3 | |
| 09/14 | 73 | | -28 | |
| 09/15 | 70 | | -3 | |
| 09/16 | 47 | | -23 | |
| 09/17 | 9 | | -38 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | | 19 | 28 |

Appendix E.17. Prince William Sound pink salmon counts, stream 612, Jackpot Bay #2, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 23 | 0 | 23 | |
| 07/18 | 20 | 0 | -3 | 30 |
| 07/19 | 43 | 3 | 26 | |
| 07/20 | 66 | 3 | 26 | |
| 07/21 | 82 | 5 | 21 | |
| 07/22 | 67 | 7 | -9 | |
| 07/23 | 52 | 7 | -9 | |
| 07/24 | 65 | 8 | 21 | |
| 07/25 | 105 | 9 | 49 | |
| 07/26 | 145 | 9 | 49 | 370 |
| 07/27 | 199 | 8 | 62 | |
| 07/28 | 213 | 18 | 32 | |
| 07/29 | 251 | 30 | 68 | |

- continued -

Appendix E.17. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 282 | 23 | 54 | |
| 07/31 | 283 | 44 | 45 | 600 |
| 08/01 | 330 | 35 | 82 | |
| 08/02 | 306 | 23 | -1 | |
| 08/03 | 327 | 45 | 66 | 150 |
| 08/04 | 390 | 60 | 123 | |
| 08/05 | 317 | 50 | -23 | |
| 08/06 | 299 | 64 | 46 | 310 |
| 08/07 | 286 | 85 | 72 | |
| 08/08 | 224 | 82 | 20 | |
| 08/09 | 261 | 51 | 88 | |
| 08/10 | 483 | 56 | 278 | |
| 08/11 | 441 | 108 | 66 | |
| 08/12 | 373 | 45 | -23 | |
| 08/13 | 236 | 72 | -65 | |
| 08/14 | 151 | 93 | 8 | 100 |
| 08/15 | 171 | 103 | 123 | |
| 08/16 | 187 | 109 | 125 | |
| 08/17 | 273 | 49 | 135 | |
| 08/18 | 222 | 35 | -16 | |
| 08/19 | 268 | 40 | 86 | |
| 08/20 | 278 | 38 | 48 | |
| 08/21 | 321 | 34 | 77 | |
| 08/22 | 277 | 47 | 3 | 2,200 |
| 08/23 | 250 | 77 | 50 | |
| 08/24 | 193 | 40 | -17 | |
| 08/25 | 142 | 64 | 13 | |
| 08/26 | 118 | 94 | 70 | |
| 08/27 | 57 | 51 | -10 | |
| 08/28 | 76 | 56 | 75 | |
| 08/29 | 54 | 70 | 48 | |
| 08/30 | 47 | 38 | 31 | |
| 08/31 | 19 | 27 | -1 | 160 |
| 09/01 | 17 | 56 | 54 | |
| 09/02 | 13 | 23 | 19 | |
| 09/03 | 13 | 2 | 2 | |

- continued -

Appendix E.17. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 160 | 13 | 160 | |
| 09/05 | 154 | 20 | 14 | 125 |
| 09/06 | 174 | 24 | 44 | |
| 09/07 | 117 | 21 | -36 | |
| 09/08 | 101 | 29 | 13 | |
| 09/09 | 148 | 7 | 54 | |
| 09/10 | 148 | 9 | 9 | |
| 09/11 | 97 | 41 | -10 | |
| 09/12 | 99 | 12 | 14 | |
| 09/13 | 68 | 42 | 11 | |
| 09/14 | 51 | 16 | -1 | |
| 09/15 | 42 | 27 | 18 | |
| 09/16 | 21 | 12 | -9 | |
| 09/17 | 5 | 0 | -16 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 2,367 | 2,372 | |

Appendix E.18. Prince William Sound pink salmon counts, stream 613, Jackson Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 2 | 0 | 2 | |
| 07/11 | 4 | 0 | 2 | 350 |
| 07/12 | 19 | 0 | 15 | |
| 07/13 | 8 | 0 | -11 | |
| 07/14 | 11 | 0 | 3 | |
| 07/15 | 37 | 1 | 27 | |
| 07/16 | 10 | 0 | -27 | 0 |
| 07/17 | 23 | 0 | 13 | |
| 07/18 | 22 | 0 | -1 | 1,200 |
| 07/19 | 30 | 0 | 8 | |
| 07/20 | 37 | 0 | 8 | |
| 07/21 | 55 | 0 | 18 | |
| 07/22 | 80 | 0 | 25 | |
| 07/23 | 104 | 1 | 26 | 1,500 |
| 07/24 | 96 | 2 | -6 | |
| 07/25 | 94 | 1 | -1 | |
| 07/26 | 379 | 13 | 298 | 800 |
| 07/27 | 526 | 9 | 156 | |
| 07/28 | 267 | 2 | -257 | |
| 07/29 | 1,565 | 2 | 1,300 | |

- continued -

Appendix E.18. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,462 | 14 | -89 | |
| 07/31 | 1,740 | 13 | 291 | 1,600 |
| 08/01 | 1,848 | 20 | 128 | |
| 08/02 | 1,732 | 25 | -91 | |
| 08/03 | 1,917 | 0 | 185 | 4,000 |
| 08/04 | 2,102 | 0 | 185 | |
| 08/05 | 2,213 | 51 | 162 | |
| 08/06 | 2,963 | 43 | 793 | 3,600 |
| 08/07 | 3,391 | 90 | 518 | |
| 08/08 | 3,170 | 65 | -156 | |
| 08/09 | 3,770 | 59 | 659 | |
| 08/10 | 4,369 | 72 | 672 | |
| 08/11 | 4,728 | 61 | 420 | |
| 08/12 | 3,784 | 57 | -887 | |
| 08/13 | 5,008 | 191 | 1,415 | |
| 08/14 | 4,752 | 188 | -68 | 4,000 |
| 08/15 | 5,231 | 272 | 751 | |
| 08/16 | 3,497 | 388 | -1,346 | |
| 08/17 | 2,808 | 259 | -430 | |
| 08/18 | 2,542 | 55 | -211 | |
| 08/19 | 2,872 | 102 | 432 | |
| 08/20 | 2,850 | 180 | 158 | |
| 08/21 | 3,007 | 228 | 385 | |
| 08/22 | 3,156 | 239 | 388 | 4,100 |
| 08/23 | 2,657 | 238 | -261 | |
| 08/24 | 2,653 | 212 | 208 | |
| 08/25 | 2,344 | 202 | -107 | |
| 08/26 | 2,026 | 233 | -85 | |
| 08/27 | 2,017 | 272 | 263 | |
| 08/28 | 1,801 | 198 | -18 | |
| 08/29 | 1,586 | 230 | 15 | |
| 08/30 | 1,991 | 261 | 666 | |
| 08/31 | 1,801 | 245 | 55 | 1,000 |
| 09/01 | 1,793 | 312 | 304 | |
| 09/02 | 2,238 | 91 | 536 | |
| 09/03 | 2,515 | 157 | 434 | |

- continued -

Appendix E.18. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,081 | 134 | -300 | |
| 09/05 | 2,820 | 130 | 869 | 1,550 |
| 09/06 | 3,307 | 153 | 640 | |
| 09/07 | 2,732 | 119 | -456 | |
| 09/08 | 3,261 | 199 | 728 | |
| 09/09 | 2,278 | 173 | -810 | |
| 09/10 | 2,330 | 225 | 277 | |
| 09/11 | 2,381 | 225 | 277 | |
| 09/12 | 1,965 | 198 | -219 | |
| 09/13 | 1,548 | 198 | -219 | |
| 09/14 | 1,179 | 68 | -302 | |
| 09/15 | 809 | 68 | -302 | |
| 09/16 | 405 | 13 | -392 | |
| 09/17 | 0 | 13 | -392 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 7,269 | 7,269 | |

Appendix E.19. Prince William Sound pink salmon counts, stream 623, Brizgaloff Creek, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | | | 0 | |
| 07/04 | | | 0 | |
| 07/05 | | | 0 | |
| 07/06 | | | 0 | |
| 07/07 | | | 0 | |
| 07/08 | | | 0 | |
| 07/09 | | | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | 0 |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | 0 |
| 07/19 | 10 | 1 | 11 | |
| 07/20 | 0 | 0 | -10 | |
| 07/21 | 1 | 0 | 1 | |
| 07/22 | 0 | 0 | -1 | |
| 07/23 | 0 | 0 | 0 | 600 |
| 07/24 | 60 | 0 | 60 | |
| 07/25 | 637 | 4 | 581 | |
| 07/26 | 1,303 | 0 | 666 | 1,300 |
| 07/27 | 1,585 | 0 | 282 | |
| 07/28 | 1,867 | 1 | 283 | |
| 07/29 | 1,478 | 2 | -387 | |

- continued -

Appendix E.19. (page 2 of 3)

| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 07/30 | 1,910 | 11 | 443 | |
| 07/31 | 1,727 | 15 | -168 | 1,500 |
| 08/01 | 2,045 | 76 | 394 | |
| 08/02 | 2,517 | 84 | 556 | |
| 08/03 | 2,491 | 157 | 131 | 700 |
| 08/04 | 4,605 | 77 | 2,191 | |
| 08/05 | 3,496 | 239 | -870 | |
| 08/06 | 3,607 | 147 | 258 | 1,500 |
| 08/07 | 3,593 | 296 | 282 | |
| 08/08 | 2,491 | 220 | -882 | |
| 08/09 | 3,344 | 69 | 922 | |
| 08/10 | 4,197 | 69 | 922 | |
| 08/11 | 4,360 | 149 | 312 | |
| 08/12 | 4,153 | 223 | 16 | |
| 08/13 | 3,185 | 534 | -434 | |
| 08/14 | 2,075 | 557 | -553 | 3,125 |
| 08/15 | 3,296 | 461 | 1,682 | |
| 08/16 | 3,230 | 784 | 718 | |
| 08/17 | 2,364 | 628 | -238 | |
| 08/18 | 5,707 | 265 | 3,608 | |
| 08/19 | 6,233 | 288 | 814 | |
| 08/20 | 4,670 | 258 | -1,305 | |
| 08/21 | 6,013 | 282 | 1,625 | |
| 08/22 | 4,608 | 636 | -769 | 2,100 |
| 08/23 | 5,233 | 459 | 1,084 | |
| 08/24 | 2,827 | 881 | -1,525 | |
| 08/25 | 2,939 | 666 | 778 | |
| 08/26 | 3,676 | 3,212 | 3,949 | |
| 08/27 | 2,775 | 2,819 | 1,918 | |
| 08/28 | 1,801 | 661 | -313 | |
| 08/29 | 1,626 | 834 | 659 | |
| 08/30 | 1,679 | 458 | 511 | |
| 08/31 | 1,831 | 587 | 739 | 810 |
| 09/01 | 1,674 | 482 | 325 | |
| 09/02 | 1,769 | 499 | 594 | |
| 09/03 | 2,483 | 349 | 1,063 | |

- continued -

Appendix E.19. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,749 | 184 | 450 | |
| 09/05 | 2,408 | 251 | -90 | 510 |
| 09/06 | 2,121 | 182 | -106 | |
| 09/07 | 1,834 | 182 | -106 | |
| 09/08 | 1,615 | 237 | 18 | |
| 09/09 | 1,858 | 169 | 412 | |
| 09/10 | 1,608 | 193 | -57 | |
| 09/11 | 1,270 | 340 | 2 | |
| 09/12 | 957 | 56 | -258 | |
| 09/13 | 643 | 56 | -258 | |
| 09/14 | 326 | 98 | -219 | |
| 09/15 | 406 | 157 | 237 | |
| 09/16 | 486 | 157 | 237 | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 20,700 | 21,186 | |

Appendix E.20. Prince William Sound pink salmon counts, stream 695, Port Audrey, 1990.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | 0 | |
| 06/26 | | | 0 | |
| 06/27 | | | 0 | |
| 06/28 | | | 0 | |
| 06/29 | | | 0 | |
| 06/30 | | | 0 | |
| 07/01 | | | 0 | |
| 07/02 | | | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 1 | 0 | 1 | |
| 07/06 | 2 | 0 | 1 | |
| 07/07 | 0 | 0 | -2 | |
| 07/08 | 4 | 0 | 4 | |
| 07/09 | 10 | 0 | 6 | |
| 07/10 | 40 | 0 | 30 | |
| 07/11 | 30 | 0 | -10 | 0 |
| 07/12 | 31 | 1 | 2 | |
| 07/13 | 39 | 2 | 10 | |
| 07/14 | 95 | 0 | 56 | |
| 07/15 | 435 | 0 | 340 | |
| 07/16 | 355 | 1 | -79 | 0 |
| 07/17 | 410 | 2 | 57 | |
| 07/18 | 496 | 0 | 86 | 0 |
| 07/19 | 470 | 6 | -20 | |
| 07/20 | 568 | 3 | 101 | |
| 07/21 | 557 | 6 | -5 | |
| 07/22 | 475 | 15 | -67 | |
| 07/23 | 478 | 8 | 11 | 90 |
| 07/24 | 454 | 10 | -14 | |
| 07/25 | 1,678 | 18 | 1,242 | |
| 07/26 | 1,198 | 61 | -419 | 1,300 |
| 07/27 | 1,713 | 7 | 522 | |
| 07/28 | 2,798 | 5 | 1,090 | |
| 07/29 | 2,233 | 145 | -420 | |

- continued -

Appendix E.20. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,172 | 120 | 59 | |
| 07/31 | 2,111 | 120 | 59 | 2,000 |
| 08/01 | 2,370 | 372 | 631 | |
| 08/02 | 2,370 | 179 | 179 | |
| 08/03 | 3,206 | 445 | 1,281 | 800 |
| 08/04 | 4,416 | 343 | 1,553 | |
| 08/05 | 3,781 | 616 | -19 | |
| 08/06 | 3,458 | 724 | 401 | 2,500 |
| 08/07 | 3,062 | 473 | 77 | |
| 08/08 | 5,099 | 395 | 2,432 | |
| 08/09 | 5,797 | 142 | 840 | |
| 08/10 | 6,087 | 242 | 532 | |
| 08/11 | 6,431 | 721 | 1,065 | |
| 08/12 | 4,376 | 815 | -1,240 | |
| 08/13 | 3,788 | 936 | 348 | |
| 08/14 | 3,322 | 1,054 | 588 | 5,000 |
| 08/15 | 2,765 | 1,257 | 700 | |
| 08/16 | 2,961 | 677 | 873 | |
| 08/17 | 3,494 | 1,354 | 1,887 | |
| 08/18 | 4,947 | 406 | 1,859 | |
| 08/19 | 4,385 | 429 | -133 | |
| 08/20 | 5,986 | 860 | 2,461 | |
| 08/21 | 5,060 | 924 | -2 | |
| 08/22 | 3,444 | 1,060 | -556 | 3,200 |
| 08/23 | 3,178 | 1,039 | 773 | |
| 08/24 | 2,899 | 758 | 479 | |
| 08/25 | 2,187 | 835 | 123 | |
| 08/26 | 1,731 | 871 | 415 | |
| 08/27 | 1,269 | 714 | 252 | |
| 08/28 | 1,230 | 656 | 617 | |
| 08/29 | 1,167 | 453 | 390 | |
| 08/30 | 910 | 487 | 230 | |
| 08/31 | 669 | 462 | 221 | 600 |
| 09/01 | 665 | 213 | 209 | |
| 09/02 | 660 | 217 | 212 | |
| 09/03 | 1,390 | 74 | 803 | |

- continued -

Appendix E.20. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,119 | 74 | 803 | |
| 09/05 | 1,833 | 220 | -66 | |
| 09/06 | 1,686 | 231 | 84 | |
| 09/07 | 1,683 | 160 | 157 | |
| 09/08 | | | | |
| 09/09 | | | | |
| 09/10 | | | | |
| 09/11 | | | | |
| 09/12 | | | | |
| 09/13 | | | | |
| 09/14 | | | | |
| 09/15 | | | | |
| 09/16 | | | | |
| 09/17 | | | | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 22,416 | 24,099 | |

Appendix F. Ground and Aerial Counts of Pink Salmon Spawners for streams surveyed by foot, Prince William Sound, Alaska, 1991.

Footnotes for Appendix F.

- ¹ Linear interpolation used to estimate missing data.
- ² No ground survey conducted; dead count from next survey equally apportioned among preceding unsurveyed days.
- ³ Missing counts estimated from ground survey data.
- ⁴ Dead count increased by 250 pink salmon to account for carcasses washed out of stream.
- ⁵ Dead count increased by 175 pink salmon to account for carcasses washed out of stream.
- ⁶ Pickets pulled on weir.
- ⁷ *Estimated total dead count divided equally among unsurveyed days.*
- ⁸ Ground surveys not conducted above weir.
- ⁹ Weir not operational; number of pink salmon passing site based on ground survey data.
- ¹⁰ No ground survey done.
- ¹¹ *Some pickets removed from weir; count estimated from ground survey data.*
- ¹² *Some pickets removed from weir, but count at weir used.*
- ¹³ *Some pickets removed from weir; no pink salmon assumed to have passed weir site.*
- ¹⁴ *Several pickets removed from weir due to high water; pink salmon count assumed to be zero.*
- ¹⁵ *Weir count estimated from ground survey data from 9/3 through 9/6.*
- ¹⁶ *Hole in weir; count estimated from ground survey data.*

Appendix F.1. Prince William Sound pink salmon counts, stream 2, Hartney Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 1 | 0 | 1 | |
| 07/08 | 0 | 0 | -1 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 5 | 0 | 5 | 0 |
| 07/16 | 36 | 0 | 31 | |
| 07/17 | 45 | 1 | 10 | |
| 07/18 | 121 | 0 | 76 | 240 |
| 07/19 | 136 | 0 | 15 | |
| 07/20 | 91 | 0 | -45 | |
| 07/21 | 111 | 0 | 20 | |
| 07/22 | 321 | 0 | 210 | |
| 07/23 | 404 | 0 | 83 | |
| 07/24 | 260 | 0 | -144 | |
| 07/25 | 150 | 0 | -110 | |
| 07/26 | 855 | 0 | 705 | 325 |
| 07/27 | 561 | 1 | -293 | |
| 07/28 | 1,092 | 0 | 531 | |
| 07/29 | 1,035 | 3 | -54 | |

- continued -

Appendix F.1. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 618 | 0 | -417 | |
| 07/31 | 562 | 1 | -55 | |
| 08/01 | 369 | 0 | -193 | |
| 08/02 | 1,430 | 3 | 1,064 | |
| 08/03 | 1,162 | 1 | -267 | 1,275 |
| 08/04 | 1,581 | 2 | 421 | |
| 08/05 | 1,631 | 1 | 51 | |
| 08/06 | 2,100 | 5 | 474 | |
| 08/07 | 1,708 | 0 | -392 | 2,300 |
| 08/08 | 1,639 | 6 | -63 | 803 |
| 08/09 | 1,348 | 8 | -283 | |
| 08/10 | 1,441 | 6 | 99 | |
| 08/11 | 1,027 | 2 | -412 | |
| 08/12 | 1,716 | 5 | 694 | 1,100 |
| 08/13 | 907 | 19 | -790 | |
| 08/14 | 2,348 | 12 | 1,453 | 1,500 |
| 08/15 | 2,280 | 54 | -14 | |
| 08/16 | 3,403 | 19 | 1,142 | |
| 08/17 | 2,509 ¹ | 6 ² | -889 | |
| 08/18 | 1,615 | 6 | -889 | |
| 08/19 | 1,754 | 35 | 174 | |
| 08/20 | 2,614 | 106 | 966 | |
| 08/21 | 1,718 | 48 | -848 | |
| 08/22 | 2,210 | 92 | 584 | |
| 08/23 | 2,873 | 89 | 752 | |
| 08/24 | 1,810 | 101 | -962 | |
| 08/25 | 1,943 | 84 | 217 | |
| 08/26 | 2,813 | 103 | 973 | |
| 08/27 | 2,245 | 79 | -489 | 5,200 |
| 08/28 | 2,174 | 70 | -1 | |
| 08/29 | 2,700 | 131 | 657 | |
| 08/30 | 3,015 | 98 | 413 | |
| 08/31 | 1,652 | 216 | -1,147 | |
| 09/01 | 3,075 | 229 | 1,652 | |
| 09/02 | 2,990 | 234 | 149 | 560 |
| 09/03 | 1,326 | 173 | -1,491 | |

- continued -

Appendix F.1. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|-----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,864 | 143 | 681 | |
| 09/05 | 224 | 114 | -1,526 | |
| 09/06 | 1,378 | 149 | 1,303 | |
| 09/07 | 1,218 | 194 | 34 | |
| 09/08 | 1,032 ¹ | 17 ² | -169 | |
| 09/09 | 847 ¹ | 17 ² | -169 | |
| 09/10 | 661 ¹ | 17 ² | -169 | |
| 09/11 | 215 | 17 | -429 | |
| 09/12 | 290 | 33 | 108 | |
| 09/13 | 291 | 71 | 72 | |
| 09/14 | 249 ¹ | 10 ² | -31 | |
| 09/15 | 208 ¹ | 10 ² | -31 | |
| 09/16 | 166 ¹ | 10 ² | -31 | |
| 09/17 | 125 ¹ | 10 ² | -31 | |
| 09/18 | 83 ¹ | 10 ² | -31 | |
| 09/19 | 43 | 10 | -30 | 8 |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>2,881</u> | <u>2,924</u> | |

Appendix F.2. Prince William Sound pink salmon counts, stream 5, Eccles Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | 0 |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | 0 |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | 0 |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | |
| 07/26 | 0 ¹ | 0 ² | 0 | 0 |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | |
| 07/29 | 0 | 0 | 0 | |

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Appendix F.2. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 0 | 0 | 0 | |
| 08/01 | 0 | 0 | 0 | |
| 08/02 | 99 | 0 | 99 | |
| 08/03 | 222 | 1 | 124 | 10 |
| 08/04 | 155 | 0 | -67 | |
| 08/05 | 199 | 0 | 44 | |
| 08/06 | 167 | 0 | -32 | |
| 08/07 | 154 | 11 | -2 | 90 |
| 08/08 | 181 | 5 | 32 | 30 |
| 08/09 | 169 | 1 | -11 | |
| 08/10 | 85 | 6 | -78 | |
| 08/11 | 308 | 0 | 223 | |
| 08/12 | 179 ¹ | 0 ² | -129 | 70 |
| 08/13 | 50 | 0 | -129 | |
| 08/14 | 100 ¹ | 0 | 50 | 20 |
| 08/15 | 150 | 21 | 71 | |
| 08/16 | 143 | 7 | 0 | |
| 08/17 | 281 ¹ | 9 ² | 146 | |
| 08/18 | 419 ¹ | 9 ² | 146 | |
| 08/19 | 656 | 9 | 246 | |
| 08/20 | 694 | 28 | 66 | |
| 08/21 | 734 | 5 | 45 | |
| 08/22 | 820 | 31 | 117 | |
| 08/23 | 911 | 16 | 107 | |
| 08/24 | 226 | 42 | -643 | |
| 08/25 | 814 | 16 | 604 | |
| 08/26 | 670 | 34 | -110 | |
| 08/27 | 895 | 14 | 239 | 75 |
| 08/28 | 823 | 74 | 2 | |
| 08/29 | 796 | 45 | 18 | |
| 08/30 | 785 | 92 | 81 | |
| 08/31 | 692 | 77 | -16 | |
| 09/01 | 771 | 65 | 144 | |
| 09/02 | 683 | 82 | -6 | 50 |
| 09/03 | 357 | 66 | -260 | |

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Appendix F.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 138 | 48 | -171 | |
| 09/05 | 285 | 16 | 163 | |
| 09/06 | 286 | 27 | 28 | |
| 09/07 | 224 | 49 | -13 | |
| 09/08 | 131 ¹ | 21 ² | -73 | |
| 09/09 | 38 | 21 | -73 | |
| 09/10 | 31 ¹ | 10 ² | 2 | |
| 09/11 | 23 | 10 | 2 | |
| 09/12 | 21 | 16 | 14 | |
| 09/13 | 23 | 8 | 10 | |
| 09/14 | 19 | 5 | 1 | |
| 09/15 | 16 ¹ | 1 ² | -2 | |
| 09/16 | 13 ¹ | 1 ² | -2 | |
| 09/17 | 10 ¹ | 1 ² | -2 | |
| 09/18 | 6 ¹ | 1 ² | -2 | |
| 09/19 | 1 | 1 | -5 | 0 |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 998 | 999 | |

Appendix F.3. Prince William Sound pink salmon counts, stream 11, Humpy Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | 0 |
| 06/28 | | | | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | 0 |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | 0 |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 3 | 0 | 3 | 10 |
| 07/14 | 73 | 0 | 70 | |
| 07/15 | 88 | 0 | 15 | |
| 07/16 | 203 | 0 | 115 | |
| 07/17 | 285 | 0 | 82 | |
| 07/18 | 416 | 0 | 131 | 250 |
| 07/19 | 499 | 0 | 83 | |
| 07/20 | 460 | 1 | -38 | |
| 07/21 | 667 | 1 | 208 | |
| 07/22 | 731 | 7 | 71 | 550 |
| 07/23 | 1,115 | 0 | 384 | |
| 07/24 | 844 | 5 | -266 | |
| 07/25 | 889 | 4 | 49 | |
| 07/26 | 1,208 | 6 | 325 | |
| 07/27 | 1,151 | 18 | -39 | 780 |
| 07/28 | 1,184 | 38 | 71 | |
| 07/29 | 935 | 14 | -235 | |

- continued -

Appendix F.3. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,161 | 16 | 242 | |
| 07/31 | 1,432 | 22 | 293 | |
| 08/01 | 1,286 ¹ | 13 ² | -134 | |
| 08/02 | 1,139 | 13 | -134 | 590 |
| 08/03 | 1,647 | 30 | 538 | |
| 08/04 | 1,637 | 37 | 27 | |
| 08/05 | 1,238 | 31 | -368 | 700 |
| 08/06 | 1,429 | 42 | 233 | |
| 08/07 | 1,443 | 62 | 76 | |
| 08/08 | 1,817 | 55 | 429 | 3,400 |
| 08/09 | 2,146 | 46 | 375 | |
| 08/10 | 1,931 ¹ | 46 ² | -169 | |
| 08/11 | 1,716 ¹ | 46 ² | -169 | |
| 08/12 | 1,892 | 46 | 222 | 630 |
| 08/13 | 1,286 | 48 | -558 | |
| 08/14 | 2,276 | 63 | 1,053 | |
| 08/15 | 2,515 ¹ | 91 ² | 329 | |
| 08/16 | 2,753 | 91 | 329 | |
| 08/17 | 2,434 ¹ | 74 ² | -246 | |
| 08/18 | 2,114 | 74 | -246 | 430 |
| 08/19 | 1,216 | 108 | -790 | |
| 08/20 | 1,475 | 53 | 312 | 900 |
| 08/21 | 1,362 | 117 | 4 | |
| 08/22 | 1,320 | 70 | 28 | |
| 08/23 | 2,696 | 222 | 1,598 | |
| 08/24 | 1,766 | 67 | -863 | |
| 08/25 | 1,976 ¹ | 83 ² | 293 | |
| 08/26 | 2,185 | 83 | 293 | 1,100 |
| 08/27 | 1,818 | 81 | -286 | |
| 08/28 | 2,007 | 67 | 256 | |
| 08/29 | 1,646 | 65 | -296 | 1,100 |
| 08/30 | 1,233 | 83 | -330 | |
| 08/31 | 1,327 | 207 | 301 | |
| 09/01 | 1,904 | 243 | 820 | |
| 09/02 | 1,782 | 179 | 57 | 975 |
| 09/03 | 1,733 | 137 | 88 | |

- continued -

Appendix F.3. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|-----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,380 ¹ | 78 ² | -275 | |
| 09/05 | 1,027 | 78 | -275 | |
| 09/06 | 1,029 | 113 | 115 | |
| 09/07 | 976 | 64 | 11 | |
| 09/08 | 549 ¹ | 9 ² | -419 | |
| 09/09 | 549 ¹ | 9 ² | 9 | |
| 09/10 | 549 ¹ | 9 ² | 9 | |
| 09/11 | 121 | 9 | -419 | |
| 09/12 | 110 | 13 | 2 | |
| 09/13 | 125 | 59 | 74 | |
| 09/14 | 64 ¹ | 1 ² | -61 | |
| 09/15 | 64 ¹ | 1 ² | 1 | |
| 09/16 | 64 ¹ | 1 ² | 1 | |
| 09/17 | 64 ¹ | 1 ² | 1 | |
| 09/18 | 2 | 1 | -61 | 0 |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>3,349</u> | <u>3,351</u> | |

Appendix F.4. Prince William Sound pink salmon counts, stream 80, Whalen Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | 0 |
| 06/28 | | | | |
| 06/29 | 3 | 0 | 3 | |
| 06/30 | 0 | 0 | -3 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 6 | 0 | 6 | |
| 07/04 | 15 | 0 | 9 | |
| 07/05 | 27 | 0 | 12 | 0 |
| 07/06 | 27 | 1 | 1 | |
| 07/07 | 62 | 0 | 35 | |
| 07/08 | 408 | 0 | 346 | |
| 07/09 | 1,390 | 9 | 991 | 700 |
| 07/10 | 2,085 | 14 | 709 | |
| 07/11 | 3,626 | 19 | 1,560 | |
| 07/12 | 3,901 | 3 | 278 | |
| 07/13 | 6,460 | 69 | 2,628 | 100 |
| 07/14 | 4,183 | 15 | -2,262 | |
| 07/15 | 5,844 | 158 | 1,819 | |
| 07/16 | 7,081 | 86 | 1,323 | |
| 07/17 | 7,601 | 153 | 673 | |
| 07/18 | 9,627 | 242 | 2,268 | 5,500 |
| 07/19 | 8,564 | 286 | -777 | |
| 07/20 | 7,618 | 421 | -525 | |
| 07/21 | 7,352 | 271 | 5 | |
| 07/22 | 12,157 | 414 | 5,219 | 4,800 |
| 07/23 | 9,907 | 503 | -1,747 | |
| 07/24 | 10,911 | 351 | 1,355 | |
| 07/25 | 8,783 | 518 | -1,610 | |
| 07/26 | 9,218 | 752 | 1,187 | |
| 07/27 | 11,331 | 743 | 2,856 | 9,600 |
| 07/28 | 11,657 | 934 | 1,260 | |
| 07/29 | 9,910 | 904 | -843 | |

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Appendix F.4. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 8,398 | 1,065 | -447 | |
| 07/31 | 9,377 | 853 | 1,832 | |
| 08/01 | 8,276 | 849 | -252 | |
| 08/02 | 9,001 | 1,196 | 1,921 | 2,600 |
| 08/03 | 7,587 | 992 | -422 | |
| 08/04 | 7,225 | 1,273 | 911 | |
| 08/05 | 7,465 | 1,059 | 1,299 | 2,100 |
| 08/06 | 7,168 | 1,260 | 963 | |
| 08/07 | 7,332 | 919 | 1,083 | |
| 08/08 | 6,325 | 903 | -104 | 15,000 |
| 08/09 | 6,486 ¹ | 948 ² | 1,109 | |
| 08/10 | 6,647 | 948 | 1,109 | |
| 08/11 | 6,488 | 634 | 475 | |
| 08/12 | 5,632 | 942 | 86 | 4,300 |
| 08/13 | 6,414 | 791 | 1,573 | |
| 08/14 | 4,509 | 753 | -1,152 | |
| 08/15 | 5,536 | 832 | 1,859 | 3,900 |
| 08/16 | 5,464 | 838 | 766 | |
| 08/17 | 4,857 ¹ | 374 ² | -233 | |
| 08/18 | 4,250 | 374 | -233 | 2,200 |
| 08/19 | 5,510 | 749 | 2,009 | |
| 08/20 | 5,982 | 699 | 1,171 | 2,300 |
| 08/21 | 6,756 | 586 | 1,360 | |
| 08/22 | 5,930 | 506 | -320 | |
| 08/23 | 6,263 | 568 | 901 | |
| 08/24 | 7,158 | 812 | 1,707 | |
| 08/25 | 6,285 | 474 | -399 | |
| 08/26 | 9,414 | 770 | 3,899 | 8,000 |
| 08/27 | 9,153 | 592 | 331 | |
| 08/28 | 6,291 | 512 | -2,350 | |
| 08/29 | 9,597 | 824 | 4,130 | 4,900 |
| 08/30 | 10,615 | 1,213 | 2,231 | |
| 08/31 | 12,773 | 1,063 | 3,221 | |
| 09/01 | 14,746 | 961 | 2,934 | |
| 09/02 | 14,398 | 1,199 | 851 | 11,000 |
| 09/03 | 13,291 | 1,067 | -40 | |

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Appendix F.4. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|------------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 12,231 | 1,323 | 263 | |
| 09/05 | 11,517 | 1,651 | 937 | |
| 09/06 | 10,803 | 1,672 | 958 | |
| 09/07 | 7,432 | 1,650 | -1,721 | |
| 09/08 | 5,412 ¹ | 382 ² | -1,638 | |
| 09/09 | 3,392 | 382 | -1,638 | |
| 09/10 | 2,058 | 444 | -890 | |
| 09/11 | 1,736 | 612 | 290 | |
| 09/12 | 1,954 | 1,972 | 2,190 | |
| 09/13 | 1,531 | 832 | 409 | |
| 09/14 | 1,253 | 678 | 400 | |
| 09/15 | 558 | 467 | -228 | |
| 09/16 | 444 ¹ | 159 ² | 45 | |
| 09/17 | 329 | 159 | 45 | |
| 09/18 | 247 | 241 | 159 | 25 |
| 09/19 | 130 | 84 | -33 | |
| 09/20 | 102 | 114 | 86 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>50,085</u> | <u>50,187</u> | |

Appendix F.5. Prince William Sound pink salmon counts, stream 92, Shale Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | 0 |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | 0 |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | 0 |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 7 | 0 | 7 | |
| 07/13 | 11 | 0 | 4 | 0 |
| 07/14 | 48 | 0 | 37 | |
| 07/15 | 99 | 0 | 51 | |
| 07/16 | 83 | 0 | -16 | |
| 07/17 | 59 | 0 | -24 | |
| 07/18 | 90 | 0 | 31 | 150 |
| 07/19 | 84 | 0 | -6 | |
| 07/20 | 61 | 0 | -23 | |
| 07/21 | 145 | 0 | 84 | |
| 07/22 | 87 | 1 | -57 | 270 |
| 07/23 | 116 | 1 | 30 | |
| 07/24 | 174 | 0 | 58 | |
| 07/25 | 91 | 3 | -80 | |
| 07/26 | 82 | 2 | -7 | |
| 07/27 | 108 | 7 | 33 | |
| 07/28 | 87 | 4 | -17 | |
| 07/29 | 124 | 6 | 43 | |

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Appendix F.5. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 153 ¹ | 3 ² | 31 | |
| 07/31 | 181 | 3 | 31 | |
| 08/01 | 231 | 11 | 61 | |
| 08/02 | 302 | 13 | 84 | 550 |
| 08/03 | 351 | 25 | 74 | |
| 08/04 | 325 | 24 | -2 | |
| 08/05 | 319 | 20 | 14 | 400 |
| 08/06 | 450 | 25 | 156 | |
| 08/07 | 388 | 30 | -32 | |
| 08/08 | 368 | 67 | 47 | 200 |
| 08/09 | 395 | 66 | 93 | |
| 08/10 | 354 | 28 | -13 | |
| 08/11 | 447 | 42 | 135 | |
| 08/12 | 317 | 29 | -101 | 600 |
| 08/13 | 329 | 30 | 42 | |
| 08/14 | 479 | 37 | 187 | |
| 08/15 | 520 | 68 | 109 | 400 |
| 08/16 | 601 | 33 | 114 | |
| 08/17 | 804 ¹ | 12 ² | 215 | |
| 08/18 | 1,006 | 12 | 215 | 400 |
| 08/19 | 728 | 45 | -233 | |
| 08/20 | 917 | 146 | 335 | 700 |
| 08/21 | 826 | 178 | 87 | |
| 08/22 | 732 | 151 | 57 | |
| 08/23 | 676 | 102 | 46 | |
| 08/24 | 1,171 | 224 | 719 | |
| 08/25 | 1,640 | 58 | 527 | |
| 08/26 | 1,275 | 162 | -203 | 600 |
| 08/27 | 1,377 | 151 | 253 | |
| 08/28 | 1,243 | 167 | 33 | |
| 08/29 | 875 | 297 | -71 | 500 |
| 08/30 | 852 | 219 | 196 | |
| 08/31 | 1,053 | 320 | 521 | |
| 09/01 | 1,083 | 237 | 267 | |
| 09/02 | 1,287 | 295 | 499 | 450 |
| 09/03 | 1,292 | 451 | 456 | |

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Appendix F.5. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|-----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,023 | 392 | 123 | |
| 09/05 | 1,012 | 159 | 148 | |
| 09/06 | 805 | 388 | 181 | |
| 09/07 | 608 | 167 | -30 | |
| 09/08 | 354 | 58 | -196 | |
| 09/09 | 502 | 84 | 232 | |
| 09/10 | 324 | 54 | -124 | |
| 09/11 | 251 | 75 | 2 | |
| 09/12 | 277 | 124 | 150 | |
| 09/13 | 255 | 80 | 58 | |
| 09/14 | 250 | 54 | 49 | |
| 09/15 | 80 | 58 | -112 | |
| 09/16 | 92 ¹ | 31 ² | 42 | |
| 09/17 | 103 | 31 | 42 | |
| 09/18 | 91 | 19 | 7 | 18 |
| 09/19 | 69 | 13 | -9 | |
| 09/20 | 35 | 28 | -6 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>5,618</u> | <u>5,653</u> | |

Appendix F.6. Prince William Sound pink salmon counts, stream 93, Kirkwood Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | 0 |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | 0 |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 10 | 0 | 10 | |
| 07/10 | 2 | 0 | -8 | 100 |
| 07/11 | 0 | 0 | -2 | |
| 07/12 | 46 | 0 | 46 | |
| 07/13 | 112 | 0 | 66 | 0 |
| 07/14 | 160 | 7 | 55 | |
| 07/15 | 238 | 0 | 78 | |
| 07/16 | 577 | 22 | 361 | |
| 07/17 | 725 | 17 | 165 | |
| 07/18 | 1,847 | 48 | 1,170 | 0 |
| 07/19 | 1,578 | 58 | -211 | |
| 07/20 | 1,511 | 71 | 4 | |
| 07/21 | 2,213 | 303 | 1,005 | |
| 07/22 | 1,898 | 185 | -130 | 1,050 |
| 07/23 | 756 | 105 | -1,037 | |
| 07/24 | 1,945 | 462 | 1,651 | |
| 07/25 | 2,069 | 539 | 663 | |
| 07/26 | 1,811 | 328 | 70 | |
| 07/27 | 1,466 | 724 | 379 | 1,100 |
| 07/28 | 1,063 | 661 | 258 | |
| 07/29 | 1,197 | 409 | 543 | |

- continued -

Appendix F.6. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,211 ¹ | 345 ² | 359 | |
| 07/31 | 1,225 | 345 | 359 | |
| 08/01 | 1,141 | 248 | 164 | |
| 08/02 | 1,179 | 275 | 313 | 380 |
| 08/03 | 1,294 | 544 | 659 | |
| 08/04 | 834 | 378 | -82 | |
| 08/05 | 851 | 237 | 254 | 400 |
| 08/06 | 794 | 432 | 375 | |
| 08/07 | 805 | 309 | 320 | |
| 08/08 | 798 | 349 | 342 | 600 |
| 08/09 | 598 | 286 | 86 | |
| 08/10 | 595 | 204 | 201 | |
| 08/11 | 787 | 179 | 371 | |
| 08/12 | 830 | 176 | 219 | 450 |
| 08/13 | 738 | 190 | 98 | |
| 08/14 | 1,005 | 110 | 377 | |
| 08/15 | 1,053 | 158 | 206 | |
| 08/16 | 1,055 | 87 | 89 | |
| 08/17 | 1,137 ¹ | 51 ² | 133 | |
| 08/18 | 1,219 | 51 | 133 | 380 |
| 08/19 | 1,249 | 129 | 159 | |
| 08/20 | 1,626 | 220 | 597 | 800 |
| 08/21 | 1,166 | 195 | -265 | |
| 08/22 | 1,513 | 138 | 485 | |
| 08/23 | 1,325 | 206 | 18 | |
| 08/24 | 1,510 | 269 | 454 | |
| 08/25 | 1,671 | 127 | 288 | |
| 08/26 | 1,897 | 299 | 525 | 700 |
| 08/27 | 1,191 | 315 | -391 | |
| 08/28 | 1,652 | 320 | 781 | |
| 08/29 | 1,502 | 253 | 103 | 900 |
| 08/30 | 1,440 | 331 | 269 | |
| 08/31 | 1,397 | 337 | 294 | |
| 09/01 | 1,404 | 391 | 398 | |
| 09/02 | 1,466 | 339 | 401 | 375 |
| 09/03 | 1,101 | 395 | 30 | |

- continued -

Appendix F.6. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,166 | 264 | 329 | |
| 09/05 | 1,275 | 121 | 230 | |
| 09/06 | 865 | 259 | -151 | |
| 09/07 | 917 | 135 | 187 | |
| 09/08 | 510 | 32 | -375 | |
| 09/09 | 814 | 127 | 431 | |
| 09/10 | 505 | 56 | -253 | |
| 09/11 | 431 | 117 | 43 | |
| 09/12 | 453 | 140 | 162 | |
| 09/13 | 319 | 234 | 100 | |
| 09/14 | 257 | 88 | 26 | |
| 09/15 | 150 | 58 | -49 | |
| 09/16 | 108 ¹ | 30 ² | -13 | |
| 09/17 | 66 | 30 | -13 | |
| 09/18 | 25 | 17 | -24 | 0 |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>14,863</u> | <u>14,888</u> | |

Appendix F.7. Prince William Sound pink salmon counts, stream 94, Rock Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | 0 |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | 0 |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 ¹ | 0 ² | 0 | 0 |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 1 | 0 | 1 | |
| 07/13 | 0 | 0 | -1 | 0 |
| 07/14 | 11 | 0 | 11 | |
| 07/15 | 0 | 0 | -11 | |
| 07/16 | 46 | 4 | 50 | |
| 07/17 | 67 | 0 | 21 | |
| 07/18 | 289 | 4 | 226 | 220 |
| 07/19 | 261 | 19 | -9 | |
| 07/20 | 293 | 26 | 58 | |
| 07/21 | 834 | 49 | 590 | |
| 07/22 | 290 | 19 | -525 | 300 |
| 07/23 | 328 | 28 | 66 | |
| 07/24 | 303 | 0 | -25 | |
| 07/25 | 432 | 40 | 169 | |
| 07/26 | 454 | 41 | 63 | |
| 07/27 | 568 | 47 | 161 | 400 |
| 07/28 | 797 | 85 | 314 | |
| 07/29 | 538 | 85 | -174 | |

- continued -

Appendix F.7. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 514 ¹ | 43 ² | 19 | |
| 07/31 | 489 | 43 | 19 | |
| 08/01 | 459 | 19 | -11 | |
| 08/02 | 730 | 89 | 360 | 0 |
| 08/03 | 636 | 124 | 30 | |
| 08/04 | 600 | 214 | 178 | |
| 08/05 | 576 | 139 | 115 | 150 |
| 08/06 | 408 | 210 | 42 | |
| 08/07 | 508 | 11 | 111 | |
| 08/08 | 365 | 338 | 195 | 0 |
| 08/09 | 470 | 175 | 280 | |
| 08/10 | 374 | 102 | 6 | |
| 08/11 | 854 | 104 | 584 | |
| 08/12 | 857 | 41 | 44 | 970 |
| 08/13 | 577 | 98 | -182 | |
| 08/14 | 967 | 62 | 452 | |
| 08/15 | 946 | 69 | 48 | |
| 08/16 | 1,145 | 85 | 284 | |
| 08/17 | 1,141 ¹ | 40 ² | 36 | |
| 08/18 | 1,137 | 40 | 36 | 80 |
| 08/19 | 1,577 | 181 | 621 | |
| 08/20 | 1,726 | 378 | 527 | 2,000 |
| 08/21 | 1,884 | 307 | 465 | |
| 08/22 | 1,303 | 357 | -224 | |
| 08/23 | 975 | 408 | 80 | |
| 08/24 | 1,243 | 432 | 700 | |
| 08/25 | 1,520 | 197 | 474 | |
| 08/26 | 2,156 | 399 | 1,035 | 600 |
| 08/27 | 1,456 | 344 | -356 | |
| 08/28 | 1,587 | 495 | 626 | |
| 08/29 | 2,162 | 271 | 846 | 1,200 |
| 08/30 | 1,736 | 533 | 107 | |
| 08/31 | 2,780 | 666 | 1,710 | |
| 09/01 | 1,577 | 515 | -688 | |
| 09/02 | 1,377 | 1,031 | 831 | 2,500 |
| 09/03 | 1,565 | 809 | 997 | |

- continued -

Appendix F.8. Prince William Sound pink salmon counts, stream 143, Siwash Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | 0 | 0 | | |
| 06/26 | 0 | 0 | | |
| 06/27 | 0 | 0 | | |
| 06/28 | 0 | 0 | | 0 |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | 0 |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | 0 |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 1 | 0 | 1 | |
| 07/09 | 0 | 0 | -1 | 0 |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 23 | 0 | 23 | |
| 07/13 | 57 | 0 | 34 | |
| 07/14 | 116 | 0 | 59 | |
| 07/15 | 313 | 1 | 198 | |
| 07/16 | 225 | 0 | -88 | |
| 07/17 | 520 | 0 | 295 | 50 |
| 07/18 | 642 | 3 | 125 | |
| 07/19 | 1,068 | 0 | 426 | |
| 07/20 | 1,914 | 14 | 860 | |
| 07/21 | 2,287 | 4 | 377 | |
| 07/22 | 2,354 | 3 | 70 | 800 |
| 07/23 | 2,697 | 11 | 354 | |
| 07/24 | 4,042 | 3 | 1,348 | |
| 07/25 | 4,928 | 4 | 890 | |
| 07/26 | 5,562 | 14 | 648 | 380 |
| 07/27 | 5,636 | 5 | 79 | |
| 07/28 | 4,499 | 8 | -1,129 | |
| 07/29 | 7,101 | 21 | 2,623 | |

- continued -

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 6,746 | 30 | -325 | |
| 07/31 | 7,127 | 15 | 396 | 1,020 |
| 08/01 | 6,969 | 36 | -122 | |
| 08/02 | 8,927 | 46 | 2,004 | |
| 08/03 | 7,991 | 57 | -879 | |
| 08/04 | 5,658 | 51 | -2,282 | |
| 08/05 | 7,099 | 77 | 1,518 | |
| 08/06 | 9,438 | 83 | 2,422 | 200 |
| 08/07 | 7,976 | 131 | -1,331 | |
| 08/08 | 8,568 | 176 | 768 | |
| 08/09 | 8,154 | 223 | -191 | 500 |
| 08/10 | 7,956 | 117 | -81 | |
| 08/11 | 5,579 | 433 | -1,944 | |
| 08/12 | 7,143 | 259 | 1,823 | 1,800 |
| 08/13 | 4,085 | 274 | -2,784 | |
| 08/14 | 6,869 | 334 | 3,118 | |
| 08/15 | 5,930 | 677 | -262 | |
| 08/16 | 6,770 | 352 | 1,192 | 270 |
| 08/17 | 5,712 | 274 | -784 | |
| 08/18 | 5,853 | 361 | 502 | |
| 08/19 | 4,541 | 435 | -877 | |
| 08/20 | 4,519 | 542 | 520 | |
| 08/21 | 3,562 | 337 | -620 | |
| 08/22 | 3,067 | 748 | 253 | 900 |
| 08/23 | 2,477 | 439 | -151 | |
| 08/24 | 2,528 | 516 | 567 | 300 |
| 08/25 | 2,012 | 526 | 10 | |
| 08/26 | 2,623 | 701 | 1,312 | |
| 08/27 | 1,754 | 903 | 34 | |
| 08/28 | 826 | 243 | -685 | |
| 08/29 | 1,501 | 447 | 1,122 | |
| 08/30 | 736 | 274 | -491 | 200 |
| 08/31 | 1,140 | 732 | 1,136 | |
| 09/01 | 756 | 250 | -134 | |
| 09/02 | 920 | 220 | 384 | 55 |
| 09/03 | 787 | 172 | 39 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 701 | 200 | 114 | |
| 09/05 | 541 | 182 | 22 | |
| 09/06 | 471 | 184 | 114 | 25 |
| 09/07 | 341 | 60 | -70 | |
| 09/08 | 252 | 113 | 24 | |
| 09/09 | 174 | 38 | -40 | |
| 09/10 | 160 | 47 | 33 | |
| 09/11 | 109 ¹ | 10 ² | -41 | |
| 09/12 | 58 | 10 | -41 | |
| 09/13 | 54 | 12 | 8 | |
| 09/14 | 27 | 8 | -19 | |
| 09/15 | 28 | 6 | 7 | |
| 09/16 | 22 ¹ | 3 ² | -4 | |
| 09/17 | 15 ¹ | 3 ² | -4 | |
| 09/18 | 9 | 3 | -4 | |
| 09/19 | 8 ¹ | 1 ² | -1 | |
| 09/20 | 6 ¹ | 1 ² | -1 | |
| 09/21 | 5 ¹ | 1 ² | -1 | |
| 09/22 | 4 ¹ | 1 ² | -1 | 0 |
| 09/23 | 3 ¹ | 1 ² | -1 | |
| 09/24 | 1 ¹ | 1 ² | -1 | |
| 09/25 | 0 | 1 | -1 | |
| 09/26 | 3 | 2 | 5 | |
| 09/27 | 2 ¹ | 1 ² | -1 | |
| 09/28 | 0 | 1 | -1 | |
| TOTAL | | <u>12,468</u> | <u>12,468</u> | |

Appendix F.9. Prince William Sound pink salmon counts, stream 145, Crooked Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | 0 | 0 | | |
| 06/26 | 0 | 0 | 0 | |
| 06/27 | 0 | 0 | 0 | 0 |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | 0 |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 6 | |
| 07/05 | 0 | 6 | 2 | 0 |
| 07/06 | 0 | 2 | 0 | |
| 07/07 | 0 | 0 | 3 | |
| 07/08 | 0 | 3 | 0 | |
| 07/09 | 0 | 0 | 2 | 20 |
| 07/10 | 1 | 1 | 2 | |
| 07/11 | 3 | 0 | -1 | |
| 07/12 | 2 | 0 | 16 | |
| 07/13 | 15 | 3 | -3 | 0 |
| 07/14 | 12 | 0 | 25 | |
| 07/15 | 37 | 0 | 29 | |
| 07/16 | 64 | 2 | 6 | |
| 07/17 | 70 | 0 | -6 | |
| 07/18 | 64 | 0 | 52 | 300 |
| 07/19 | 116 | 0 | 18 | |
| 07/20 | 134 | 0 | 14 | |
| 07/21 | 147 | 1 | -5 | |
| 07/22 | 142 | 0 | 32 | 110 |
| 07/23 | 168 | 6 | 33 | |
| 07/24 | 201 | 0 | 62 | |
| 07/25 | 255 | 8 | 101 | |
| 07/26 | 352 | 4 | 99 | |
| 07/27 | 437 | 14 | -27 | 520 |
| 07/28 | 375 | 35 | 234 | |
| 07/29 | 595 | 14 | -119 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 449 | 27 | -193 | |
| 07/31 | 219 | 37 | 231 | |
| 08/01 | 425 | 25 | 114 | |
| 08/02 | 506 | 33 | 129 | 120 |
| 08/03 | 585 | 50 | 15 | |
| 08/04 | 563 | 37 | 271 | |
| 08/05 | 765 | 69 | 37 | 700 |
| 08/06 | 725 | 77 | 3 | |
| 08/07 | 668 | 60 | 86 | |
| 08/08 | 716 | 38 | -206 | 0 |
| 08/09 | 481 | 29 | 179 | |
| 08/10 | 599 | 61 | -83 | |
| 08/11 | 441 | 75 | 186 | |
| 08/12 | 597 | 30 | -55 | 0 |
| 08/13 | 489 | 53 | 41 | |
| 08/14 | 452 | 78 | -79 | |
| 08/15 | 294 | 79 | 143 | |
| 08/16 | 350 | 87 | -115 | |
| 08/17 | 207 | 28 | 152 | |
| 08/18 | 299 | 60 | -29 | 500 |
| 08/19 | 228 | 42 | 58 | |
| 08/20 | 247 | 39 | 80 | 200 |
| 08/21 | 259 | 68 | -2 | |
| 08/22 | 238 | 19 | 29 | |
| 08/23 | 234 | 33 | 5 | |
| 08/24 | 203 | 36 | 91 | |
| 08/25 | 255 | 39 | -48 | |
| 08/26 | 172 | 35 | -27 | 300 |
| 08/27 | 123 | 22 | 44 | |
| 08/28 | 149 | 18 | 33 | |
| 08/29 | 162 | 20 | 56 | 100 |
| 08/30 | 193 | 25 | 5 | |
| 08/31 | 166 | 32 | 16 | |
| 09/01 | 149 | 33 | 21 | |
| 09/02 | 146 | 24 | 8 | 25 |
| 09/03 | 129 | 25 | 0 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|-----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 91 | 38 | 29 | |
| 09/05 | 108 | 12 | 6 | |
| 09/06 | 102 | 12 | -1 | |
| 09/07 | 84 ¹ | 18 ² | -1 | |
| 09/08 | 65 | 18 | -6 | |
| 09/09 | 43 | 16 | -2 | |
| 09/10 | 31 | 10 | 12 | |
| 09/11 | 30 | 13 | -3 | |
| 09/12 | 23 | 4 | 13 | |
| 09/13 | 27 | 9 | -6 | |
| 09/14 | 17 | 4 | 0 | |
| 09/15 | 10 | 7 | 12 | |
| 09/16 | 12 | 10 | -2 | |
| 09/17 | 9 | 1 | 5 | |
| 09/18 | 9 | 5 | 3 | 0 |
| 09/19 | 8 | 4 | 1 | |
| 09/20 | 6 | 3 | 1 | |
| 09/21 | 6 | 1 | -2 | |
| 09/22 | 3 | 1 | -1 | |
| 09/23 | 2 | 0 | 1 | |
| 09/24 | 1 | 2 | -1 | |
| 09/25 | 0 | 0 | 0 | |
| 09/26 | 0 | 0 | 1 | |
| 09/27 | 0 | 1 | 0 | |
| 09/28 | 0 | 0 | 0 | |
| TOTAL | | <u>1,830</u> | <u>1,830</u> | |

Appendix F.10 Prince William Sound pink salmon counts, stream 507, Gumboot Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 ¹ | 0 ² | 0 | |
| 07/07 | 0 ¹ | 0 ² | 0 | |
| 07/08 | 0 ¹ | 0 ² | 0 | |
| 07/09 | 0 ¹ | 0 ² | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 2 | 0 | 2 | |
| 07/25 | 3 | 0 | 1 | 0 |
| 07/26 | 18 | 0 | 15 | |
| 07/27 | 3 | 3 | -12 | |
| 07/28 | 0 | 0 | -3 | 0 |
| 07/29 | 0 | 0 | 0 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1 | 0 | 1 | |
| 07/31 | 14 ¹ | 0 ² | 13 | |
| 08/01 | 26 | 0 | 13 | |
| 08/02 | 27 ¹ | 0 ² | 1 | 0 |
| 08/03 | 28 | 0 | 1 | |
| 08/04 | 5 | 0 | -23 | |
| 08/05 | 59 | 0 | 54 | |
| 08/06 | 54 | 0 | -5 | |
| 08/07 | 34 | 0 | -20 | |
| 08/08 | 31 | 0 | -3 | |
| 08/09 | 44 | 0 | 13 | 0 |
| 08/10 | 107 ¹ | 0 ² | 63 | |
| 08/11 | 170 | 0 | 63 | |
| 08/12 | 196 | 1 | 27 | 0 |
| 08/13 | 408 | 0 | 212 | |
| 08/14 | 437 | 0 | 29 | |
| 08/15 | 411 | 0 | -26 | |
| 08/16 | 717 | 0 | 306 | |
| 08/17 | 736 ¹ | 2 ² | 20 | |
| 08/18 | 754 | 2 | 20 | |
| 08/19 | 809 | 1 | 56 | 0 |
| 08/20 | 788 | 4 | -17 | |
| 08/21 | 1,439 | 2 | 653 | |
| 08/22 | 1,061 | 3 | -375 | 0 |
| 08/23 | 1,607 | 23 | 569 | |
| 08/24 | 1,572 ¹ | 2 ² | -34 | |
| 08/25 | 1,536 | 2 | -34 | |
| 08/26 | 1,403 ¹ | 27 ² | -107 | |
| 08/27 | 1,270 | 27 | -107 | |
| 08/28 | 1,038 | 43 | -189 | 1,000 |
| 08/29 | 1,251 | 22 | 235 | |
| 08/30 | 1,157 | 56 | -38 | |
| 08/31 | 1,214 | 60 | 117 | |
| 09/01 | 1,541 | 49 | 376 | |
| 09/02 | 1,366 | 48 | -127 | |
| 09/03 | 1,391 | 68 | 93 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,527 | 20 | 1,156 | |
| 09/05 | 1,247 | 12 | -1,268 | 500 |
| 09/06 | 1,338 | 14 | 105 | |
| 09/07 | 813 | 49 | -476 | |
| 09/08 | 560 ¹ | 22 ² | -232 | |
| 09/09 | 306 | 22 | -232 | |
| 09/10 | 222 ¹ | 13 ² | -72 | |
| 09/11 | 138 | 13 | -72 | |
| 09/12 | 147 ¹ | 25 ² | 33 | |
| 09/13 | 155 | 25 | 33 | |
| 09/14 | 99 ¹ | 7 ² | -50 | |
| 09/15 | 43 | 7 | -50 | |
| 09/16 | 34 ¹ | 2 ² | -6 | |
| 09/17 | 26 ¹ | 2 ² | -6 | |
| 09/18 | 17 | 2 | -6 | |
| 09/19 | 8 | 17 | 8 | |
| 09/20 | 6 | 3 | 1 | |
| 09/21 | 5 ¹ | 4 ² | 3 | |
| 09/22 | 4 | 4 | 3 | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>702</u> | <u>706</u> | |

Appendix F.11. Prince William Sound pink salmon counts, stream 508, Solf Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 ¹ | 0 ² | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 ¹ | 0 ² | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 25 | 0 | 25 | |
| 07/25 | 0 | 0 | -25 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 3 | 0 | 3 | |
| 07/28 | 5 | 0 | 2 | 0 |
| 07/29 | 15 | 0 | 10 | |

- continued -

Appendix F.11. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 35 | 1 | 21 | |
| 07/31 | 87 | 0 | 52 | |
| 08/01 | 83 | 3 | -1 | |
| 08/02 | 200 | 2 | 119 | |
| 08/03 | 249 | 5 | 54 | |
| 08/04 | 205 | 10 | -34 | |
| 08/05 | 454 ¹ | 10 ² | 259 | |
| 08/06 | 703 | 10 | 259 | |
| 08/07 | 432 | 61 | -210 | |
| 08/08 | 372 | 75 | 15 | |
| 08/09 | 518 | 79 | 225 | 50 |
| 08/10 | 566 | 84 | 132 | |
| 08/11 | 807 | 27 | 268 | |
| 08/12 | 924 | 52 | 169 | 2,500 |
| 08/13 | 985 | 56 | 117 | |
| 08/14 | 1,397 | 76 | 488 | |
| 08/15 | 1,405 | 204 | 212 | |
| 08/16 | 1,757 | 101 | 453 | |
| 08/17 | 2,264 | 115 | 622 | |
| 08/18 | 3,072 | 307 | 1,115 | |
| 08/19 | 2,609 | 274 | -189 | 5,000 |
| 08/20 | 2,506 | 493 | 390 | |
| 08/21 | 2,862 | 618 | 974 | |
| 08/22 | 2,421 | 590 | 149 | |
| 08/23 | 3,545 | 476 | 1,600 | |
| 08/24 | 4,120 | 563 | 1,138 | |
| 08/25 | 8,620 | 433 | 4,933 | |
| 08/26 | 6,906 ¹ | 316 | -1,398 | |
| 08/27 | 5,192 | 613 | -1,101 | |
| 08/28 | 6,401 | 860 | 2,069 | 7,000 |
| 08/29 | 5,283 | 877 | -241 | |
| 08/30 | 5,717 | 748 | 1,182 | |
| 08/31 | 5,233 | 728 | 244 | |
| 09/01 | 9,027 | 889 | 4,683 | |
| 09/02 | 3,924 | 707 | -4,396 | |
| 09/03 | 9,076 | 1,993 | 7,145 | |

- continued -

Appendix F.11. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------|---------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 8,851 | 892 | 667 | |
| 09/05 | 9,414 | 1,427 | 1,990 | 2,500 |
| 09/06 | 6,571 | 1,590 | -1,253 | |
| 09/07 | 6,904 | 1,113 | 1,446 | |
| 09/08 | 4,370 | 996 | -1,538 | |
| 09/09 | 4,590 | 862 | 1,082 | |
| 09/10 | 2,590 | 759 | -1,241 | |
| 09/11 | 3,307 | 1,046 | 1,763 | |
| 09/12 | 2,740 | 1,014 | 447 | |
| 09/13 | 2,122 | 1,060 | 442 | |
| 09/14 | 1,307 | 541 | -274 | |
| 09/15 | 1,198 | 376 | 267 | |
| 09/16 | 747 | 406 | -45 | |
| 09/17 | 346 | 519 | 118 | |
| 09/18 | 269 | 427 | 350 | |
| 09/19 | 137 | 111 | -21 | |
| 09/20 | 83 | 72 | 18 | |
| 09/21 | 43 | 62 | 22 | |
| 09/22 | 28 | 37 | 22 | |
| 09/23 | 11 | 22 | 5 | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>25,788</u> | <u>25,799</u> | |

Appendix F.12. Prince William Sound pink salmon counts, stream 510, Elishansky Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 ¹ | 0 ² | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 1 | 0 | 1 | |
| 07/18 | 3 | 0 | 2 | |
| 07/19 | 0 | 0 | -3 | 0 |
| 07/20 | 2 | 0 | 2 | |
| 07/21 | 30 | 0 | 28 | |
| 07/22 | 47 | 0 | 17 | |
| 07/23 | 85 | 0 | 38 | |
| 07/24 | 150 | 0 | 65 | |
| 07/25 | 259 | 0 | 109 | 0 |
| 07/26 | 253 | 3 | -3 | |
| 07/27 | 396 | 2 | 145 | |
| 07/28 | 399 | 3 | 6 | 206 |
| 07/29 | 406 | 3 | 10 | |

- continued -

Appendix F.12. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 773 | 9 | 376 | |
| 07/31 | 282 | 1 | -490 | |
| 08/01 | 978 | 13 | 709 | |
| 08/02 | 1,015 | 26 | 63 | 1,100 |
| 08/03 | 1,015 | 37 | 37 | |
| 08/04 | 723 | 90 | -202 | |
| 08/05 | 937 | 134 | 348 | |
| 08/06 | 1,090 | 110 | 263 | |
| 08/07 | 1,166 | 132 | 208 | |
| 08/08 | 1,413 | 187 | 434 | |
| 08/09 | 1,211 | 195 | -7 | 900 |
| 08/10 | 1,260 | 153 | 202 | |
| 08/11 | 1,254 | 140 | 134 | |
| 08/12 | 1,224 | 108 | 78 | 700 |
| 08/13 | 1,165 | 101 | 42 | |
| 08/14 | 1,507 | 96 | 438 | |
| 08/15 | 1,428 | 160 | 81 | |
| 08/16 | 1,506 | 113 | 191 | |
| 08/17 | 1,998 | 105 | 597 | |
| 08/18 | 1,891 | 167 | 60 | |
| 08/19 | 1,896 | 125 | 130 | 2,500 |
| 08/20 | 1,888 | 271 | 263 | |
| 08/21 | 1,964 | 280 | 356 | |
| 08/22 | 1,923 | 374 | 333 | |
| 08/23 | 1,841 | 234 | 152 | |
| 08/24 | 2,071 | 179 | 409 | |
| 08/25 | 2,375 ¹ | 124 ² | 428 | |
| 08/26 | 2,679 | 124 | 428 | |
| 08/27 | 2,671 ¹ | 195 ² | 186 | |
| 08/28 | 2,662 | 195 | 186 | 5,000 |
| 08/29 | 2,552 | 209 | 99 | |
| 08/30 | 2,680 | 282 | 410 | |
| 08/31 | 2,735 | 269 | 324 | |
| 09/01 | 2,611 | 396 | 272 | |
| 09/02 | 3,360 ¹ | 265 | 1,014 | |
| 09/03 | 4,110 ¹ | 405 | 1,154 | |

- continued -

Appendix F.12. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 4,859 | 382 | 1,131 | |
| 09/05 | 2,672 | 354 | -1,833 | 1,200 |
| 09/06 | 2,789 | 541 | 658 | |
| 09/07 | 2,746 | 744 | 701 | |
| 09/08 | 1,262 | 664 | -820 | |
| 09/09 | 1,635 | 223 | 596 | |
| 09/10 | 785 | 364 | -486 | |
| 09/11 | 1,320 | 512 | 1,047 | |
| 09/12 | 1,192 | 432 | 304 | |
| 09/13 | 947 | 331 | 86 | |
| 09/14 | 304 | 174 | -469 | |
| 09/15 | 398 | 134 | 228 | |
| 09/16 | 248 | 159 | 9 | |
| 09/17 | 281 | 159 | 192 | |
| 09/18 | 169 | 124 | 12 | |
| 09/19 | 143 | 31 | 5 | |
| 09/20 | 104 | 30 | -9 | |
| 09/21 | 60 | 32 | -12 | |
| 09/22 | 29 | 17 | -14 | |
| 09/23 | 15 | 6 | -8 | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>11,426</u> | <u>11,441</u> | |

Appendix F.13. Prince William Sound pink salmon counts, stream 516, Clemence Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 ¹ | 0 ² | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | |
| 07/29 | 0 | 0 | 0 | |

- continued -

Appendix F.13. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 0 ¹ | 0 ² | 0 | |
| 08/01 | 0 | 0 | 0 | |
| 08/02 | 0 ¹ | 0 ² | 0 | |
| 08/03 | 0 | 0 | 0 | |
| 08/04 | 0 | 0 | 0 | |
| 08/05 | 0 | 0 | 0 | |
| 08/06 | 0 | 0 | 0 | |
| 08/07 | 0 | 0 | 0 | |
| 08/08 | 2 | 0 | 2 | |
| 08/09 | 1 | 0 | -1 | |
| 08/10 | 1 ¹ | 0 ² | -1 | |
| 08/11 | 0 | 0 | -1 | |
| 08/12 | 18 | 0 | 18 | 0 |
| 08/13 | 9 | 0 | -9 | |
| 08/14 | 21 | 0 | 12 | |
| 08/15 | 21 | 0 | 0 | |
| 08/16 | 48 | 0 | 27 | |
| 08/17 | 138 ¹ | 0 ² | 90 | |
| 08/18 | 228 | 0 | 90 | |
| 08/19 | 339 | 1 | 112 | |
| 08/20 | 298 | 19 | -22 | |
| 08/21 | 614 | 88 | 404 | |
| 08/22 | 623 | 62 | 71 | |
| 08/23 | 881 | 228 | 486 | |
| 08/24 | 1,430 ¹ | 113 ² | 662 | |
| 08/25 | 1,978 | 113 | 662 | 1,000 |
| 08/26 | 1,630 | 138 | -210 | |
| 08/27 | 1,918 | 208 | 496 | |
| 08/28 | 1,542 | 83 | -293 | |
| 08/29 | 1,847 | 101 | 406 | |
| 08/30 | 1,751 | 222 | 126 | |
| 08/31 | 1,720 | 234 | 203 | |
| 09/01 | 1,650 ¹ | 268 ² | 198 | |
| 09/02 | 1,579 | 268 | 198 | |
| 09/03 | 1,617 | 365 | 403 | |

- continued -

Appendix F.13. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,007 | 262 | 652 | |
| 09/05 | 2,478 | 208 | 679 | 200 |
| 09/06 | 2,119 | 186 | -173 | |
| 09/07 | 2,124 | 363 | 368 | |
| 09/08 | 1,586 | 79 | -459 | |
| 09/09 | 1,304 | 248 | -34 | |
| 09/10 | 959 | 91 | -254 | |
| 09/11 | 690 | 105 | -164 | |
| 09/12 | 561 ¹ | 162 ² | 33 | |
| 09/13 | 432 | 162 | 33 | |
| 09/14 | 281 ¹ | 33 ² | -118 | |
| 09/15 | 130 | 33 | -118 | |
| 09/16 | 100 ¹ | 25 ² | -4 | |
| 09/17 | 71 ¹ | 25 ² | -4 | |
| 09/18 | 41 | 25 | -4 | |
| 09/19 | 40 | 10 | 9 | |
| 09/20 | 33 | 72 | 65 | |
| 09/21 | 18 | 37 | 22 | |
| 09/22 | 16 | 11 | 9 | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>4,649</u> | <u>4,665</u> | |

Appendix F.14. Prince William Sound pink salmon counts, stream 601, Paddy Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 ¹ | 0 ² | 0 | |
| 07/01 | 0 ¹ | 0 ² | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

- continued -

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| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,849 | 631 | 1,915 | |
| 09/05 | 2,539 | 285 | -25 | |
| 09/06 | 3,121 | 397 | 979 | |
| 09/07 | 2,301 | 275 | -545 | |
| 09/08 | 358 | 53 | -1,890 | |
| 09/09 | 1,101 | 169 | 912 | |
| 09/10 | 470 | 79 | -552 | |
| 09/11 | 670 | 153 | 353 | |
| 09/12 | 671 | 336 | 337 | |
| 09/13 | 404 | 318 | 51 | |
| 09/14 | 287 | 161 | 44 | |
| 09/15 | 41 | 36 | -210 | |
| 09/16 | 35 ¹ | 24 ² | 18 | |
| 09/17 | 29 | 24 | 18 | |
| 09/18 | 39 | 26 | 36 | 0 |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| TOTAL | | 12,783 | 12,822 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 16 | 1 | 17 | |
| 07/31 | 109 | 0 | 93 | |
| 08/01 | 363 | 0 | 254 | |
| 08/02 | 351 | 0 | -12 | |
| 08/03 | 451 | 3 | 103 | |
| 08/04 | 324 | 18 | -109 | 25 |
| 08/05 | 196 | 20 | -108 | |
| 08/06 | 211 | 17 | 32 | |
| 08/07 | 218 | 27 | 34 | |
| 08/08 | 183 | 28 | -7 | |
| 08/09 | 111 | 102 | 30 | 40 |
| 08/10 | 304 | 53 | 246 | |
| 08/11 | 1,029 | 67 | 792 | |
| 08/12 | 1,119 | 20 | 110 | |
| 08/13 | 825 | 26 | -268 | |
| 08/14 | 1,724 | 44 | 943 | 820 |
| 08/15 | 1,408 | 84 | -232 | |
| 08/16 | 1,518 | 89 | 199 | |
| 08/17 | 2,186 | 33 | 701 | |
| 08/18 | 3,058 | 165 | 1,037 | |
| 08/19 | 2,299 | 213 | -546 | 3,200 |
| 08/20 | 2,052 | 321 | 74 | |
| 08/21 | 1,641 | 211 | -200 | |
| 08/22 | 1,516 | 329 | 204 | 230 |
| 08/23 | 1,066 | 350 | -100 | |
| 08/24 | 1,132 | 238 | 304 | |
| 08/25 | 4,663 | 153 | 3,684 | |
| 08/26 | 4,972 | 328 | 637 | |
| 08/27 | 3,309 | 530 | -1,133 | |
| 08/28 | 3,046 | 286 | 23 | 1,500 |
| 08/29 | 4,313 | 323 | 1,590 | |
| 08/30 | 3,687 | 452 | -174 | |
| 08/31 | 2,970 | 292 | -425 | |
| 09/01 | 3,025 | 677 | 732 | |
| 09/02 | 3,532 | 991 | 1,498 | |
| 09/03 | 3,084 | 883 | 435 | |

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| Ground Survey | | | | |
|---------------|------------------|------------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 09/04 | 2,358 | 487 | -239 | |
| 09/05 | 4,633 | 547 | 2,822 | 1,500 |
| 09/06 | 4,998 | 452 | 817 | |
| 09/07 | 4,582 | 398 | -18 | |
| 09/08 | 1,461 | 257 | -2,864 | |
| 09/09 | 2,607 | 345 | 1,491 | |
| 09/10 | 837 | 205 | -1,565 | |
| 09/11 | 2,009 | 525 | 1,697 | |
| 09/12 | 1,574 | 389 | -46 | |
| 09/13 | 1,129 | 495 | 50 | |
| 09/14 | 765 ¹ | 196 ² | -169 | |
| 09/15 | 401 | 196 | -169 | |
| 09/16 | 321 ¹ | 74 ² | -7 | |
| 09/17 | 241 | 74 | -7 | |
| 09/18 | 183 | 90 | 32 | |
| 09/19 | 109 | 103 | 29 | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 12,205 | 12,314 | |

Appendix F.15. Prince William Sound pink salmon counts, stream 602, Nacketan Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 ¹ | 0 ² | 0 | |
| 07/01 | 0 ¹ | 0 ² | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

- continued -

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| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 0 | 0 | 0 | |
| 08/01 | 45 | 0 | 45 | |
| 08/02 | 123 | 0 | 78 | |
| 08/03 | 126 | 0 | 3 | |
| 08/04 | 126 | 0 | 0 | 0 |
| 08/05 | 117 | 0 | -9 | |
| 08/06 | 102 | 0 | -15 | |
| 08/07 | 110 | 0 | 8 | |
| 08/08 | 403 | 10 | 303 | |
| 08/09 | 290 | 2 | -111 | 0 |
| 08/10 | 413 | 5 | 128 | |
| 08/11 | 471 | 11 | 69 | |
| 08/12 | 618 | 0 | 147 | |
| 08/13 | 377 | 4 | -237 | |
| 08/14 | 874 | 6 | 503 | 300 |
| 08/15 | 944 | 15 | 85 | |
| 08/16 | 1,160 | 5 | 221 | |
| 08/17 | 2,577 | 3 | 1,420 | |
| 08/18 | 3,196 | 52 | 671 | |
| 08/19 | 2,543 | 29 | -624 | 5,000 |
| 08/20 | 2,687 | 88 | 232 | |
| 08/21 | 2,270 | 145 | -272 | |
| 08/22 | 2,537 | 240 | 507 | 1,400 |
| 08/23 | 2,482 | 265 | 210 | |
| 08/24 | 2,385 | 176 | 79 | |
| 08/25 | 4,795 | 176 | 2,586 | |
| 08/26 | 6,052 | 417 | 1,674 | |
| 08/27 | 6,059 | 540 | 547 | |
| 08/28 | 5,442 | 422 | -195 | 5,000 |
| 08/29 | 4,557 | 590 | -295 | |
| 08/30 | 6,382 | 581 | 2,406 | |
| 08/31 | 4,033 | 647 | -1,702 | |
| 09/01 | 5,793 | 651 | 2,411 | |
| 09/02 | 3,702 | 1,067 | -1,024 | |
| 09/03 | 4,072 | 1,029 | 1,399 | |

- continued -

Appendix F.15. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|------------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 5,582 | 798 | 2,308 | |
| 09/05 | 4,846 | 498 | -238 | 2,300 |
| 09/06 | 4,154 | 680 | -12 | |
| 09/07 | 4,459 | 964 | 1,269 | |
| 09/08 | 1,685 | 311 | -2,463 | |
| 09/09 | 2,717 | 464 | 1,496 | |
| 09/10 | 1,173 | 273 | -1,271 | |
| 09/11 | 2,080 | 724 | 1,631 | |
| 09/12 | 1,502 | 398 | -180 | |
| 09/13 | 959 | 512 | -31 | |
| 09/14 | 750 ¹ | 191 ² | -19 | |
| 09/15 | 541 | 191 | -19 | |
| 09/16 | 444 ¹ | 122 ² | 24 | |
| 09/17 | 346 | 122 | 24 | |
| 09/18 | 219 | 141 | 14 | |
| 09/19 | 116 | 63 | -40 | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>13,626</u> | <u>13,742</u> | |

Appendix F.16. Prince William Sound pink salmon counts, stream 604, Erb Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 49 | 0 | 49 | |
| 07/16 | 2 | 0 | -47 | |
| 07/17 | 0 | 0 | -2 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 6 | 0 | 6 | |
| 07/22 | 123 | 0 | 117 | |
| 07/23 | 53 | 0 | -70 | |
| 07/24 | 74 | 0 | 21 | |
| 07/25 | 262 | 2 | 190 | 100 |
| 07/26 | 240 | 0 | -22 | |
| 07/27 | 444 | 3 | 207 | |
| 07/28 | 529 | 19 | 104 | 125 |
| 07/29 | 517 | 22 | 10 | |

- continued -

Appendix F.16. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 657 | 28 | 168 | |
| 07/31 | 1,380 | 5 | 728 | |
| 08/01 | 2,339 | 32 | 991 | |
| 08/02 | 2,107 | 87 | -145 | |
| 08/03 | 2,178 | 69 | 140 | |
| 08/04 | 2,543 | 105 | 470 | 800 |
| 08/05 | 2,491 | 199 | 147 | |
| 08/06 | 2,527 | 205 | 241 | |
| 08/07 | 2,407 | 208 | 88 | |
| 08/08 | 2,317 | 332 | 242 | |
| 08/09 | 2,392 | 370 | 445 | 1,200 |
| 08/10 | 3,213 | 335 | 1,156 | |
| 08/11 | 3,101 | 241 | 129 | |
| 08/12 | 3,539 | 213 | 651 | |
| 08/13 | 5,143 | 150 | 1,754 | |
| 08/14 | 3,955 | 403 | -785 | 1,300 |
| 08/15 | 4,302 | 401 | 748 | |
| 08/16 | 3,720 | 295 | -287 | |
| 08/17 | 5,562 | 359 | 2,201 | |
| 08/18 | 4,456 | 571 | -535 | |
| 08/19 | 4,396 | 635 | 575 | 4,000 |
| 08/20 | 4,546 | 384 | 534 | |
| 08/21 | 4,330 | 556 | 340 | |
| 08/22 | 3,839 | 533 | 42 | 1,700 |
| 08/23 | 3,321 | 569 | 51 | |
| 08/24 | 4,455 | 797 | 1,931 | |
| 08/25 | 6,376 | 346 | 2,267 | |
| 08/26 | 6,426 | 536 | 586 | |
| 08/27 | 5,567 | 628 | -231 | |
| 08/28 | 7,033 | 787 | 2,253 | 3,700 |
| 08/29 | 6,005 | 321 | -707 | |
| 08/30 | 5,847 | 696 | 538 | |
| 08/31 | 5,416 | 1,097 | 666 | |
| 09/01 | 7,036 | 801 | 2,421 | |
| 09/02 | 6,298 | 904 | 166 | |
| 09/03 | 6,183 | 1,041 | 926 | |

- continued -

Appendix F.16. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 4,037 | 637 | -1,509 | |
| 09/05 | 6,694 | 728 | 3,385 | 1,000 |
| 09/06 | 5,007 | 950 | -737 | |
| 09/07 | 5,206 | 1,011 | 1,210 | |
| 09/08 | 2,430 | 316 | -2,460 | |
| 09/09 | 2,510 | 535 | 615 | |
| 09/10 | 816 | 123 | -1,571 | |
| 09/11 | 1,936 | 597 | 1,717 | |
| 09/12 | 1,167 | 508 | -261 | |
| 09/13 | 1,149 | 393 | 375 | |
| 09/14 | 304 | 142 | -703 | |
| 09/15 | 369 | 205 | 270 | |
| 09/16 | 251 ¹ | 72 ² | -47 | |
| 09/17 | 132 | 72 | -47 | |
| 09/18 | 110 | 74 | 52 | |
| 09/19 | 103 | 57 | 50 | |
| 09/20 | 67 | 44 | 8 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>21,748</u> | <u>21,815</u> | |

Appendix F.17. Prince William Sound pink salmon counts, stream 606, not named, 1991.

| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 2 | 0 | 2 | |
| 07/22 | 0 | 0 | -2 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 1 | 0 | 1 | |
| 07/25 | 13 | 1 | 13 | 20 |
| 07/26 | 5 | 1 | -7 | |
| 07/27 | 6 | 0 | 1 | |
| 07/28 | 33 | 1 | 28 | |
| 07/29 | 24 | 2 | -7 | |

- continued -

Appendix F.17. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 85 | 0 | 61 | |
| 07/31 | 67 | 1 | -17 | |
| 08/01 | 102 | 0 | 35 | |
| 08/02 | 166 | 0 | 64 | |
| 08/03 | 210 | 2 | 46 | |
| 08/04 | 265 | 3 | 58 | 0 |
| 08/05 | 272 | 8 | 15 | |
| 08/06 | 338 | 10 | 76 | |
| 08/07 | 325 | 18 | 5 | |
| 08/08 | 387 | 17 | 79 | |
| 08/09 | 423 | 35 | 71 | |
| 08/10 | 438 | 18 | 33 | |
| 08/11 | 537 | 13 | 112 | |
| 08/12 | 465 | 13 | -59 | |
| 08/13 | 467 | 16 | 18 | |
| 08/14 | 477 | 14 | 24 | 740 |
| 08/15 | 613 | 11 | 147 | |
| 08/16 | 372 | 44 | -197 | |
| 08/17 | 577 | 7 | 212 | |
| 08/18 | 1,216 | 29 | 668 | |
| 08/19 | 947 | 36 | -233 | 600 |
| 08/20 | 1,021 | 40 | 114 | |
| 08/21 | 1,097 | 153 | 229 | |
| 08/22 | 1,078 | 96 | 77 | |
| 08/23 | 1,234 | 166 | 322 | |
| 08/24 | 1,179 | 235 | 180 | |
| 08/25 | 1,224 | 51 | 96 | |
| 08/26 | 1,406 ¹ | 173 ² | 355 | |
| 08/27 | 1,587 | 173 | 355 | |
| 08/28 | 1,803 | 294 | 510 | 300 |
| 08/29 | 1,607 | 229 | 33 | |
| 08/30 | 1,269 | 205 | -133 | |
| 08/31 | 1,290 | 391 | 412 | |
| 09/01 | 1,800 | 285 | 795 | |
| 09/02 | 1,598 | 280 | 78 | |
| 09/03 | 1,644 | 552 | 598 | |

- continued -

Appendix F.17. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,013 | 289 | -342 | |
| 09/05 | 809 | 302 | 98 | 25 |
| 09/06 | 555 | 207 | -47 | |
| 09/07 | 459 | 169 | 73 | |
| 09/08 | 208 | 90 | -161 | |
| 09/09 | 51 | 78 | -79 | |
| 09/10 | 86 ¹ | 48 | 83 | |
| 09/11 | 121 | 50 | 85 | |
| 09/12 | 64 | 34 | -23 | |
| 09/13 | 51 | 44 | 31 | |
| 09/14 | 30 ¹ | 6 | -15 | |
| 09/15 | 9 | 13 | -8 | |
| 09/16 | 2 | 17 | 10 | |
| 09/17 | 9 | 10 | 17 | |
| 09/18 | 8 | 6 | 5 | |
| 09/19 | 6 ¹ | 2 ² | 0 | |
| 09/20 | 4 ¹ | 2 ² | 0 | |
| 09/21 | 2 | 2 | -2 | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>4,991</u> | <u>4,991</u> | |

Appendix F.18. Prince William Sound pink salmon counts, stream 610, Kompkoff River, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 2 | 0 | 2 | |
| 07/19 | 0 | 0 | -2 | 0 |
| 07/20 | 2 | 0 | 2 | |
| 07/21 | 11 | 0 | 9 | |
| 07/22 | 43 | 0 | 32 | |
| 07/23 | 32 | 0 | -11 | |
| 07/24 | 59 | 0 | 27 | |
| 07/25 | 113 | 0 | 54 | 0 |
| 07/26 | 98 | 0 | -15 | |
| 07/27 | 126 | 0 | 28 | |
| 07/28 | 204 | 0 | 78 | 0 |
| 07/29 | 219 | 0 | 15 | |

- continued -

Appendix F.18. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 234 | 0 | 15 | |
| 07/31 | 131 | 0 | -103 | |
| 08/01 | 152 | 0 | 21 | |
| 08/02 | 518 | 0 | 366 | |
| 08/03 | 530 | 0 | 12 | |
| 08/04 | 767 | 1 | 238 | 600 |
| 08/05 | 560 | 0 | -207 | |
| 08/06 | 1,309 | 0 | 749 | |
| 08/07 | 972 | 1 | -336 | |
| 08/08 | 978 | 5 | 11 | |
| 08/09 | 2,335 | 56 | 1,413 | 700 |
| 08/10 | 1,150 | 11 | -1,174 | |
| 08/11 | 1,554 | 11 | 415 | |
| 08/12 | 2,076 | 10 | 532 | |
| 08/13 | 1,287 | 6 | -783 | |
| 08/14 | 1,615 | 17 | 345 | 600 |
| 08/15 | 2,056 | 49 | 490 | |
| 08/16 | 1,906 | 43 | -107 | |
| 08/17 | 1,533 | 10 | -363 | |
| 08/18 | 2,034 | 65 | 566 | |
| 08/19 | 1,990 | 106 | 62 | 3,100 |
| 08/20 | 1,772 | 101 | -117 | |
| 08/21 | 2,915 | 220 | 1,363 | |
| 08/22 | 2,099 | 73 | -743 | 200 |
| 08/23 | 2,009 | 138 | 48 | |
| 08/24 | 3,389 | 156 | 1,536 | |
| 08/25 | 3,223 ¹ | 203 ² | 38 | |
| 08/26 | 3,058 ¹ | 203 ² | 38 | |
| 08/27 | 2,892 | 203 | 38 | |
| 08/28 | 2,968 | 155 | 231 | 4,025 |
| 08/29 | 2,345 | 268 | -355 | |
| 08/30 | 2,393 | 209 | 257 | |
| 08/31 | 1,595 | 363 | -435 | |
| 09/01 | 1,544 | 420 | 369 | |
| 09/02 | 2,170 | 446 | 1,072 | |
| 09/03 | 1,889 ¹ | 394 | 113 | |

- continued -

Appendix F.18. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,608 | 318 | 37 | |
| 09/05 | 1,353 ¹ | 109 | -146 | 100 |
| 09/06 | 1,098 | 274 | 19 | |
| 09/07 | 938 | 342 | 182 | |
| 09/08 | 758 ¹ | 134 | -47 | |
| 09/09 | 577 ¹ | 172 | -9 | |
| 09/10 | 397 ¹ | 242 | 62 | |
| 09/11 | 216 | 196 | 16 | |
| 09/12 | 184 | 95 | 63 | |
| 09/13 | 127 | 72 | 15 | |
| 09/14 | 76 ¹ | 34 | -17 | |
| 09/15 | 25 | 27 | -24 | |
| 09/16 | 18 ¹ | 8 | 1 | |
| 09/17 | 10 | 12 | 5 | |
| 09/18 | 5 | 2 | -3 | |
| 09/19 | 3 | 4 | 2 | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>5,985</u> | <u>5,988</u> | |

Appendix F.19. Prince William Sound pink salmon counts, stream 611, West Arm Jackpot Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 1 | 0 | 1 | |
| 07/25 | 2 | 0 | 1 | 0 |
| 07/26 | 0 | 0 | -2 | |
| 07/27 | 2 | 0 | 2 | |
| 07/28 | 11 | 1 | 10 | 0 |

- continued -

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| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/29 | 6 | 0 | -5 | |
| 07/30 | 44 | 0 | 38 | |
| 07/31 | 41 | 0 | -3 | |
| 08/01 | 107 | 0 | 66 | |
| 08/02 | 109 | 0 | 2 | |
| 08/03 | 105 | 10 | 6 | |
| 08/04 | 135 | 14 | 44 | 20 |
| 08/05 | 91 | 15 | -29 | |
| 08/06 | 146 | 18 | 73 | |
| 08/07 | 146 | 63 | 63 | |
| 08/08 | 161 | 53 | 68 | |
| 08/09 | 120 | 103 | 62 | 100 |
| 08/10 | 242 | 21 | 143 | |
| 08/11 | 422 | 61 | 241 | |
| 08/12 | 423 | 154 | 155 | |
| 08/13 | 370 | 20 | -33 | |
| 08/14 | 710 | 91 | 431 | 410 |
| 08/15 | 367 | 172 | -171 | |
| 08/16 | 430 | 108 | 171 | |
| 08/17 | 851 | 66 | 487 | |
| 08/18 | 624 | 263 | 36 | |
| 08/19 | 429 | 201 | 6 | 150 |
| 08/20 | 262 | 189 | 22 | |
| 08/21 | 223 | 140 | 101 | |
| 08/22 | 199 | 78 | 54 | 0 |
| 08/23 | 169 | 73 | 43 | |
| 08/24 | 147 | 54 | 32 | |
| 08/25 | 263 ¹ | 77 ² | 192 | |
| 08/26 | 378 ¹ | 77 ² | 192 | |
| 08/27 | 494 | 77 | 192 | |
| 08/28 | 420 | 37 | -37 | 125 |
| 08/29 | 299 | 100 | -21 | |
| 08/30 | 215 | 144 | 60 | |
| 08/31 | 177 | 166 | 128 | |
| 09/01 | 213 | 55 | 91 | |
| 09/02 | 207 | 216 | 210 | |

- continued -

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| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/03 | 305 | 78 | 176 | |
| 09/04 | 488 | 44 | 227 | |
| 09/05 | 595 | 83 | 190 | 100 |
| 09/06 | 377 | 165 | -53 | |
| 09/07 | 278 | 211 | 112 | |
| 09/08 | 178 | 69 | -31 | |
| 09/09 | 184 | 45 | 51 | |
| 09/10 | 152 | 76 | 44 | |
| 09/11 | 105 | 137 | 90 | |
| 09/12 | 63 | 47 | 5 | |
| 09/13 | 47 | 34 | 18 | |
| 09/14 | 15 | 11 | -21 | |
| 09/15 | 14 | 0 | -1 | |
| 09/16 | 7 | 11 | 4 | |
| 09/17 | 5 | 8 | 6 | |
| 09/18 | 2 | 5 | 2 | |
| 09/19 | 1 ¹ | 0 ² | -1 | |
| 09/20 | 1 ¹ | 0 ² | -1 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>3,940</u> | <u>3,941</u> | |

Appendix F.20. Prince William Sound pink salmon counts, stream 612, Jackpot #2 Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 26 | 0 | 26 | |
| 07/25 | 20 | 0 | -6 | 0 |
| 07/26 | 19 | 0 | -1 | |
| 07/27 | 19 | 0 | 0 | |
| 07/28 | 20 | 3 | 4 | 0 |
| 07/29 | 23 | 1 | 4 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 91 | 0 | 68 | |
| 07/31 | 130 | 2 | 41 | |
| 08/01 | 231 | 2 | 103 | |
| 08/02 | 297 | 2 | 68 | |
| 08/03 | 280 | 9 | -8 | |
| 08/04 | 244 | 29 | -7 | 75 |
| 08/05 | 165 | 38 | -41 | |
| 08/06 | 264 | 58 | 157 | |
| 08/07 | 233 | 63 | 32 | |
| 08/08 | 214 | 76 | 57 | |
| 08/09 | 113 | 61 | -40 | 100 |
| 08/10 | 189 | 26 | 102 | |
| 08/11 | 424 | 19 | 254 | |
| 08/12 | 739 | 48 | 363 | |
| 08/13 | 339 | 30 | -370 | |
| 08/14 | 792 | 56 | 509 | 200 |
| 08/15 | 616 | 109 | -67 | |
| 08/16 | 586 | 96 | 66 | |
| 08/17 | 840 | 53 | 307 | |
| 08/18 | 947 | 123 | 230 | |
| 08/19 | 700 | 97 | -150 | 300 |
| 08/20 | 582 | 211 | 93 | |
| 08/21 | 452 | 214 | 84 | |
| 08/22 | 465 | 52 | 65 | 300 |
| 08/23 | 401 | 129 | 65 | |
| 08/24 | 201 | 151 | -49 | |
| 08/25 | 306 ¹ | 93 ² | 198 | |
| 08/26 | 411 ¹ | 93 ² | 198 | |
| 08/27 | 516 | 93 | 198 | |
| 08/28 | 475 | 56 | 15 | 130 |
| 08/29 | 470 | 91 | 86 | |
| 08/30 | 330 | 86 | -54 | |
| 08/31 | 310 | 88 | 68 | |
| 09/01 | 286 | 16 | -8 | |
| 09/02 | 360 | 132 | 206 | |
| 09/03 | 210 | 123 | -27 | |

- continued -

Appendix F.20. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 382 | 21 | 193 | |
| 09/05 | 347 | 46 | 11 | 250 |
| 09/06 | 436 | 73 | 162 | |
| 09/07 | 465 | 130 | 159 | |
| 09/08 | 101 | 50 | -314 | |
| 09/09 | 174 | 52 | 125 | |
| 09/10 | 138 | 49 | 13 | |
| 09/11 | 168 | 56 | 86 | |
| 09/12 | 100 | 71 | 3 | |
| 09/13 | 47 | 31 | -22 | |
| 09/14 | 34 ¹ | 14 | 1 | |
| 09/15 | 20 | 22 | 9 | |
| 09/16 | 10 | 0 | -10 | |
| 09/17 | 13 | 1 | 4 | |
| 09/18 | 7 | 3 | -3 | |
| 09/19 | 5 | 1 | -2 | |
| 09/20 | 2 ¹ | 1 ² | -2 | |
| 09/21 | 0 ¹ | 1 | -2 | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>3,250</u> | <u>3,250</u> | |

Appendix F.21. Prince William Sound pink salmon counts, stream 613, Jackson Creek, 1991.

| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 3 | 0 | 3 | |
| 07/16 | 6 | 0 | 3 | |
| 07/17 | 43 | 0 | 37 | |
| 07/18 | 125 | 0 | 82 | |
| 07/19 | 42 | 0 | -83 | 600 |
| 07/20 | 63 | 0 | 21 | |
| 07/21 | 91 | 0 | 28 | |
| 07/22 | 201 | 0 | 110 | |
| 07/23 | 542 | 0 | 341 | |
| 07/24 | 972 | 0 | 430 | |
| 07/25 | 767 | 0 | -205 | 820 |
| 07/26 | 1,195 | 0 | 428 | |
| 07/27 | 1,443 | 0 | 248 | |
| 07/28 | 1,497 | 2 | 56 | 3,000 |
| 07/29 | 1,722 | 10 | 235 | |

- continued -

Appendix F.21. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------------|--------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 2,968 | 2 | 1,248 | |
| 07/31 | 3,825 | 8 | 865 | |
| 08/01 | 2,525 | 4 | -1,296 | |
| 08/02 | 5,936 | 18 | 3,429 | |
| 08/03 | 5,730 | 25 | -181 | |
| 08/04 | 6,545 | 108 | 923 | 10,500 |
| 08/05 | 7,126 | 133 | 714 | |
| 08/06 | 7,239 | 171 | 284 | |
| 08/07 | 7,201 | 220 | 182 | |
| 08/08 | 8,434 | 248 | 1,481 | |
| 08/09 | 8,598 | 202 | 366 | 7,300 |
| 08/10 | 8,619 | 201 | 222 | |
| 08/11 | 8,645 | 194 | 220 | |
| 08/12 | 13,244 | 230 | 4,829 | |
| 08/13 | 5,947 | 178 | -7,119 | |
| 08/14 | 12,052 | 376 | 6,481 | 2,600 |
| 08/15 | 11,707 | 610 | 265 | |
| 08/16 | 11,698 | 527 | 518 | |
| 08/17 | 6,792 | 316 | -4,590 | |
| 08/18 | 13,536 | 845 | 7,589 | |
| 08/19 | 12,240 | 971 | -325 | 11,500 |
| 08/20 | 11,291 | 1,295 | 346 | |
| 08/21 | 12,584 | 951 | 2,244 | |
| 08/22 | 10,634 | 1,601 | -349 | 4,400 |
| 08/23 | 10,632 | 1,351 | 1,349 | |
| 08/24 | 12,935 | 1,034 | 3,337 | |
| 08/25 | 9,736 | 820 | -2,379 | |
| 08/26 | 10,510 ¹ | 1,573 ² | 2,347 | |
| 08/27 | 11,284 | 1,573 | 2,347 | |
| 08/28 | 10,039 | 1,363 | 118 | 17,000 |
| 08/29 | 7,499 | 1,540 | -1,000 | |
| 08/30 | 7,328 | 1,454 | 1,283 | |
| 08/31 | 9,145 | 1,482 | 3,299 | |
| 09/01 | 8,868 | 1,601 | 1,324 | |
| 09/02 | 7,360 | 2,074 | 566 | |
| 09/03 | 2,985 | 972 | -3,403 | |

- continued -

Appendix F.21. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 6,038 | 1,131 | 4,184 | |
| 09/05 | 2,900 | 527 | -2,611 | 2,000 |
| 09/06 | 3,211 | 819 | 1,130 | |
| 09/07 | 3,097 | 823 | 709 | |
| 09/08 | 715 | 324 | -2,058 | |
| 09/09 | 477 | 297 | 59 | |
| 09/10 | 563 ¹ | 134 | 220 | |
| 09/11 | 648 | 487 | 573 | |
| 09/12 | 537 | 155 | 44 | |
| 09/13 | 403 | 201 | 67 | |
| 09/14 | 244 ¹ | 40 ² | -120 | |
| 09/15 | 84 | 40 | -120 | |
| 09/16 | 64 ¹ | 34 | 14 | |
| 09/17 | 44 | 24 | 4 | |
| 09/18 | 48 | 17 | 21 | |
| 09/19 | 50 | 4 | 6 | |
| 09/20 | 37 ¹ | 5 ² | -9 | |
| 09/21 | 24 | 5 | -9 | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>31,347</u> | <u>31,371</u> | |

Appendix F.22. Prince William Sound pink salmon counts, stream 615, not named, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 ¹ | 0 ² | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 60 | 0 | 60 | |
| 07/23 | 0 | 0 | -60 | |
| 07/24 | 3 | 0 | 3 | |
| 07/25 | 53 | 0 | 50 | |
| 07/26 | 43 | 0 | -10 | |
| 07/27 | 1,075 | 0 | 1,032 | |
| 07/28 | 1,539 | 0 | 464 | |
| 07/29 | 303 | 0 | -1,236 | |

- continued -

Appendix F.22. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 1,048 | 0 | 745 | |
| 07/31 | 529 | 0 | -519 | |
| 08/01 | 263 | 0 | -266 | |
| 08/02 | 1,250 | 1 | 988 | |
| 08/03 | 270 | 7 | -973 | |
| 08/04 | 287 | 11 | 28 | 300 |
| 08/05 | 1,939 | 50 | 1,702 | |
| 08/06 | 1,420 | 32 | -487 | |
| 08/07 | 1,214 | 142 | -64 | |
| 08/08 | 1,459 | 44 | 289 | |
| 08/09 | 922 | 122 | -415 | |
| 08/10 | 1,864 | 74 | 1,016 | |
| 08/11 | 1,432 | 79 | -353 | |
| 08/12 | 1,354 | 75 | -3 | |
| 08/13 | 1,383 | 107 | 136 | |
| 08/14 | 1,221 | 69 | -93 | 0 |
| 08/15 | 907 | 183 | -131 | |
| 08/16 | 1,456 ¹ | 84 ² | 633 | |
| 08/17 | 2,005 | 84 | 633 | |
| 08/18 | 1,050 | 227 | -728 | |
| 08/19 | 723 | 196 | -131 | 3,700 |
| 08/20 | 709 | 285 | 271 | |
| 08/21 | 696 | 242 | 229 | |
| 08/22 | 1,726 | 288 | 1,318 | |
| 08/23 | 2,427 | 283 | 984 | |
| 08/24 | 2,251 | 337 | 161 | |
| 08/25 | 2,932 | 286 | 967 | |
| 08/26 | 2,840 ¹ | 358 ² | 266 | |
| 08/27 | 2,748 | 358 | 266 | |
| 08/28 | 735 | 222 | -1,791 | 3,100 |
| 08/29 | 2,774 | 538 | 2,577 | |
| 08/30 | 1,658 | 328 | -788 | |
| 08/31 | 733 | 263 | -662 | |
| 09/01 | 1,754 | 362 | 1,383 | |
| 09/02 | 1,226 | 482 | -46 | |
| 09/03 | 2,317 | 516 | 1,607 | |

- continued

Appendix F.22. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,128 | 492 | 303 | |
| 09/05 | 2,383 | 291 | 546 | 1,100 |
| 09/06 | 1,624 | 469 | -290 | |
| 09/07 | 1,247 | 222 | -155 | |
| 09/08 | 836 | 280 | -131 | |
| 09/09 | 739 | 132 | 35 | |
| 09/10 | 540 | 123 | -76 | |
| 09/11 | 322 | 169 | -49 | |
| 09/12 | 253 | 191 | 122 | |
| 09/13 | 155 | 135 | 37 | |
| 09/14 | 48 | 24 | -83 | |
| 09/15 | 39 ¹ | 20 ² | 11 | |
| 09/16 | 29 | 20 | 11 | |
| 09/17 | 22 | 14 | 7 | |
| 09/18 | 19 | 12 | 9 | |
| 09/19 | | | | |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>9,328</u> | <u>9,347</u> | |

Appendix F.23. Prince William Sound pink salmon counts, stream 618, Junction Creek, 1991.

| Ground Survey | | | | |
|---------------|----------------|----------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 ¹ | 0 ² | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

- continued -

Appendix F.23. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 1 ¹ | 0 ² | 1 | |
| 08/01 | 2 ¹ | 0 ² | 1 | |
| 08/02 | 3 | 0 | 1 | |
| 08/03 | 4 | 0 | 1 | |
| 08/04 | 1 | 0 | -3 | 0 |
| 08/05 | 2 | 0 | 1 | |
| 08/06 | 1 | 0 | -1 | |
| 08/07 | 0 | 0 | -1 | |
| 08/08 | 0 | 0 | 0 | |
| 08/09 | 0 | 0 | 0 | 0 |
| 08/10 | 0 | 0 | 0 | |
| 08/11 | 0 | 0 | 0 | |
| 08/12 | 2 | 0 | 2 | |
| 08/13 | 0 | 0 | -2 | |
| 08/14 | 51 | 2 | 53 | 40 |
| 08/15 | 48 | 1 | -2 | |
| 08/16 | 91 | 0 | 43 | |
| 08/17 | 683 | 0 | 592 | |
| 08/18 | 797 | 14 | 128 | |
| 08/19 | 720 | 14 | -63 | 250 |
| 08/20 | 646 | 37 | -37 | |
| 08/21 | 502 | 73 | -71 | |
| 08/22 | 420 | 120 | 38 | 220 |
| 08/23 | 413 | 60 | 53 | |
| 08/24 | 557 | 36 | 180 | |
| 08/25 | 2,311 | 63 | 1,817 | |
| 08/26 | 2,206 | 45 | -60 | |
| 08/27 | 1,616 | 95 | -495 | |
| 08/28 | 2,004 | 160 | 548 | 100 |
| 08/29 | 1,687 | 68 | -249 | |
| 08/30 | 1,894 | 192 | 399 | |
| 08/31 | 1,526 | 226 | -142 | |
| 09/01 | 2,293 | 279 | 1,046 | |
| 09/02 | 2,158 | 264 | 129 | |
| 09/03 | 2,399 ¹ | 103 ² | 344 | |

- continued -

Appendix F.23. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,640 | 103 | 344 | |
| 09/05 | 2,825 | 196 | 381 | 900 |
| 09/06 | 1,345 | 64 | -1,416 | |
| 09/07 | 2,159 | 498 | 1,312 | |
| 09/08 | 1,373 | 92 | -694 | |
| 09/09 | 1,032 | 143 | -198 | |
| 09/10 | 1,284 | 137 | 389 | |
| 09/11 | 1,099 | 176 | -9 | |
| 09/12 | 1,588 | 182 | 671 | |
| 09/13 | 1,073 | 345 | -170 | |
| 09/14 | 885 ¹ | 43 ² | -146 | |
| 09/15 | 697 | 43 | -146 | |
| 09/16 | 520 ¹ | 135 ² | -43 | |
| 09/17 | 342 | 135 | -43 | |
| 09/18 | 268 | 193 | 119 | |
| 09/19 | 181 | 72 | -15 | |
| 09/20 | 142 ¹ | 44 ² | 5 | |
| 09/21 | 103 | 44 | 5 | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>4,495</u> | <u>4,598</u> | |

Appendix F.24. Prince William Sound pink salmon counts, stream 623, Brizgaloff Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | 0 | 0 | 0 | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 ¹ | 0 ² | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 200 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 1 | 1 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 58 | 0 | 58 | |
| 07/25 | 1 | 0 | -57 | 240 |
| 07/26 | 0 | 0 | -1 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

- continued -

Appendix F.24. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 36 | 2 | 38 | |
| 07/31 | 403 | 0 | 367 | |
| 08/01 | 1,322 | 0 | 919 | |
| 08/02 | 1,107 | 0 | -215 | |
| 08/03 | 1,133 | 2 | 28 | |
| 08/04 | 1,701 | 4 | 572 | 10 |
| 08/05 | 1,458 | 25 | -218 | |
| 08/06 | 1,148 | 33 | -277 | |
| 08/07 | 1,345 | 84 | 281 | |
| 08/08 | 1,709 | 75 | 439 | |
| 08/09 | 1,952 | 97 | 340 | 800 |
| 08/10 | 2,363 | 36 | 447 | |
| 08/11 | 2,775 | 64 | 476 | |
| 08/12 | 4,068 | 78 | 1,371 | |
| 08/13 | 2,694 | 30 | -1,344 | |
| 08/14 | 4,770 | 79 | 2,155 | 1,300 |
| 08/15 | 5,149 | 171 | 550 | |
| 08/16 | 5,132 | 116 | 99 | |
| 08/17 | 6,938 | 119 | 1,925 | |
| 08/18 | 6,671 | 260 | -7 | |
| 08/19 | 7,434 | 221 | 984 | 4,000 |
| 08/20 | 6,685 | 263 | -486 | |
| 08/21 | 5,966 | 548 | -171 | |
| 08/22 | 4,420 | 603 | -943 | 2,310 |
| 08/23 | 4,633 | 430 | 643 | |
| 08/24 | 5,379 | 619 | 1,365 | |
| 08/25 | 8,213 | 318 | 3,152 | |
| 08/26 | 7,249 | 378 | -586 | |
| 08/27 | 9,426 | 911 | 3,088 | |
| 08/28 | 8,582 | 317 | -527 | 4,100 |
| 08/29 | 8,060 | 776 | 254 | |
| 08/30 | 9,484 | 705 | 2,129 | |
| 08/31 | 8,456 | 778 | -250 | |
| 09/01 | 7,482 | 1,240 | 266 | |
| 09/02 | 6,526 | 1,264 | 308 | |
| 09/03 | 8,519 | 825 | 2,818 | |

- continued -

Appendix F.24. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 8,506 | 712 | 699 | |
| 09/05 | 6,392 | 359 | -1,755 | 1,000 |
| 09/06 | 5,927 | 721 | 256 | |
| 09/07 | 7,013 | 1,165 | 2,251 | |
| 09/08 | 2,068 | 407 | -4,538 | |
| 09/09 | 3,986 | 549 | 2,467 | |
| 09/10 | 2,643 | 377 | -966 | |
| 09/11 | 2,540 | 772 | 669 | |
| 09/12 | 2,013 | 756 | 229 | |
| 09/13 | 1,670 | 569 | 226 | |
| 09/14 | 656 | 204 | -810 | |
| 09/15 | 806 | 266 | 416 | |
| 09/16 | 149 | 43 | -614 | |
| 09/17 | 437 | 315 | 603 | |
| 09/18 | 275 | 230 | 68 | |
| 09/19 | 167 | 123 | 15 | |
| 09/20 | 139 | 86 | 58 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>19,126</u> | <u>19,265</u> | |

Appendix F.25. Prince William Sound pink salmon counts, stream 632, Claw Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | 4 | 0 | 4 | 0 |
| 07/20 | 2 | 0 | -2 | |
| 07/21 | 4 | 0 | 2 | |
| 07/22 | 23 | 0 | 19 | |
| 07/23 | 108 | 0 | 85 | |
| 07/24 | 103 ¹ | 0 ² | -6 | |
| 07/25 | 97 | 0 | -6 | 60 |
| 07/26 | 144 | 0 | 47 | |
| 07/27 | 142 | 0 | -2 | |
| 07/28 | 509 | 2 | 369 | |
| 07/29 | 373 | 6 | -130 | |

- continued -

Appendix F.25. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 766 | 2 | 395 | |
| 07/31 | 798 | 1 | 33 | |
| 08/01 | 1,224 | 5 | 431 | |
| 08/02 | 1,383 | 10 | 169 | |
| 08/03 | 1,445 | 9 | 71 | |
| 08/04 | 1,824 | 37 | 416 | 2,750 |
| 08/05 | 1,612 | 71 | -141 | |
| 08/06 | 1,656 | 78 | 122 | |
| 08/07 | 3,019 | 155 | 1,518 | |
| 08/08 | 2,357 | 159 | -503 | |
| 08/09 | 2,534 | 190 | 367 | 2,000 |
| 08/10 | 3,349 | 115 | 930 | |
| 08/11 | 4,213 | 147 | 1,011 | |
| 08/12 | 3,115 | 140 | -958 | |
| 08/13 | 2,921 | 134 | -60 | |
| 08/14 | 3,382 | 195 | 656 | 2,200 |
| 08/15 | 3,645 | 332 | 595 | |
| 08/16 | 5,571 | 224 | 2,150 | |
| 08/17 | 4,267 | 259 | -1,045 | |
| 08/18 | 3,168 | 394 | -705 | |
| 08/19 | 3,926 | 352 | 1,110 | 2,100 |
| 08/20 | 2,971 | 373 | -582 | |
| 08/21 | 2,780 | 313 | 122 | |
| 08/22 | 3,089 | 544 | 853 | 800 |
| 08/23 | 2,988 ¹ | 534 ² | 432 | |
| 08/24 | 2,886 | 534 | 432 | |
| 08/25 | 3,348 | 200 | 662 | |
| 08/26 | 3,083 | 453 | 188 | |
| 08/27 | 3,211 | 494 | 622 | |
| 08/28 | 3,108 ¹ | 255 ² | 152 | 2,000 |
| 08/29 | 3,004 | 255 | 152 | |
| 08/30 | 2,318 | 131 | -555 | |
| 08/31 | 2,421 | 320 | 423 | |
| 09/01 | 2,686 | 248 | 513 | |
| 09/02 | 2,489 | 420 | 223 | |
| 09/03 | 1,890 | 352 | -247 | |

- continued -

Appendix F.25. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,200 | 230 | 540 | |
| 09/05 | 1,483 | 153 | -564 | 600 |
| 09/06 | 1,731 | 337 | 585 | |
| 09/07 | 1,244 | 494 | 7 | |
| 09/08 | 1,145 | 56 | -43 | |
| 09/09 | 610 | 201 | -334 | |
| 09/10 | 636 | 76 | 102 | |
| 09/11 | 975 | 157 | 496 | |
| 09/12 | 548 | 135 | -292 | |
| 09/13 | 367 | 165 | -16 | |
| 09/14 | 253 ¹ | 22 ² | -92 | |
| 09/15 | 139 | 22 | -92 | |
| 09/16 | 83 | 45 | -11 | |
| 09/17 | 62 | 9 | -12 | |
| 09/18 | 60 | 25 | 23 | |
| 09/19 | 61 | 21 | 22 | |
| 09/20 | 23 | 5 | -33 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>10,595</u> | <u>10,618</u> | |

Appendix F.26. Prince William Sound pink salmon counts, stream 633, Pablo Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | 8 | 0 | 8 | 600 |
| 07/20 | 64 | 0 | 56 | |
| 07/21 | 119 | 0 | 55 | |
| 07/22 | 255 | 0 | 136 | |
| 07/23 | 251 | 0 | -4 | |
| 07/24 | 387 | 1 | 137 | |
| 07/25 | 385 | 3 | 1 | 70 |
| 07/26 | 594 | 0 | 209 | |
| 07/27 | 984 | 2 | 392 | |
| 07/28 | 472 | 1 | -511 | 200 |
| 07/29 | 419 | 15 | -38 | |

- continued -

Appendix F.26. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 767 | 10 | 358 | |
| 07/31 | 741 | 0 | -26 | |
| 08/01 | 1,441 | 45 | 745 | |
| 08/02 | 1,383 | 91 | 33 | |
| 08/03 | 1,325 | 82 | 24 | |
| 08/04 | 1,997 | 110 | 782 | 4,900 |
| 08/05 | 1,417 | 51 | -529 | |
| 08/06 | 1,430 | 115 | 128 | |
| 08/07 | 1,552 | 123 | 245 | |
| 08/08 | 1,871 | 188 | 507 | |
| 08/09 | 2,970 | 254 | 1,353 | 1,650 |
| 08/10 | 2,645 | 320 | -5 | |
| 08/11 | 4,189 | 235 | 1,779 | |
| 08/12 | 2,951 | 183 | -1,055 | |
| 08/13 | 3,028 | 159 | 236 | |
| 08/14 | 3,662 | 213 | 847 | 1,900 |
| 08/15 | 3,540 | 279 | 157 | |
| 08/16 | 3,118 | 262 | -160 | |
| 08/17 | 5,021 | 190 | 2,093 | |
| 08/18 | 3,748 | 365 | -908 | |
| 08/19 | 4,861 | 413 | 1,526 | 5,500 |
| 08/20 | 3,025 | 307 | -1,529 | |
| 08/21 | 3,492 | 270 | 737 | |
| 08/22 | 3,294 | 734 | 536 | 1,600 |
| 08/23 | 3,257 | 332 | 295 | |
| 08/24 | 4,453 | 410 | 1,606 | |
| 08/25 | 5,428 | 358 | 1,333 | |
| 08/26 | 3,808 | 349 | -1,271 | |
| 08/27 | 4,376 | 424 | 992 | |
| 08/28 | 2,913 | 222 | -1,241 | 1,500 |
| 08/29 | 3,388 ¹ | 416 ² | 891 | |
| 08/30 | 3,863 | 416 | 891 | |
| 08/31 | 2,742 | 426 | -695 | |
| 09/01 | 4,679 | 663 | 2,600 | |
| 09/02 | 3,950 | 504 | -225 | |
| 09/03 | 3,460 | 409 | -81 | |

- continued -

Appendix F.26. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,597 | 376 | -487 | |
| 09/05 | 3,208 | 310 | 921 | 1,500 |
| 09/06 | 2,944 | 438 | 174 | |
| 09/07 | 3,065 | 385 | 506 | |
| 09/08 | 1,535 | 125 | -1,405 | |
| 09/09 | 953 | 331 | -251 | |
| 09/10 | 922 | 217 | 186 | |
| 09/11 | 1,003 | 279 | 360 | |
| 09/12 | 686 | 186 | -131 | |
| 09/13 | 630 | 151 | 95 | |
| 09/14 | 396 ¹ | 64 ² | -171 | |
| 09/15 | 161 | 64 | -171 | |
| 09/16 | 52 | 51 | -58 | |
| 09/17 | 55 | 27 | 30 | |
| 09/18 | 39 | 26 | 10 | |
| 09/19 | 36 | 10 | 7 | |
| 09/20 | 42 | 20 | 26 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>13,008</u> | <u>13,050</u> | |

Appendix F.27. Prince William Sound pink salmon counts, stream 634, Passover Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 1 ¹ | 0 ² | 1 | |
| 07/25 | 1 | 0 | 1 | 0 |
| 07/26 | 0 | 0 | -1 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 1 | 1 | 0 |
| 07/29 | 0 | 0 | 0 | |

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Appendix F.27. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 18 | 2 | 20 | |
| 08/01 | 272 | 0 | 254 | |
| 08/02 | 227 | 0 | -45 | |
| 08/03 | 220 | 3 | -4 | |
| 08/04 | 216 | 1 | -3 | 0 |
| 08/05 | 124 | 0 | -92 | |
| 08/06 | 93 | 1 | -30 | |
| 08/07 | 121 | 15 | 43 | |
| 08/08 | 105 | 24 | 8 | |
| 08/09 | 95 | 19 | 9 | 0 |
| 08/10 | 947 | 39 | 891 | |
| 08/11 | 1,596 | 121 | 770 | |
| 08/12 | 1,477 | 114 | -5 | |
| 08/13 | 922 | 33 | -522 | |
| 08/14 | 2,150 | 83 | 1,311 | 0 |
| 08/15 | 1,647 | 137 | -366 | |
| 08/16 | 1,488 | 92 | -67 | |
| 08/17 | 1,637 | 33 | 182 | |
| 08/18 | 1,659 | 80 | 102 | |
| 08/19 | 1,723 | 190 | 254 | 500 |
| 08/20 | 2,894 | 150 | 1,321 | |
| 08/21 | 1,600 | 84 | -1,210 | |
| 08/22 | 2,042 | 177 | 619 | 800 |
| 08/23 | 2,217 | 150 | 325 | |
| 08/24 | 2,198 | 236 | 217 | |
| 08/25 | 3,801 | 251 | 1,854 | |
| 08/26 | 3,661 | 333 | 193 | |
| 08/27 | 3,542 | 292 | 173 | |
| 08/28 | 2,914 | 544 | -84 | 0 |
| 08/29 | 2,984 ¹ | 297 ² | 367 | |
| 08/30 | 3,054 | 297 | 367 | |
| 08/31 | 2,631 | 328 | -95 | |
| 09/01 | 2,754 | 497 | 620 | |
| 09/02 | 2,685 | 293 | 224 | |
| 09/03 | 3,768 | 224 | 1,307 | |

- continued -

Appendix F.27. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,210 | 390 | -1,168 | |
| 09/05 | 2,227 | 223 | 240 | 100 |
| 09/06 | 1,659 | 194 | -374 | |
| 09/07 | 2,229 | 340 | 910 | |
| 09/08 | 1,340 | 92 | -797 | |
| 09/09 | 1,139 | 65 | -136 | |
| 09/10 | 752 | 74 | -313 | |
| 09/11 | 911 | 98 | 257 | |
| 09/12 | 575 | 132 | -204 | |
| 09/13 | 665 | 151 | 241 | |
| 09/14 | 414 ¹ | 35 ² | -216 | |
| 09/15 | 163 | 35 | -216 | |
| 09/16 | 128 | 21 | -14 | |
| 09/17 | 108 | 19 | -1 | |
| 09/18 | 71 | 25 | -12 | |
| 09/19 | 56 | 27 | 12 | |
| 09/20 | 35 | 10 | -11 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>7,072</u> | <u>7,107</u> | |

Appendix F.28. Prince William Sound pink salmon counts, stream 636, Whale Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 4 | 0 | 4 | |
| 07/22 | 43 | 0 | 39 | |
| 07/23 | 58 | 0 | 15 | |
| 07/24 | 73 | 0 | 15 | |
| 07/25 | 88 | 0 | 15 | 70 |
| 07/26 | 23 | 0 | -65 | |
| 07/27 | 35 | 0 | 12 | |
| 07/28 | 166 | 27 | 158 | 0 |
| 07/29 | 84 | 15 | -67 | |

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Appendix F.28. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 218 | 4 | 138 | |
| 07/31 | 1,158 | 2 | 942 | |
| 08/01 | 1,475 | 27 | 344 | |
| 08/02 | 1,783 | 143 | 451 | |
| 08/03 | 1,615 | 154 | -14 | |
| 08/04 | 2,465 | 176 | 1,026 | 1,500 |
| 08/05 | 753 | 97 | -1,615 | |
| 08/06 | 646 | 105 | -2 | |
| 08/07 | 943 | 152 | 449 | |
| 08/08 | 1,093 | 236 | 386 | |
| 08/09 | 1,334 | 335 | 576 | 850 |
| 08/10 | 3,469 | 458 | 2,593 | |
| 08/11 | 3,519 | 228 | 278 | |
| 08/12 | 3,336 | 248 | 65 | |
| 08/13 | 1,547 | 229 | -1,560 | |
| 08/14 | 6,456 | 353 | 5,262 | 1,370 |
| 08/15 | 3,574 | 418 | -2,464 | |
| 08/16 | 4,878 | 539 | 1,843 | |
| 08/17 | 3,867 | 316 | -695 | |
| 08/18 | 6,495 | 798 | 3,426 | |
| 08/19 | 6,079 | 724 | 308 | 5,500 |
| 08/20 | 5,570 | 1,020 | 511 | |
| 08/21 | 3,091 | 962 | -1,517 | |
| 08/22 | 2,542 | 1,128 | 579 | 1,100 |
| 08/23 | 2,158 ¹ | 867 ² | 482 | |
| 08/24 | 1,773 | 867 | 482 | |
| 08/25 | 5,568 | 390 | 4,185 | |
| 08/26 | 4,742 | 439 | -387 | |
| 08/27 | 4,326 | 964 | 548 | |
| 08/28 | 5,308 | 518 | 1,500 | 2,000 |
| 08/29 | 4,478 ¹ | 996 ² | 166 | |
| 08/30 | 3,648 | 996 | 166 | |
| 08/31 | 2,986 | 1,000 | 338 | |
| 09/01 | 4,387 | 1,031 | 2,432 | |
| 09/02 | 3,421 | 972 | 6 | |
| 09/03 | 6,103 | 685 | 3,367 | |

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Appendix F.28. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 5,599 | 731 | 227 | |
| 09/05 | 4,213 | 561 | -825 | 1,700 |
| 09/06 | 3,543 | 831 | 161 | |
| 09/07 | 4,121 | 636 | 1,214 | |
| 09/08 | 1,584 | 308 | -2,229 | |
| 09/09 | 1,476 | 284 | 176 | |
| 09/10 | 1,001 | 312 | -163 | |
| 09/11 | 1,165 | 362 | 526 | |
| 09/12 | 608 | 384 | -173 | |
| 09/13 | 542 | 298 | 232 | |
| 09/14 | 401 ¹ | 55 ² | -87 | |
| 09/15 | 259 | 55 | -87 | |
| 09/16 | 94 | 64 | -101 | |
| 09/17 | 58 | 32 | -4 | |
| 09/18 | 53 | 14 | 9 | |
| 09/19 | 41 | 8 | -4 | |
| 09/20 | 22 | 11 | -8 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>23,562</u> | <u>23,584</u> | |

Appendix F.29. Prince William Sound pink salmon counts, stream 665, Bjorne Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | | | | 0 |
| 07/20 | | | | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 ¹ | 0 | 0 | |
| 07/24 | 0 ¹ | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 0 ¹ | 0 ² | 0 | |
| 08/01 | 0 | 0 | 0 | |
| 08/02 | 43 | 4 | 47 | |
| 08/03 | 32 | 1 | -10 | |
| 08/04 | 20 ¹ | 0 ² | -13 | 0 |
| 08/05 | 7 | 0 | -13 | |
| 08/06 | 0 | 0 | -7 | |
| 08/07 | 5 | 0 | 5 | |
| 08/08 | 22 | 1 | 18 | |
| 08/09 | 38 | 0 | 16 | 0 |
| 08/10 | 113 | 1 | 76 | |
| 08/11 | 112 | 9 | 8 | |
| 08/12 | 122 | 5 | 15 | |
| 08/13 | 359 | 0 | 237 | |
| 08/14 | 622 | 4 | 267 | 90 |
| 08/15 | 376 | 16 | -230 | |
| 08/16 | 803 | 38 | 465 | |
| 08/17 | 1,178 ¹ | 49 ² | 424 | |
| 08/18 | 1,552 | 49 | 424 | |
| 08/19 | 2,877 | 156 | 1,481 | 700 |
| 08/20 | 1,580 | 142 | -1,155 | |
| 08/21 | 1,599 | 149 | 168 | |
| 08/22 | 1,261 | 217 | -121 | 600 |
| 08/23 | 1,011 | 170 | -80 | |
| 08/24 | 3,633 | 496 | 3,118 | |
| 08/25 | 5,409 ¹ | 260 ² | 2,036 | |
| 08/26 | 7,185 | 260 | 2,036 | |
| 08/27 | 3,183 | 459 | -3,543 | |
| 08/28 | 5,015 | 681 | 2,513 | 800 |
| 08/29 | 3,824 | 1,164 | -27 | |
| 08/30 | 4,292 | 297 | 765 | |
| 08/31 | 3,101 | 1,764 | 573 | |
| 09/01 | 6,664 | 1,254 | 4,817 | |
| 09/02 | 9,950 ¹ | 509 ² | 3,795 | |
| 09/03 | 13,235 | 509 | 3,795 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------------|------------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 10,650 ¹ | 892 ² | -1,694 | |
| 09/05 | 8,064 | 892 | -1,694 | 2,300 |
| 09/06 | 2,190 | 1,663 | -4,211 | |
| 09/07 | 3,488 | 1,170 | 2,468 | |
| 09/08 | 3,729 ¹ | 661 ² | 902 | |
| 09/09 | 3,970 ¹ | 661 ² | 902 | |
| 09/10 | 4,211 ¹ | 661 ² | 902 | |
| 09/11 | 4,452 ¹ | 661 | 902 | |
| 09/12 | 4,693 ¹ | 3,257 | 3,498 | |
| 09/13 | 4,934 | 0 | 241 | |
| 09/14 | 4,171 ¹ | 463 ² | -300 | |
| 09/15 | 3,408 ¹ | 463 ² | -300 | |
| 09/16 | 2,645 ¹ | 463 ² | -300 | |
| 09/17 | 1,882 | 463 | -300 | |
| 09/18 | 1,427 ¹ | 3,200 | 2,745 | |
| 09/19 | 971 | 608 | 153 | |
| 09/20 | 630 | 813 | 472 | |
| 09/21 | 486 ¹ | 303 ² | 159 | |
| 09/22 | 342 | 303 | 159 | |
| 09/23 | 250 ¹ | 0 ² | -92 | |
| 09/24 | 157 ¹ | 0 | -92 | |
| 09/25 | 65 | 0 | -92 | |
| 09/26 | 47 ¹ | 0 ² | -18 | |
| 09/27 | 28 ¹ | 0 | -18 | |
| 09/28 | 10 | 0 | -18 | |
| TOTAL | | <u>26,258</u> | <u>26,268</u> | |

Appendix F.30. Prince William Sound pink salmon counts, stream 670, Montgomery Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | | | | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | |

- continued -

Appendix F.30. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/29 | 0 | 0 | 0 | |
| 07/30 | 0 | 0 | 0 | |
| 07/31 | 0 | 0 | 0 | |
| 08/01 | 37 | 0 | 37 | |
| 08/02 | 85 ¹ | 0 ² | 122 | 40 |
| 08/03 | 132 | 0 | 217 | |
| 08/04 | 137 ¹ | 0 ² | 269 | 50 |
| 08/05 | 142 | 0 | 279 | |
| 08/06 | 166 ¹ | 1 ² | 309 | |
| 08/07 | 189 | 1 | 356 | |
| 08/08 | 279 ¹ | 0 ² | 468 | |
| 08/09 | 369 | 0 | 648 | 110 |
| 08/10 | 571 | 1 | 941 | |
| 08/11 | 821 | 2 | 1,394 | |
| 08/12 | 957 | 2 | 1,780 | |
| 08/13 | 1,466 ¹ | 3 ² | 2,426 | |
| 08/14 | 1,975 | 3 | 3,444 | 1,000 |
| 08/15 | 1,325 | 0 | 3,300 | |
| 08/16 | 2,242 ¹ | 12 ² | 3,579 | |
| 08/17 | 3,158 ¹ | 12 ² | 5,412 | |
| 08/18 | 4,075 | 12 | 7,246 | |
| 08/19 | 4,170 | 5 | 8,250 | 10,000 |
| 08/20 | 4,168 | 13 | 8,351 | |
| 08/21 | 3,750 | 12 | 7,930 | |
| 08/22 | 4,223 | 59 | 8,032 | 2,300 |
| 08/23 | 5,195 | 38 | 9,456 | |
| 08/24 | 5,741 | 86 | 11,022 | |
| 08/25 | 6,463 ¹ | 36 ² | 12,239 | |
| 08/26 | 7,184 | 36 | 13,682 | |
| 08/27 | 5,305 | 155 | 12,644 | |
| 08/28 | 5,198 | 128 | 10,631 | 6,000 |
| 08/29 | 6,594 | 229 | 12,021 | |
| 08/30 | 7,000 | 264 | 13,858 | |
| 08/31 | 9,279 | 304 | 16,583 | |
| 09/01 | 9,069 | 616 | 18,964 | |
| 09/02 | 6,425 | 474 | 15,968 | |

- continued -

Appendix F.30. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/03 | 985 | 189 | 7,599 | |
| 09/04 | 6,125 | 829 | 7,939 | |
| 09/05 | 6,970 | 1,282 | 14,377 | 1,600 |
| 09/06 | 4,638 | 925 | 12,533 | |
| 09/07 | 4,575 | 1,203 | 10,416 | |
| 09/08 | 3,614 ¹ | 281 ² | 8,470 | |
| 09/09 | 2,652 | 281 | 6,547 | |
| 09/10 | 1,686 | 365 | 4,703 | |
| 09/11 | 1,793 | 648 | 4,127 | |
| 09/12 | 1,503 | 677 | 3,973 | |
| 09/13 | 1,629 | 550 | 3,682 | |
| 09/14 | 1,244 ¹ | 158 ² | 3,031 | |
| 09/15 | 859 | 158 | 2,261 | |
| 09/16 | 648 | 101 | 1,608 | |
| 09/17 | 643 | 96 | 1,387 | |
| 09/18 | 537 | 124 | 1,304 | |
| 09/19 | 494 | 152 | 1,183 | |
| 09/20 | 349 | 75 | 918 | |
| 09/21 | 402 | 86 | 837 | |
| 09/22 | 250 | 51 | 703 | |
| 09/23 | 218 ¹ | 33 ² | 501 | |
| 09/24 | 185 | 33 | 436 | |
| 09/25 | 169 | 25 | 379 | |
| 09/26 | 106 ¹ | 5 ² | 280 | |
| 09/27 | 43 | 5 | 154 | |
| 09/28 | | | | |
| TOTAL | | <u>10,835</u> | <u>311,201</u> | |

Appendix F.31. Prince William Sound pink salmon counts, stream 673, Falls Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | | | | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 ¹ | 0 ² | 0 | |
| 07/22 | 0 ¹ | 0 ² | 0 | |
| 07/23 | 0 ¹ | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 15 | 4 | 19 | |
| 07/29 | 0 | 0 | -15 | |

- continued -

Appendix F.31. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 10 | 2 | 12 | |
| 07/31 | 9 | 1 | 0 | |
| 08/01 | 465 | 2 | 458 | |
| 08/02 | 577 ¹ | 1 ² | 113 | 0 |
| 08/03 | 689 | 1 | 113 | |
| 08/04 | 824 | 1 | 136 | 1,550 |
| 08/05 | 954 | 1 | 131 | |
| 08/06 | 1,219 | 0 | 265 | |
| 08/07 | 2,045 | 6 | 832 | |
| 08/08 | 2,114 ¹ | 18 ² | 87 | |
| 08/09 | 2,182 | 18 | 87 | 360 |
| 08/10 | 2,693 | 46 | 557 | |
| 08/11 | 2,711 | 49 | 67 | |
| 08/12 | 2,758 | 28 | 75 | |
| 08/13 | 3,144 ¹ | 66 ² | 452 | |
| 08/14 | 3,530 | 66 | 452 | 900 |
| 08/15 | 3,027 | 144 | -359 | |
| 08/16 | 3,809 ¹ | 100 | 882 | |
| 08/17 | 4,591 ¹ | 100 ² | 882 | |
| 08/18 | 5,373 | 100 | 882 | |
| 08/19 | 3,810 | 195 | -1,368 | 8,000 |
| 08/20 | 4,134 | 188 | 512 | |
| 08/21 | 4,911 | 218 | 995 | |
| 08/22 | 4,914 | 429 | 432 | 5,800 |
| 08/23 | 5,371 | 481 | 938 | |
| 08/24 | 6,350 | 203 | 1,182 | |
| 08/25 | 7,598 ¹ | 243 ² | 1,491 | |
| 08/26 | 8,846 | 243 | 1,491 | 7,000 |
| 08/27 | 6,529 | 1,093 | -1,224 | |
| 08/28 | 5,786 | 406 | -337 | |
| 08/29 | 6,101 | 586 | 901 | |
| 08/30 | 6,424 | 510 | 833 | |
| 08/31 | 6,900 | 971 | 1,447 | |
| 09/01 | 6,843 | 516 | 459 | |
| 09/02 | 6,815 | 944 | 916 | |
| 09/03 | 5,397 | 604 | -814 | |

- continued -

Appendix F.31. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 2,630 | 429 | -2,338 | |
| 09/05 | 4,047 | 889 | 2,306 | |
| 09/06 | 5,135 | 516 | 1,604 | 2,600 |
| 09/07 | 3,489 | 1,247 | -399 | |
| 09/08 | 2,584 ¹ | 187 ² | -718 | |
| 09/09 | 1,679 | 187 | -718 | |
| 09/10 | 1,497 | 586 | 404 | |
| 09/11 | 1,797 | 283 | 583 | |
| 09/12 | 1,683 | 361 | 247 | |
| 09/13 | 1,009 | 488 | -186 | |
| 09/14 | 751 ¹ | 152 ² | -107 | |
| 09/15 | 493 | 152 | -107 | |
| 09/16 | 448 | 87 | 42 | |
| 09/17 | 397 | 100 | 49 | |
| 09/18 | 436 | 100 | 139 | |
| 09/19 | 365 | 143 | 72 | |
| 09/20 | 273 | 71 | -21 | |
| 09/21 | 304 | 73 | 104 | |
| 09/22 | 208 | 22 | -74 | |
| 09/23 | 177 ¹ | 28 ² | -4 | |
| 09/24 | 145 | 28 | -4 | |
| 09/25 | 133 | 29 | 17 | |
| 09/26 | 82 ¹ | 1 ² | -50 | |
| 09/27 | 31 | 1 | -50 | |
| 09/28 | | | | |
| TOTAL | | 14,741 | 14,772 | |

Appendix F.32. Prince William Sound pink salmon counts, stream 678, Sleepy Bay, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | | | | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 ¹ | 0 ² | 0 | |
| 07/22 | 0 ¹ | 0 | 0 | |
| 07/23 | 0 ¹ | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 0 | 0 | 0 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | 0 |
| 07/29 | 0 | 0 | 0 | |

- continued -

Appendix F.32. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 0 ¹ | 0 ² | 0 | |
| 07/31 | 0 ¹ | 0 | 0 | |
| 08/01 | 0 ¹ | 0 | 0 | |
| 08/02 | 0 ¹ | 0 | 0 | 0 |
| 08/03 | 0 | 0 | 0 | |
| 08/04 | 0 | 0 | 0 | 0 |
| 08/05 | 0 ¹ | 0 | 0 | |
| 08/06 | 0 | 0 | 0 | |
| 08/07 | 0 | 0 | 0 | |
| 08/08 | 0 | 0 | 0 | |
| 08/09 | 0 | 0 | 0 | 0 |
| 08/10 | 5 | 0 | 5 | |
| 08/11 | 21 ¹ | 0 ² | 16 | |
| 08/12 | 36 | 0 | 16 | |
| 08/13 | 78 ¹ | 0 ² | 42 | |
| 08/14 | 120 | 0 | 42 | 0 |
| 08/15 | 139 | 0 | 19 | |
| 08/16 | 132 | 1 | -6 | |
| 08/17 | 178 ¹ | 1 ² | 47 | |
| 08/18 | 224 ¹ | 1 | 47 | |
| 08/19 | 270 | 1 | 47 | 50 |
| 08/20 | 559 | 11 | 300 | |
| 08/21 | 698 | 15 | 154 | |
| 08/22 | 681 | 25 | 8 | 1,100 |
| 08/23 | 886 | 88 | 293 | |
| 08/24 | 849 | 0 | -37 | |
| 08/25 | 922 ¹ | 87 ² | 160 | |
| 08/26 | 995 ¹ | 87 | 160 | |
| 08/27 | 1,069 ¹ | 87 | 160 | |
| 08/28 | 1,142 ¹ | 87 | 160 | 2,000 |
| 08/29 | 1,215 | 87 | 160 | |
| 08/30 | 2,196 | 156 | 1,137 | |
| 08/31 | 2,660 | 61 | 525 | |
| 09/01 | 1,220 | 0 | -1,440 | |
| 09/02 | 3,005 | 260 | 2,045 | |
| 09/03 | 1,878 | 176 | -951 | |

- continued -

Appendix F.32. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|--------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 1,501 | 147 | -230 | |
| 09/05 | 1,171 | 68 | -262 | 1,200 |
| 09/06 | 1,398 | 124 | 351 | |
| 09/07 | 1,228 | 232 | 62 | |
| 09/08 | 743 ¹ | 15 ² | -471 | |
| 09/09 | 257 | 15 | -471 | |
| 09/10 | 342 | 19 | 104 | |
| 09/11 | 484 | 94 | 236 | |
| 09/12 | 426 | 50 | -8 | |
| 09/13 | 649 | 88 | 311 | |
| 09/14 | 450 ¹ | 20 ² | -179 | |
| 09/15 | 251 | 20 | -179 | |
| 09/16 | 165 | 13 | -73 | |
| 09/17 | 165 | 7 | 7 | |
| 09/18 | 160 | 18 | 13 | |
| 09/19 | 125 | 23 | -12 | |
| 09/20 | 122 | 33 | 30 | |
| 09/21 | 93 ¹ | 6 ² | -23 | |
| 09/22 | 64 ¹ | 6 | -23 | |
| 09/23 | 35 | 6 | -23 | |
| 09/24 | 21 | 5 | -9 | |
| 09/25 | 8 | 8 | -5 | |
| 09/26 | 4 ¹ | 0 | -4 | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>2,246</u> | <u>2,250</u> | |

Appendix F.33. Prince William Sound pink salmon counts, stream 695, Port Audrey, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | 0 | 0 | 0 | |
| 06/30 | 0 | 0 | 0 | |
| 07/01 | 0 | 0 | 0 | |
| 07/02 | 0 | 0 | 0 | |
| 07/03 | 0 | 0 | 0 | |
| 07/04 | 0 | 0 | 0 | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 ¹ | 0 ² | 0 | |
| 07/10 | 0 ¹ | 0 ² | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 0 | 0 | 0 | |
| 07/25 | 6 | 0 | 6 | 0 |
| 07/26 | 0 | 0 | -6 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 9 | 0 | 9 | |
| 07/29 | 18 | 5 | 14 | |

- continued -

Appendix F.33. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|--------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 25 | 0 | 7 | |
| 07/31 | 55 | 0 | 30 | |
| 08/01 | 394 | 0 | 339 | |
| 08/02 | 423 | 1 | 30 | 195 |
| 08/03 | 356 | 0 | -67 | |
| 08/04 | 295 | 3 | -58 | 0 |
| 08/05 | 314 | 8 | 27 | |
| 08/06 | 475 | 5 | 166 | |
| 08/07 | 471 | 31 | 27 | |
| 08/08 | 662 | 45 | 236 | |
| 08/09 | 793 | 73 | 204 | 320 |
| 08/10 | 988 | 78 | 273 | |
| 08/11 | 1,254 | 44 | 310 | |
| 08/12 | 1,181 | 53 | -20 | |
| 08/13 | 1,459 | 31 | 309 | |
| 08/14 | 1,920 | 72 | 533 | 130 |
| 08/15 | 1,828 | 149 | 57 | |
| 08/16 | 2,411 | 101 | 684 | |
| 08/17 | 3,653 | 114 | 1,356 | |
| 08/18 | 3,330 | 330 | 7 | |
| 08/19 | 3,018 | 262 | -50 | 1,500 |
| 08/20 | 2,900 | 384 | 266 | |
| 08/21 | 3,402 | 513 | 1,015 | |
| 08/22 | 3,108 | 628 | 334 | |
| 08/23 | 3,153 | 203 | 248 | |
| 08/24 | 3,411 | 432 | 690 | |
| 08/25 | 3,216 | 113 | -82 | |
| 08/26 | 6,696 | 744 | 4,224 | |
| 08/27 | 7,617 | 588 | 1,509 | |
| 08/28 | 7,106 | 548 | 37 | 8,000 |
| 08/29 | 7,058 | 655 | 607 | |
| 08/30 | 5,759 | 696 | -603 | |
| 08/31 | 5,793 | 886 | 920 | |
| 09/01 | 5,586 | 984 | 777 | |
| 09/02 | 5,622 | 1,266 | 1,302 | |
| 09/03 | 6,773 ¹ | 1,152 ² | 2,303 | |

- continued -

Appendix F.33. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|--------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 7,925 ¹ | 1,152 | 2,303 | |
| 09/05 | 9,076 ¹ | 833 | 1,984 | 1,600 |
| 09/06 | 7,575 | 2,056 | 555 | |
| 09/07 | 6,002 | 508 | -1,065 | |
| 09/08 | 5,335 ¹ | 314 ² | -354 | |
| 09/09 | 4,668 ¹ | 314 | -354 | |
| 09/10 | 4,000 ¹ | 309 | -358 | |
| 09/11 | 3,333 | 1,164 | 497 | |
| 09/12 | 2,364 | 1,316 | 347 | |
| 09/13 | 1,974 | 641 | 251 | |
| 09/14 | 1,355 ¹ | 294 ² | -325 | |
| 09/15 | 736 | 294 | -325 | |
| 09/16 | 616 ¹ | 158 ² | 37 | |
| 09/17 | 495 | 158 | 37 | |
| 09/18 | 324 | 229 | 58 | |
| 09/19 | 176 | 114 | -34 | |
| 09/20 | 113 | 87 | 24 | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | 21,135 | 21,248 | |

Appendix F.34. Prince William Sound pink salmon counts, stream 850, Canoe Creek, 1991.

| Date | Ground Survey | | | Aerial Counts |
|-------|--------------------|----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 06/25 | | | | |
| 06/26 | | | | |
| 06/27 | | | | |
| 06/28 | | | | |
| 06/29 | | | | |
| 06/30 | | | | |
| 07/01 | | | | |
| 07/02 | | | | |
| 07/03 | | | | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | 0 |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | 0 |
| 07/16 | | | | |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | | | | |
| 07/20 | | | | |
| 07/21 | | | | |
| 07/22 | | | | |
| 07/23 | | | | |
| 07/24 | | | | |
| 07/25 | 2,440 | 2 | 2,442 | |
| 07/26 | 3,853 | 4 | 1,417 | 800 |
| 07/27 | 4,145 ¹ | 1 ² | 293 | |
| 07/28 | 4,438 ¹ | 1 ² | 293 | |
| 07/29 | 4,730 ¹ | 1 | 293 | |

- continued -

Appendix F.34. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|---------------------|--------------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/30 | 5,022 | 1 | 293 | |
| 07/31 | 5,958 ¹ | 7 ² | 943 | |
| 08/01 | 6,894 ¹ | 7 ² | 943 | |
| 08/02 | 7,831 ¹ | 7 ² | 943 | |
| 08/03 | 8,767 ¹ | 7 ² | 943 | 2,300 |
| 08/04 | 9,703 | 7 | 943 | |
| 08/05 | 8,620 | 101 | -982 | |
| 08/06 | 9,933 | 98 | 1,411 | |
| 08/07 | 9,679 | 227 | -27 | 2,000 |
| 08/08 | 13,976 | 183 | 4,480 | |
| 08/09 | 17,755 | 282 | 4,061 | |
| 08/10 | 15,477 ¹ | 11 ² | -2,267 | |
| 08/11 | 13,199 | 11 | -2,267 | |
| 08/12 | 14,972 ¹ | 277 ² | 2,049 | |
| 08/13 | 16,744 | 277 | 2,049 | |
| 08/14 | 20,985 | 390 | 4,631 | |
| 08/15 | 22,134 | 1,024 | 2,173 | |
| 08/16 | 20,063 | 634 | -1,437 | |
| 08/17 | 20,141 ¹ | 517 ² | 595 | |
| 08/18 | 20,219 ¹ | 517 ² | 595 | |
| 08/19 | 20,297 | 517 | 595 | |
| 08/20 | 19,041 | 1,324 | 68 | |
| 08/21 | 20,440 | 940 | 2,339 | 18,000 |
| 08/22 | 17,887 | 1,196 | -1,357 | |
| 08/23 | 19,366 | 1,211 | 2,690 | |
| 08/24 | 18,327 | 869 | -170 | |
| 08/25 | 22,765 ¹ | 1,542 ² | 5,980 | |
| 08/26 | 27,203 | 1,542 | 5,980 | |
| 08/27 | 20,047 | 1,072 | -6,084 | 17,000 |
| 08/28 | 18,579 | 1,998 | 530 | |
| 08/29 | 19,412 | 1,445 | 2,278 | |
| 08/30 | 15,056 | 1,870 | -2,486 | |
| 08/31 | 18,215 | 2,256 | 5,415 | |
| 09/01 | 18,815 | 2,591 | 3,191 | |
| 09/02 | 15,897 | 2,667 | -251 | |
| 09/03 | 17,309 | 2,926 | 4,338 | |

- continued -

Appendix F.34. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|---------------------|------------------|---------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/04 | 12,662 | 2,290 | -2,357 | |
| 09/05 | 11,427 ¹ | 2,512 | 1,276 | 600 |
| 09/06 | 10,191 | 2,512 | 1,276 | |
| 09/07 | 8,363 ¹ | 584 ² | -1,244 | |
| 09/08 | 6,536 ¹ | 584 ² | -1,244 | |
| 09/09 | 4,708 ¹ | 584 ² | -1,244 | |
| 09/10 | 2,881 ¹ | 584 ² | -1,244 | |
| 09/11 | 1,053 | 584 | -1,244 | |
| 09/12 | 1,106 | 2,773 | 2,826 | |
| 09/13 | 757 | 1,034 | 685 | |
| 09/14 | 391 ¹ | 66 ² | -301 | |
| 09/15 | 25 | 66 | -301 | |
| 09/16 | 21 ¹ | 142 ² | 138 | |
| 09/17 | 16 ¹ | 142 ² | 138 | |
| 09/18 | 12 | 142 | 138 | |
| 09/19 | | | | 0 |
| 09/20 | | | | |
| 09/21 | | | | |
| 09/22 | | | | |
| 09/23 | | | | |
| 09/24 | | | | |
| 09/25 | | | | |
| 09/26 | | | | |
| 09/27 | | | | |
| 09/28 | | | | |
| TOTAL | | <u>45,151</u> | <u>45,163</u> | |

Appendix G. Ground and Aerial Counts of Pink Salmon Spawners for streams surveyed by foot, Prince William Sound, Alaska, 1992.

Footnotes for Appendix G.

- ¹ Linear interpolation used to estimate missing data.
- ² No ground survey conducted; dead count from next survey equally apportioned among preceding unsurveyed days.
- ³ Ground surveys not conducted above weir.
- ⁴ Hole in weir; number of pink salmon passing site based on ground survey data.
- ⁵ Estimated total dead count divided equally among unsurveyed days.
- ⁶ Hole in weir; weir count used since it was greater than new entries estimate.
- ⁷ Volcanic ash in stream; many sections not surveyed; linear interpolation used to estimate missing data.
- ⁸ Some weir pickets removed; new entries estimate used for weir count.
- ⁹ Hole in weir; new entries estimate used for weir count.
- ¹⁰ Some weir pickets removed; weir count used since it was greater than new entries estimate.
- ¹¹ Seventy-nine pink salmon removed for another study; added to postseason dead count.
- ¹² Some pickets removed from weir; new entries estimate used for weir count.
- ¹³ Thirty-eight pink salmon removed for another study; added to postseason dead count.
- ¹⁴ Some pink salmon may have been passed upstream through weir uncounted by unauthorized individuals.
- ¹⁵ Some pickets removed from weir; weir count used.
- ¹⁶ Sixty pink salmon removed for another study; added to postseason dead count.

Appendix G.1. Prince William Sound pink salmon counts, stream 507, Gumboot Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/04 | | | | |
| 07/05 | | | | |
| 07/06 | | | | |
| 07/07 | | | | |
| 07/08 | | | | |
| 07/09 | | | | |
| 07/10 | | | | |
| 07/11 | | | | |
| 07/12 | | | | |
| 07/13 | | | | |
| 07/14 | | | | |
| 07/15 | | | | |
| 07/16 | | | | 0 |
| 07/17 | | | | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | 0 |
| 07/23 | 8 | 0 | 8 | |
| 07/24 | 1 | 0 | -7 | |
| 07/25 | 0 | 0 | -1 | |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 0 | 0 | 0 | |
| 07/28 | 0 | 0 | 0 | |
| 07/29 | 5 | 0 | 5 | 0 |
| 07/30 | 6 | 0 | 1 | |

- continued -

| Date | Ground Survey | | | Aerial Counts |
|-------|-----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/31 | 12 | 0 | 6 | |
| 08/01 | 7 | 0 | -5 | |
| 08/02 | 4 | 0 | -3 | |
| 08/03 | 3 | 0 | -1 | |
| 08/04 | 0 | 0 | -3 | |
| 08/05 | 0 | 0 | 0 | |
| 08/06 | 8 | 0 | 8 | 0 |
| 08/07 | 13 | 0 | 5 | |
| 08/08 | 5 | 0 | -8 | |
| 08/09 | 0 | 0 | -5 | |
| 08/10 | 0 | 0 | 0 | |
| 08/11 | 0 | 0 | 0 | |
| 08/12 | 5 | 0 | 5 | |
| 08/13 | 7 | 0 | 2 | |
| 08/14 | 10 | 0 | 3 | |
| 08/15 | 5 | 0 | -5 | |
| 08/16 | 3 | 0 | -2 | |
| 08/17 | 3 | 0 | 0 | |
| 08/18 | 6 | 0 | 3 | |
| 08/19 | 8 | 0 | 2 | |
| 08/20 | 8 | 0 | 0 | |
| 08/21 | 13 | 0 | 5 | 30 |
| 08/22 | 31 | 0 | 18 | 0 |
| 08/23 | 85 | 0 | 54 | |
| 08/24 | 81 ¹ | 0 | -4 | |
| 08/25 | 77 | 0 | -4 | |
| 08/26 | 86 | 0 | 9 | |

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Appendix G.1. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|--------------|-----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/27 | 67 | 0 | -19 | |
| 08/28 | 176 | 1 | 110 | 0 |
| 08/29 | 119 | 0 | -57 | |
| 08/30 | 348 | 4 | 233 | |
| 08/31 | 242 | 5 | -101 | |
| 09/01 | 273 | 4 | 35 | |
| 09/02 | 180 | 2 | -91 | 0 |
| 09/03 | 136 | 0 | -44 | |
| 09/04 | 122 | 0 | -14 | |
| 09/05 | 188 | 13 | 79 | |
| 09/06 | 9 | 1 | -178 | |
| 09/07 | 66 | 11 | 68 | |
| 09/08 | 66 | 3 | 3 | |
| 09/09 | 69 | 8 | 11 | |
| 09/10 | 67 | 8 | 6 | |
| 09/11 | 38 | 28 | -1 | |
| 09/12 | 36 | 4 | 2 | |
| 09/13 | 27 | 12 | 3 | |
| 09/14 | 16 | 14 | 3 | |
| 09/15 | 10 ¹ | 2 | -5 | |
| 09/16 | 4 | 2 | -5 | |
| 09/17 | 0 | 2 | -2 | |
| 09/18 | | | | |
| 09/19 | | | | |
| 09/20 | | | | |
| TOTAL | | 123 | 123 | 30 |

Appendix G.2. Prince William Sound pink salmon counts, stream 508, Solf Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/05 | 0 | 0 | 0 | |
| 07/06 | 0 | 0 | 0 | |
| 07/07 | 0 | 0 | 0 | |
| 07/08 | 0 | 0 | 0 | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 ¹ | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 ¹ | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | 0 |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | |
| 07/23 | 0 | 0 | 0 | |
| 07/24 | 25 | 0 | 25 | |
| 07/25 | 0 | 0 | -25 | 0 |
| 07/26 | 0 | 0 | 0 | |
| 07/27 | 3 | 0 | 3 | |
| 07/28 | 5 | 0 | 2 | 0 |
| 07/29 | 15 | 0 | 10 | |
| 07/30 | 35 | 1 | 21 | |

- continued -

Appendix G.2. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|-------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/31 | 87 | 0 | 52 | |
| 08/01 | 83 | 3 | -1 | |
| 08/02 | 200 | 2 | 119 | |
| 08/03 | 249 | 5 | 54 | |
| 08/04 | 205 | 10 | -34 | |
| 08/05 | 454 ¹ | 10 | 259 | |
| 08/06 | 703 | 10 | 259 | |
| 08/07 | 432 | 61 | -210 | |
| 08/08 | 372 | 75 | 15 | |
| 08/09 | 518 | 79 | 225 | 50 |
| 08/10 | 566 | 84 | 132 | |
| 08/11 | 807 | 27 | 268 | |
| 08/12 | 924 | 52 | 169 | 2500 |
| 08/13 | 985 | 56 | 117 | |
| 08/14 | 1397 | 76 | 488 | |
| 08/15 | 1405 | 204 | 212 | |
| 08/16 | 1757 | 101 | 453 | |
| 08/17 | 2264 | 115 | 622 | |
| 08/18 | 3072 | 307 | 1115 | |
| 08/19 | 2609 | 274 | -189 | 5000 |
| 08/20 | 2506 | 493 | 390 | |
| 08/21 | 2862 | 618 | 974 | |
| 08/22 | 2421 | 590 | 149 | |
| 08/23 | 3545 | 476 | 1600 | |
| 08/24 | 4120 ¹ | 563 | 1138 | |
| 08/25 | 8620 | 433 | 4933 | |
| 08/26 | 6906 ¹ | 316 | -1398 | |

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Appendix G.2. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|-------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/27 | 5192 | 613 | -1101 | |
| 08/28 | 6401 | 860 | 2069 | 7000 |
| 08/29 | 5283 | 877 | -241 | |
| 08/30 | 5717 | 748 | 1182 | |
| 08/31 | 5233 | 728 | 244 | |
| 09/01 | 9027 | 889 | 4683 | |
| 09/02 | 3924 | 707 | -4396 | |
| 09/03 | 9076 | 1993 | 7145 | |
| 09/04 | 8851 | 892 | 667 | |
| 09/05 | 9414 | 1427 | 1990 | 2500 |
| 09/06 | 6571 | 1590 | -1253 | |
| 09/07 | 6904 | 1113 | 1446 | |
| 09/08 | 4370 | 996 | -1538 | |
| 09/09 | 4590 | 862 | 1082 | |
| 09/10 | 2590 | 759 | -1241 | |
| 09/11 | 3307 | 1046 | 1763 | |
| 09/12 | 2740 | 1014 | 447 | |
| 09/13 | 2122 | 1060 | 442 | |
| 09/14 | 1307 | 541 | -274 | |
| 09/15 | 1198 ¹ | 376 | 267 | |
| 09/16 | 747 | 406 | -45 | |
| 09/17 | 346 | 519 | 118 | |
| 09/18 | 269 | 427 | 350 | |
| 09/19 | 137 | 111 | -21 | |
| 09/20 | 83 | 72 | 18 | |
| 09/21 | 43 | 62 | 22 | |
| 09/22 | 28 | 37 | 22 | |
| 09/23 | 11 | 22 | 5 | |
| TOTAL | | 25788 | 25799 | 17050 |

Appendix G.3. Prince William Sound pink salmon counts, stream 604, Erb Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|-------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/09 | 0 | 0 | 0 | |
| 07/10 | 8 ¹ | 0 | 8 | |
| 07/11 | 16 | 0 | 8 | |
| 07/12 | 2 | 0 | -14 | |
| 07/13 | 0 | 1 | -1 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 ¹ | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 2 | 0 | 2 | |
| 07/22 | 16 | 0 | 14 | 100 |
| 07/23 | 273 | 0 | 257 | |
| 07/24 | 309 | 1 | 37 | |
| 07/25 | 310 | 1 | 2 | |
| 07/26 | 402 | 2 | 94 | |
| 07/27 | 536 | 1 | 135 | |
| 07/28 | 493 | 4 | -39 | |
| 07/29 | 756 | 9 | 272 | |
| 07/30 | 877 | 48 | 169 | 500 |
| 07/31 | 689 | 26 | -162 | |
| 08/01 | 664 | 44 | 19 | |
| 08/02 | 711 | 17 | 64 | |
| 08/03 | 924 | 19 | 232 | |
| 08/04 | 1174 ¹ | 23 | 272 | |

- continued -

Appendix G.3. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/05 | 1423 | 23 | 272 | |
| 08/06 | 1243 | 211 | 31 | 700 |
| 08/07 | 1184 | 103 | 44 | |
| 08/08 | 1196 | 191 | 203 | |
| 08/09 | 1129 | 175 | 108 | |
| 08/10 | 1119 | 145 | 135 | |
| 08/11 | 1008 | 114 | 3 | |
| 08/12 | 1027 | 72 | 91 | |
| 08/13 | 965 | 172 | 110 | |
| 08/14 | 968 | 76 | 79 | 900 |
| 08/15 | 898 | 30 | -40 | |
| 08/16 | 944 | 81 | 127 | |
| 08/17 | 890 | 71 | 17 | |
| 08/18 | 802 | 96 | 8 | |
| 08/19 | 738 | 122 | 58 | |
| 08/20 | 589 | 69 | -80 | |
| 08/21 | 542 | 45 | -2 | |
| 08/22 | 480 | 32 | -30 | 500 |
| 08/23 | 448 | 36 | 4 | |
| 08/24 | 504 | 18 | 74 | |
| 08/25 | 544 | 48 | 88 | |
| 08/26 | 538 | 17 | 11 | |
| 08/27 | 542 | 40 | 44 | |
| 08/28 | 541 | 47 | 46 | 500 |
| 08/29 | 438 | 77 | -26 | |
| 08/30 | 363 | 45 | -30 | |
| 08/31 | 511 | 34 | 182 | |

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Appendix G.3. (page 3 of 3)

| Ground Survey | | | | |
|---------------|-------------|-------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 09/01 | 486 | 46 | 21 | |
| 09/02 | 559 | 39 | 112 | |
| 09/03 | 449 | 49 | -61 | |
| 09/04 | 497 | 46 | 94 | 400 |
| 09/05 | 457 | 38 | -2 | |
| 09/06 | 342 | 21 | -94 | |
| 09/07 | 359 | 24 | 41 | |
| 09/08 | 347 | 23 | 11 | |
| 09/09 | 296 | 25 | -26 | |
| 09/10 | 238 | 35 | -23 | |
| 09/11 | 204 | 26 | -8 | |
| 09/12 | 172 | 31 | -1 | |
| 09/13 | 128 | 17 | -27 | 10 |
| 09/14 | 83 | 31 | -14 | |
| 09/15 | 23 | 14 | -46 | |
| 09/16 | 1 | 1 | -21 | |
| TOTAL | | 2851 | 2852 | 3610 |

Appendix G.4. Prince William Sound pink salmon counts, stream 633, Pablo Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/15 | | | | |
| 07/16 | | | | 20 |
| 07/17 | | | | |
| 07/18 | 29 | 0 | 24 | |
| 07/19 | 53 | 0 | 19 | |
| 07/20 | 72 | 0 | 54 | |
| 07/21 | 126 | 0 | 120 | |
| 07/22 | 246 | 0 | 333 | 700 |
| 07/23 | 579 | 0 | 32 | |
| 07/24 | 609 | 2 | 252 | |
| 07/25 | 847 | 14 | -71 | |
| 07/26 | 773 | 3 | -77 | |
| 07/27 | 692 | 4 | -58 | |
| 07/28 | 629 | 5 | 646 | |
| 07/29 | 1273 | 2 | -206 | |
| 07/30 | 1019 | 48 | 87 | 1100 |
| 07/31 | 1083 | 23 | -342 | |
| 08/01 | 721 | 20 | -76 | |
| 08/02 | 636 | 9 | 429 | |
| 08/03 | 1056 | 9 | -110 | |
| 08/04 | 937 ¹ | 10 ² | -110 | |
| 08/05 | 818 | 10 | 199 | |
| 08/06 | 989 | 28 | -5 | 1300 |
| 08/07 | 932 | 52 | -114 | |
| 08/08 | 747 | 71 | 107 | |
| 08/09 | 796 | 58 | -1 | |
| 08/10 | 718 | 77 | 67 | |

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Appendix G.4. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-----------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/11 | 719 | 66 | -146 | |
| 08/12 | 547 | 26 | 159 | |
| 08/13 | 679 ¹ | 27 ² | 159 | |
| 08/14 | 811 | 27 | -244 | 2400 |
| 08/15 | 498 | 69 | 59 | |
| 08/16 | 525 | 32 | 14 | |
| 08/17 | 513 ¹ | 26 ² | 14 | |
| 08/18 | 501 | 26 | -137 | |
| 08/19 | 324 | 40 | 9 | |
| 08/20 | 318 ¹ | 15 ² | 9 | |
| 08/21 | 311 ¹ | 15 ² | 9 | |
| 08/22 | 305 | 15 | 117 | 1500 |
| 08/23 | 361 | 61 | 93 | |
| 08/24 | 442 ¹ | 13 ² | 93 | |
| 08/25 | 522 | 13 | 148 | |
| 08/26 | 630 | 40 | 7 | |
| 08/27 | 584 | 53 | -2 | |
| 08/28 | 517 | 65 | 53 | 1200 |
| 08/29 | 504 | 66 | 301 | |
| 08/30 | 637 | 168 | 260 | |
| 08/31 | 759 | 138 | 169 | |
| 09/01 | 709 | 219 | 370 | |
| 09/02 | 937 | 142 | -90 | |
| 09/03 | 693 | 154 | 399 | |
| 09/04 | 911 | 181 | 121 | 2100 |
| 09/05 | 886 | 146 | 507 | |
| 09/06 | 1274 | 119 | -223 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/07 | 817 | 234 | 152 | |
| 09/08 | 877 | 92 | 56 | |
| 09/09 | 783 | 150 | -4 | |
| 09/10 | 645 | 134 | -135 | |
| 09/11 | 359 | 151 | 18 | |
| 09/12 | 341 | 36 | 92 | |
| 09/13 | 353 | 80 | -80 | 125 |
| 09/14 | 203 | 70 | -30 | |
| 09/15 | 127 ¹ | 47 ² | -30 | |
| 09/16 | 50 | 47 | -8 | |
| 09/17 | 32 ¹ | 11 ² | -8 | |
| 09/18 | 13 | 11 | -13 | |
| 09/19 | | | | |
| 09/20 | | | | |
| TOTAL | | 3466 | 3437 | 10445 |

Appendix G.5. Prince William Sound pink salmon counts, stream 665, Bjorne Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/16 | | | | 0 |
| 07/17 | | | | |
| 07/18 | | | | |
| 07/19 | 0 | 0 | 0 | |
| 07/20 | 0 | 0 | 0 | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 0 | 0 | 0 | 0 |
| 07/23 | 5 ¹ | 0 | 5 | |
| 07/24 | 10 | 0 | 5 | |
| 07/25 | 4 | 0 | -6 | |
| 07/26 | 1 | 0 | -3 | |
| 07/27 | 18 | 0 | 17 | |
| 07/28 | 70 | 1 | 53 | |
| 07/29 | 120 | 0 | 50 | |
| 07/30 | 60 | 0 | -60 | 0 |
| 07/31 | 62 | 0 | 2 | |
| 08/01 | 47 | 0 | -15 | |
| 08/02 | 56 ¹ | 0 | 9 | |
| 08/03 | 66 ¹ | 0 | 9 | |
| 08/04 | 75 | 0 | 9 | |
| 08/05 | 120 ¹ | 0 | 45 | |
| 08/06 | 164 | 1 | 46 | 120 |
| 08/07 | 165 | 1 | 2 | |
| 08/08 | 136 | 3 | -26 | |
| 08/09 | 71 | 0 | -65 | |
| 08/10 | 86 | 0 | 15 | |

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Appendix G.5. (page 2 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/11 | 84 | 4 | 2 | |
| 08/12 | 84 | 1 | 1 | |
| 08/13 | 244 | 0 | 160 | |
| 08/14 | 205 | 10 | -29 | 0 |
| 08/15 | 184 | 8 | -13 | |
| 08/16 | 112 | 1 | -71 | |
| 08/17 | 169 | 4 | 61 | |
| 08/18 | 122 | 8 | -39 | |
| 08/19 | 81 | 25 | -16 | |
| 08/20 | 176 | 4 | 99 | |
| 08/21 | 56 | 9 | -111 | |
| 08/22 | 456 | 123 | 523 | 15 |
| 08/23 | 804 | 50 | 398 | |
| 08/24 | 953 ¹ | 53 | 201 | |
| 08/25 | 1101 | 53 | 201 | |
| 08/26 | 1546 | 157 | 602 | |
| 08/27 | 1572 | 272 | 298 | |
| 08/28 | 1173 | 330 | -70 | 275 |
| 08/29 | 773 | 330 | -70 | |
| 08/30 | 891 | 455 | 573 | |
| 08/31 | 2220 | 367 | 1696 | |
| 09/01 | 1614 | 762 | 156 | |
| 09/02 | 1127 | 816 | 329 | |
| 09/03 | 670 | 635 | 178 | |
| 09/04 | 533 | 454 | 317 | 250 |
| 09/05 | 2410 | 453 | 2330 | |
| 09/06 | 2436 | 505 | 531 | |

- continued -

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| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/07 | 2120 | 1038 | 722 | |
| 09/08 | 1638 | 1009 | 527 | |
| 09/09 | 1334 | 550 | 246 | |
| 09/10 | 947 | 644 | 257 | |
| 09/11 | 715 | 405 | 173 | |
| 09/12 | 559 | 282 | 126 | |
| 09/13 | 575 | 241 | 257 | 120 |
| 09/14 | 483 | 183 | 91 | |
| 09/15 | 377 ¹ | 143 | 37 | |
| 09/16 | 271 | 143 | 37 | |
| 09/17 | 211 ¹ | 19 | -42 | |
| 09/18 | 151 ¹ | 19 | -41.5 | |
| 09/19 | 90 ¹ | 19 | -41.5 | |
| 09/20 | 30 | 75 | 14.75 | |
| TOTAL | | 10661 | 10691 | 780 |

Appendix G.6. Prince William Sound pink salmon counts, stream 673, Falls Creek, 1992.

| Date | Ground Survey | | | Aerial Counts |
|-------|-------------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 07/21 | 0 | 0 | 0 | |
| 07/22 | 12 | 0 | 12 | 0 |
| 07/23 | 41 | 0 | 29 | |
| 07/24 | 108 | 0 | 67 | |
| 07/25 | 109 | 0 | 1 | |
| 07/26 | 287 | 0 | 178 | |
| 07/27 | 536 | 0 | 249 | |
| 07/28 | 645 ¹ | 1 | 110 | |
| 07/29 | 754 | 1 | 110 | |
| 07/30 | 841 | 0 | 87 | 0 |
| 07/31 | 908 | 0 | 67 | |
| 08/01 | 946 ¹ | 0 | 38 | |
| 08/02 | 983 ¹ | 0 | 38 | |
| 08/03 | 1021 ¹ | 0 | 38 | |
| 08/04 | 1059 ¹ | 0 | 38 | |
| 08/05 | 1097 ¹ | 0 | 38 | |
| 08/06 | 1134 ¹ | 0 | 38 | 250 |
| 08/07 | 1172 | 3 | 41 | |
| 08/08 | 1370 | 1 | 199 | |
| 08/09 | 1320 | 0 | -50 | |
| 08/10 | 1547 | 30 | 257 | |
| 08/11 | 1293 | 19 | -235 | |
| 08/12 | 920 | 13 | -360 | |
| 08/13 | 757 | 40 | -123 | 1700 |
| 08/14 | 1374 | 26 | 643 | |
| 08/15 | 1121 ¹ | 33 | -220 | |
| 08/16 | 868 | 33 | -220 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/17 | 1060 | 33 | 225 | |
| 08/18 | 760 | 105 | -195 | |
| 08/19 | 660 | 61 | -39 | |
| 08/20 | 596 | 77 | 13 | |
| 08/21 | 428 | 64 | -104 | |
| 08/22 | 605 | 23 | 200 | 755 |
| 08/23 | 617 ¹ | 9 | 21 | |
| 08/24 | 629 ¹ | 9 | 21 | |
| 08/25 | 640 ¹ | 9 | 21 | |
| 08/26 | 652 | 9 | 21 | |
| 08/27 | 767 | 21 | 136 | |
| 08/28 | 692 | 41 | -34 | 250 |
| 08/29 | 622 ¹ | 7 | -64 | |
| 08/30 | 551 | 7 | -64 | |
| 08/31 | 690 | 46 | 185 | |
| 09/01 | 701 | 28 | 39 | |
| 09/02 | 646 | 30 | -25 | |
| 09/03 | 604 | 37 | -5 | |
| 09/04 | 599 | 71 | 66 | 900 |
| 09/05 | 450 | 34 | -115 | |
| 09/06 | 447 ¹ | 17 | 14 | |
| 09/07 | 444 | 17 | 14 | |
| 09/08 | 560 | 26 | 142 | |
| 09/09 | 376 | 47 | -137 | |
| 09/10 | 351 | 43 | 18 | |
| 09/11 | 272 | 20 | -59 | 200 |
| 09/12 | 259 | 32 | 19 | |

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| Date | Ground Survey | | | Aerial Counts |
|--------------|------------------|-------------|-------------|---------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/13 | 244 | 20 | 5 | |
| 09/14 | 142 | 19 | -83 | |
| 09/15 | 110 ¹ | 18 | -15 | |
| 09/16 | 77 | 18 | -15 | |
| 09/17 | 43 | 29 | -5 | |
| 09/18 | 10 | 25 | -8 | |
| 09/19 | | | | |
| 09/20 | | | | |
| TOTAL | | 1249 | 1259 | 4055 |

Appendix G.7. Prince William Sound pink salmon counts, stream 695, Port Audrey, 1992.

| Ground Survey | | | | |
|---------------|-------------------|-----------------|-------------|---------------|
| Date | Live Counts | Dead Counts | New Entries | Aerial Counts |
| 07/10 | 0 | 0 | 0 | |
| 07/11 | 0 ¹ | 0 | 0 | |
| 07/12 | 0 | 0 | 0 | |
| 07/13 | 0 ¹ | 0 | 0 | |
| 07/14 | 0 | 0 | 0 | |
| 07/15 | 0 ¹ | 0 | 0 | |
| 07/16 | 0 | 0 | 0 | 0 |
| 07/17 | 0 | 0 | 0 | |
| 07/18 | 0 | 0 | 0 | |
| 07/19 | 17 | 0 | 17 | |
| 07/20 | 3 | 0 | -14 | |
| 07/21 | 1 | 0 | -2 | |
| 07/22 | 10 | 0 | 9 | 0 |
| 07/23 | 242 | 0 | 232 | |
| 07/24 | 303 | 0 | 61 | |
| 07/25 | 259 | 0 | -44 | |
| 07/26 | 346 | 1 | 88 | |
| 07/27 | 403 | 0 | 57 | |
| 07/28 | 1202 | 0 | 799 | |
| 07/29 | 1001 | 0 | -201 | |
| 07/30 | 1022 | 0 | 21 | 1300 |
| 07/31 | 738 | 33 | -251 | |
| 08/01 | 561 | 32 | -145 | |
| 08/02 | 869 | 12 | 320 | |
| 08/03 | 1597 | 0 | 728 | |
| 08/04 | 1996 | 0 | 399 | |
| 08/05 | 2605 ¹ | 22 ² | 631 | |

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| Date | Ground Survey | | | Aerial Counts |
|-------|-------------------|------------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 08/06 | 3214 | 22 | 631 | 1420 |
| 08/07 | 2269 | 189 | -756 | |
| 08/08 | 1665 | 388 | -216 | |
| 08/09 | 1493 | 431 | 259 | |
| 08/10 | 1279 | 358 | 144 | |
| 08/11 | 1321 | 328 | 370 | |
| 08/12 | 2192 | 102 | 973 | |
| 08/13 | 2225 ¹ | 225 ² | 258 | 1900 |
| 08/14 | 2257 | 225 | 258 | |
| 08/15 | 1620 | 270 | -367 | |
| 08/16 | 1451 | 438 | 269 | |
| 08/17 | 1810 | 226 | 585 | |
| 08/18 | 1165 | 227 | -418 | |
| 08/19 | 896 | 221 | -48 | |
| 08/20 | 685 | 250 | 39 | |
| 08/21 | 668 | 196 | 179 | 350 |
| 08/22 | 793 | 150 | 275 | 1500 |
| 08/23 | 836 | 159 | 202 | |
| 08/24 | 1182 ¹ | 76 ² | 421 | |
| 08/25 | 1527 | 76 | 421 | |
| 08/26 | 1479 | 100 | 52 | |
| 08/27 | 1210 | 161 | -108 | |
| 08/28 | 1484 | 196 | 470 | |
| 08/29 | 1172 | 183 | -129 | |
| 08/30 | 1190 | 218 | 236 | |
| 08/31 | 1517 | 206 | 533 | |
| 09/01 | 1276 | 265 | 24 | |

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Appendix G.7. (page 3 of 3)

| Date | Ground Survey | | | Aerial Counts |
|-------|----------------|----------------|----------------|------------------|
| | Live Counts | Dead Counts | New Entries | |
| 09/02 | 1236 | 125 | 85 | 1000 |
| 09/03 | 1204 | 308 | 276 | |
| 09/04 | 939 | 231 | -34 | |
| 09/05 | 1308 | 114 | 483 | |
| 09/06 | 1074 | 169 | -65 | |
| 09/07 | 615 | 217 | -242 | |
| 09/08 | 497 | 304 | 186 | |
| 09/09 | 299 | 169 | -29 | |
| 09/10 | 303 | 78 | 82 | |
| 09/11 | 142 | 146 | -15 | |
| 09/12 | 57 | 52 | -33 | |
| 09/13 | 20 | 21 | -16 | 0 |
| 09/14 | 20 | 3 | 3 | |
| 09/15 | | | | |
| TOTAL | | 7922 | 7942 | 7470 |

**Appendix H. Peterson Disk Tagging of Pink Salmon for Determination of Stream Life,
Prince William Sound, Alaska, 1990-1992.**

Appendix H.1. Results of Peterson Disk tagging of pink salmon for determination of stream life, Prince William Sound, Alaska, 1990.

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|------|-------|------|--|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE | |
| 002 | Hartney Creek | 07/24/90 | 41 | 9 | 22.0% | 3 | 25 | 20.89 | 1.24 | |
| | | 07/30/90 | 80 | 19 | 23.8% | 13 | 37 | 22.53 | 0.85 | |
| | | 08/08/90 | 60 | 16 | 26.7% | 3 | 50 | 19.50 | 0.93 | |
| | | 08/17/90 | 11 | 2 | 18.2% | 1 | 17 | 16.00 | 2.63 | |
| | | Total | 192 | 46 | 24.0% | | | | | |
| | | Mean | 48 | 12 | 22.6% | 5 | 32 | 19.73 | 1.41 | |
| 005 | Eccles Creek | 07/26/90 | 52 | 32 | 61.5% | 5 | 31 | 17.38 | 0.66 | |
| | | 08/01/90 | 80 | 44 | 55.0% | 1 | 24 | 13.07 | 0.56 | |
| | | 08/08/90 | 80 | 48 | 60.0% | 8 | 31 | 17.73 | 0.54 | |
| | | 08/16/90 | 80 | 54 | 67.5% | 6 | 22 | 12.70 | 0.51 | |
| | | 08/22/90 | 80 | 26 | 32.5% | 5 | 20 | 11.85 | 0.73 | |
| | | Total | 372 | 204 | 54.8% | | | | | |
| Mean | 74 | 41 | 55.3% | 5 | 26 | 14.55 | 0.60 | | | |
| 076 | Irish Creek | 07/10/90 | 200 | 71 | 35.5% | 1 | 44 | 27.14 | 0.44 | |
| | | 07/25/90 | 200 | 140 | 70.0% | 8 | 43 | 26.27 | 0.31 | |
| | | 08/01/90 | 200 | 137 | 68.5% | 3 | 35 | 20.20 | 0.32 | |
| | | 08/08/90 | 200 | 123 | 61.5% | 2 | 33 | 19.14 | 0.34 | |
| | | 08/15/90 | 200 | 115 | 57.5% | 9 | 26 | 14.90 | 0.35 | |
| | | Total | 1000 | 586 | 58.6% | | | | | |
| Mean | 200 | 117 | 58.6% | 5 | 36 | 21.53 | 0.35 | | | |
| 080 | Whalen Creek | 07/20/90 | 80 | 26 | 32.5% | 10 | 43 | 17.31 | 0.73 | |
| | | 07/27/90 | 80 | 30 | 37.5% | 4 | 44 | 20.37 | 0.68 | |
| | | 08/03/90 | 80 | 29 | 36.3% | 1 | 30 | 14.07 | 0.69 | |
| | | 08/10/90 | 80 | 32 | 40.0% | 6 | 32 | 14.50 | 0.66 | |
| | | 08/16/90 | 80 | 24 | 30.0% | 6 | 19 | 11.54 | 0.76 | |
| | | Total | 400 | 141 | 35.3% | | | | | |
| Mean | 80 | 28 | 35.3% | 5 | 34 | 15.56 | 0.70 | | | |

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Appendix H.1. (page 2 of 6)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Mi | Max | Mean | SE |
| 089 | Fish Creek | 07/19/90 | 80 | 30 | 37.5% | 4 | 33 | 16.03 | 0.68 |
| | | 07/26/90 | 80 | 13 | 16.3% | 12 | 45 | 21.77 | 1.03 |
| | | 08/02/90 | 80 | 12 | 15.0% | 16 | 35 | 25.92 | 1.07 |
| | | 08/09/90 | 80 | 2 | 2.5% | 20 | 27 | 23.50 | 2.63 |
| | | 08/17/90 | 80 | 4 | 5.0% | 8 | 25 | 15.25 | 1.86 |
| | | Total | 400 | 61 | 15.3% | | | | |
| | | Mean | 80 | 12 | 15.3% | 12 | 33 | 20.49 | 1.46 |
| 506 | Loomis Creek | 08/06/90 | 80 | 24 | 30.0% | 1 | 32 | 15.25 | 0.76 |
| | | 08/13/90 | 80 | 35 | 43.8% | 2 | 31 | 12.80 | 0.63 |
| | | 08/20/90 | 80 | 38 | 47.5% | 3 | 19 | 9.47 | 0.60 |
| | | 08/28/90 | 80 | 26 | 32.5% | 1 | 13 | 7.58 | 0.73 |
| | | Total | 320 | 123 | 38.4% | | | | |
| | | Mean | 80 | 31 | 38.4% | 2 | 24 | 11.28 | 0.68 |
| 507 | Gumboot Creek | 07/25/90 | 79 | 3 | 3.8% | 9 | 29 | 15.67 | 2.15 |
| | | 08/04/90 | 78 | 0 | 0.0% | 7 | 16 | | |
| | | 08/08/90 | 80 | 2 | 2.5% | 10 | 23 | 16.50 | 2.63 |
| | | 08/15/90 | 80 | 3 | 3.8% | 12 | 21 | 15.67 | 2.15 |
| | | 08/22/90 | 80 | 6 | 7.5% | 5 | 14 | 7.50 | 1.52 |
| | | Total | 397 | 14 | 3.5% | | | | |
| Mean | 79 | 3 | 3.5% | 9 | 21 | 13.84 | 2.11 | | |
| 508 | Solf Creek | 07/18/90 | 80 | 28 | 35.0% | 3 | 35 | 19.96 | 0.70 |
| | | 07/27/90 | 79 | 46 | 58.2% | 4 | 37 | 19.13 | 0.55 |
| | | 08/02/90 | 80 | 63 | 78.8% | 1 | 19 | 9.73 | 0.47 |
| | | 08/11/90 | 80 | 48 | 60.0% | 2 | 25 | 11.33 | 0.54 |
| | | 08/17/90 | 80 | 53 | 66.3% | 4 | 25 | 10.21 | 0.51 |
| | | Total | 399 | 238 | 59.6% | | | | |
| Mean | 80 | 48 | 59.6% | 3 | 28 | 14.07 | 0.55 | | |

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Appendix H.1. (page 3 of 6)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | | |
|--------|------------------|----------|--------|------------|---------|------------------------|-----|-------|------|--|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE | |
| 510 | Elishansky Creek | 07/24/90 | 80 | 20 | 25.0% | 3 | 27 | 13.20 | 0.83 | |
| | | 07/31/90 | 80 | 34 | 42.5% | 2 | 31 | 11.65 | 0.64 | |
| | | 08/07/90 | 80 | 27 | 33.8% | 1 | 20 | 8.19 | 0.72 | |
| | | 08/14/90 | 80 | 21 | 26.3% | 3 | 24 | 12.62 | 0.81 | |
| | | 08/21/90 | 80 | 35 | 43.8% | 1 | 17 | 9.06 | 0.63 | |
| | | Total | 400 | 137 | 34.3% | | | | | |
| | | Mean | 80 | 27 | 34.3% | 2 | 24 | 10.94 | 0.73 | |
| 601 | Paddy Creek | 07/15/90 | 80 | 47 | 58.8% | 1 | 45 | 25.36 | 0.54 | |
| | | 07/29/90 | 80 | 46 | 57.5% | 2 | 35 | 13.67 | 0.55 | |
| | | 08/05/90 | 80 | 38 | 47.5% | 1 | 24 | 14.79 | 0.60 | |
| | | 08/12/90 | 80 | 36 | 45.0% | 6 | 26 | 15.83 | 0.62 | |
| | | Total | 320 | 167 | 52.2% | | | | | |
| | | Mean | 80 | 42 | 52.2% | 3 | 33 | 17.41 | 0.58 | |
| 602 | Nacktan Creek | 07/24/90 | 80 | 56 | 70.0% | 2 | 38 | 18.86 | 0.50 | |
| | | 08/01/90 | 80 | 39 | 48.8% | 2 | 36 | 21.72 | 0.60 | |
| | | 08/08/90 | 80 | 41 | 51.3% | 6 | 29 | 17.85 | 0.58 | |
| | | 08/15/90 | 80 | 36 | 45.0% | 6 | 24 | 15.19 | 0.62 | |
| | | Total | 320 | 172 | 53.8% | | | | | |
| | | Mean | 80 | 43 | 53.8% | 4 | 32 | 18.41 | 0.57 | |
| 604 | Erb Creek | 07/11/90 | 80 | 17 | 21.3% | 9 | 30 | 18.00 | 0.90 | |
| | | 07/18/90 | 80 | 24 | 30.0% | 11 | 52 | 25.46 | 0.76 | |
| | | 07/30/90 | 80 | 29 | 36.3% | 1 | 30 | 13.45 | 0.69 | |
| | | 08/06/90 | 79 | 26 | 32.9% | 1 | 30 | 13.04 | 0.73 | |
| | | 08/14/90 | 80 | 31 | 38.8% | 5 | 27 | 13.77 | 0.67 | |
| | | Total | 399 | 127 | 31.8% | | | | | |
| | | Mean | 80 | 25 | 31.8% | 5 | 34 | 16.74 | 0.75 | |

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Appendix H.1. (page 4 of 6)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|-----|-------|------|--|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE | |
| 606 | No Name Creek | 07/27/90 | 80 | 7 | 8.8% | 6 | 27 | 19.86 | 1.41 | |
| | | 08/03/90 | 80 | 20 | 25.0% | 5 | 24 | 15.35 | 0.83 | |
| | | 08/10/90 | 80 | 18 | 22.5% | 4 | 28 | 12.72 | 0.88 | |
| | | 08/17/90 | 80 | 15 | 18.8% | 4 | 24 | 10.93 | 0.96 | |
| | | 08/24/90 | 80 | 20 | 25.0% | 1 | 13 | 6.25 | 0.83 | |
| | | Total | 400 | 80 | 20.0% | | | | | |
| | | Mean | 80 | 16 | 20.0% | 4 | 23 | 13.02 | 0.98 | |
| 610 | Kompkoff Creek | 07/19/90 | 80 | 8 | 10.0% | 16 | 31 | 23.00 | 1.32 | |
| | | 07/26/90 | 80 | 9 | 11.3% | 3 | 43 | 18.11 | 1.24 | |
| | | 08/02/90 | 80 | 15 | 18.8% | 14 | 32 | 22.13 | 0.96 | |
| | | 08/09/90 | 79 | 24 | 30.4% | 5 | 23 | 11.92 | 0.76 | |
| | | 08/16/90 | 80 | 25 | 31.3% | 3 | 21 | 11.60 | 0.74 | |
| | | Total | 399 | 81 | 20.3% | | | | | |
| | | Mean | 80 | 16 | 20.3% | 8 | 30 | 17.35 | 1.00 | |
| 612 | Jackpot Bay #1 | 07/24/90 | 80 | 26 | 32.5% | 3 | 27 | 13.92 | 0.73 | |
| | | 07/31/90 | 80 | 40 | 50.0% | 1 | 21 | 9.30 | 0.59 | |
| | | 08/07/90 | 80 | 22 | 27.5% | 1 | 22 | 11.14 | 0.79 | |
| | | 08/15/90 | 80 | 34 | 42.5% | 1 | 13 | 5.79 | 0.64 | |
| | | 08/22/90 | 80 | 33 | 41.3% | 1 | 10 | 5.48 | 0.65 | |
| | | Total | 400 | 155 | 38.8% | | | | | |
| | | Mean | 80 | 31 | 38.8% | 1 | 19 | 9.13 | 0.68 | |
| 613 | Jackpot Creek | 07/23/90 | 80 | 17 | 21.3% | 10 | 33 | 21.53 | 0.90 | |
| | | 07/30/90 | 80 | 30 | 37.5% | 6 | 26 | 17.60 | 0.68 | |
| | | 08/06/90 | 80 | 32 | 40.0% | 5 | 25 | 13.63 | 0.66 | |
| | | 08/13/90 | 80 | 38 | 47.5% | 3 | 20 | 11.50 | 0.60 | |
| | | 08/20/90 | 80 | 38 | 47.5% | 1 | 22 | 7.18 | 0.60 | |
| | | Total | 400 | 155 | 38.8% | | | | | |
| | | Mean | 80 | 31 | 38.8% | 5 | 25 | 14.29 | 0.69 | |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | | |
|--------|-------------------|----------|--------|------------|---------|------------------------|-----|-------|------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE | |
| 621 | Totemoff Creek | 07/12/90 | 80 | 29 | 36.3% | 13 | 54 | 24.07 | 0.69 | |
| | | 07/25/90 | 80 | 27 | 33.8% | 7 | 36 | 22.67 | 0.72 | |
| | | 08/02/90 | 80 | 22 | 27.5% | 4 | 31 | 15.95 | 0.79 | |
| | | 08/09/90 | 80 | 28 | 35.0% | 1 | 26 | 16.25 | 0.70 | |
| | | 08/16/90 | 80 | 26 | 32.5% | 4 | 22 | 12.85 | 0.73 | |
| | | Total | 400 | 132 | 33.0% | | | | | |
| | | Mean | 80 | 26 | 33.0% | 6 | 34 | 18.36 | 0.73 | |
| 623 | Brizgaloff Creek | 07/28/90 | 80 | 41 | 51.3% | 4 | 28 | 12.80 | 0.58 | |
| | | 08/04/90 | 80 | 32 | 40.0% | 10 | 30 | 19.94 | 0.66 | |
| | | 08/11/90 | 80 | 43 | 53.8% | 3 | 22 | 14.56 | 0.57 | |
| | | 08/18/90 | 80 | 36 | 45.0% | 4 | 22 | 12.50 | 0.62 | |
| | | Total | 320 | 152 | 47.5% | | | | | |
| | | Mean | 80 | 38 | 47.5% | 5 | 26 | 14.95 | 0.61 | |
| 692 | Herring Bay Creek | 08/03/90 | 80 | 46 | 57.5% | 8 | 25 | 15.57 | 0.55 | |
| | | 08/10/90 | 80 | 46 | 57.5% | 12 | 26 | 18.24 | 0.55 | |
| | | 08/17/90 | 80 | 39 | 48.8% | 8 | 21 | 13.72 | 0.60 | |
| | | 08/25/90 | 80 | 38 | 47.5% | 2 | 19 | 8.74 | 0.60 | |
| | | 08/31/90 | 80 | 39 | 48.8% | 1 | 13 | 8.41 | 0.60 | |
| | | Total | 400 | 208 | 52.0% | | | | | |
| | | Mean | 80 | 42 | 52.0% | 6 | 21 | 12.94 | 0.58 | |
| 695 | Audrey Creek | 07/18/90 | 80 | 32 | 40.0% | 6 | 36 | 21.44 | 0.66 | |
| | | 08/01/90 | 80 | 40 | 50.0% | 1 | 23 | 11.50 | 0.54 | |
| | | 08/08/90 | 80 | 53 | 66.3% | 2 | 15 | 7.09 | 0.59 | |
| | | 08/15/90 | 80 | 49 | 61.3% | 1 | 16 | 8.51 | 0.51 | |
| | | Total | 400 | 222 | 55.5% | | | | | 0.53 |
| | | Mean | 80 | 44 | 55.5% | 2 | 25 | 13.00 | 0.57 | |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|-------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 699 | Cathead Creek | 07/12/90 | 80 | 38 | 47.5% | 9 | 43 | 26.03 | 0.60 |
| | | 07/26/90 | 80 | 43 | 53.8% | 5 | 33 | 18.91 | 0.57 |
| | | 08/01/90 | 80 | 47 | 58.8% | 3 | 22 | 13.30 | 0.54 |
| | | 08/09/90 | 80 | 62 | 77.5% | 2 | 22 | 16.48 | 0.47 |
| | | 08/16/90 | 80 | 67 | 83.8% | 1 | 19 | 9.84 | 0.45 |
| | | Total | 400 | 257 | 64.3% | | | | |
| | Mean | 80 | 51 | 64.3% | 4 | 28 | 16.91 | 0.53 | |

Appendix H.2. Results of Peterson Disk tagging of pink salmon for determination of stream life,
Prince William Sound, Alaska, 1991.

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 002 | Hartney Creek | 08/08/91 | 25 | 4 | 16.0% | 23 | 27 | 0.00 | 0.87 |
| 005 | Eccles Creek | 08/20/91 | 107 | 49 | 45.8% | 8 | 30 | 14.10 | 0.25 |
| | | 08/27/91 | 63 | 27 | 42.9% | 4 | 17 | 12.07 | 0.33 |
| | | Total: | 170 | 76 | 44.7% | | | | |
| | | Mean | 85 | 38 | 44.3% | 6 | 24 | 13.09 | 0.29 |
| 011 | Humpty Creek | 07/22/91 | 150 | 50 | 33.3% | 2 | 28 | 16.34 | 0.24 |
| | | 07/30/91 | 80 | 16 | 20.0% | 7 | 34 | 17.81 | 0.43 |
| | | 08/05/91 | 150 | 22 | 14.7% | 4 | 31 | 17.41 | 0.37 |
| | | 08/13/91 | 64 | 5 | 7.8% | 16 | 21 | 18.40 | 0.77 |
| | | 08/19/91 | 106 | 38 | 35.8% | 1 | 19 | 13.24 | 0.28 |
| | | Total | 550 | 151 | 23.8% | | | | |
| Mean | 110 | 26 | 22.3% | 6 | 27 | 16.64 | 0.42 | | |
| 076 | Irish Creek | 07/17/91 | 198 | 76 | 38.4% | 1 | 45 | 17.12 | 0.20 |
| | | 07/24/91 | 200 | 104 | 52.0% | 4 | 51 | 21.50 | 0.17 |
| | | 07/31/91 | 200 | 120 | 60.0% | 4 | 44 | 20.39 | 0.16 |
| | | 08/07/91 | 200 | 129 | 64.5% | 2 | 39 | 18.02 | 0.15 |
| | | 08/14/91 | 200 | 118 | 59.0% | 5 | 35 | 16.26 | 0.16 |
| | | 08/21/91 | 200 | 144 | 72.0% | 7 | 27 | 16.22 | 0.14 |
| | | 08/28/91 | 149 | 77 | 51.7% | 1 | 21 | 10.60 | 0.20 |
| | | 09/04/91 | 150 | 77 | 51.3% | 3 | 12 | 8.12 | 0.20 |
| | | Total | 1497 | 845 | 56.4% | | | | |
| Mean | 187 | 106 | 56.1% | 3 | 34 | 16.03 | 0.17 | | |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 080 | Whalen Creek | 07/14/91 | 200 | 101 | 50.5% | 4 | 35 | 19.87 | 0.17 |
| | | 07/21/91 | 200 | 94 | 47.0% | 2 | 42 | 20.67 | 0.18 |
| | | 07/28/91 | 200 | 95 | 47.5% | 7 | 39 | 17.84 | 0.18 |
| | | 08/04/91 | 200 | 86 | 43.0% | 6 | 34 | 19.79 | 0.19 |
| | | 08/11/91 | 199 | 92 | 46.2% | 7 | 38 | 17.40 | 0.18 |
| | | 08/19/91 | 198 | 98 | 49.5% | 4 | 30 | 16.66 | 0.17 |
| | | 09/01/91 | 149 | 64 | 43.0% | 4 | 19 | 12.09 | 0.22 |
| | | Total | 1346 | 630 | 46.8% | | | | |
| Mean | 192 | 90 | 46.7% | 5 | 34 | 17.76 | 0.18 | | |
| 092 | Shale Creek | 08/13/91 | 147 | 45 | 30.6% | 2 | 20 | 11.09 | 0.26 |
| | | 08/20/91 | 150 | 72 | 48.0% | 1 | 23 | 9.63 | 0.20 |
| | | 08/27/91 | 150 | 50 | 33.3% | 2 | 19 | 8.54 | 0.24 |
| | | 09/03/91 | 150 | 47 | 31.3% | 1 | 17 | 6.47 | 0.25 |
| | | Total | 597 | 214 | 35.8% | | | | |
| Mean | 149 | 54 | 35.8% | 2 | 20 | 8.93 | 0.24 | | |
| 093 | Kirkwood Creek | 07/19/91 | 150 | 69 | 46.0% | 1 | 23 | 12.42 | 0.21 |
| | | 07/26/91 | 149 | 75 | 50.3% | 1 | 48 | 11.35 | 0.20 |
| | | 08/02/91 | 148 | 53 | 35.8% | 1 | 23 | 10.92 | 0.24 |
| | | 08/09/91 | 149 | 53 | 35.6% | 1 | 31 | 11.77 | 0.24 |
| | | 08/16/91 | 150 | 44 | 29.3% | 2 | 22 | 13.98 | 0.26 |
| | | 08/23/91 | 149 | 40 | 26.8% | 2 | 26 | 10.77 | 0.27 |
| | | 08/30/91 | 149 | 46 | 30.9% | 1 | 19 | 6.89 | 0.26 |
| | | Total | 1044 | 380 | 36.4% | | | | |
| Mean | 149 | 54 | 36.4% | 1 | 27 | 11.16 | 0.24 | | |
| 094 | Rock Creek | 08/03/91 | 150 | 52 | 34.7% | 1 | 32 | 9.00 | 0.24 |
| | | 08/10/91 | 148 | 51 | 34.5% | 5 | 31 | 12.57 | 0.24 |
| | | 08/18/91 | 147 | 68 | 46.3% | 3 | 31 | 14.63 | 0.21 |
| | | 08/24/91 | 149 | 63 | 42.3% | 1 | 22 | 9.46 | 0.22 |
| | | 08/31/91 | 150 | 43 | 28.7% | 1 | 18 | 8.02 | 0.26 |
| | | Total | 744 | 277 | 37.2% | | | | |
| Mean | 149 | 55 | 37.3% | 2 | 27 | 10.74 | 0.24 | | |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|------------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 506 | Loomis Creek | 08/09/91 | 134 | 63 | 47.0% | 4 | 31 | 13.87 | 0.22 |
| | | 08/16/91 | 136 | 89 | 65.4% | 1 | 33 | 8.94 | 0.18 |
| | | 08/23/91 | 150 | 52 | 34.7% | 1 | 20 | 10.54 | 0.24 |
| | | 08/30/91 | 150 | 40 | 26.7% | 5 | 17 | 9.48 | 0.27 |
| | | 09/06/91 | 150 | 42 | 28.0% | 3 | 17 | 7.26 | 0.27 |
| | | Total | 720 | 286 | 39.7% | | | | |
| | | Mean | 144 | 57 | 40.4% | 3 | 24 | 10.02 | 0.24 |
| 507 | Gumboot Creek | 08/10/91 | 149 | 0 | 0.0% | 13 | 13 | 0.00 | |
| | | 08/18/91 | 150 | 3 | 2.0% | 9 | 13 | 11.67 | 1.00 |
| | | 08/24/91 | 150 | 1 | 0.7% | 1 | 16 | 16.00 | |
| | | 08/31/91 | 150 | 0 | 0.0% | 4 | 9 | 0.00 | |
| | | Total | 599 | 4 | 0.7% | | | | |
| | | Mean | 150 | 1 | 0.7% | 7 | 13 | 6.92 | 1.00 |
| 508 | Solf Creek | 07/29/91 | 150 | 58 | 38.7% | 8 | 45 | 21.78 | 0.23 |
| | | 08/05/91 | 150 | 68 | 45.3% | 3 | 24 | 18.91 | 0.21 |
| | | 08/12/91 | 150 | 106 | 70.7% | 2 | 22 | 9.87 | 0.17 |
| | | 08/19/91 | 149 | 97 | 65.1% | 2 | 25 | 11.41 | 0.18 |
| | | 08/26/91 | 149 | 70 | 47.0% | 1 | 22 | 9.56 | 0.21 |
| | | 09/02/91 | 150 | 52 | 34.7% | 1 | 16 | 7.08 | 0.24 |
| | | Total | 898 | 451 | 50.2% | | | | |
| Mean | 150 | 75 | 50.2% | 3 | 26 | 13.10 | 0.20 | | |
| 510 | Elishansky Creek | 07/23/91 | 149 | 49 | 32.9% | 3 | 29 | 17.04 | 0.25 |
| | | 07/30/91 | 150 | 51 | 34.0% | 5 | 35 | 14.71 | 0.24 |
| | | 08/06/91 | 150 | 53 | 35.3% | 2 | 32 | 15.74 | 0.24 |
| | | 08/13/91 | 150 | 43 | 28.7% | 1 | 26 | 12.98 | 0.26 |
| | | 08/20/91 | 150 | 35 | 23.3% | 1 | 18 | 9.57 | 0.29 |
| | | 08/27/91 | 150 | 21 | 14.0% | 6 | 16 | 9.05 | 0.38 |
| | | Total | 899 | 252 | 28.0% | | | | |
| | | Mean | 150 | 42 | 28.0% | 3 | 26 | 13.18 | 0.28 |

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Appendix H.2. (page 4 of 10)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 516 | Clemence Creek | 08/22/91 | 80 | 16 | 20.0% | 1 | 19 | 10.63 | 0.43 |
| | | 08/29/91 | 78 | 12 | 15.4% | 2 | 24 | 8.67 | 0.50 |
| | | Total | 158 | 28 | 17.7% | | | | |
| | | Mean | 79 | 14 | 17.7% | 2 | 22 | 9.65 | 0.47 |
| 601 | Paddy Creek | 08/02/91 | 150 | 77 | 51.3% | 6 | 36 | 18.44 | 0.20 |
| | | 08/09/91 | 150 | 81 | 54.0% | 1 | 24 | 11.19 | 0.19 |
| | | 08/16/91 | 150 | 100 | 66.7% | 2 | 24 | 12.23 | 0.17 |
| | | 08/23/91 | 150 | 70 | 46.7% | 5 | 23 | 12.36 | 0.21 |
| | | 08/30/91 | 149 | 71 | 47.7% | 1 | 18 | 7.52 | 0.21 |
| | | Total | 749 | 399 | 53.3% | | | | |
| Mean | 150 | 80 | 53.3% | 3 | 25 | 12.35 | 0.20 | | |
| 602 | Nacktan Creek | 08/06/91 | 149 | 36 | 24.2% | 7 | 38 | 20.89 | 0.29 |
| | | 08/13/91 | 149 | 60 | 40.3% | 7 | 33 | 18.78 | 0.22 |
| | | 08/20/91 | 150 | 53 | 35.3% | 3 | 26 | 13.00 | 0.24 |
| | | 08/27/91 | 150 | 53 | 35.3% | 3 | 21 | 10.57 | 0.24 |
| | | 09/03/91 | 150 | 75 | 50.0% | 3 | 15 | 8.04 | 0.20 |
| | | Total | 748 | 277 | 37.0% | | | | |
| Mean | 150 | 55 | 37.0% | 5 | 27 | 14.26 | 0.24 | | |
| 604 | Erb Creek | 07/27/91 | 150 | 66 | 44.0% | 2 | 43 | 16.71 | 0.21 |
| | | 08/03/91 | 150 | 82 | 54.7% | 4 | 36 | 17.11 | 0.19 |
| | | 08/10/91 | 150 | 70 | 46.7% | 3 | 32 | 15.41 | 0.21 |
| | | 08/17/91 | 149 | 58 | 38.9% | 1 | 26 | 14.19 | 0.23 |
| | | 08/24/91 | 149 | 58 | 38.9% | 2 | 20 | 10.67 | 0.23 |
| | | 09/01/91 | 150 | 69 | 46.0% | 1 | 16 | 9.29 | 0.21 |
| | | Total | 898 | 403 | 44.9% | | | | |
| Mean | 150 | 67 | 44.9% | 2 | 29 | 13.90 | 0.21 | | |

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Appendix H.2. (page 5 of 10)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|-----|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 606 | Jackpot River | 07/29/91 | 138 | 15 | 10.9% | 6 | 27 | 13.20 | 0.45 |
| | | 08/05/91 | 150 | 36 | 24.0% | 3 | 32 | 15.56 | 0.29 |
| | | 08/12/91 | 150 | 52 | 34.7% | 3 | 27 | 13.38 | 0.24 |
| | | 08/20/91 | 150 | 27 | 18.0% | 1 | 26 | 12.11 | 0.33 |
| | | 08/27/91 | 150 | 43 | 28.7% | 1 | 14 | 8.51 | 0.26 |
| | | 09/02/91 | 104 | 21 | 20.2% | 2 | 15 | 6.62 | 0.38 |
| | | Total | 842 | 194 | 23.0% | | | | |
| | | Mean | 140 | 32 | 22.7% | 3 | 24 | 11.56 | 0.33 |
| 610 | Kompkoff River | 08/03/91 | 150 | 23 | 15.3% | 7 | 35 | 20.65 | 0.36 |
| | | 08/10/91 | 120 | 14 | 11.7% | 11 | 27 | 20.14 | 0.46 |
| | | 08/17/91 | 90 | 28 | 31.1% | 10 | 21 | 13.61 | 0.33 |
| | | 08/24/91 | 150 | 13 | 8.7% | 3 | 20 | 12.69 | 0.48 |
| | | 08/31/91 | 150 | 34 | 22.7% | 1 | 19 | 7.15 | 0.30 |
| | | Total | 660 | 112 | 17.0% | | | | |
| | | Mean | 132 | 22 | 17.9% | 6 | 24 | 14.85 | 0.39 |
| 613 | Jackson Creek | 07/24/91 | 132 | 70 | 53.0% | 11 | 34 | 24.89 | 0.21 |
| | | 08/02/91 | 150 | 79 | 52.7% | 9 | 33 | 21.80 | 0.19 |
| | | 08/09/91 | 150 | 88 | 58.7% | 7 | 30 | 17.13 | 0.18 |
| | | 08/16/91 | 141 | 74 | 52.5% | 5 | 24 | 15.66 | 0.20 |
| | | 08/23/91 | 149 | 60 | 40.3% | 1 | 23 | 12.48 | 0.22 |
| | | 08/30/91 | 150 | 35 | 23.3% | 1 | 19 | 8.97 | 0.29 |
| | | Total | 872 | 406 | 46.6% | | | | |
| | | Mean | 145 | 68 | 46.7% | 6 | 27 | 16.82 | 0.22 |
| 615 | not named | 07/30/91 | 150 | 61 | 40.7% | 4 | 30 | 14.23 | 0.22 |
| | | 08/06/91 | 143 | 56 | 39.2% | 1 | 28 | 10.13 | 0.23 |
| | | 08/13/91 | 150 | 91 | 60.7% | 1 | 32 | 11.75 | 0.18 |
| | | 08/19/91 | 16 | 14 | 87.5% | 1 | 10 | 5.57 | 0.46 |
| | | 08/28/91 | 150 | 73 | 48.7% | 1 | 16 | 7.27 | 0.20 |
| | | 09/03/91 | 150 | 64 | 42.7% | 1 | 14 | 4.42 | 0.22 |
| | | Total | 759 | 359 | 47.3% | | | | |
| | | Mean | 127 | 60 | 53.2% | 2 | 22 | 8.90 | 0.25 |

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Appendix H.2.(page 6 of 10)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|------------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 618 | Junction Creek | 08/18/91 | 149 | 40 | 26.8% | 2 | 21 | 11.70 | 0.27 |
| | | 08/26/91 | 149 | 12 | 8.1% | 1 | 22 | 12.08 | 0.50 |
| | | 08/31/91 | 150 | 33 | 22.0% | 1 | 18 | 8.45 | 0.30 |
| | | Total | 448 | 85 | 19.0% | | | | |
| | | Mean | 149 | 28 | 19.0% | 1 | 20 | 10.74 | 0.36 |
| 621 | Totemoff Creek | 07/25/91 | 150 | 118 | 78.7% | 7 | 39 | 22.13 | 0.16 |
| | | 08/01/91 | 150 | 87 | 58.0% | 7 | 36 | 21.38 | 0.19 |
| | | 08/08/91 | 150 | 85 | 56.7% | 7 | 35 | 18.82 | 0.19 |
| | | 08/15/91 | 150 | 99 | 66.0% | 8 | 30 | 16.54 | 0.17 |
| | | 08/22/91 | 149 | 95 | 63.8% | 5 | 23 | 13.91 | 0.18 |
| | | 08/29/91 | 150 | 93 | 62.0% | 2 | 20 | 11.73 | 0.18 |
| | | Total | 899 | 577 | 64.2% | | | | |
| Mean | 150 | 96 | 64.2% | 6 | 31 | 17.42 | 0.18 | | |
| 623 | Brizgaloff Creek | 07/31/91 | 150 | 70 | 46.7% | 6 | 37 | 20.66 | 0.21 |
| | | 08/07/91 | 150 | 55 | 36.7% | 2 | 26 | 15.82 | 0.23 |
| | | 08/14/91 | 150 | 80 | 53.3% | 8 | 30 | 15.36 | 0.19 |
| | | 08/21/91 | 150 | 62 | 41.3% | 5 | 25 | 14.00 | 0.22 |
| | | 08/28/91 | 150 | 60 | 40.0% | 2 | 21 | 11.95 | 0.22 |
| | | Total | 750 | 327 | 43.6% | | | | |
| Mean | 150 | 65 | 43.6% | 5 | 28 | 15.56 | 0.22 | | |
| 628 | Chenega Creek | 07/31/91 | 144 | 77 | 53.5% | 6 | 34 | 20.66 | 0.20 |
| | | 08/11/91 | 150 | 61 | 40.7% | 6 | 32 | 17.20 | 0.22 |
| | | 08/15/91 | 150 | 50 | 33.3% | 2 | 27 | 15.32 | 0.24 |
| | | 08/22/91 | 150 | 30 | 20.0% | 2 | 21 | 14.10 | 0.32 |
| | | 08/29/91 | 150 | 33 | 22.0% | 1 | 16 | 9.73 | 0.30 |
| | | Total | 744 | 251 | 33.7% | | | | |
| Mean | 149 | 50 | 33.9% | 3 | 26 | 15.40 | 0.26 | | |

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Appendix H.2. (page 7 of 10)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|-----|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 632 | Claw Creek | 07/26/91 | 150 | 52 | 34.7% | 9 | 37 | 17.79 | 0.24 |
| | | 08/03/91 | 150 | 66 | 44.0% | 1 | 28 | 14.35 | 0.21 |
| | | 08/10/91 | 119 | 34 | 28.6% | 6 | 28 | 14.76 | 0.30 |
| | | 08/20/91 | 149 | 74 | 49.7% | 1 | 27 | 9.95 | 0.20 |
| | | Total | 568 | 226 | 39.8% | | | | |
| | | Mean | 142 | 57 | 39.2% | 4 | 30 | 14.21 | 0.24 |
| 633 | Pablo Creek | 07/25/91 | 150 | 48 | 32.0% | 1 | 26 | 12.44 | 0.25 |
| | | 08/02/91 | 149 | 43 | 28.9% | 5 | 23 | 14.35 | 0.26 |
| | | 08/09/91 | 148 | 31 | 20.9% | 3 | 27 | 17.35 | 0.31 |
| | | Total | 447 | 122 | 27.3% | | | | |
| | | Mean | 149 | 41 | 27.3% | 3 | 25 | 14.71 | 0.28 |
| 634 | Whale Bay #1 | 08/04/91 | 80 | 6 | 7.5% | 7 | 42 | 20.67 | 0.71 |
| | | 08/14/91 | 80 | 22 | 27.5% | 5 | 33 | 15.73 | 0.37 |
| | | 08/21/91 | 80 | 14 | 17.5% | 3 | 29 | 10.00 | 0.46 |
| | | 08/31/91 | 80 | 15 | 18.8% | 1 | 16 | 5.27 | 0.45 |
| | | Total | 320 | 57 | 17.8% | | | | |
| | | Mean | 80 | 14 | 17.8% | 4 | 30 | 12.92 | 0.50 |
| 636 | Whale Creek | 07/27/91 | 149 | 68 | 45.6% | 1 | 41 | 10.12 | 0.21 |
| | | 08/04/91 | 150 | 69 | 46.0% | 3 | 42 | 16.16 | 0.21 |
| | | 08/11/91 | 150 | 73 | 48.7% | 4 | 35 | 14.70 | 0.20 |
| | | 08/19/91 | 150 | 64 | 42.7% | 3 | 24 | 12.92 | 0.22 |
| | | 08/28/91 | 150 | 67 | 44.7% | 6 | 23 | 12.22 | 0.21 |
| | | Total | 749 | 341 | 45.5% | | | | |
| | | Mean | 150 | 68 | 45.5% | 3 | 33 | 13.22 | 0.21 |
| 637 | Countess Creek | 08/08/91 | 113 | 51 | 45.1% | 5 | 31 | 15.04 | 0.24 |
| | | 08/15/91 | 150 | 59 | 39.3% | 3 | 32 | 18.51 | 0.23 |
| | | 08/26/91 | 150 | 47 | 31.3% | 3 | 24 | 15.15 | 0.25 |
| | | 09/04/91 | 150 | 115 | 76.7% | 1 | 12 | 7.37 | 0.16 |
| | | Total | 563 | 272 | 48.3% | | | | |
| | | Mean | 141 | 68 | 48.1% | 3 | 25 | 14.02 | 0.22 |

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Appendix H.2. (page 8 of 10)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|----------|---------------|----------|--------------|------------|---------|------------------------|-------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 665 | Bjorne Creek | 08/10/91 | 148 | 58 | 39.2% | 1 | 40 | 16.50 | 0.23 |
| | | 08/18/91 | 149 | 36 | 24.2% | 1 | 38 | 16.67 | 0.29 |
| | | 08/25/91 | 149 | 30 | 20.1% | 1 | 28 | 13.17 | 0.32 |
| | | 09/01/91 | 150 | 42 | 28.0% | 4 | 26 | 12.83 | 0.27 |
| | | 09/09/91 | 150 | 43 | 28.7% | 3 | 18 | 9.74 | 0.26 |
| | | Total | 746 | 209 | 28.0% | | | | |
| | | Mean | 149 | 42 | 28.0% | 2 | 30 | 13.84 | 0.27 |
| 666 | O'Brien Creek | 08/15/91 | 150 | 98 | 65.3% | 4 | 24 | 12.84 | 0.17 |
| | | 08/22/91 | 150 | 87 | 58.0% | 1 | 30 | 11.91 | 0.19 |
| | | 08/29/91 | 148 | 67 | 45.3% | 1 | 23 | 10.00 | 0.21 |
| | | 09/06/91 | 150 | 46 | 30.7% | 2 | 17 | 8.59 | 0.26 |
| | | 09/12/91 | 150 | 81 | 54.0% | 2 | 14 | 6.41 | 0.19 |
| | | Total | 748 | 379 | 50.7% | | | | |
| | | Mean: | 150 | 76 | 50.7% | 2 | 22 | 9.88 | 0.20 |
| 673 | Falls Creek | 08/07/91 | 150 | 37 | 24.7% | 2 | 26 | 16.81 | 0.28 |
| | | 08/18/91 | 137 | 35 | 25.5% | 1 | 24 | 11.57 | 0.29 |
| | | 08/23/91 | 141 | 27 | 19.1% | 6 | 24 | 12.63 | 0.33 |
| | | 08/23/91 | 148 | 24 | 16.2% | 2 | 17 | 7.38 | 0.35 |
| | | Total | 576 | 123 | 21.4% | | | | |
| | | Mean | 144 | 31 | 21.4% | 3 | 23 | 12.10 | 0.32 |
| | | 677 | Hayden Creek | 08/04/91 | 143 | 48 | 33.6% | 5 | 38 |
| 08/13/91 | 150 | | | 55 | 36.7% | 6 | 34 | 17.29 | 0.23 |
| 08/20/91 | 150 | | | 35 | 23.3% | 8 | 28 | 18.89 | 0.29 |
| 08/26/91 | 150 | | | 45 | 30.0% | 3 | 19 | 12.82 | 0.26 |
| 09/02/91 | 150 | | | 78 | 52.0% | 1 | 17 | 9.55 | 0.20 |
| 09/09/91 | 150 | | | 91 | 60.7% | 3 | 16 | 8.55 | 0.18 |
| Total | 893 | | | 352 | 39.4% | | | | |
| Mean | 149 | 59 | 39.4% | 4 | 25 | 13.82 | 0.24 | | |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|-----|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 678 | Sleepy Creek | 08/21/91 | 80 | 9 | 11.3% | 2 | 19 | 9.44 | 0.58 |
| | | 08/29/91 | 80 | 2 | 2.5% | 1 | 13 | 5.00 | 1.22 |
| | | 09/03/91 | 79 | 2 | 2.5% | 3 | 12 | 8.00 | 1.22 |
| | | Total | 239 | 13 | 5.4% | | | | |
| | | Mean | 80 | 4 | 5.4% | 2 | 15 | 7.48 | 1.01 |
| 692 | Herring Bay | 08/15/91 | 150 | 95 | 63.3% | 3 | 27 | 15.31 | 0.18 |
| | | 08/22/91 | 150 | 65 | 43.3% | 2 | 30 | 14.60 | 0.21 |
| | | 08/29/91 | 150 | 70 | 46.7% | 1 | 23 | 10.60 | 0.21 |
| | | Total | 450 | 230 | 51.1% | | | | |
| | | Mean | 150 | 77 | 51.1% | 2 | 27 | 13.50 | 0.20 |
| 695 | Port Audrey | 07/26/91 | 132 | 28 | 21.2% | 9 | 43 | 26.71 | 0.33 |
| | | 08/02/91 | 150 | 47 | 31.3% | 4 | 26 | 17.81 | 0.25 |
| | | 08/09/91 | 150 | 47 | 31.3% | 1 | 27 | 12.45 | 0.25 |
| | | 08/16/91 | 149 | 34 | 22.8% | 2 | 30 | 12.32 | 0.30 |
| | | 08/23/91 | 150 | 35 | 23.3% | 1 | 18 | 8.71 | 0.29 |
| | | 08/30/91 | 148 | 19 | 12.8% | 2 | 14 | 8.16 | 0.40 |
| | | Total | 879 | 210 | 23.9% | | | | |
| | | Mean | 147 | 35 | 23.8% | 3 | 26 | 14.36 | 0.30 |
| 699 | Cathead Creek | 08/17/91 | 150 | 87 | 58.0% | 4 | 34 | 19.62 | 0.19 |
| | | 08/24/91 | 150 | 92 | 61.3% | 0 | 23 | 14.15 | 0.18 |
| | | 08/31/91 | 150 | 100 | 66.7% | 2 | 22 | 12.68 | 0.17 |
| | | Total | 450 | 279 | 62.0% | | | | |
| | | Mean | 150 | 93 | 62.0% | 2 | 26 | 15.48 | 0.18 |

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| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|---------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 847 | Hawkins Creek | 07/29/91 | 150 | 65 | 43.3% | 4 | 50 | 18.48 | 0.21 |
| | | 08/05/91 | 150 | 69 | 46.0% | 4 | 33 | 18.32 | 0.21 |
| | | 08/12/91 | 150 | 75 | 50.0% | 3 | 32 | 17.89 | 0.20 |
| | | 08/19/91 | 150 | 59 | 39.3% | 7 | 29 | 16.81 | 0.23 |
| | | 08/27/91 | 150 | 39 | 26.0% | 2 | 19 | 11.26 | 0.28 |
| | | 09/02/91 | 150 | 42 | 28.0% | 3 | 15 | 6.76 | 0.27 |
| | | Total | 900 | 349 | 38.8% | | | | |
| Mean | 150 | 58 | 38.8% | 4 | 30 | 14.92 | 0.23 | | |
| 850 | Canoe Creek | 08/04/91 | 150 | 60 | 40.0% | 2 | 45 | 22.33 | 0.22 |
| | | 08/11/91 | 150 | 71 | 47.3% | 8 | 32 | 19.03 | 0.21 |
| | | 08/18/91 | 150 | 61 | 40.7% | 5 | 31 | 16.33 | 0.22 |
| | | 08/25/91 | 150 | 44 | 29.3% | 6 | 24 | 14.52 | 0.26 |
| | | 09/01/91 | 150 | 37 | 24.7% | 0 | 17 | 9.03 | 0.28 |
| | | Total | 750 | 273 | 36.4% | | | | |
| Mean | 150 | 55 | 36.4% | 4 | 30 | 16.25 | 0.24 | | |
| 16965 | not named | 08/21/91 | 149 | 8 | 5.4% | 4 | 20 | 14.63 | 0.61 |
| | | 08/28/91 | 150 | 5 | 3.3% | 12 | 21 | 15.60 | 0.77 |
| | | Total | 299 | 13 | 4.3% | | | | |
| | | Mean | 150 | 7 | 4.4% | 8 | 21 | 15.12 | 0.69 |

Appendix H.3. Results of Peterson Disk tagging of pink salmon for the determination of stream life, Prince William Sound, Alaska, 1992.

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|----------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 076 | Irish Creek | 07/23/92 | 157 | 66 | 42.0% | 5 | 26 | 15.35 | 0.57 |
| | | 07/30/92 | 135 | 81 | 60.0% | 4 | 44 | 21.88 | 0.68 |
| | | 08/07/92 | 141 | 59 | 41.8% | 4 | 36 | 18.22 | 0.76 |
| | | 08/13/92 | 200 | 99 | 49.5% | 5 | 26 | 13.42 | 0.39 |
| | | 08/20/92 | 197 | 71 | 36.0% | 2 | 26 | 13.54 | 0.49 |
| | | 08/29/92 | 200 | 63 | 31.5% | 6 | 17 | 12.24 | 0.31 |
| | | Total | 1030 | 439 | 42.6% | | | | |
| Mean | 172 | 73 | 43.5% | 4 | 29 | 16.31 | 0.26 | | |
| 506 | Loomis Creek | 08/16/92 | 75 | 38 | 50.7% | 4 | 21 | 13.34 | 0.62 |
| | | 08/23/92 | 120 | 60 | 50.0% | 4 | 21 | 9.68 | 0.52 |
| | | 08/30/92 | 150 | 92 | 61.3% | 2 | 18 | 8.29 | 0.31 |
| | | 09/06/92 | 100 | 46 | 46.0% | 1 | 12 | 5.76 | 0.46 |
| | | Total | 445 | 236 | 53.0% | | | | |
| Mean | 111 | 59 | 52.0% | 3 | 18 | 10.50 | 0.31 | | |
| 621 | Totemoff Creek | 07/22/92 | 150 | 93 | 62.0% | 13 | 38 | 22.13 | 0.54 |
| | | 07/29/92 | 150 | 68 | 45.3% | 11 | 38 | 19.94 | 0.62 |
| | | 08/05/92 | 150 | 62 | 41.3% | 3 | 30 | 16.63 | 0.44 |
| | | 08/12/92 | 150 | 60 | 40.0% | 2 | 24 | 12.38 | 0.56 |
| | | 08/20/92 | 150 | 35 | 23.3% | 3 | 20 | 14.03 | 0.58 |
| | | Total | 1306 | 613 | 46.9% | | | | |
| Mean | 187 | 88 | 45.3% | 6 | 28 | 16.84 | 0.26 | | |
| 628 | Chenega Creek | 07/30/92 | 150 | 78 | 52.0% | 7 | 36 | 19.62 | 0.73 |
| | | 08/06/92 | 150 | 70 | 46.7% | 10 | 32 | 18.93 | 0.54 |
| | | 08/13/92 | 150 | 42 | 28.0% | 4 | 31 | 16.33 | 0.78 |
| | | 08/20/92 | 150 | 84 | 56.0% | 5 | 22 | 12.10 | 0.31 |
| | | 08/27/92 | 150 | 19 | 12.7% | 1 | 18 | 11.58 | 0.91 |
| | | 09/03/92 | 150 | 20 | 13.3% | 1 | 13 | 9.15 | 0.42 |
| | | Total | 900 | 313 | 34.8% | | | | |
| Mean | 150 | 52 | 34.8% | 5 | 25 | 12.45 | 0.38 | | |

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Appendix H.3. (page 2 of 2)

| Stream | | Tagging | | Recoveries | | Stream Life Statistics | | | |
|--------|-------------------|----------|--------|------------|---------|------------------------|------|-------|------|
| No. | Name | Date | Number | Total | Percent | Min | Max | Mean | SE |
| 637 | Countess Creek | 08/04/92 | 150 | 102 | 68.0% | 2 | 16 | 7.68 | 0.31 |
| | | 08/31/92 | 150 | 43 | 28.7% | 1 | 16 | 9.05 | 0.60 |
| | | Total | 300 | 145 | 48.3% | | | | |
| | | Mean | 150 | 73 | 48.3% | 2 | 16 | 7.85 | 0.28 |
| 666 | O'Brien Creek | 08/10/92 | 100 | 25 | 25.0% | 1 | 18 | 8.32 | 0.69 |
| | | 08/19/92 | 75 | 42 | 56.0% | 0 | 18 | 11.62 | 0.55 |
| | | 08/28/92 | 150 | 119 | 79.3% | 2 | 23 | 11.14 | 0.38 |
| | | 09/07/92 | 38 | 13 | 34.2% | 2 | 13 | 8.54 | 0.76 |
| | | Total | 363 | 199 | 54.8% | | | | |
| Mean | 91 | 50 | 48.6% | 1 | 18 | 10.01 | 0.29 | | |
| 677 | Hayden Creek | 08/21/92 | 100 | 55 | 55.0% | 2 | 19 | 12.84 | 0.48 |
| | | 08/26/92 | 86 | 50 | 58.1% | 4 | 16 | 11.42 | 0.40 |
| | | 09/02/92 | 96 | 73 | 76.0% | 2 | 14 | 9.34 | 0.36 |
| | | Total | 282 | 178 | 63.1% | | | | |
| Mean | 94 | 59 | 63.1% | 3 | 16 | 10.26 | 0.26 | | |
| 692 | Herring Bay Creek | 08/09/92 | 108 | 11 | 10.2% | 4 | 26 | 17.00 | 1.64 |
| | | 08/19/92 | 58 | 9 | 15.5% | 6 | 18 | 14.33 | 0.58 |
| | | 08/26/92 | 90 | 11 | 12.2% | 6 | 18 | 12.55 | 0.72 |
| | | Total | 256 | 31 | 12.1% | | | | |
| Mean | 85 | 10 | 12.6% | 5 | 21 | 13.17 | 0.59 | | |
| 699 | Cathead Creek | 07/23/92 | 150 | 59 | 39.3% | 3 | 37 | 19.76 | 0.78 |
| | | 07/30/92 | 150 | 85 | 56.7% | 2 | 25 | 12.02 | 0.46 |
| | | 08/06/92 | 150 | 58 | 38.7% | 2 | 24 | 13.05 | 0.58 |
| | | 08/13/92 | 150 | 46 | 30.7% | 2 | 19 | 7.50 | 0.59 |
| | | Total | 600 | 248 | 41.3% | | | | |
| Mean | 150 | 62 | 41.3% | 2 | 26 | 12.03 | 0.32 | | |
| 847 | Hawkins Creek | 07/26/92 | 200 | 57 | 28.5% | 6 | 41 | 23.05 | 0.98 |

Appendix I. Streams Randomly Added to the Aerial Survey Program in 1991 to Assess Pink Salmon Spawning Escapements in Streams Not Included in the Routine Aerial Survey Program, Prince William Sound, Alaska.

Appendix I. Streams randomly added to the aerial survey program in 1991 to assess pink salmon spawning escapements in streams not included within the routine aerial survey program, Prince William Sound, Alaska. Stream numbers and names used in the aerial survey database along with corresponding stream numbers and locations used in the anadromous waters catalog are shown. Legal descriptions include meridian, township, range and section.

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 072 Two Moon Creek #2 | 221-40-10720 | 60° 43' 55" N 146° 31' 14" W | C 13S 7W 19 |
| | | 60° 43' 30" N 146° 31' 0" W | C 13S 7W 19 |
| 085 not named | 221-40-10850 | 60° 52' 17" N 146° 11' 8" W | C 11S 5W 31 |
| | | 60° 52' 0" N 146° 10' 5" W | C 11S 5W 30 |
| 086 Fidalgo River | 221-40-10860 | 60° 52' 33" N 146° 11' 14" W | C 11S 5W 31 |
| | | 60° 53' 54" N 146° 7' 55" W | C 11S 5W 21 |
| 10030 Nicolet Creek | 221-10-10350 | 60° 31' 10" N 145° 47' 24" W | C 15S 3W 32 |
| | | 60° 31' 8" N 145° 47' 0" W | C 15S 3W 32 |
| 10040 Heney Creek | 221-10-10040 | 60° 31' 26" N 145° 47' 24" W | C 15S 3W 32 |
| | | 60° 31' 25" N 145° 46' 22" W | C 15S 3W 33 |
| 10165 Rude River Tributary | 221-10-10165 | 60° 40' 27" N 145° 37' 21" W | C 14S 2W 8 |
| | | 60° 40' 53" N 145° 37' 8" W | C 14S 2W 5 |
| 10180 Hole-in-wall | 221-20-10180 | 60° 37' 2" N 145° 52' 25" W | C 14S 4W 35 |
| | | 60° 36' 56" N 145° 52' 12" W | C 14S 4W 35 |
| 10318 not named | 221-20-10318 | 60° 40' 21" N 145° 57' 7" W | C 14S 4W 9 |
| | | 60° 40' 7" N 145° 56' 14" W | C 14S 4W 9 |
| 10320 not named | 221-20-10320 | 60° 40' 24" N 145° 57' 2" W | C 14S 4W 9 |
| | | 60° 40' 36" N 145° 55' 34" W | C 14S 4W 9 |
| 10380 not named | 221-20-10380 | 60° 38' 43" N 146° 7' 13" W | C 14S 5W 21 |
| | | 60° 38' 49" N 146° 7' 29" W | C 14S 5W 21 |

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Appendix I. (page 2 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|-------|
| | | Latitude and Longitude | | Legal Description | |
| 10440 not named | 221-30-10440 | 60° 41' 49" N | 146° 9' 20" W | C 13S | 5W 32 |
| | | 60° 41' 6" N | 146° 8' 30" W | C 14S | 5W 5 |
| 10513 not named | 221-30-10513 | 60° 44' 0" N | 146° 10' 13" W | C 13S | 5W 19 |
| | | 60° 44' 31" N | 146° 9' 34" W | C 13S | 5W 18 |
| 10590 not named | 221-30-10590 | 60° 45' 42" N | 146° 19' 22" W | C 13S | 6W 8 |
| | | 60° 45' 45" N | 146° 19' 29" W | C 13S | 6W 8 |
| 10600 not named | 221-30-10600 | 60° 45' 29" N | 146° 19' 39" W | C 13S | 6W 8 |
| | | 60° 45' 40" N | 146° 20' 16" W | C 13S | 6W 7 |
| 10610 not named | 221-30-10610 | 60° 43' 56" N | 146° 20' 49" W | C 13S | 6W 19 |
| | | 60° 44' 1" N | 146° 20' 59" W | C 13S | 6W 19 |
| 10630 not named | 221-30-10630 | 60° 42' 24" N | 146° 22' 54" W | C 13S | 7W 25 |
| | | 60° 43' 55" N | 146° 24' 38" W | C 13S | 7W 23 |
| 10670 not named | 221-30-10670 | 60° 41' 53" N | 146° 34' 53" W | C 13S | 8W 35 |
| | | 60° 43' 11" N | 146° 33' 10" W | C 13S | 8W 25 |
| 10677 not named | 221-40-10677 | 60° 43' 44" N | 146° 39' 17" W | C 13S | 8W 21 |
| | | 60° 43' 37" N | 146° 39' 46" W | C 13S | 8W 20 |
| 10680 not named | 221-40-10680 | 60° 43' 2" N | 146° 37' 21" W | C 13S | 8W 27 |
| | | 60° 42' 51" N | 146° 35' 43" W | C 13S | 8W 26 |
| 10738 not named | 221-40-10738 | 60° 44' 28" N | 146° 29' 41" W | C 13S | 7W 17 |
| | | 60° 44' 31" N | 146° 29' 20" W | C 13S | 7W 17 |
| 10768 not named | 221-40-10768 | 60° 47' 8" N | 146° 21' 19" W | C 12S | 6W 31 |
| | | 60° 46' 59" N | 146° 21' 27" W | C 12S | 6W 31 |
| 10770 not named | 221-40-10770 | 60° 47' 18" N | 146° 20' 16" W | C 12S | 6W 32 |
| | | 60° 47' 7" N | 146° 20' 25" W | C 12S | 6W 32 |

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Appendix I. (page 3 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 10861 not named | 221-40-10861 | 60° 52' 38" N | 146° 11' 39" W | C 11S 5W 31 |
| | | 60° 52' 55" N | 146° 11' 33" W | C 11S 5W 30 |
| 12960 not named | 222-30-12960 | 60° 41' 57" N | 147° 54' 57" W | S 7N 9E 17 |
| | | 60° 42' 7" N | 147° 55' 2" W | S 7N 9E 17 |
| 12950 not named | 222-30-12950 | 60° 41' 22" N | 147° 54' 22" W | S 7N 9E 8 |
| | | 60° 41' 12" N | 147° 54' 23" W | S 7N 9E 8 |
| 12955 not named | 222-30-12955 | 60° 41' 47" N | 147° 54' 26" W | S 7N 9E 17 |
| | | 60° 41' 52" N | 147° 54' 6" W | S 7N 9E 17 |
| 244 Miners Creek | 222-50-12440 | 61° 4' 7" N | 147° 28' 51" W | S 11N 11E 3 |
| | | 61° 5' 38" N | 147° 24' 30" W | S 12N 11E 36 |
| 12965 not named | 222-30-12965 | 60° 41' 47" N | 147° 55' 1" W | S 7N 9E 17 |
| | | 60° 41' 53" N | 147° 55' 20" W | S 7N 9E 17 |
| 12910 not named | 222-30-12910 | 60° 52' 15" N | 147° 48' 51" W | S 9N 9E 14 |
| | | 60° 52' 1" N | 147° 49' 16" W | S 9N 9E 15 |
| 12450 not named | 222-50-12450 | 61° 5' 11" N | 147° 30' 31" W | S 12N 11E 33 |
| | | 61° 5' 13" N | 147° 29' 34" W | S 12N 11E 34 |
| 12920 not named | 222-30-12920 | 60° 50' 29" N | 147° 47' 53" W | S 9N 9E 26 |
| | | 60° 50' 31" N | 147° 47' 22" W | S 9N 9E 25 |
| 12460 not named | 222-50-12460 | 61° 6' 10" N | 147° 31' 12" W | S 12N 11E 28 |
| | | 61° 6' 16" N | 147° 30' 26" W | S 12N 11E 28 |
| 12900 not named | 222-30-12900 | 60° 52' 29" N | 147° 49' 34" W | S 9N 9E 15 |
| | | 60° 52' 21" N | 147° 49' 37" W | S 9N 9E 15 |
| 12070 not named | 222-10-12070 | 60° 59' 27" N | 147° 9' 47" W | C 10S 11W 22 |
| | | 60° 59' 41" N | 147° 9' 33" W | C 10S 11W 15 |

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Appendix I. (page 4 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 12200 not named | 222-10-12200 | 60° 55' 34" N | 147° 17' 40" W | S 10N 15E 27 |
| | | 60° 56' 1" N | 147° 17' 39" W | S 10N 12E 27 |
| 12310 not named | 222-20-12310 | 60° 57' 34" N | 147° 25' 55" W | S 10N 11E 13 |
| | | 60° 57' 32" N | 147° 26' 2" W | S 10N 11E 13 |
| 12800 not named | 222-30-12800 | 60° 56' 34" N | 147° 43' 49" W | S 10N 10E 20 |
| | | 60° 57' 5" N | 147° 43' 33" W | S 10N 10E 17 |
| 12350 not named | 222-20-12350 | 61° 0' 27" N | 147° 28' 40" W | S 11N 11E 34 |
| | | 61° 0' 27" N | 147° 28' 15" W | S 11N 11E 34 |
| 12710 not named | 222-30-12710 | 60° 51' 39" N | 147° 39' 28" W | S 9N 10E 22 |
| | | 60° 51' 35" N | 147° 39' 1" W | S 9N 10E 22 |
| 12590 not named | 222-50-12590 | 61° 0' 12" N | 147° 40' 2" W | S 11N 10E 34 |
| | | 60° 59' 50" N | 147° 39' 47" W | S 11N 10E 34 |
| 300 Red Creek | 223-20-13000 | 60° 51' 57" N | 147° 54' 19" W | S 9N 9E 17 |
| | | 60° 51' 53" N | 147° 53' 38" W | S 9N 9E 17 |
| 13060 not named | 223-20-13060 | 60° 55' 32" N | 148° 1' 9" W | S 10N 8E 27 |
| | | 60° 55' 42" N | 148° 0' 30" W | S 10N 8E 27 |
| 14800 not named | 224-30-14800 | 60° 39' 36" N | 148° 10' 54" W | S 7N 7E 35 |
| | | 60° 39' 35" N | 148° 10' 44" W | S 7N 7E 35 |
| 14830 not named | 224-40-14830 | 60° 32' 50" N | 148° 18' 39" W | S 5N 6E 1 |
| | | 60° 33' 1" N | 148° 18' 54" W | S 5N 6E 1 |
| 14970 not named | 224-40-14970 | 60° 29' 32" N | 148° 10' 54" W | S 5N 7E 26 |
| | | 60° 29' 22" N | 148° 10' 41" W | S 5N 7E 26 |
| 14810 not named | 224-40-14810 | 60° 35' 6" N | 148° 16' 3" W | S 6N 7E 29 |
| | | 60° 35' 4" N | 148° 16' 14" W | S 6N 7E 29 |

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Appendix I. (page 5 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 14805 not named | 224-30-14805 | 60° 39' 56" N 148° 10' 50" W | S 7N 7E 26 |
| | | 60° 39' 59" N 148° 10' 38" W | S 7N 7E 26 |
| 14860 not named | 224-40-14860 | 60° 34' 24" N 148° 28' 27" W | S 6N 6E 31 |
| | | 60° 34' 55" N 148° 27' 49" W | S 6N 6E 30 |
| 14800 not named | 224-40-14800 | 60° 35' 50" N 148° 15' 1" W | S 6N 7E 20 |
| | | 60° 36' 18" N 148° 14' 47" W | S 6N 7E 17 |
| 14750 not named | 224-30-14750 | 60° 41' 7" N 148° 16' 56" W | S 7N 7E 19 |
| | | 60° 41' 2" N 148° 17' 30" W | S 7N 7E 19 |
| 14720 not named | 224-30-14720 | 60° 42' 53" N 148° 15' 21" W | S 7N 7E 8 |
| | | 60° 42' 52" N 148° 15' 34" W | S 7N 7E 8 |
| 14670 not named | 224-10-14670 | 60° 43' 10" N 148° 18' 6" W | S 7N 7E 6 |
| | | 60° 42' 52" N 148° 17' 54" W | S 7N 7E 7 |
| 14620 not named | 224-10-14620 | 60° 37' 51" N 148° 24' 31" W | S 6N 6E 9 |
| | | 60° 37' 42" N 148° 24' 26" W | S 6N 6E 9 |
| 14260 not named | 224-10-14260 | 60° 52' 57" N 148° 17' 57" W | S 9N 6E 12 |
| | | 60° 52' 41" N 148° 17' 54" W | S 9N 6E 13 |
| 14230 not named | 224-10-14230 | 60° 56' 46" N 148° 18' 37" W | S 10N 6E 24 |
| | | 60° 56' 38" N 148° 18' 41" W | S 10N 6E 24 |
| 14180 not named | 224-10-14180 | 60° 56' 43" N 148° 16' 1" W | S 10N 7E 19 |
| | | 60° 56' 57" N 148° 15' 36" W | S 10N 7E 20 |
| 14020 not named | 224-10-14020 | 61° 2' 15" N 148° 4' 53" W | S 11N 8E 17 |
| | | 61° 3' 19" N 148° 3' 16" W | S 11N 8E 9 |
| 478 not named | 224-30-14780 | 60° 37' 48" N 148° 12' 26" W | S 6N 7E 10 |
| | | 60° 38' 2" N 148° 12' 57" W | S 6N 7E 3 |

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Appendix I. (page 6 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|--------------------------|
| | | Latitude and Longitude | Legal Description |
| 14270 not named | 224-10-14270 | 60° 52' 7" N 148° 18' 30" W 60° 52' 17" N 148° 18' 39" W | S 9N 6E 13 S 9N 6E 13 |
| 513 not named | 225-30-15130 | 60° 27' 20" N 148° 0' 22" W 60° 27' 11" N 148° 0' 18" W | S 4N 8E 11 S 4N 8E 11 |
| 15163 Clemence River | 225-30-15163 | 60° 26' 58" N 147° 58' 6" W 60° 26' 51" N 147° 57' 55" W | S 4N 8E 12 S 4N 9E 7 |
| 15090 not named | 225-30-15090 | 60° 27' 52" N 148° 4' 16" W 60° 28' 2" N 148° 3' 58" W | S 4N 8E 4 S 4N 8E 4 |
| 502 Discher Creek | 225-20-15020 | 60° 32' 21" N 148° 5' 1" W 60° 32' 21" N 148° 5' 40" W | S 5N 8E 8 S 5N 8E 8 |
| 504 Comstock Creek | 225-20-15040 | 60° 32' 10" N 148° 3' 0" W 60° 32' 19" N 148° 2' 28" W | S 5N 8E 9 S 5N 8E 9 |
| 609 Jackpot Bay N. Arm | 226-20-16090 | 60° 21' 58" N 148° 14' 33" W 60° 22' 19" N 148° 14' 50" W | S 3N 7E 9 S 3N 7E 9 |
| 618 Junction Creek | 226-20-16180 | 60° 22' 18" N 147° 59' 35" W 60° 21' 55" N 147° 59' 55" W | S 3N 8E 12 S 3N 8E 11 |
| 628 Chenega NE | 226-20-16280 | 60° 19' 57" N 148° 0' 43" W 60° 19' 41" N 148° 1' 21" W | S 3N 8E 23 S 3N 8E 26 |
| 637 Point Countess | 226-20-16392 | 60° 13' 5" N 148° 7' 3" W 60° 12' 43" N 148° 7' 4" W | S 2S 8E 31 S 1S 8E 6 |
| 661 Calvert Creek | 226-40-16610 | 60° 6' 30" N 147° 57' 55" W 60° 6' 6" N 147° 58' 15" W | S 1S 9E 7 S 1S 9E 7 |
| 663 Shelter Creek | 226-40-16630 | 60° 7' 25" N 147° 55' 20" W 60° 7' 4" N 147° 55' 37" W | S 1S 9E 4 S 1S 9E 5 |

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Appendix I. (page 7 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 678 Sleepy Bay | 226-40-16780 | 60° 3' 57" N | 147° 50' 15" W | S 1S 9E 25 | |
| | | 60° 3' 40" N | 147° 50' 27" W | S 1S 9E 26 | |
| 681 Hogan Bay | 226-40-16810 | 60° 10' 51" N | 148° 7' 36" W | S 1N 8E 18 | |
| | | 60° 10' 50" N | 148° 8' 15" W | S 1N 8E 18 | |
| 692 Herring Bay | 226-10-16982 | 60° 26' 25" N | 147° 47' 6" W | S 4N 10E 18 | |
| | | 60° 26' 11" N | 147° 47' 25" W | S 4N 10E 18 | |
| 695 Port Audrey (listed as two streams in anadromous stream catalog) | 226-20-16950 | 60° 21' 8" N | 147° 45' 44" W | S 3N 10E 17 | |
| | | 60° 21' 24" N | 147° 45' 35" W | S 3N 10E 17 | |
| | 226-20-16949 | 60° 21' 6" N | 147° 45' 48" W | S 3N 10E 17 | |
| | | 60° 21' 12" N | 147° 45' 53" W | S 3N 10E 17 | |
| 699 Cathead Creek | 226-20-16990 | 60° 17' 3" N | 147° 50' 25" W | S 2N 9E 11 | |
| | | 60° 16' 51" N | 147° 50' 18" W | S 2N 9E 11 | |
| 16000 not named | 226-20-16000 | 60° 25' 57" N | 148° 1' 13" W | S 4N 8E 14 | |
| | | 60° 26' 8" N | 148° 2' 17" W | S 4N 8E 15 | |
| 16034 not named | 226-20-16034 | 60° 23' 50" N | 148° 9' 42" W | S 4N 7E 36 | |
| | | 60° 23' 42" N | 148° 9' 37" W | S 4N 7E 36 | |
| 16036 not named | 226-20-16036 | 60° 23' 16" N | 148° 9' 17" W | S 4N 7E 36 | |
| | | 60° 23' 15" N | 148° 9' 31" W | S 4N 7E 36 | |
| 16075 not named | 226-20-16075 | 60° 21' 50" N | 148° 12' 30" W | S 3N 7E 10 | |
| | | 60° 22' 3" N | 148° 12' 26" W | S 3N 7E 10 | |
| 16106 not named | 226-50-16106 | 60° 10' 36" N | 148° 20' 22" W | S 1N 6E 13 | |
| | | 60° 10' 36" N | 148° 20' 34" W | S 1N 6E 13 | |
| 16150 not named | 226-20-16150 | 60° 19' 41" N | 148° 13' 2" W | S 3N 7E 27 | |
| | | 60° 19' 42" N | 148° 13' 17" W | S 3N 7E 27 | |

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Appendix I. (page 8 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 16181 not named | 226-40-16181 | 60° 10' 51" N | 148° 7' 36" W | S 1N 8E 18 | |
| | | 60° 10' 50" N | 148° 8' 15" W | S 1N 8E 18 | |
| 16182 not named | 226-20-16182 | 60° 22' 38" N | 147° 59' 38" W | S 3N 8E 1 | |
| | | 60° 22' 31" N | 147° 59' 43" W | S 3N 8E 1 | |
| 16272 not named | 226-40-16272 | 60° 7' 26" N | 148° 7' 3" W | S 1S 8E 5 | |
| | | 60° 7' 23" N | 148° 7' 7" W | S 1S 8E 5 | |
| 16289 not named | 226-40-16289 | 60° 7' 30" N | 148° 6' 12" W | S 1S 8E 5 | |
| | | 60° 7' 27" N | 148° 6' 11" W | S 1S 8E 5 | |
| 16322 not named | 226-20-16322 | 60° 12' 36" N | 148° 11' 52" W | S 1N 7E 2 | |
| | | 60° 12' 32" N | 148° 12' 1" W | S 1N 7E 3 | |
| 16368 not named | 226-20-16368 | 60° 12' 28" N | 148° 8' 40" W | S 1N 7E 1 | |
| | | 60° 12' 21" N | 148° 8' 28" W | S 1N 8E 6 | |
| 16370 not named | 226-50-16370 | 59° 57' 13" N | 148° 2' 41" W | S 3S 8E 3 | |
| | | 59° 57' 9" N | 148° 2' 32" W | S 3S 8E 3 | |
| 16380 not named | 226-50-16380 | 59° 58' 20" N | 148° 1' 47" W | S 2S 8E 26 | |
| | | 59° 58' 23" N | 148° 1' 11" W | S 2S 8E 26 | |
| 16442 not named | 226-40-16442 | 60° 7' 6" N | 148° 5' 49" W | S 1S 8E 4 | |
| | | 60° 7' 6" N | 148° 5' 55" W | S 1S 8E 5 | |
| 16494 not named | 226-40-16494 | 60° 4' 57" N | 148° 3' 52" W | S 1S 8E 22 | |
| | | 60° 4' 58" N | 148° 3' 40" W | S 1S 8E 22 | |
| 16498 not named | 226-40-16498 | 60° 5' 12" N | 148° 3' 16" W | S 1S 8E 15 | |
| | | 60° 5' 10" N | 148° 3' 13" W | S 1S 8E 15 | |
| 16502 not named | 226-40-16502 | 60° 5' 27" N | 148° 2' 59" W | S 1S 8E 15 | |
| | | 60° 5' 26" N | 148° 2' 52" W | S 1S 8E 15 | |

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Appendix I. (page 9 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | | |
|---|-------------------------------------|--|----------------|-------------------|--|
| | | Latitude and Longitude | | Legal Description | |
| 16520 not named | 226-50-16520 | 60° 4' 18" N | 148° 10' 56" W | S 1S 7E 24 | |
| | | 60° 4' 30" N | 148° 9' 52" W | S 1S 7E 24 | |
| 16550 not named | 226-40-16550 | 60° 6' 17" N | 147° 59' 30" W | S 1S 8E 12 | |
| | | 60° 6' 0" N | 147° 59' 12" W | S 1S 8E 12 | |
| 16680 not named | 226-40-16680 | 60° 3' 28" N | 148° 3' 7" W | S 1S 8E 27 | |
| | | 60° 3' 26" N | 148° 3' 41" W | S 1S 8E 27 | |
| 16695 not named | 226-40-16695 | 60° 2' 37" N | 148° 3' 17" W | S 1S 8E 34 | |
| | | 60° 2' 29" N | 148° 3' 31" W | S 1S 8E 34 | |
| 16700 not named | 226-40-16700 | 60° 1' 45" N | 148° 1' 22" W | S 2S 8E 2 | |
| | | 60° 1' 39" N | 148° 1' 22" W | S 2S 8E 2 | |
| 16740 not named | 226-40-16740 | 60° 0' 8" N | 147° 58' 31" W | S 2S 9E 18 | |
| | | 60° 0' 25" N | 147° 57' 58" W | S 2S 9E 18 | |
| 16750 not named | 226-40-16750 | 60° 1' 5" N | 147° 56' 24" W | S 2S 9E 8 | |
| | | 60° 0' 52" N | 147° 56' 55" W | S 2S 9E 8 | |
| 16782 not named | 226-40-16782 | 60° 3' 40" N | 147° 49' 1" W | S 1S 9E 25 | |
| | | 60° 3' 35" N | 147° 49' 5" W | S 1S 9E 25 | |
| 16801 not named | 226-40-16801 | 60° 12' 18" N | 147° 47' 34" W | S 1N 10E 6 | |
| | | 60° 12' 11" N | 147° 47' 36" W | S 1N 10E 6 | |
| 16803 not named | 226-40-16803 | 60° 12' 24" N | 147° 47' 16" W | S 1N 10E 6 | |
| | | 60° 12' 20" N | 147° 47' 11" W | S 1N 10E 6 | |
| 16809 not named | 226-40-16809 | 60° 11' 30" N | 147° 47' 16" W | S 1N 10E 6 | |
| | | 60° 21' 34" N | 147° 47' 7" W | S 1N 10E 6 | |
| 16830 not named | 226-30-16830 | 60° 16' 41" N | 147° 43' 36" W | S 2N 10E 9 | |
| | | 60° 16' 58" N | 147° 43' 55" W | S 2N 10E 9 | |

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| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 16853 not named | 226-30-16853 | 60° 20' 53" N 147° 38' 38" W | S 3N 10E 13 |
| | | 60° 20' 57" N 147° 38' 46" W | S 3N 10E 13 |
| 16855 not named | 226-40-16855 | 60° 14' 29" N 147° 47' 44" W | S 2N 9E 25 |
| | | 60° 14' 36" N 147° 47' 41" W | S 2N 9E 24 |
| 16860 not named | 226-30-16860 | 60° 21' 44" N 147° 41' 34" W | S 3N 10E 10 |
| | | 60° 21' 36" N 147° 41' 42" W | S 3N 10E 10 |
| 16880 not named | 226-30-16880 | 60° 24' 55" N 147° 39' 8" W | S 4N 10E 26 |
| | | 60° 25' 15" N 147° 38' 40" W | S 4N 10E 24 |
| 16940 not named | 226-10-16940 | 60° 27' 33" N 147° 41' 45" W | S 4N 10E 3 |
| | | 60° 27' 28" N 147° 41' 52" W | S 4N 10E 10 |
| 16963 not named | 226-20-16963 | 60° 19' 37" N 147° 44' 28" W | S 3N 10E 29 |
| | | 60° 19' 41" N 147° 44' 14" W | S 3N 10E 29 |
| 16970 Barnes Creek | 226-20-16970 | 60° 18' 47" N 147° 45' 39" W | S 3N 10E 32 |
| | | 60° 18' 32" N 147° 45' 28" W | S 3N 10E 32 |
| 16980 not named | 226-20-16980 | 60° 17' 14" N 147° 48' 20" W | S 2N 9E 1 |
| | | 60° 17' 2" N 147° 48' 15" W | S 2N 9E 12 |
| 17653 not named | 227-20-17653 | 60° 15' 52" N 147° 6' 59" W | S 2N 13E 13 |
| | | 60° 15' 52" N 147° 7' 44" W | S 2N 13E 14 |
| 17680 not named | 227-20-17680 | 60° 15' 40" N 147° 6' 21" W | S 2N 13E 13 |
| | | 60° 15' 0" N 147° 5' 59" W | S 2N 13E 24 |
| 17657 not named | 227-20-17657 | 60° 15' 46" N 147° 7' 1" W | S 2N 13E 13 |
| | | 60° 15' 35" N 147° 7' 42" W | S 2N 13E 14 |
| 17465 not named | 227-20-17465 | 60° 15' 39" N 147° 11' 30" W | S 2N 13E 16 |
| | | 60° 15' 42" N 147° 11' 8" W | S 2N 13E 15 |

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Appendix I. (page 11 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | | |
|---|-------------------------------------|--|----------------|-------------------|
| | | Latitude and Longitude | | Legal Description |
| 17890 not named | 227-20-17890 | 60° 16' 6" N | 147° 26' 22" W | S 2N 12E 18 |
| | | 60° 15' 45" N | 147° 26' 53" W | S 2N 11E 13 |
| 17596 not named | 227-20-17596 | 60° 20' 14" N | 147° 6' 6" W | S 3N 13E 24 |
| | | 60° 19' 52" N | 147° 5' 54" W | S 3N 14E 19 |
| 17600 not named | 227-20-17600 | 60° 20' 16" N | 147° 5' 12" W | S 3N 14E 19 |
| | | 60° 20' 9" N | 147° 4' 51" W | S 3N 14E 19 |
| 17374 not named | 227-20-17374 | 60° 10' 6" N | 147° 20' 42" W | S 1N 12E 22 |
| | | 60° 9' 44" N | 147° 19' 41" W | S 1N 12E 23 |
| 17150 not named | 227-10-17150 | 60° 1' 21" N | 147° 35' 9" W | S 2S 11E 8 |
| | | 60° 1' 3" N | 147° 34' 7" W | S 2S 11E 9 |
| 17022 not named | 227-10-17022 | 59° 52' 28" N | 147° 45' 44" W | S 3S 10E 32 |
| | | 59° 52' 6" N | 147° 46' 3" W | S 3S 10E 32 |
| 17080 not named | 227-10-17080 | 59° 55' 27" N | 147° 46' 56" W | S 3N 10E 17 |
| | | 59° 55' 8" N | 147° 47' 24" W | S 3N 10E 18 |
| 17330 not named | 227-20-17330 | 60° 7' 30" N | 147° 23' 19" W | S 1S 12E 4 |
| | | 60° 7' 5" N | 147° 22' 42" W | S 1S 12E 3 |
| 17280 not named | 227-10-17280 | 60° 5' 25" N | 147° 26' 34" W | S 1S 12E 18 |
| | | 60° 5' 11" N | 147° 26' 23" W | S 1S 12E 18 |
| 17200 not named | 227-10-17200 | 60° 3' 15" N | 147° 32' 42" W | S 1S 11E 34 |
| | | 60° 2' 50" N | 147° 32' 58" W | S 1S 11E 34 |
| 17310 not named | 227-20-17310 | 60° 6' 36" N | 147° 24' 43" W | S 1S 12E 8 |
| | | 60° 6' 23" N | 147° 23' 56" W | S 1S 12E 9 |
| 17290 not named | 227-10-17290 | 60° 5' 29" N | 147° 26' 19" W | S 1S 12E 17 |
| | | 60° 5' 24" N | 147° 25' 1" W | S 1S 12E 17 |

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Appendix I. (page 12 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 17230 not named | 227-10-17230 | 60° 3' 42" N 147° 31' 10" W | S 1S 11E 26 |
| | | 60° 3' 30" N 147° 30' 38" W | S 1S 11E 26 |
| 18520 not named | 228-30-18520 | 60° 30' 42" N 146° 4' 14" W | C 16S 5W 3 |
| | | 60° 30' 46" N 146° 3' 18" W | C 16S 5W 2 |
| 18650 not named | 228-10-18650 | 60° 35' 10" N 145° 48' 21" W | C 15S 3W 8 |
| | | 60° 34' 30" N 145° 50' 17" W | C 15S 4W 13 |
| 18640 not named | 228-10-18640 | 60° 35' 13" N 145° 52' 26" W | C 15S 4W 11 |
| | | 60° 34' 33" N 145° 51' 28" W | C 15S 4W 12 |
| 18530 not named | 228-30-18530 | 60° 31' 43" N 146° 5' 31" W | C 15S 5W 34 |
| | | 60° 31' 39" N 146° 5' 24" W | C 15S 5W 34 |
| 18300 not named | 228-40-18300 | 60° 27' 20" N 146° 28' 16" W | C 16S 7W 28 |
| | | 60° 27' 5" N 146° 28' 16" W | C 16S 7W 28 |
| 18320 not named | 228-40-18320 | 60° 27' 48" N 146° 26' 15" W | C 16S 7W 22 |
| | | 60° 27' 28" N 146° 26' 5" W | C 16S 7W 27 |
| 18130 not named | 228-60-18130 | 60° 21' 13" N 146° 34' 53" W | C 17S 8W 35 |
| | | 60° 21' 31" N 146° 34' 20" W | C 17S 8W 35 |
| 18195 not named | 228-50-18195 | 60° 26' 4" N 146° 39' 16" W | C 16S 8W 32 |
| | | 60° 26' 30" N 146° 39' 6" W | C 16S 8W 33 |
| 18168 not named | 228-60-18168 | 60° 20' 48" N 146° 40' 56" W | C 17S 8W 31 |
| | | 60° 20' 55" N 146° 41' 9" W | C 17S 8W 31 |
| 18160 not named | 228-60-18160 | 60° 21' 31" N 146° 38' 28" W | C 17S 8W 33 |
| | | 60° 21' 47" N 146° 38' 32" W | C 17S 8W 29 |
| 18155 not named | 228-60-18155 | 60° 21' 55" N 146° 37' 5" W | C 17S 8W 28 |
| | | 60° 22' 0" N 146° 37' 14" W | C 17S 8W 28 |

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Appendix I. (page 13 of 13)

| Aerial Survey Stream Number and Name | Anadromous Stream Catalog Number | Location of Stream Mouth and Upper Reach | |
|---|-------------------------------------|--|-------------------|
| | | Latitude and Longitude | Legal Description |
| 18153 not named | 228-60-18153 | 60° 22' 11" N 146° 36' 32" W | C 17S 8W 27 |
| | | 60° 22' 16" N 146° 36' 42" W | C 17S 8W 27 |
| 18165 not named | 228-60-18165 | 60° 21' 8" N 146° 39' 59" W | C 17S 8W 32 |
| | | 60° 21' 14" N 146° 40' 4" W | C 17S 8W 32 |

Appendix J. Run Timing Curves for Pink Salmon, Prince William Sound, Alaska.

Appendix J.1. Run timing curves into Irish (76) and Hawkins (847) Creeks, Prince William Sound, Alaska.

| Date | Irish | | | | Hawkins | | | |
|--------|-------|-------|-------|-------|---------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 20-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | | |
| 21-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | | |
| 22-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | | |
| 23-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | 0.000 | 0.000 |
| 24-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | 0.000 | 0.000 |
| 25-Jun | 0.000 | 0.000 | 0.000 | 0.000 | | | 0.000 | 0.000 |
| 26-Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 27-Jun | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |
| 28-Jun | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |
| 29-Jun | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |
| 30-Jun | 0.001 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 |
| 1-Jul | 0.000 | 0.001 | 0.001 | 0.003 | 0.000 | 0.001 | 0.000 | 0.000 |
| 2-Jul | 0.000 | 0.001 | 0.001 | 0.004 | 0.000 | 0.001 | 0.000 | 0.000 |
| 3-Jul | 0.001 | 0.002 | 0.001 | 0.005 | 0.001 | 0.002 | 0.000 | 0.000 |
| 4-Jul | 0.000 | 0.002 | 0.001 | 0.006 | 0.000 | 0.002 | 0.000 | 0.000 |
| 5-Jul | 0.001 | 0.003 | 0.001 | 0.007 | 0.001 | 0.003 | 0.000 | 0.000 |
| 6-Jul | 0.000 | 0.003 | 0.002 | 0.009 | 0.001 | 0.004 | 0.000 | 0.000 |
| 7-Jul | 0.001 | 0.004 | 0.003 | 0.012 | 0.001 | 0.005 | 0.000 | 0.000 |
| 8-Jul | 0.001 | 0.005 | 0.002 | 0.014 | 0.001 | 0.006 | 0.000 | 0.000 |
| 9-Jul | 0.000 | 0.005 | 0.003 | 0.017 | 0.001 | 0.007 | 0.000 | 0.000 |
| 10-Jul | 0.001 | 0.006 | 0.003 | 0.020 | 0.001 | 0.008 | 0.000 | 0.000 |
| 11-Jul | 0.001 | 0.007 | 0.004 | 0.024 | 0.001 | 0.009 | 0.000 | 0.000 |
| 12-Jul | 0.002 | 0.009 | 0.004 | 0.028 | 0.001 | 0.010 | 0.001 | 0.001 |
| 13-Jul | 0.002 | 0.011 | 0.005 | 0.033 | 0.002 | 0.012 | 0.000 | 0.001 |
| 14-Jul | 0.003 | 0.014 | 0.005 | 0.038 | 0.001 | 0.013 | 0.000 | 0.001 |
| 15-Jul | 0.004 | 0.018 | 0.005 | 0.043 | 0.002 | 0.015 | 0.000 | 0.001 |
| 16-Jul | 0.003 | 0.021 | 0.007 | 0.050 | 0.002 | 0.017 | 0.001 | 0.002 |
| 17-Jul | 0.005 | 0.026 | 0.006 | 0.056 | 0.001 | 0.018 | 0.000 | 0.002 |
| 18-Jul | 0.005 | 0.031 | 0.008 | 0.064 | 0.002 | 0.020 | 0.001 | 0.003 |
| 19-Jul | 0.005 | 0.036 | 0.007 | 0.071 | 0.002 | 0.022 | 0.001 | 0.004 |
| 20-Jul | 0.005 | 0.041 | 0.008 | 0.079 | 0.002 | 0.024 | 0.001 | 0.005 |
| 21-Jul | 0.006 | 0.047 | 0.009 | 0.088 | 0.003 | 0.027 | 0.002 | 0.007 |
| 22-Jul | 0.007 | 0.054 | 0.009 | 0.097 | 0.003 | 0.030 | 0.002 | 0.009 |
| 23-Jul | 0.006 | 0.060 | 0.009 | 0.106 | 0.003 | 0.033 | 0.003 | 0.012 |
| 24-Jul | 0.008 | 0.068 | 0.010 | 0.116 | 0.003 | 0.036 | 0.004 | 0.016 |
| 25-Jul | 0.008 | 0.076 | 0.011 | 0.127 | 0.005 | 0.041 | 0.005 | 0.021 |
| 26-Jul | 0.008 | 0.084 | 0.011 | 0.138 | 0.006 | 0.047 | 0.005 | 0.026 |
| 27-Jul | 0.010 | 0.094 | 0.011 | 0.149 | 0.007 | 0.054 | 0.007 | 0.033 |
| 28-Jul | 0.010 | 0.104 | 0.013 | 0.162 | 0.008 | 0.062 | 0.007 | 0.040 |
| 29-Jul | 0.010 | 0.114 | 0.013 | 0.175 | 0.010 | 0.072 | 0.009 | 0.049 |

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Appendix J.1. (page 2 of 3)

| Date | Irish | | | | Hawkins | | | |
|--------|-------|-------|-------|-------|---------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 30-Jul | 0.011 | 0.125 | 0.014 | 0.189 | 0.010 | 0.082 | 0.010 | 0.059 |
| 31-Jul | 0.012 | 0.137 | 0.016 | 0.205 | 0.012 | 0.094 | 0.012 | 0.071 |
| 1-Aug | 0.014 | 0.151 | 0.016 | 0.221 | 0.013 | 0.107 | 0.013 | 0.084 |
| 2-Aug | 0.016 | 0.167 | 0.018 | 0.239 | 0.014 | 0.121 | 0.015 | 0.099 |
| 3-Aug | 0.016 | 0.183 | 0.018 | 0.257 | 0.014 | 0.135 | 0.017 | 0.116 |
| 4-Aug | 0.017 | 0.200 | 0.019 | 0.276 | 0.016 | 0.151 | 0.018 | 0.134 |
| 5-Aug | 0.017 | 0.217 | 0.019 | 0.295 | 0.017 | 0.168 | 0.021 | 0.155 |
| 6-Aug | 0.017 | 0.234 | 0.021 | 0.316 | 0.018 | 0.186 | 0.022 | 0.177 |
| 7-Aug | 0.018 | 0.252 | 0.022 | 0.338 | 0.019 | 0.205 | 0.024 | 0.201 |
| 8-Aug | 0.018 | 0.270 | 0.023 | 0.361 | 0.021 | 0.226 | 0.025 | 0.226 |
| 9-Aug | 0.019 | 0.289 | 0.022 | 0.383 | 0.022 | 0.248 | 0.025 | 0.251 |
| 10-Aug | 0.020 | 0.309 | 0.023 | 0.406 | 0.023 | 0.271 | 0.025 | 0.276 |
| 11-Aug | 0.021 | 0.330 | 0.023 | 0.429 | 0.025 | 0.296 | 0.026 | 0.302 |
| 12-Aug | 0.022 | 0.352 | 0.022 | 0.451 | 0.027 | 0.323 | 0.027 | 0.329 |
| 13-Aug | 0.024 | 0.376 | 0.023 | 0.474 | 0.026 | 0.349 | 0.027 | 0.356 |
| 14-Aug | 0.024 | 0.400 | 0.024 | 0.498 | 0.028 | 0.377 | 0.028 | 0.384 |
| 15-Aug | 0.025 | 0.425 | 0.025 | 0.523 | 0.028 | 0.405 | 0.028 | 0.412 |
| 16-Aug | 0.025 | 0.450 | 0.025 | 0.548 | 0.029 | 0.434 | 0.029 | 0.441 |
| 17-Aug | 0.024 | 0.474 | 0.024 | 0.572 | 0.029 | 0.463 | 0.029 | 0.470 |
| 18-Aug | 0.025 | 0.499 | 0.024 | 0.596 | 0.029 | 0.492 | 0.030 | 0.500 |
| 19-Aug | 0.026 | 0.525 | 0.024 | 0.620 | 0.028 | 0.520 | 0.029 | 0.529 |
| 20-Aug | 0.024 | 0.549 | 0.024 | 0.644 | 0.028 | 0.548 | 0.030 | 0.559 |
| 21-Aug | 0.026 | 0.575 | 0.024 | 0.668 | 0.029 | 0.577 | 0.029 | 0.588 |
| 22-Aug | 0.026 | 0.601 | 0.024 | 0.692 | 0.028 | 0.605 | 0.029 | 0.617 |
| 23-Aug | 0.026 | 0.627 | 0.024 | 0.716 | 0.029 | 0.634 | 0.029 | 0.646 |
| 24-Aug | 0.026 | 0.653 | 0.024 | 0.740 | 0.028 | 0.662 | 0.028 | 0.674 |
| 25-Aug | 0.026 | 0.679 | 0.023 | 0.763 | 0.029 | 0.691 | 0.027 | 0.701 |
| 26-Aug | 0.025 | 0.704 | 0.022 | 0.785 | 0.028 | 0.719 | 0.026 | 0.727 |
| 27-Aug | 0.026 | 0.730 | 0.021 | 0.806 | 0.027 | 0.746 | 0.026 | 0.753 |
| 28-Aug | 0.025 | 0.755 | 0.020 | 0.826 | 0.027 | 0.773 | 0.025 | 0.778 |
| 29-Aug | 0.025 | 0.780 | 0.019 | 0.845 | 0.026 | 0.799 | 0.023 | 0.801 |
| 30-Aug | 0.024 | 0.804 | 0.018 | 0.863 | 0.024 | 0.823 | 0.021 | 0.822 |
| 31-Aug | 0.022 | 0.826 | 0.017 | 0.880 | 0.022 | 0.845 | 0.020 | 0.842 |
| 1-Sep | 0.020 | 0.846 | 0.017 | 0.897 | 0.021 | 0.866 | 0.019 | 0.861 |
| 2-Sep | 0.018 | 0.864 | 0.015 | 0.912 | 0.020 | 0.886 | 0.018 | 0.879 |
| 3-Sep | 0.016 | 0.880 | 0.013 | 0.925 | 0.017 | 0.903 | 0.016 | 0.895 |
| 4-Sep | 0.014 | 0.894 | 0.013 | 0.938 | 0.016 | 0.919 | 0.015 | 0.910 |
| 5-Sep | 0.013 | 0.907 | 0.011 | 0.949 | 0.015 | 0.934 | 0.013 | 0.923 |
| 6-Sep | 0.011 | 0.918 | 0.010 | 0.959 | 0.012 | 0.946 | 0.012 | 0.935 |
| 7-Sep | 0.010 | 0.928 | 0.008 | 0.967 | 0.011 | 0.957 | 0.010 | 0.945 |
| 8-Sep | 0.009 | 0.937 | 0.007 | 0.974 | 0.010 | 0.967 | 0.009 | 0.954 |
| 9-Sep | 0.009 | 0.946 | 0.005 | 0.979 | 0.008 | 0.975 | 0.008 | 0.962 |

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Appendix J.1. (page 3 of 3)

| Date | Irish | | | | Hawkins | | | |
|--------|-------|-------|-------|-------|---------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 10-Sep | 0.008 | 0.954 | 0.004 | 0.983 | 0.006 | 0.981 | 0.006 | 0.968 |
| 11-Sep | 0.007 | 0.961 | 0.004 | 0.987 | 0.005 | 0.986 | 0.005 | 0.973 |
| 12-Sep | 0.006 | 0.967 | 0.002 | 0.989 | 0.004 | 0.990 | 0.005 | 0.978 |
| 13-Sep | 0.006 | 0.973 | 0.003 | 0.992 | 0.003 | 0.993 | 0.004 | 0.982 |
| 14-Sep | 0.005 | 0.978 | 0.001 | 0.993 | 0.002 | 0.995 | 0.003 | 0.985 |
| 15-Sep | 0.004 | 0.982 | 0.002 | 0.995 | 0.001 | 0.996 | 0.003 | 0.988 |
| 16-Sep | 0.003 | 0.985 | 0.001 | 0.996 | 0.001 | 0.997 | 0.003 | 0.991 |
| 17-Sep | 0.003 | 0.988 | 0.001 | 0.997 | 0.001 | 0.998 | 0.002 | 0.993 |
| 18-Sep | 0.003 | 0.991 | 0.000 | 0.997 | 0.001 | 0.999 | 0.001 | 0.994 |
| 19-Sep | 0.002 | 0.993 | 0.001 | 0.998 | 0.001 | 1.000 | 0.002 | 0.996 |
| 20-Sep | 0.002 | 0.995 | 0.000 | 0.998 | 0.000 | 1.000 | 0.001 | 0.997 |
| 21-Sep | 0.001 | 0.996 | 0.001 | 0.999 | 0.000 | 1.000 | 0.001 | 0.998 |
| 22-Sep | 0.002 | 0.998 | 0.000 | 0.999 | 0.000 | 1.000 | 0.001 | 0.999 |
| 23-Sep | 0.000 | 0.998 | 0.000 | 0.999 | 0.000 | 1.000 | 0.000 | 0.999 |
| 24-Sep | 0.001 | 0.999 | 0.001 | 1.000 | | | 0.001 | 1.000 |
| 25-Sep | 0.000 | 0.999 | 0.000 | 1.000 | | | 0.000 | 1.000 |
| 26-Sep | 0.001 | 1.000 | 0.000 | 1.000 | | | 0.000 | 1.000 |
| 27-Sep | 0.000 | 1.000 | 0.000 | 1.000 | | | 0.000 | 1.000 |
| 28-Sep | 0.000 | 1.000 | 0.000 | 1.000 | | | 0.000 | 1.000 |
| 29-Sep | 0.000 | 1.000 | | | | | 0.000 | 1.000 |
| 30-Sep | 0.000 | 1.000 | | | | | | |

Appendix J.2. Run timing curves into Loomis (506) and Totemoff (621) Creeks, Prince William Sound, Alaska.

| Date | Loomis | | | | Totemoff | | | |
|--------|--------|-------|-------|-------|----------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 5-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 |
| 9-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| 10-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.000 | 0.000 |
| 11-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.003 | 0.000 | 0.000 |
| 12-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.004 | 0.000 | 0.000 |
| 13-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.006 | 0.000 | 0.000 |
| 14-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.008 | 0.000 | 0.000 |
| 15-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.009 | 0.000 | 0.000 |
| 16-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.011 | 0.000 | 0.000 |
| 17-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.012 | 0.000 | 0.000 |
| 18-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.014 | 0.000 | 0.000 |
| 19-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.016 | 0.000 | 0.000 |
| 20-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.018 | 0.001 | 0.001 |
| 21-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.020 | 0.000 | 0.001 |
| 22-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.024 | 0.001 | 0.002 |
| 23-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.029 | 0.001 | 0.003 |
| 24-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.036 | 0.001 | 0.004 |
| 25-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.008 | 0.044 | 0.003 | 0.007 |
| 26-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 | 0.055 | 0.003 | 0.010 |
| 27-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 | 0.066 | 0.005 | 0.015 |
| 28-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.014 | 0.080 | 0.006 | 0.021 |
| 29-Jul | 0.001 | 0.001 | 0.000 | 0.000 | 0.014 | 0.094 | 0.007 | 0.028 |
| 30-Jul | 0.001 | 0.002 | 0.001 | 0.001 | 0.015 | 0.109 | 0.009 | 0.037 |
| 31-Jul | 0.000 | 0.002 | 0.000 | 0.001 | 0.017 | 0.126 | 0.010 | 0.047 |
| 1-Aug | 0.001 | 0.003 | 0.001 | 0.002 | 0.018 | 0.144 | 0.011 | 0.058 |
| 2-Aug | 0.000 | 0.003 | 0.001 | 0.003 | 0.020 | 0.164 | 0.012 | 0.070 |
| 3-Aug | 0.001 | 0.004 | 0.001 | 0.004 | 0.021 | 0.185 | 0.015 | 0.085 |
| 4-Aug | 0.001 | 0.005 | 0.002 | 0.006 | 0.023 | 0.208 | 0.015 | 0.100 |
| 5-Aug | 0.002 | 0.007 | 0.002 | 0.008 | 0.026 | 0.234 | 0.017 | 0.117 |
| 6-Aug | 0.001 | 0.008 | 0.003 | 0.011 | 0.027 | 0.261 | 0.018 | 0.135 |
| 7-Aug | 0.002 | 0.010 | 0.003 | 0.014 | 0.030 | 0.291 | 0.020 | 0.155 |
| 8-Aug | 0.008 | 0.018 | 0.004 | 0.018 | 0.031 | 0.322 | 0.022 | 0.177 |
| 9-Aug | 0.011 | 0.029 | 0.005 | 0.023 | 0.032 | 0.354 | 0.024 | 0.201 |
| 10-Aug | 0.016 | 0.045 | 0.005 | 0.028 | 0.034 | 0.388 | 0.026 | 0.227 |
| 11-Aug | 0.020 | 0.065 | 0.007 | 0.035 | 0.035 | 0.423 | 0.028 | 0.255 |
| 12-Aug | 0.024 | 0.089 | 0.008 | 0.043 | 0.036 | 0.459 | 0.030 | 0.285 |
| 13-Aug | 0.028 | 0.117 | 0.014 | 0.057 | 0.036 | 0.495 | 0.030 | 0.315 |

- continued -

Appendix J.2. (page 2 of 2)

| Date | Loomis | | | | Totemoff | | | |
|--------|--------|-------|-------|-------|----------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 14-Aug | 0.028 | 0.145 | 0.019 | 0.076 | 0.035 | 0.530 | 0.032 | 0.347 |
| 15-Aug | 0.026 | 0.171 | 0.025 | 0.101 | 0.034 | 0.564 | 0.034 | 0.381 |
| 16-Aug | 0.025 | 0.196 | 0.028 | 0.129 | 0.032 | 0.596 | 0.035 | 0.416 |
| 17-Aug | 0.024 | 0.220 | 0.032 | 0.161 | 0.030 | 0.626 | 0.038 | 0.454 |
| 18-Aug | 0.023 | 0.243 | 0.035 | 0.196 | 0.029 | 0.655 | 0.038 | 0.492 |
| 19-Aug | 0.022 | 0.265 | 0.038 | 0.234 | 0.027 | 0.682 | 0.038 | 0.530 |
| 20-Aug | 0.020 | 0.285 | 0.035 | 0.269 | 0.024 | 0.706 | 0.038 | 0.568 |
| 21-Aug | 0.021 | 0.306 | 0.031 | 0.300 | 0.024 | 0.730 | 0.037 | 0.605 |
| 22-Aug | 0.019 | 0.325 | 0.028 | 0.328 | 0.024 | 0.754 | 0.035 | 0.640 |
| 23-Aug | 0.020 | 0.345 | 0.029 | 0.357 | 0.023 | 0.777 | 0.034 | 0.674 |
| 24-Aug | 0.021 | 0.366 | 0.032 | 0.389 | 0.024 | 0.801 | 0.034 | 0.708 |
| 25-Aug | 0.023 | 0.389 | 0.035 | 0.424 | 0.024 | 0.825 | 0.033 | 0.741 |
| 26-Aug | 0.027 | 0.416 | 0.039 | 0.463 | 0.023 | 0.848 | 0.030 | 0.771 |
| 27-Aug | 0.030 | 0.446 | 0.042 | 0.505 | 0.021 | 0.869 | 0.029 | 0.800 |
| 28-Aug | 0.034 | 0.480 | 0.046 | 0.551 | 0.020 | 0.889 | 0.026 | 0.826 |
| 29-Aug | 0.037 | 0.517 | 0.044 | 0.595 | 0.017 | 0.906 | 0.024 | 0.850 |
| 30-Aug | 0.039 | 0.556 | 0.042 | 0.637 | 0.014 | 0.920 | 0.022 | 0.872 |
| 31-Aug | 0.039 | 0.595 | 0.040 | 0.677 | 0.013 | 0.933 | 0.019 | 0.891 |
| 1-Sep | 0.040 | 0.635 | 0.038 | 0.715 | 0.010 | 0.943 | 0.017 | 0.908 |
| 2-Sep | 0.042 | 0.677 | 0.036 | 0.751 | 0.009 | 0.952 | 0.016 | 0.924 |
| 3-Sep | 0.044 | 0.721 | 0.034 | 0.785 | 0.008 | 0.960 | 0.015 | 0.939 |
| 4-Sep | 0.040 | 0.761 | 0.032 | 0.817 | 0.007 | 0.967 | 0.013 | 0.952 |
| 5-Sep | 0.038 | 0.799 | 0.030 | 0.847 | 0.006 | 0.973 | 0.012 | 0.964 |
| 6-Sep | 0.033 | 0.832 | 0.027 | 0.874 | 0.006 | 0.979 | 0.010 | 0.974 |
| 7-Sep | 0.029 | 0.861 | 0.024 | 0.898 | 0.005 | 0.984 | 0.008 | 0.982 |
| 8-Sep | 0.025 | 0.886 | 0.021 | 0.919 | 0.005 | 0.989 | 0.006 | 0.988 |
| 9-Sep | 0.020 | 0.906 | 0.018 | 0.937 | 0.003 | 0.992 | 0.005 | 0.993 |
| 10-Sep | 0.017 | 0.923 | 0.015 | 0.952 | 0.003 | 0.995 | 0.003 | 0.996 |
| 11-Sep | 0.015 | 0.938 | 0.012 | 0.964 | 0.002 | 0.997 | 0.002 | 0.998 |
| 12-Sep | 0.013 | 0.951 | 0.009 | 0.973 | 0.002 | 0.999 | 0.001 | 0.999 |
| 13-Sep | 0.012 | 0.963 | 0.008 | 0.981 | 0.001 | 1.000 | 0.000 | 0.999 |
| 14-Sep | 0.011 | 0.974 | 0.005 | 0.986 | 0.000 | 1.000 | 0.001 | 1.000 |
| 15-Sep | 0.009 | 0.983 | 0.004 | 0.990 | 0.000 | 1.000 | 0.000 | 1.000 |
| 16-Sep | 0.007 | 0.990 | 0.003 | 0.993 | 0.000 | 1.000 | 0.000 | 1.000 |
| 17-Sep | 0.005 | 0.995 | 0.002 | 0.995 | 0.000 | 1.000 | 0.000 | 1.000 |
| 18-Sep | 0.003 | 0.998 | 0.002 | 0.997 | | | 0.000 | 1.000 |
| 19-Sep | 0.002 | 1.000 | 0.002 | 0.999 | | | 0.000 | 1.000 |
| 20-Sep | 0.000 | 1.000 | 0.000 | 0.999 | | | 0.000 | 1.000 |
| 21-Sep | 0.000 | 1.000 | 0.001 | 1.000 | | | 0.000 | 1.000 |

Appendix J.3. Run timing curves into O'Brien (666) and Hayden (677) Creeks, Prince William Sound, Alaska.

| Date | O'Brien | | | | Hayden | | | |
|--------|---------|-------|-------|-------|--------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 2-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 4-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 9-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 11-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 12-Jul | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |
| 13-Jul | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 |
| 14-Jul | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 |
| 15-Jul | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 |
| 16-Jul | 0.000 | 0.000 | 0.001 | 0.002 | 0.000 | 0.000 | 0.001 | 0.002 |
| 17-Jul | 0.001 | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.001 | 0.003 |
| 18-Jul | 0.000 | 0.001 | 0.001 | 0.003 | 0.000 | 0.000 | 0.000 | 0.003 |
| 19-Jul | 0.001 | 0.002 | 0.000 | 0.003 | 0.000 | 0.000 | 0.001 | 0.004 |
| 20-Jul | 0.000 | 0.002 | 0.001 | 0.004 | 0.001 | 0.001 | 0.001 | 0.005 |
| 21-Jul | 0.001 | 0.003 | 0.000 | 0.004 | 0.000 | 0.001 | 0.001 | 0.006 |
| 22-Jul | 0.001 | 0.004 | 0.001 | 0.005 | 0.000 | 0.001 | 0.001 | 0.007 |
| 23-Jul | 0.001 | 0.005 | 0.001 | 0.006 | 0.000 | 0.001 | 0.002 | 0.009 |
| 24-Jul | 0.002 | 0.007 | 0.001 | 0.007 | 0.001 | 0.002 | 0.002 | 0.011 |
| 25-Jul | 0.003 | 0.010 | 0.002 | 0.009 | 0.003 | 0.005 | 0.003 | 0.014 |
| 26-Jul | 0.003 | 0.013 | 0.003 | 0.012 | 0.003 | 0.008 | 0.004 | 0.018 |
| 27-Jul | 0.005 | 0.018 | 0.004 | 0.016 | 0.006 | 0.014 | 0.005 | 0.023 |
| 28-Jul | 0.005 | 0.023 | 0.005 | 0.021 | 0.006 | 0.020 | 0.008 | 0.031 |
| 29-Jul | 0.008 | 0.031 | 0.006 | 0.027 | 0.009 | 0.029 | 0.012 | 0.043 |
| 30-Jul | 0.009 | 0.040 | 0.006 | 0.033 | 0.010 | 0.039 | 0.016 | 0.059 |
| 31-Jul | 0.011 | 0.051 | 0.008 | 0.041 | 0.014 | 0.053 | 0.020 | 0.079 |
| 1-Aug | 0.012 | 0.063 | 0.009 | 0.050 | 0.014 | 0.067 | 0.022 | 0.101 |
| 2-Aug | 0.014 | 0.077 | 0.011 | 0.061 | 0.015 | 0.082 | 0.023 | 0.124 |
| 3-Aug | 0.015 | 0.092 | 0.011 | 0.072 | 0.016 | 0.098 | 0.022 | 0.146 |
| 4-Aug | 0.016 | 0.108 | 0.014 | 0.086 | 0.020 | 0.118 | 0.021 | 0.167 |
| 5-Aug | 0.017 | 0.125 | 0.014 | 0.100 | 0.023 | 0.141 | 0.022 | 0.189 |
| 6-Aug | 0.018 | 0.143 | 0.014 | 0.114 | 0.027 | 0.168 | 0.022 | 0.211 |
| 7-Aug | 0.019 | 0.162 | 0.013 | 0.127 | 0.031 | 0.199 | 0.021 | 0.232 |
| 8-Aug | 0.020 | 0.182 | 0.015 | 0.142 | 0.034 | 0.233 | 0.021 | 0.253 |
| 9-Aug | 0.021 | 0.203 | 0.017 | 0.159 | 0.038 | 0.271 | 0.021 | 0.274 |
| 10-Aug | 0.023 | 0.226 | 0.018 | 0.177 | 0.039 | 0.310 | 0.021 | 0.295 |

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Appendix J.3. (page 2 of 2)

| Date | O'Brien | | | | Hayden | | | |
|--------|---------|-------|-------|-------|--------|-------|-------|-------|
| | Even | | Odd | | Even | | Odd | |
| | Daily | Cum | Daily | Cum | Daily | Cum | Daily | Cum |
| 11-Aug | 0.023 | 0.249 | 0.020 | 0.197 | 0.039 | 0.349 | 0.022 | 0.317 |
| 12-Aug | 0.026 | 0.275 | 0.021 | 0.218 | 0.037 | 0.386 | 0.023 | 0.340 |
| 13-Aug | 0.026 | 0.301 | 0.022 | 0.240 | 0.037 | 0.423 | 0.023 | 0.363 |
| 14-Aug | 0.029 | 0.330 | 0.024 | 0.264 | 0.036 | 0.459 | 0.023 | 0.386 |
| 15-Aug | 0.031 | 0.361 | 0.026 | 0.290 | 0.035 | 0.494 | 0.025 | 0.411 |
| 16-Aug | 0.031 | 0.392 | 0.027 | 0.317 | 0.031 | 0.525 | 0.026 | 0.437 |
| 17-Aug | 0.031 | 0.423 | 0.028 | 0.345 | 0.029 | 0.554 | 0.028 | 0.465 |
| 18-Aug | 0.032 | 0.455 | 0.030 | 0.375 | 0.026 | 0.580 | 0.029 | 0.494 |
| 19-Aug | 0.032 | 0.487 | 0.032 | 0.407 | 0.024 | 0.604 | 0.029 | 0.523 |
| 20-Aug | 0.032 | 0.519 | 0.031 | 0.438 | 0.022 | 0.626 | 0.029 | 0.552 |
| 21-Aug | 0.032 | 0.551 | 0.032 | 0.470 | 0.020 | 0.646 | 0.027 | 0.579 |
| 22-Aug | 0.033 | 0.584 | 0.030 | 0.500 | 0.019 | 0.665 | 0.027 | 0.606 |
| 23-Aug | 0.032 | 0.616 | 0.031 | 0.531 | 0.017 | 0.682 | 0.028 | 0.634 |
| 24-Aug | 0.031 | 0.647 | 0.031 | 0.562 | 0.018 | 0.700 | 0.030 | 0.664 |
| 25-Aug | 0.032 | 0.679 | 0.031 | 0.593 | 0.019 | 0.719 | 0.030 | 0.694 |
| 26-Aug | 0.032 | 0.711 | 0.030 | 0.623 | 0.019 | 0.738 | 0.030 | 0.724 |
| 27-Aug | 0.030 | 0.741 | 0.029 | 0.652 | 0.019 | 0.757 | 0.030 | 0.754 |
| 28-Aug | 0.029 | 0.770 | 0.030 | 0.682 | 0.020 | 0.777 | 0.029 | 0.783 |
| 29-Aug | 0.026 | 0.796 | 0.028 | 0.710 | 0.020 | 0.797 | 0.026 | 0.809 |
| 30-Aug | 0.026 | 0.822 | 0.026 | 0.736 | 0.021 | 0.818 | 0.024 | 0.833 |
| 31-Aug | 0.023 | 0.845 | 0.025 | 0.761 | 0.022 | 0.840 | 0.022 | 0.855 |
| 1-Sep | 0.021 | 0.866 | 0.025 | 0.786 | 0.020 | 0.860 | 0.021 | 0.876 |
| 2-Sep | 0.019 | 0.885 | 0.025 | 0.811 | 0.020 | 0.880 | 0.019 | 0.895 |
| 3-Sep | 0.016 | 0.901 | 0.023 | 0.834 | 0.019 | 0.899 | 0.018 | 0.913 |
| 4-Sep | 0.015 | 0.916 | 0.023 | 0.857 | 0.019 | 0.918 | 0.017 | 0.930 |
| 5-Sep | 0.015 | 0.931 | 0.021 | 0.878 | 0.019 | 0.937 | 0.015 | 0.945 |
| 6-Sep | 0.012 | 0.943 | 0.019 | 0.897 | 0.016 | 0.953 | 0.012 | 0.957 |
| 7-Sep | 0.011 | 0.954 | 0.016 | 0.913 | 0.013 | 0.966 | 0.011 | 0.968 |
| 8-Sep | 0.010 | 0.964 | 0.014 | 0.927 | 0.011 | 0.977 | 0.008 | 0.976 |
| 9-Sep | 0.008 | 0.972 | 0.012 | 0.939 | 0.009 | 0.986 | 0.007 | 0.983 |
| 10-Sep | 0.007 | 0.979 | 0.011 | 0.950 | 0.006 | 0.992 | 0.006 | 0.989 |
| 11-Sep | 0.005 | 0.984 | 0.009 | 0.959 | 0.004 | 0.996 | 0.004 | 0.993 |
| 12-Sep | 0.005 | 0.989 | 0.007 | 0.966 | 0.002 | 0.998 | 0.003 | 0.996 |
| 13-Sep | 0.003 | 0.992 | 0.005 | 0.971 | 0.002 | 1.000 | 0.002 | 0.998 |
| 14-Sep | 0.003 | 0.995 | 0.005 | 0.976 | 0.000 | 1.000 | 0.001 | 0.999 |
| 15-Sep | 0.002 | 0.997 | 0.004 | 0.980 | 0.000 | 1.000 | 0.001 | 1.000 |
| 16-Sep | 0.002 | 0.999 | 0.003 | 0.983 | 0.000 | 1.000 | 0.000 | 1.000 |
| 17-Sep | 0.001 | 1.000 | 0.003 | 0.986 | | | 0.000 | 1.000 |
| 18-Sep | 0.000 | 1.000 | 0.003 | 0.989 | | | 0.000 | 1.000 |
| 19-Sep | 0.000 | 1.000 | 0.002 | 0.991 | | | | |
| 20-Sep | 0.000 | 1.000 | 0.002 | 0.993 | | | | |
| 21-Sep | 0.000 | 1.000 | 0.002 | 0.995 | | | | |
| 22-Sep | | | 0.005 | 1.000 | | | | |

Appendix K. Estimating Salmon Escapement using Area-Under-the-Curve, Aerial Observer Efficiency, and Stream-Life Estimates: the Prince William Sound Pink Salmon Example.

Estimating Salmon Escapement using Area-Under-the-Curve, Aerial Observer Efficiency, and Stream-Life Estimates: The Prince William Sound Pink Salmon Example

Brian G. Bue, Stephen M. Fried, Samuel Sharr,
Daniel G. Sharp, John A. Wilcock, and Harold J. Geiger

Alaska Department of Fish and Game
Division of Commercial Fisheries Management and Development
333 Raspberry Road, Anchorage, Ak 99518



Bue, B.G., S.M. Fried, S. Sharr, D.G. Sharp, J.A. Wilcock, and H.J. Geiger. 1998. Estimating salmon escapement using area-under-the-curve, aerial observer efficiency, and stream-life estimates: The Prince William Sound pink salmon example. N. Pac. Anadr. Fish Comm. Bull. No. 1: 240-250

Accurate estimates of Pacific salmon spawners are needed to set spawning escapement goals and regulate harvests. Estimating the number of pink salmon *Oncorhynchus gorbuscha* spawning in Prince William Sound, Alaska, is difficult since annual runs have ranged between 2.2 million and 19.6 million and spawning occurs in over one thousand individual freshwater systems. Escapement monitoring is accomplished by surveying a collection of 208 index creeks several times over a period of weeks from fixed wing aircraft. Unadjusted survey counts are used to monitor escapements during the commercial fishing season, while estimates of the total number of spawners are calculated after the season using area-under-the-curve methods. We examined the accuracy of area-under-the-curve estimates by using information obtained on creeks with intertidal weirs: 3 creeks in 1990, 8 creeks in 1991, and 7 creeks in 1992. Aerial observer efficiency and stream-life values, calculated for each study creek each year of the study, used in conjunction with aerial observations, produced pink salmon escapement estimates that were on average within 10% of weir counts for these same creeks. Currently used methods, using only the area-under-the-curve and a constant stream life of 17.5 days, produced escapement estimates that were on average less than 50% of the corresponding weir counts. The use of a correction for aerial observer efficiency provided the greatest improvement in escapement estimates, although, the adjustment for stream life also provided substantial improvement. An investigation of the effect of survey frequency on area-under-the-curve estimates indicated that accuracy deteriorated when the survey interval exceeded 7 days.



INTRODUCTION

The annual wild pink salmon *Oncorhynchus gorbuscha* run to Prince William Sound, Alaska, has ranged between 2.2 million and 19.6 million since 1977 (Morstad et al. 1996). These salmon are harvested within nine commercial fishing districts and spawn in over one thousand freshwater systems within Prince William Sound. To ensure the continued viability of the run, district spawning goals have been set and spawning populations have been monitored by aerial surveyors in a collection of 208 index creeks (Fried 1994). Although unadjusted survey counts are used to monitor spawning escapements during the fishing season, estimates of the total number of spawners within each surveyed creek are calculated after the season using area-under-the-curve calculations (e.g. English, Bocking, and

Irvine 1992; Johnson and Barrett 1988; Pirtle 1977).

The accuracy of total escapement estimates based on aerial surveys depends upon the number of observations made and their distribution throughout the run, the accuracy of counts (observer efficiency), and the amount of time salmon entering the survey area were visible to observers (stream life). In this paper, we report results of studies conducted in 1990-1992 on 10 creeks with intertidal weirs. Our results indicate that survey frequency was adequate, that aerial observers tend to undercount, and that stream life, while quite variable, appears to be less than the 17.5 day estimate currently used for Prince William Sound. These findings show that current methods used to estimate pink salmon spawning populations in Prince William Sound provide values that are biased low.

MATERIALS AND METHODS

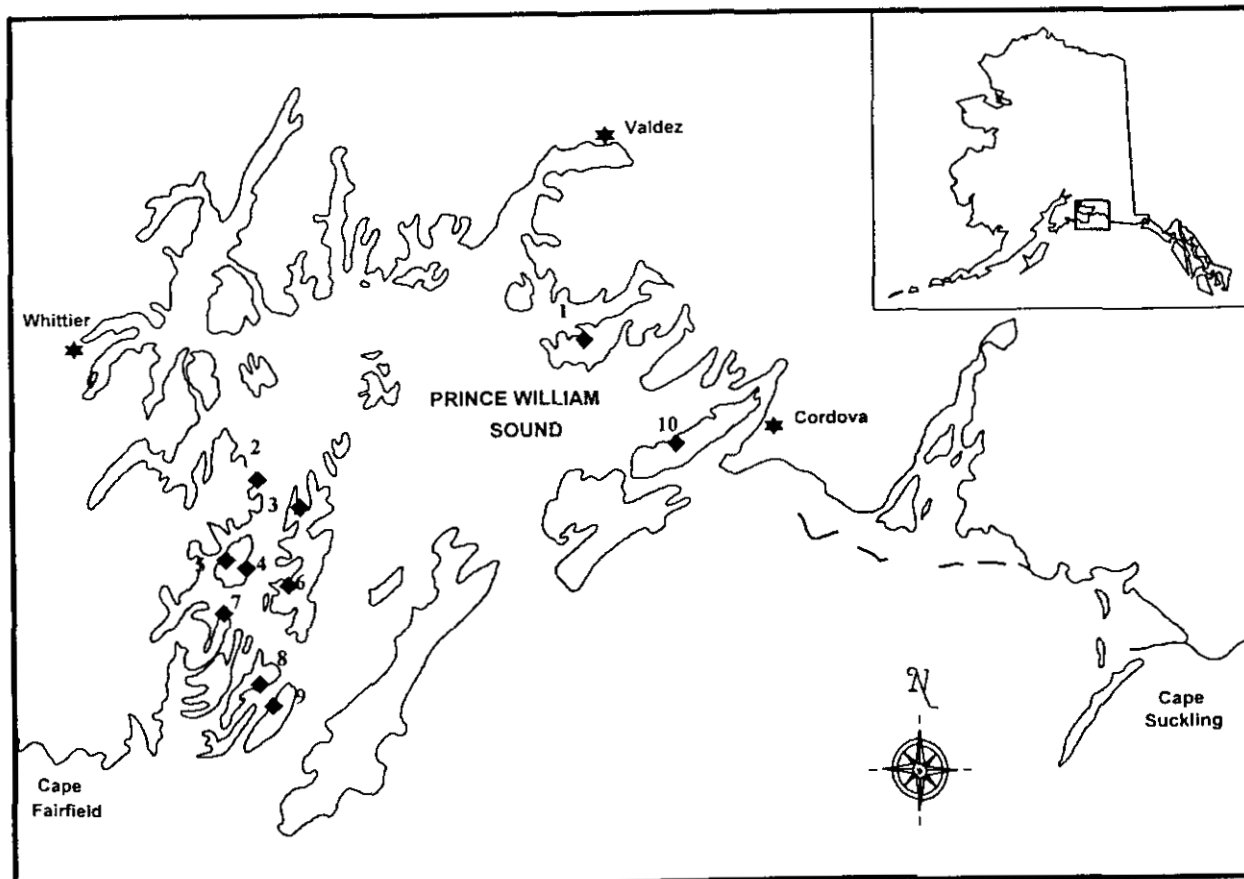
Weir Operation

Weirs were installed on pink salmon creeks in Prince William Sound during 1990-1992 to enumerate spawning escapement. All weirs were installed in the intertidal zone because approximately 75% of Prince William Sound pink salmon spawn within this area (Helle et al. 1964). This appears to have been the first time that intertidal weirs were used in Alaska. Four weirs were used in 1990, while 10 were used in 1991 and 1992 (Fig. 1). The study creeks included two moderate sized creeks in the eastern Sound (Irish and Hawkins creeks) and eight small to medium creeks in western Prince William Sound (Loomis, Totemoff, Chenega, Point Countess, O'Brien, Hayden, Herring, and Cathead creeks). Salmon were visually counted as they swam upstream through a

small opening in the weir made by raising a few pickets. No live boxes were used. Salmon were passed through the weir several times each day in response to tides and salmon movement patterns. Total escapement into each creek was defined as the sum of daily counts of pink salmon passed upstream through the weir.

Daily ground surveys were made above each weir to enumerate pink salmon that had recently died. The tail was removed from each dead salmon, and its carcass was thrown onto the streambank to avoid counting an individual salmon more than once. The combination of total weir live counts and total ground survey dead counts by day allowed the number of live pink salmon in the creek to be estimated on a daily basis. We estimated the number alive (\hat{L}_j), for day j of the run by,

Fig. 1 Location of creeks (filled diamonds) used to examine pink salmon aerial escapement estimation methodology, Prince William Sound, Alaska, 1990-1992. Stream identifiers are (1) Irish Creek, (2) Loomis Creek, (3) Herring Creek, (4) Chenega Creek, (5) Totemoff Creek, (6) Cathead Creek, (7) Point Countess Creek, (8) O'Brien Creek, (9) Hayden Creek, (10) Hawkins Creek.



$$\hat{L}_j = \sum_{k=1}^j (W_k - D_k), \quad (1)$$

where W_k was the number of live pink salmon counted through the weir and D_k was the number of newly dead pink salmon on day k . Counts of live pink salmon were also made during ground surveys.

During periods of high creek flows, caused by heavy rains, weir pickets had to be raised to avoid weir destruction, and ground surveys often could not be conducted. In these instances, missing weir (\hat{W}) and ground survey dead (\hat{D}) counts were estimated by,

$$\hat{W}_j = [(G_j - G_{(j-1)}) / O] + D_j, \text{ and} \quad (2)$$

$$\hat{D}_j = D_{next} / m^{(j-k)+1} \quad (3)$$

where G_j was the number of live pink salmon counted during the ground survey on day j ; O was the slope of the linear regression, fitted through the origin, of the estimated number alive (\hat{L}_j) during ground survey counts for each day of the season prior to the day of the first missing count; D_{next} was the first daily dead count after the period to be interpolated; and m was the number of consecutive days of missed observations.

In designing the project, we assumed that (1) errors made in estimating pink salmon past the weirs due to breaches in the weir or errors in counting were small, and (2) errors made in counting dead salmon above weirs due to removals by predators or errors in counting were also small. If both assumptions were valid, we expected the total weir count of live pink salmon to equal the total ground survey count of dead pink salmon within each creek. If the ratio of weir live to ground survey dead counts was not close to one, we assumed that at least one of these assumptions had been violated and that stream life and aerial observer efficiency estimates based on these data were not accurate.

Aerial surveys were flown at least weekly, weather permitting, from mid-June to mid-September by biologists stationed in Cordova. Four observers were used each year.

Escapement Estimation

Three components are required to estimate salmon escapements using visual counts: (1) counts collected systematically throughout the time salmon are present in the study area; (2) an estimate of observer efficiency; and (3) an estimate of the average time an individual salmon remains in the

survey area, commonly called stream life. The area-under-the-curve is a commonly applied method of estimating salmon escapement (E) when periodic visual counts are used (e.g. English, Bocking, and Irvine 1992, Johnson and Barrett 1988),

$$\hat{E} = \frac{\hat{A}}{\hat{S}\hat{B}}, \quad (4)$$

where \hat{A} is an estimate of the area under the escapement curve, \hat{S} is an estimate of stream life, and \hat{B} is an estimate of observer efficiency.

Area-under-the-curve (A) was estimated using a trapezoidal approximation procedure similar to that described in English, Bocking, and Irvine (1992),

$$\hat{A} = \sum_{i=2}^n \frac{(t_i - t_{i-1})(c_i + c_{i-1})}{2}, \quad (5)$$

where t_i was the date and c_i was the number of salmon observed for the i^{th} survey. Attempts were made to initiate surveys prior to the presence of pink salmon in the creek. When pink salmon were present for the first survey, the parameter A prior to the first survey was estimated as,

$$\hat{A}_{first} = \frac{c_1 \hat{S}}{2} \quad (6)$$

We also made an effort to continue surveys until all pink salmon had died. When this was not possible, we estimated A after the final survey as,

$$\hat{A}_{last} = \frac{c_n \hat{S}}{2} \quad (7)$$

Stream life (S), the residence time or survey life of pink salmon within each creek, was estimated as the mean number of days which elapsed between creek entry and post-spawning death,

$$\hat{S} = \frac{\sum_{j=1}^n \hat{L}_j}{\sum_{j=1}^n W_j} \quad (8)$$

Calibration regression was used to estimate observer efficiency (Neter, Wasserman, and Kutner 1990). We assumed that (1) the relationship between the estimated number of live pink salmon in a creek (independent variable) and survey counts (dependent variable) was linear, and (2) aerial observers would

not see salmon in a creek when none were present (i.e. the fitted line passed through the origin). Observer efficiency (B) was estimated by the slope of the linear fit, constrained to pass through the origin, of survey counts regressed against daily estimates (\hat{L}_j).

Evaluation of Survey Frequency

An evaluation of the effect of survey frequency on area-under-the-curve estimates was undertaken using a simple systematic simulation and our estimates of the number of live salmon above the weirs (\hat{L}_j ; equation 1). The simulation assumed (1) the number of live salmon above the weir was known and (2) the first survey occurred during the first week salmon were in the creek. The simulation was initiated by selecting a survey frequency (F) and a day during the first week salmon were present in the creek (j_1 , where j_1 was in the range of 1 to 7). The second day (j_2) was selected by

$$j_2 = j_1 + F, \tag{9}$$

and all remaining days were selected at intervals of F . The number of live salmon above the weir (\hat{L}_j) for each selected j was then used to estimate area-under-the-curve using equations 5, 6, and 7. Seven simulations were performed for each $F \geq 0$, one simulation for each day of the first week that salmon were present in the stream. The number of

simulations for $F < 7$ was equal to F . Average area-under-the-curve for a survey frequency (F) was estimated as the mean of the simulated estimates.

Comparison of Historic Escapement Estimates to Revised Estimates

Total spawning escapement estimates from currently applied methods for each study creek were compared to estimates using the new information obtained from our study. Currently, area-under-the-curve is estimated using the trapezoidal approximation method described previously, and total escapement estimates are made using a stream life of 17.5 days and no observer efficiency adjustment. We used the same method to estimate area-under-the-curve, but used our estimates of creek-specific stream life and observer efficiency to estimate escapements. Escapement estimates were expressed as a percent of the corresponding weir count to determine the incremental effect of each modification.

RESULTS

Weir Operation

While 24 creek-year data sets were obtained from 10 different creeks over the three years of the study, we chose to use only 18 data sets from 9 different creeks (Table 1). Three data sets were not used because the total number of dead pink salmon far

Table 1. Aerial observer, stream life, and observer efficiency data collected for spawning pink salmon in study creeks with weirs and daily ground surveys, Prince William Sound, Alaska, 1990-1992.

| Stream Name | Total Weir Count | W/D Ratio ^a | Number of Surveys | Days Between Surveys | | | A ^b | Stream Life | Observer Efficiency ^c |
|--------------------|------------------|------------------------|-------------------|----------------------|-----|-----|----------------|-------------|----------------------------------|
| | | | | Average | Min | Max | | | |
| 1990 | | | | | | | | | |
| Irish Creek | 44,900 | 0.97 | 18 | 4.7 | 2 | 7 | 474,010 | 18.1 | 0.499 |
| Herring Creek | 4,927 | 0.97 | 12 | 6.0 | 3 | 9 | 43,896 | 11.4 | 0.888 |
| Cathead Creek | 7,971 | 1.01 | 12 | 5.1 | 2 | 9 | 58,305 | 9.8 | 0.825 |
| 1991 | | | | | | | | | |
| Irish Creek | 95,034 | 1.00 | 17 | 5.1 | 1 | 16 | 397,733 | 16.0 | 0.177 |
| Loomis Creek | 20,315 | 1.08 | 10 | 5.3 | 3 | 8 | 51,741 | 6.8 | 0.322 |
| Chenega Creek | 49,769 | 0.96 | 5 | 8.0 | 5 | 10 | 140,680 | 10.2 | 0.234 |
| Pt. Countess Creek | 15,028 | 1.06 | 10 | 5.3 | 3 | 8 | 61,192 | 9.7 | 0.456 |
| Hayden Creek | 18,372 | 1.12 | 10 | 5.3 | 2 | 8 | 73,947 | 11.7 | 0.485 |
| Herring Creek | 13,022 | 0.95 | 10 | 5.3 | 2 | 8 | 72,337 | 11.8 | 0.371 |
| Cathead Creek | 9,629 | 1.10 | 10 | 5.3 | 2 | 8 | 23,007 | 11.0 | 0.246 |
| Hawkins Creek | 40,433 | 0.95 | 9 | 8.8 | 4 | 14 | 236,768 | 15.6 | 0.406 |
| 1992 | | | | | | | | | |
| Irish Creek | 8,208 | 0.94 | 14 | 5.2 | 2 | 9 | 117,169 | 21.5 | 0.554 |
| Loomis Creek | 3,845 | 1.21 | 10 | 7.4 | 1 | 15 | 5,939 | 9.6 | 0.177 |
| Totemoff Creek | 8,428 | 1.09 | 9 | 7.4 | 6 | 9 | 61,675 | 14.7 | 0.535 |
| Chenega Creek | 10,658 | 1.21 | 6 | 7.6 | 5 | 11 | 38,722 | 14.2 | 0.245 |
| Hayden Creek | 2,708 | 1.08 | 9 | 7.1 | 6 | 8 | 8,337 | 9.0 | 0.359 |
| Herring Creek | 911 | 1.24 | 9 | 7.4 | 1 | 11 | 5,625 | 13.7 | 0.388 |
| Cathead Creek | 3,937 | 1.22 | 9 | 7.4 | 1 | 11 | 27,450 | 11.9 | 0.685 |

^a W/D ratio is the ratio of total weir count to total dead count.
^b Area-under-the-curve estimate.
^c Slope of the regression of aerial counts on estimated number of salmon above the weir.

exceeded the total number of live pink salmon counted through weirs (Totemoff Creek, 1990; Totemoff and O'Brien Creeks, 1992). Three other data sets were excluded because large amounts of weir and ground survey data were missing due to several high creek flow events (O'Brien, Point Countess, and Hawkins Creeks, 1992).

For the 18 creek-year data sets used in our study, escapements ranged from 95,034 (Irish Creek, 1991) to 911 (Herring Creek, 1992) pink salmon (Table 1). The ratio of weir live to ground survey dead counts ranged from 0.94 (Irish Creek, 1992) to 1.24 (Herring Creek, 1992). Odd-year escapements in 1991 were greater than even-year escapements in 1990 and 1992 for all creeks retained in the data set for two (Loomis, Chenega, and Hayden Creeks) or three (Irish, Herring, and Cathead Creeks) years. For example, the Irish Creek 1991 escapement of 95,034 pink salmon was more than two times greater than the 1990 escapement of 44,900 pink salmon, and more than 11 times greater than the 1992 escapement of 8,208 pink salmon.

Escapement Estimation

Aerial survey frequency declined from an average of 5 days between surveys in 1990, to 6 days in 1991,

and to 7 days in 1992 (Table 1). Area-under-the-curve estimates, unadjusted for either observer efficiency or stream life, did not always show trends similar to those of weir counts for all study streams. For example, total weir counts for Irish Creek in 1990 and 1991, and Cathead Creek in 1990, 1991, and 1992 increased while area-under-the-curve estimates decreased.

Our simulation results on the effect of survey frequency on area-under-the-curve estimates indicated that accuracy and precision decreased as surveys became less frequent (Table 2; Fig. 2). It appears that a survey frequency of 5-7 days would provide the best allocation of survey effort for Prince William Sound pink salmon.

Stream-life estimates for the 18 creek-year combinations ranged from 6.8 days (Loomis Creek, 1991) to 21.5 days (Irish Creek, 1992; Table 1 and Fig. 3). The median stream-life value for all 18 data sets was 11.6 and the mean was 12.6 days. While pink salmon stream life was shorter in 1991 than 1992 for five (Irish, Herring, Cathead, Loomis, Chenega, and Herring Creeks) of the six creeks retained in the data set both these years, only one (Irish Creek) of the three creeks retained in the data set all three years had a shorter stream life in 1991 than in either 1990 or 1992.

Table 2. Average error in area-under-the-curve estimates for simulated systematic pink salmon escapement surveys.

| Stream Name | Average Error ^a in Area-Under-The-Curve Estimates ^b | | | | | | | | | | | | |
|--------------------|---|-------|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Number of Days Between Surveys | | | | | | | | | | | | |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1990 | | | | | | | | | | | | | |
| Irish Creek | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.02 | -0.02 | -0.01 | -0.06 | 0.10 | 0.01 |
| Herring Creek | 0.00 | -0.02 | -0.01 | -0.01 | 0.06 | 0.00 | 0.06 | 0.14 | 0.19 | 0.38 | -0.13 | 0.29 | 0.74 |
| Cathead Creek | 0.00 | -0.01 | -0.02 | -0.04 | -0.04 | -0.07 | -0.07 | -0.08 | -0.01 | -0.14 | -0.18 | 0.06 | 0.13 |
| 1991 | | | | | | | | | | | | | |
| Irish Creek | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | 0.02 | 0.02 | 0.00 | 0.03 | -0.03 | -0.01 | 0.06 |
| Loomis Creek | -0.04 | -0.05 | -0.04 | 0.02 | -0.05 | 0.04 | 0.17 | 0.25 | -0.30 | 0.07 | 0.38 | -0.51 | -0.40 |
| Chenga Creek | 0.00 | -0.01 | -0.01 | -0.02 | 0.11 | 0.09 | 0.24 | 0.39 | 0.26 | 0.09 | 0.32 | 0.31 | -0.25 |
| Pt. Countess Creek | -0.02 | -0.02 | -0.01 | -0.02 | 0.01 | 0.03 | 0.24 | 0.38 | 0.26 | 0.10 | 0.31 | -0.25 | -0.11 |
| Hayden Creek | 0.00 | -0.01 | -0.01 | -0.02 | -0.02 | -0.08 | -0.09 | -0.12 | -0.06 | -0.11 | -0.12 | 0.04 | 0.01 |
| Herring Creek | 0.00 | 0.00 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | 0.17 | 0.03 | -0.02 | 0.19 | 0.29 | 0.26 |
| Cathead Creek | -0.03 | -0.05 | -0.04 | -0.07 | -0.09 | -0.09 | -0.08 | 0.14 | -0.06 | 0.09 | 0.08 | 0.04 | -0.34 |
| Hawkins Creek | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | 0.00 | 0.00 | 0.03 | -0.01 | 0.14 | 0.04 | 0.05 | 0.16 |
| 1992 | | | | | | | | | | | | | |
| Irish Creek | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | 0.04 | 0.08 | -0.05 | 0.07 | 0.37 | 0.23 | 0.09 |
| Loomis Creek | -0.01 | -0.03 | -0.07 | -0.06 | -0.14 | -0.07 | -0.01 | -0.10 | 0.14 | 0.05 | -0.40 | -0.22 | -0.02 |
| Totemoff Creek | -0.01 | 0.00 | -0.02 | -0.04 | -0.04 | -0.03 | -0.03 | -0.06 | -0.10 | -0.04 | -0.12 | -0.06 | -0.19 |
| Chenega Creek | -0.02 | -0.03 | -0.06 | -0.09 | -0.12 | -0.11 | -0.12 | -0.14 | 0.04 | -0.05 | -0.04 | 0.07 | 0.03 |
| Hayden Creek | -0.02 | -0.03 | -0.05 | -0.07 | -0.05 | 0.02 | 0.06 | -0.08 | 0.11 | -0.34 | -0.07 | 0.15 | -0.43 |
| Herring Creek | 0.00 | -0.01 | -0.06 | -0.09 | -0.06 | -0.01 | 0.02 | -0.09 | 0.04 | -0.10 | -0.02 | 0.00 | -0.42 |
| Cathead Creek | 0.04 | 0.04 | 0.07 | 0.09 | 0.05 | 0.08 | 0.04 | -0.05 | -0.16 | -0.11 | -0.19 | -0.11 | -0.08 |

^a Average Error is defined as $(\bar{A}-A)/A$ where A is the true area and \bar{A} is the average area from simulations.

^b Underestimate is indicated by a negative sign; all errors greater than or equal to 0.10 are underlined and bold.

Fig. 2 Number of salmon present by day and the results of a systematic simulation of area-under-the-curve estimates for Irish Creek (A and B) and Herring Creek (C and D) in 1990, Prince William Sound, Alaska. Large solid dots indicate the mean of the simulations while the short lines indicate individual simulations.

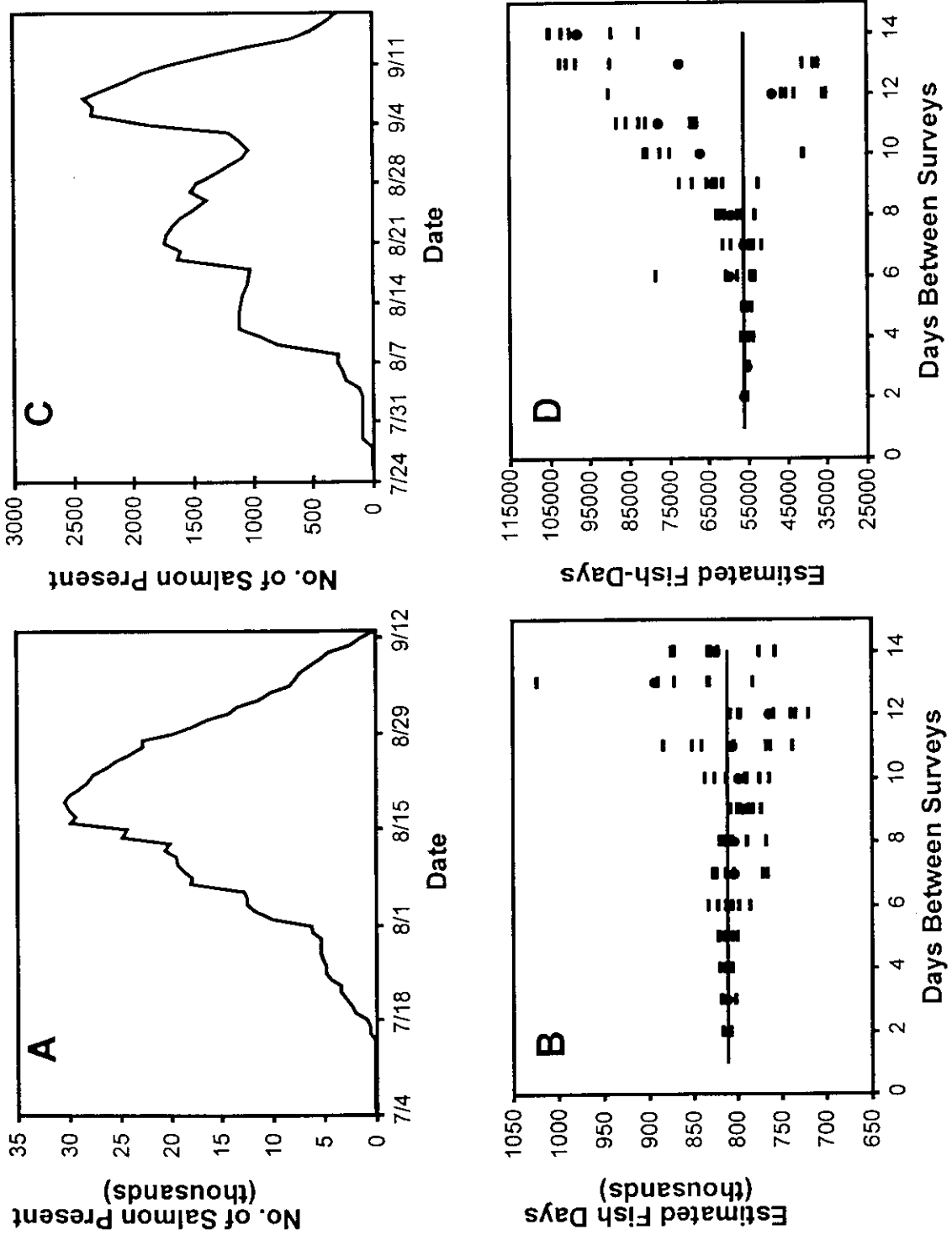
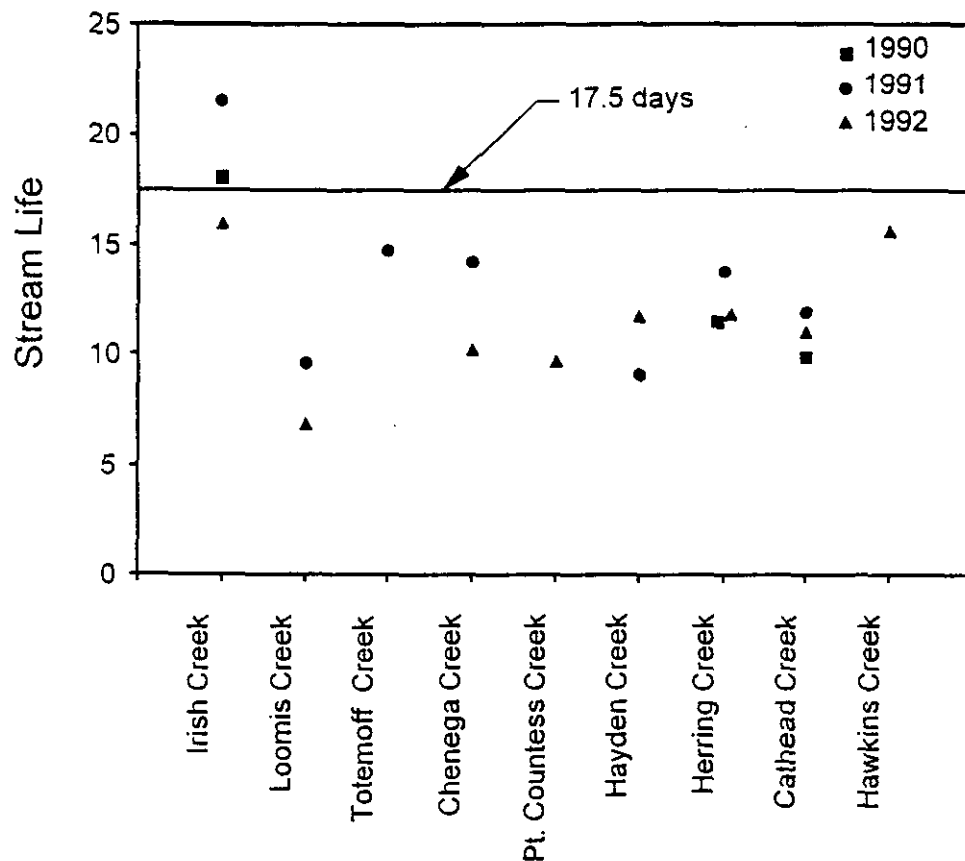


Fig. 3 Estimated stream life for selected study creeks in Prince William Sound, Alaska, 1990-1992.



Stream-life values were generally much shorter than the 17.5 day value currently used to estimate total pink salmon escapement into Prince William Sound spawning creeks (Table 1 and Fig. 3). Only Irish and Hawkins Creek pink salmon had stream-life values similar to (16.0 days, Irish Creek, 1991; 15.6 days, Hawkins Creek, 1991) or greater than (18.1 days, Irish Creek, 1990; 21.5 days, Irish Creek, 1992) the 17.5 day stream-life value. Pink salmon in all other study creeks had stream-life values that ranged from 1.9 (Hawkins Creek, 1991) to 10.7 (Loomis Creek, 1991) days shorter than the currently used 17.5 day value.

Individual creeks were surveyed five to 18 times during the course of each season (Table 1). Aerial observer efficiency estimates ranged from 0.177 (Irish Creek, 1991; Loomis Creek, 1992) to 0.888 (Herring Creek, 1990). This meant that aerial observers generally were able to count from 17.7% to 88.8% of the live pink salmon present. The median observer efficiency value for all 18 data sets was 0.406, while the mean value was 0.436. There appeared to be a trend in aerial observer efficiency between odd- and even-year escapements. Values were lower in 1991 than in 1992 for three (Irish, Chenega, and Cathead Creeks) of the six creeks retained in the data set both these years, and values were lower in 1991 than in

both 1990 and 1992 for the three creeks (Irish, Herring, and Cathead Creeks) retained all three years. Overall, aerial observers tended to under-count the actual number of pink salmon available, and this trend appeared to be accentuated in odd-years as well as when the number of pink salmon available to observers increased (Fig. 4).

Comparison of Historic Escapement Estimates to Revised Estimates

Total escapement estimates based on currently applied methods accounted for, on average, 51%, 22%, and 35% of the total weir counts in 1990, 1991, and 1992, respectively (Table 3; Fig. 5). These estimates improved when the appropriate stream-life value was used in place of the currently used 17.5 day value. On average, total escapement estimates based on appropriate stream-life values accounted for 70%, 34%, and 42% of the total weir counts in 1990, 1991, and 1992, respectively. A greater improvement in estimates was obtained when observer efficiency was taken into account, even when a 17.5 day stream-life value was used for all study creeks. On average, total escapement estimates which had been adjusted for observer efficiency accounted for 76%, 71%, and 80% of the total weir counts in 1990, 1991, and

Fig. 4 Observer efficiency relationships used for Irish Creek, Prince William Sound, Alaska for 1990 (A), and 1992 (B). Solid line is the regression fit while the dashed line represents the 1:1 line.

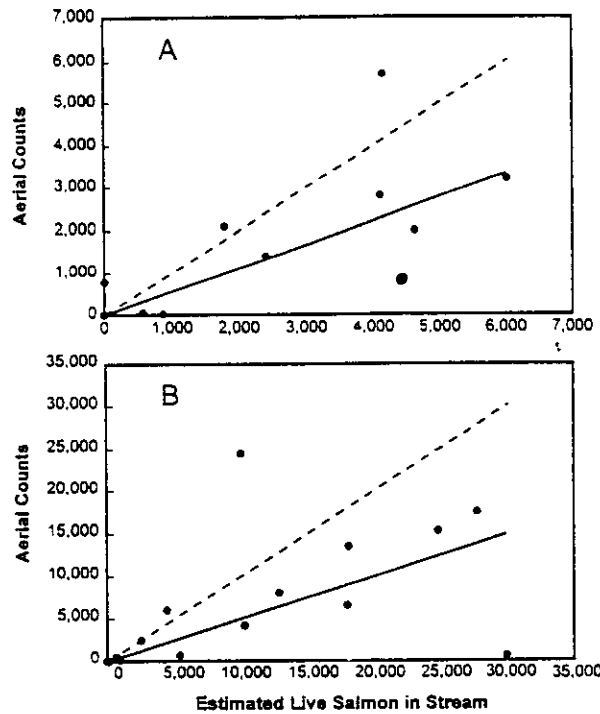


Table 3. Escapement estimates obtained using current and adjusted methods for spawning pink salmon in study creeks with weirs and daily ground surveys, Prince William Sound, Alaska, 1990-1992.

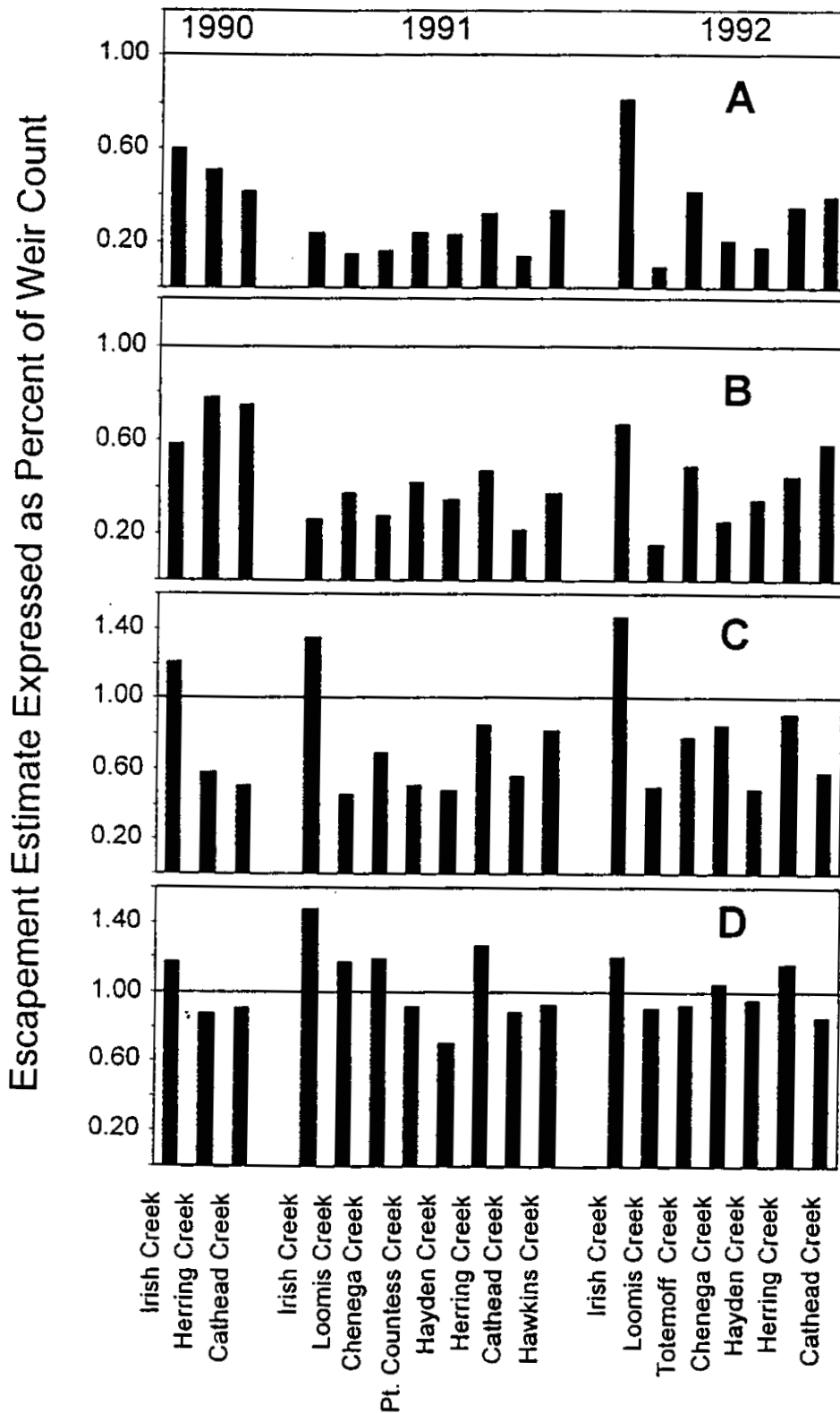
| Stream | Total Weir Count | Estimates from Aerial Surveys | | | |
|--------------------|------------------|-------------------------------|----------------|-----------------------|----------------|
| | | Current Method ^a | | Adjusted ^b | |
| | | Estimate | % ^c | Estimate | % ^c |
| 1990 | | | | | |
| Irish Creek | 44,900 | 27,086 | 60 | 52,482 | 117 |
| Herring Creek | 4,927 | 2,508 | 51 | 4,336 | 88 |
| Cathead Creek | 7,971 | 3,332 | 42 | 7,212 | 90 |
| Average | | | 51 | | 98 |
| 1991 | | | | | |
| Irish Creek | 95,034 | 22,728 | 24 | 140,442 | 148 |
| Loomis Creek | 20,315 | 2,957 | 15 | 23,630 | 116 |
| Chenega Creek | 49,769 | 8,039 | 16 | 58,941 | 118 |
| Pt. Countess Creek | 15,028 | 3,497 | 23 | 13,834 | 92 |
| Hayden Creek | 18,372 | 4,226 | 23 | 13,031 | 71 |
| Herring Creek | 13,022 | 4,134 | 32 | 16,524 | 127 |
| Cathead Creek | 9,629 | 1,315 | 14 | 8,502 | 88 |
| Hawkins Creek | 40,433 | 13,530 | 33 | 37,383 | 92 |
| Average | | | 22 | | 107 |
| 1992 | | | | | |
| Irish Creek | 8,208 | 6,695 | 82 | 9,837 | 120 |
| Loomis Creek | 3,845 | 339 | 9 | 3,495 | 91 |
| Totemoff Creek | 8,428 | 3,524 | 42 | 7,842 | 93 |
| Chenega Creek | 10,658 | 2,213 | 21 | 11,130 | 104 |
| Hayden Creek | 2,708 | 476 | 18 | 2,580 | 95 |
| Herring Creek | 911 | 321 | 35 | 1,058 | 116 |
| Cathead Creek | 3,937 | 1,569 | 40 | 3,367 | 86 |
| Average | | | 35 | | 101 |

^a Constant 17.5 day stream life and no observer efficiency adjustment.

^b Creek-specific stream life and observer adjustment.

^c Percent of total weir count.

Fig. 5 Escapement estimates expressed as a percent of the weir count for the currently used method (A: 17.5 day stream life, no correction for observer efficiency), adjusted for stream life only (B: stream-specific stream life used, no correction for observer), adjusted for observer efficiency only (C: stream-specific observer correction with 17.5 day stream life), and adjusted for stream life and observer efficiency combined (D: stream-specific stream life and observer efficiency corrections). The solid line at 1.00 in each plot indicates the weir count.



1992, respectively. When both appropriate stream-life and observer efficiency values were used, total escapement estimates accounted for, on average, 98%, 107% and 101% of the total weir counts in 1990, 1991, and 1992, respectively (Fig. 5). This provided total escapement estimates that were within 20% of the total weir count in 15 of the 18 cases examined (Table 3).

DISCUSSION

This study shows that aerial surveys can be used to estimate pink salmon escapement if survey frequency is maintained at 5-7 day intervals throughout the run and reasonable estimates of stream life and observer efficiency are available. One could argue that an unbiased evaluation of the methodology was not performed because total weir counts were used to estimate stream life and observer efficiency as well as measure total escapement. However, we obtained strong evidence that escapement estimates based on appropriate stream-life and observer efficiency values were more accurate than those based on the currently used 17.5 day stream-life value and no adjustment for observer efficiency. This is best evidenced by Irish and Cathead Creeks in 1990 and 1991 where estimates based on the currently used method declined while corresponding total weir counts increased. The most dramatic example can be seen at Irish Creek in 1991, when the total weir count was more than double the estimate based on the currently used method. Although escapement estimates to Irish and Cathead Creeks using appropriate stream-life and observer efficiency values were not always very accurate (48% over-estimate for Irish Creek in 1991), they at least trended in the correct direction and were closer to the total weir count than estimates based on currently used methods.

Some of the error presently associated with estimating pink salmon escapements in Prince William Sound from aerial survey data is due to use of a stream life of 17.5 days for all creeks. This value was based on Helle et al. (1964) study of the pink salmon run to the middle portion of Olsen Creek in eastern Prince William Sound. Results of studies by McCurdy (1984) suggested that stream life varies among Prince William Sound pink salmon spawning systems and that the 17.5 day estimate used to calculate total escapement may be too large, especially for smaller streams. Our studies confirm McCurdy's (1984) findings. Most stream-life values for pink salmon in our study creeks were shorter than 17.5 days. However, pink salmon spawning in Irish Creek, a large system more similar to Olsen Creek, had annual stream-life values similar to 17.5 days.

Another, and possibly greater, source of error in

estimating pink salmon spawning escapements is due to aerial observer efficiency. Our study indicates that aerial observers tend to under-count pink salmon in Prince William Sound spawning systems. Great differences can exist among different observers, and we assume that each observer's efficiency changes in response to both viewing conditions and learning.

Great fluctuations in water level and velocity due to heavy rain, effects of which were magnified by steep gradients and loose gravel substrate, all contributed to problems in maintaining weirs in the various creeks used in this study. Not only did these high water flow events make it necessary to remove weir pickets and miss counts, but they also caused gaps at the bottom of weirs which sometimes went unnoticed and allowed salmon to pass uncounted. We caution that weirs will provide accurate counts of spawning salmon only if efforts are made to carefully maintain their integrity. The use of properly designed ground surveys to count dead salmon can provide a valuable independent check on weir counts.

Finally, our results suggest that use of appropriate stream-life and aerial observer efficiency values will provide more accurate aerial estimates of salmon spawning populations. We caution, however, that treating stream life and aerial observer efficiency as constants will continue to introduce unknown errors into annual spawning population numbers. We recommend that weirs be maintained on a subset of the 208 index creeks both to calibrate aerial observers and to track changes in stream life more closely. Such projects need not be done every year, but particular care should be taken when changes in aerial observers occur.

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Appendix L. Estimating Spawning Escapements from Periodic Counts: A Comparison of Methods.

**Estimating spawning escapements from periodic counts: a
comparison of methods.**

Ray Hilborn

School of Fisheries, Box 357980

University of Washington

Seattle, WA 98195-7980 U.S.A.

Brian G. Bue

Alaska Department of Fish and Game

333 Raspberry Rd.

Anchorage, AK 99518 U.S.A.

and

Samuel Sharr

Hoop Valley Tribal Fisheries Department

Box 417

Hoop, CA 95546 U.S.A.

Abstract

The escapement of Pacific salmon is often estimated by periodic counts of spawners, calculating the number fish-days present, and dividing by the average number of days a fish spends in the survey area. We present a maximum likelihood method to calculate the number of spawning fish and compare this approach to the most commonly used method, which relies on linear interpolation between observations. The maximum likelihood method is computationally more demanding; however it does provide a statistical basis for describing uncertainty and can also be used to deal with data sets where the first or last counts are non-zero, or where there are few observations. We compared escapement estimation methods using data from 18 experimental streams where the number of fish in the stream was evaluated by weir and carcass counts. In this comparison, the method of linear interpolation deviated from the weir count by an average of 19%, whereas the maximum likelihood method deviated by 23%, 24%, 30%, or 40% depending upon which likelihood and arrival time model was used. We conclude that for most data sets where measures of uncertainty are not required, the linear interpolation method is adequate but recommend an examination of maximum likelihood methods when an estimate of uncertainty is required.

Introduction

In many salmon management jurisdictions, the number of observable adult fish in streams is counted periodically and the total number of fish spawning for the season is estimated by the "area-under-the-curve" method. In this method, the number of fish observed is plotted against Julian day and the number of fish-days (the area-under-the-curve) is estimated (Figure 1) using a variety of algorithms. The total number of fish spawning can then be estimated by dividing the cumulative fish-days by the estimated mean number of days an individual fish is thought to spend in the survey area (survey-life) and multiplying this by a correction factor for fish visibility (observer efficiency).

Figure 1 near here

Area-under-the-curve methods are documented in Ames and Phinney (1977), Pirtle (1977), Beidler and Nickelson (1980), Ames (1984), Johnson and Barrett (1988), English et al. (1992), Hill (1997), Quinn and Gates (1997), and Bue et al. (1998) and are commonly used in Oregon, Washington, Alaska, and Canada. These methods are used where passage counts from fences, sonar or weirs are unavailable; where redds cannot be counted and aged; or where observers cannot determine which fish present in the stream entered since the previous count. The three critical types of data required for this technique are counts of fish, an estimate of survey-life, and an estimate of observer efficiency. Fish counts are most commonly obtained from aerial or ground surveys of the stream but can also be obtained from observers in boats or swimming in the river. Generally these counts are collected periodically (7 to 10 day interval) rather than daily. Hill (1997) and Bue et al. (1998) both showed an increase in uncertainty in escapement estimates as the time between surveys increased. Observer efficiency has been obtained from experimental studies where the number in the stream has been estimated by other methods, such as weir counts (Shardlow et al. 1987; Bue et al. 1998). Survey-life is often obtained from tagging studies (English et al. 1992), although, other methods have been used successfully (Perin and Irvine 1990). Stream-life, the number of days a fish is

present in a stream is often interchanged with survey-life depending upon the application and data available (Bue et al. 1998).

Given periodic counts of fish in the stream, there are a number of methods for estimating escapement. In some agencies, area-under-the-curve is calculated by drawing a line through the data manually (Ames 1984), but generally, agencies have adopted some algorithm for computing the area. The purpose of this paper is to describe a statistical method for estimating area-under-the-curve, and compare the statistical method to the more traditional approach.

Methods

Trapezoidal Approximation

The most commonly used method for calculating area-under-the-curve (*AUC*) is the trapezoidal approximation,

$$AUC = \sum_{i=2}^n (t_i - t_{i-1}) \frac{(x_i + x_{i-1})}{2} , \quad (1)$$

where t_i is the day of the year and x_i is the number of salmon observed for the i^{th} survey (English et al. 1992; Bue et al. 1998). Attempts are often made to initiate surveys prior to the presence of salmon in the survey area, however, when the first or last survey is not zero, this algorithm will fail. Several methods have been developed to deal with the problem of non-zero surveys at the beginning and end of the run (Johnson and Barrett 1988; English et al. 1992).

The following rules are used by the Alaska Department of Fish and Game in Cordova (Bue et al. 1998) and will be used in this paper. This method is unbiased for estimates of total-season escapement but is biased when partial-season estimates are required. When salmon are present for the first survey, the area-under-the-curve prior to the first survey (AUC_{first}) was estimated as,

$$AUC_{\text{first}} = \frac{x_1 s}{2} , \quad (2)$$

where s is the survey-life. Attempts were also made to continue surveys until all salmon had died. When this was not possible, we estimated area-under-the-curve after the final survey (AUC_{last}) as,

$$AUC_{\text{last}} = \frac{x_{\text{last}} s}{2} . \quad (3)$$

Examples of area-under-the-curve estimates using these trapezoidal rules are presented in Table 1 and Figure 1. Total escapement (E) is then estimated by,

$$\hat{E} = \frac{AUC}{s} v , \quad (4)$$

where v is a correction for observer efficiency.

Table 1 near here

A likelihood model

An alternative to the trapezoidal method is a maximum likelihood approach that involves fitting an arrival time model to the data. We use the following notation to develop the model:

s = survey-life

N_t = number of fish alive in a stream at time t

A_t = cumulative arrivals to day t

D_t = cumulative deaths to day t

m = mean date of arrival

σ_m = standard deviation of date of arrival

E = total escapement for the stream

x_t = the number of fish observed in the stream at time t

C_t = the number of fish predicted to be seen in the stream at time t

v = observer efficiency

We assume an underlying model of fish arrival and death from which we can predict how many fish are alive in the stream on a given day. We also assume the pattern of arrivals and death is normally distributed, thus the cumulative number of fish that have arrived by time t is

$$A_t = E \int_{i=0}^t \left[\frac{1}{\sigma_m \sqrt{2\pi}} \exp\left(-\frac{(i-m)^2}{2\sigma_d^2}\right) \right] di \quad (5)$$

the cumulative number of deaths is

$$D_t = E \int_{i=0}^{t-s} \left[\frac{1}{\sigma_m \sqrt{2\pi}} \exp\left(-\frac{(i-m)^2}{2\sigma_d^2}\right) \right] di \quad (6)$$

and the total number alive in the stream is,

$$N_t = A_t - D_t \quad (7)$$

The parameters of this model are the total escapement (E), the mean day of arrival (m), and standard deviation of the day of arrival (σ_m), and the survey-life (s).

The observation model

An observer counts the number of fish present at a particular time (x_t). The predicted counts of fish on day t (C_t) are assumed to be proportional to the number of fish alive in the stream (N_t), scaled by observer efficiency (v):

$$C_t = vN_t \quad (8)$$

The arrival and death model, and the observation model make deterministic predictions about the number of fish alive in the stream and the number seen on a particular day as a function of five parameters. These parameters are survey-life (s) and observer efficiency (v), which are assumed to be known, and the three parameters which are estimated; the mean day of arrival (m), the standard deviation of arrival (σ_m), and the total escapement (E).

The statistical model

We wish to use counts of fish and prior information about survey-life and observer efficiency to estimate the total number of fish spawning in a stream. For any set of parameters (E, m, σ_m, s, v), we have predicted numbers counted (C_t), and an actual count (x_t). A goodness-of-fit criterion is required to determine which combination of parameters provides the best fit to the observations. To do this estimation, we need to specify a likelihood structure for the observations. The assumptions we make about error structure may have a major impact on the inference we make about escapement (Schnute 1987), so let us first consider our options. In statistical estimation, two types of error are generally recognized: variation in the dynamic model (process error) and variation in the observation of the outputs of the model (observation error). Certainly there is both process and observation error in estimating the number of salmon in a stream. From streams with weirs, we can estimate the magnitude of process error, and when we

compare such streams with known numbers of fish in them to the actual counts, we can estimate the magnitude of the observation error.

However, the simplest estimation schemes are often based on the assumption of deterministic dynamics, and all error is assumed to be in the observation process. This is the tact we have taken, and the following holds:

$$\begin{aligned} x_t &= vN_t + e_t \\ e_t &= N(0, \sigma_n^2) \end{aligned} \quad (9)$$

The number observed at time t is the observer efficiency times the number present at time t plus some error. The simplest option for a likelihood model is the standard additive normal model, which would say that e_t is normally distributed with a mean of zero and some standard deviation σ_n . The likelihood of the observations (x_t), given the parameters, looks similar to the process error model:

$$L(x|C) = \prod \frac{1}{\sigma_n \sqrt{2\pi}} \exp\left(-\frac{(x_t - C_t)^2}{2\sigma_n^2}\right) \quad (10)$$

As we will see when we examine the data, there is evidence to suggest that the amount of variability is not constant but is higher when there are more fish present in the stream. In such circumstances it is common to assume the error has a lognormal distribution:

$$\begin{aligned} x_t &= vN_t \exp(e_t) \\ e_t &= N(0, \sigma_t^2) \end{aligned}$$

and

$$L(x|C) = \prod \frac{1}{\sigma_t \sqrt{2\pi}} \frac{1}{x_t} \exp\left(-\frac{(\log(x_t) - \log(C_t))^2}{2\sigma_t^2}\right) \quad (11)$$

Here we have a new standard deviation denoted σ_t , distinct from σ_n . The lognormal distribution cannot be used when an observed count is 0; thus, we have chosen to ignore such data points when using lognormal error.

We considered a third error distribution, which we call the pseudo-Poisson. In this model, the variance is assumed to be proportional to the expected value of the observation as in the Poisson distribution but the error is normally distributed. The pseudo-Poisson can be written as;

$$x_i = vN_i + e_i$$

$$e_i = N(0, \sigma_i^2)$$

$$\sigma_i^2 = qC_i$$

and

$$L(x|C) = \prod \frac{1}{\sigma_i \sqrt{2\pi}} \exp\left(-\frac{(x_i - C_i)^2}{2\sigma_i^2}\right) \quad (12)$$

In this case the standard deviation (σ_i) is different at each observation and can give large weight to very small counts. We addressed this concern by constraining the value of σ_i^2 to a minimum value of 10.

We also consider an alternative and more flexible arrival time model based on the Beta distribution (Hilborn and Mangel 1997, p 223),

$$p(\theta) \propto \theta^{\alpha-1} (1-\theta)^{\beta-1} \quad (13)$$

where θ ranges from 0 to 1, and α and β are parameters of the distribution. The Beta distribution is defined between 0 and 1 can take on a wide range of shapes, including uniform, symmetric and asymmetric. To use the Beta distribution in our model we simply substitute the Beta distribution for the normal in equations 5 and 6, noting that we must specify the first and last day of fish arrival to rescale the X-axis to dates rather than the 0 and 1 of the Beta distribution. The Beta arrival model can be used with any of the likelihood models, but for application below we used the pseudo-Poisson likelihood.

Incorporation of Uncertainty in Survey-life and Observer Efficiency

In most studies, historical estimates of survey-life and observer efficiency are treated as constants; implying knowledge without error. The likelihood model can be

easily modified to allow for uncertainty in survey-life and observer efficiency. If we assume that the error about each of these estimates is normally distributed with means of \bar{s} and \bar{v} and standard deviation σ_s and σ_v , then we can define two additional likelihood components to the likelihood presented in equation 10, and treat s and v as free parameters. The likelihood components are

$$L(s|\bar{s}, \sigma_s) = \prod \frac{1}{\sigma_s \sqrt{2\pi}} \exp\left(-\frac{(s - \bar{s})^2}{2\sigma_s^2}\right)$$

$$L(v|\bar{v}, \sigma_v) = \prod \frac{1}{\sigma_v \sqrt{2\pi}} \exp\left(-\frac{(v - \bar{v})^2}{2\sigma_v^2}\right)$$

and

$$L_{total} = L(x|C)L(s|\bar{s}, \sigma_s)L(v|\bar{v}, \sigma_v) \quad (14)$$

Thus to use the Beta distribution for example, one would need to specify the starting and ending dates for stream arrival and the mean and standard deviation of survey-life and observer efficiency. To find the maximum likelihood estimate for escapement we would then search over the two parameters of the Beta distribution, the survey-life, and observer efficiency.

Confidence Bounds

We can calculate the likelihood of different escapements and confidence bounds on these estimates using the method of likelihood profile (Schnute 1987; Venzon and Moolgavkar 1988). For each level of escapement, we calculate the maximum likelihood by searching over all possible values of the nuisance parameters and call the negative logarithm of this likelihood $L(E)$. We can calculate the confidence bounds for E by noting that

$$2 \cdot (L(E) - L(E)_{\min}) = \chi^2 \text{ with 1 d.f.} \quad (15)$$

We can then plot the probability distribution for E in what Schnute (1987) calls funnel graphs. To determine the 95% confidence interval on such a graph, we find the two points where a graph crosses the 0.95 probability line.

Using Prior information

The methods presented in this paper utilize only observed counts. We have assumed that historical experience with the mean date of arrival, or the standard deviation of date of arrival is of no utility. In years when we have numerous counts spanning the entire period of fish presence, information from previous years may provide little assistance. However, when data sets are sparse or the first or last count is large, prior information can assist in providing reasonable estimates. These types of data pose particular problems for the trapezoidal method.

The maximum likelihood method allows for the use of prior information. For instance, if a prior distribution for the mean date of arrival is normally distributed with the average mean date of arrival m^* and the standard deviation of the mean date of arrival, σ_m , the likelihood of any particular set of parameters is the likelihood of the data given the parameters times the likelihood of the value of m under our prior distribution on m :

$$L(x|s, m^*, \sigma_m) = L(x|C) \left(\frac{1}{\sigma_m \sqrt{2\pi}} \exp \left(-\frac{(m - m^*)^2}{2\sigma_m^2} \right) \right) \quad (16)$$

Comparing Trapezoidal and Maximum Likelihood Estimates

We used pink salmon data obtained from several streams in Prince William Sound, Alaska, in 1990-1992 (described in Bue et al. 1998) to evaluate the performance of four variations of the maximum likelihood method (normal entry with normal,

lognormal, and pseudo-Poisson error models, and Beta entry) and the trapezoidal method. In this data set, weirs were used to count pink salmon entering the streams and ground surveys were performed on an almost daily basis to count newly dead fish so as to estimate the number of live fish available to the aerial observers. Stream-life, the number of days a fish is alive in the stream was used rather than survey-life because the estimates were based on total weir and dead fish counts. Observer efficiency estimates were based on the comparison of aerial counts to the number estimated alive in the stream, thus any differences in observer efficiency due to fish behavior were incorporated into the estimate.

We used the 1991 dataset from Irish Creek, Prince William Sound, to demonstrate the impact of allowing for uncertainty in stream-life and observer efficiency. Likelihood profiles on the total escapement were examined for four cases – (1) stream-life and observer efficiency known without error, (2) stream-life assumed to be uncertain with observer efficiency known, (3) observer efficiency assumed to be uncertain with stream-life known, and both stream-life and observer efficiency assumed to be uncertain. We used the stream-life published in Table 1 of Bue et al. (1998) for 1990, 1991, and 1992 for Irish Creek, which were 18.1, 16.0 and 21.5 days, respectively. These provide an estimated mean of 18.5 days and a standard deviation of 2.8. Similarly, the estimated observer efficiencies, 0.499, 0.177 and 0.554 provided a mean of 0.41 and a standard deviation of 0.20. Note that the estimate of observer efficiency is highly uncertain.

Results

Comparing Trapezoidal and Maximum Likelihood Methods

The application of the trapezoidal method to aerial data is illustrated for three Prince William Sound creeks in Table 1. Because the last survey was not zero for any of

these streams, the estimated area at the end of the run was the last count times the stream-life divided by two. The Cathead Creek data also show a non-zero initial count, thus the initial trapezoidal area was the number seen times one half the stream-life (Table 1).

Examples of the maximum likelihood fits for the normal entry model using the normal, lognormal, and pseudo-Poisson error models for Irish and Cathead Creeks in 1990 can be found in Figure 2 while Figure 3 presents the pseudo-Poisson error model fits and trapezoidal fits for the eight streams examined in 1991. The last aerial count was greater than zero for all of the streams presented in Figures 2 and 3 with the exception of Irish Creek in 1991 (Figure 3). This was most problematic for Herring and Loomis Creeks in 1991 (Figure 3) where the last count was very large. These situations pose great difficulties for the maximum likelihood method. For instance, in the case of Herring Creek in 1991, the maximum likelihood fit using the normal entry model assumes the run has just begun to enter the stream. In this case the trapezoidal method requires the assumption that the run would be zero in one stream-life. The appropriateness of this assumption depends greatly on the number of surveys and how well these surveys are distributed throughout the run.

Figure 2 and Figure 3 near here

Examples of calculated confidence bounds for Irish and Cathead Creeks in 1990 are shown in Figure 4. These confidence bounds are conditional on perfect estimates of stream-life and observer efficiency.

Figure 4 near here

Weir counts and the corresponding escapement estimates using the trapezoidal and maximum likelihood methods are presented in Table 2 for 18 different year-stream combinations. The average errors for the 18 estimates indicate no bias for the trapezoidal method and positive biases ranging from 6% to 19% for maximum likelihood models. The absolute errors ranged from a low of 19% for the trapezoidal method to 40% for the

maximum likelihood model using a normal entry pattern and log-normal errors. The absolute % error grossly underestimates the true error in normal field application of these methods because the stream-life and observer efficiency values were calculated from the stream data for that year, which is unusual in most circumstances. We thus expect the actual error (and bias) in most applications will be much higher.

Table 2 near here

Using Prior Information

While the estimates for Irish and Cathead Creeks in 1990 are in reasonable agreement with their weir counts, other data sets are not so well behaved. For example, the surveys of Herring Creek in 1990 found the greatest number of salmon in the stream during the last survey (Table 1). The problem with this type of data set and the maximum likelihood techniques described here can be seen in Table 2 where we were unable to obtain believable estimates for two out of the four maximum likelihood methods used. Figure 5 shows the likelihood profile for the normal entry model with pseudo-Poisson errors for Herring Creek in 1990. Note that the right-hand limb never reaches the 90% confidence level, even at escapement levels four times that of the most likely escapement level. The reason for this flat, right-hand limb can be seen in Figure 6, which shows the air counts and best-fit lines for $E=6000$, $E=15,000$ and $E=25,000$. For the higher total escapement levels, the best-fit assumes that the mean date of entry was very late. For the $S=25,000$ fit, the mean date of entry is estimated to be September 22, over a month after the true mean date of entry. The fact that the last air count was the highest means there is little information in the air-count data about the true mean date of arrival. This uncertainty is reflected in the uncertainty about the total escapement. Such problems are reasonably common when there are a small number of counts of individuals in streams. The first or the last count may be the largest, or one of the largest.

Figure 5 near here

Figure 6 near here

We know that the mean date of arrival of pink salmon in Prince William Sound is not as late as 22 September and this historical experience is very useful in this case for giving us the usual date of arrival for every stream in the region. We apply this information to the Herring Creek profile and the new curve effectively eliminates the probability that the true escapement was high (Figure 5, where m^* is 28 August and σ_m is 5 d).

Uncertainty in stream-life and Observer Efficiency

Tight confidence limits were obtained for the Beta distribution fit to the 1991 Irish Creek data when both stream-life and observer efficiency were assumed known without error (Figure 7). Admitting uncertainty in stream-life expanded the confidence limits slightly, but when we allowed for uncertainty in observer efficiency the confidence limits became very broad. The point estimate (50,000) for this fit was lower than that presented in Table 2 (136,691) because the average observer efficiency for the three years of data (0.41) was used rather than the year-specific estimate (0.177). Also, the high standard deviation of observer efficiency may have resulted from estimating using three observations. But the main point is clear, when we admit uncertainty in stream-life and observer efficiency we become much less certain about the actual escapement.

Figure 7 near here

Discussion

The comparison of trapezoidal and maximum likelihood methods shows the pseudo-Poisson error model is the best of the maximum likelihood methods, but there is generally little difference between this method and the trapezoidal method. For most management purposes, the trapezoidal method is a suitable numerical method for estimating escapement. The major failings of the trapezoidal method are (1) lack of any rigorous statistical method to calculate confidence bounds, and (2) problems posed by

very sparse data sets or data sets where first or last counts are non-zero. When confidence bounds are desired, or the data are sparse or poorly behaved, the maximum likelihood method should be used.

There are clearly many variations on the maximum likelihood method. In this paper we have presented four different likelihood models, and while the normal entry with *pseudo-Poisson error model* performed best, on average, we recommend that all four methods be explored for any particular data set. It is clear that any realistic appraisal of uncertainty should allow for uncertainty in stream-life and observer efficiency, and the data presented in Bue et al. (1998) show quite large year-to-year and stream-to-stream differences

Considerable methodological extensions of the maximum likelihood model are possible. Of particular interest would be further exploration of arrival-time models such as the Beta distribution that are not normal or models that relate to environmental conditions. Weir data shows that most fish arrive in a few major pulses, and other types of models could be used to try to relate number arriving to flow, rainfall, or other conditions.

Such arrival time models might include mixtures of several distributions fit directly to the count data, rather than assuming a single underlying arrival distribution. For example, a mixture of normal distributions would allow all of the machinery of maximum likelihood to be used to calculate confidence bounds. The advantage of this approach is that a set of increasingly complex nested models could be tried in order to capture the pattern in the counts as the number of counts increases. The trapezoidal method is, in effect, a version of such a model with a parameter for each data point. Various tests, such as the likelihood-ratio test could be used to test increasingly complex models.

The problem with using generalized statistical models to the count data is that they do not provide an easy way to determine prior distributions, which we have seen are

necessary for reasonable consideration of uncertainty and interpretation of some data sets. With simple distributions, such as the normal, prior probability distributions could be estimated from historical data, just as we propose estimating mean date and standard deviation of arrival from historical data. However, some aggregate properties of the mixture, such as the mean and standard deviation of the arrival time could be specified as priors.

A major advantage of the maximum likelihood approach is the ability to make probabilistic statements about alternative hypotheses, albeit conditional upon the assumptions of the method. We believe that when uncertainty in stream-life and observer efficiency are allowed for, the likelihood may capture most of the important elements and thus be precise. The major assumption of our methods was the particular arrival time model, and we believe that when a more complex arrival time model is used, the precision may well improve.

While implementation of the maximum likelihood algorithm is reasonably straightforward and can be accomplished using spreadsheets with non-linear minimizing functions, routine analysis of large data sets, such as the 208 streams surveyed in Prince William Sound, will probably continue to be done by trapezoidal approximation. However, where individual streams are of particular interest we recommend using the maximum likelihood procedure presented in this paper.

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- Figure 5. Chi squared probabilities for the Herring Creek, 1990, data using the normal entry model with pseudo-Poisson errors. The solid line indicates the model uncertainty when no prior information on mean date of arrival is incorporated into the model while the dashed line indicates the uncertainty when prior run timing information is used.

Figure 6. Three maximum likelihood fits to the Herring Creek, 1990, data representing total escapement values of 6000 (*thick solid line*), 15,000 (*thin solid line*) and 25,000 fish (*dashed line*).

Figure 7. Maximum likelihood fit (A) and chi-squared probability graph for Irish Creek, 1991, when a Beta distribution was used for the entry model and uncertainty in stream-life and observer efficiency were allowed for. The line with solid circles indicates the fit where both stream-life and observer efficiency were fixed, the line with open circles the fit where stream-life was allowed to vary, the dashed line where observer efficiency varied, and the plain solid line where both stream-life and observer efficiency were allowed to vary.

Table 1. Number of pink salmon seen and the calculated trapezoidal area for three creeks in Prince William Sound, Alaska, 1990.

Add-on represents the extrapolated number of fish days after the last count.

| Count Number | Irish Creek | | | Herring Creek | | | Cathead Creek | | |
|-----------------|----------------|----------------|---------------------|----------------|----------------|---------------------|----------------|----------------|---------------------|
| | Day of Year | Number Seen | Trapezoidal Area | Day of Year | Number Seen | Trapezoidal Area | Day of Year | Number Seen | Trapezoidal Area |
| 1 | 183 | 0 | 0 | 192 | 0 | 0 | 192 | 60 | 294 |
| 2 | 188 | 0 | 0 | 197 | 0 | 0 | 197 | 0 | 150 |
| 3 | 193 | 0 | 0 | 199 | 0 | 0 | 199 | 0 | 0 |
| 4 | 197 | 500 | 1,000 | 204 | 0 | 0 | 204 | 250 | 625 |
| 5 | 199 | 150 | 650 | 207 | 0 | 0 | 207 | 300 | 825 |
| 6 | 205 | 6,000 | 18,450 | 212 | 0 | 0 | 212 | 2,100 | 6,000 |
| 7 | 211 | 700 | 20,100 | 215 | 25 | 38 | 215 | 200 | 3,450 |
| 8 | 214 | 24,500 | 37,800 | 218 | 1,000 | 1,538 | 218 | 2,000 | 3,300 |
| 9 | 218 | 8,000 | 65,000 | 226 | 200 | 4,800 | 226 | 2,000 | 16,000 |
| 10 | 220 | 6,500 | 14,500 | 234 | 1,100 | 5,200 | 234 | 1,550 | 14,200 |
| 11 | 226 | 15,310 | 65,430 | 243 | 750 | 8,325 | 243 | 400 | 8,775 |
| 12 | 232 | 600 | 47,730 | 248 | 2,700 | 8,625 | 248 | 500 | 2,250 |
| 13 | 235 | 17,500 | 27,150 | | | | | | |
| 14 | 242 | 13,500 | 108,500 | | | | | | |
| 15 | 247 | 4,200 | 44,250 | | | | | | |
| 16 | 254 | 2,500 | 23,450 | | | | | | |
| Add-on | | | 22,625 | | | 15,390 | | | 2,450 |
| Total | | | 496,635 | | | 28,526 | | | 55,869 |

Table 2. Stream life, air visibility, weir counts, and the estimated number of spawners using the trapezoidal method and four variations of the maximum likelihood method and the percent error for each method. The symbol “*” represents an estimate of 10,483,541 while “**” indicates the estimates were not included in the percent error calculations.

| Stream | No. of Surveys | Stream Life | Observer Efficiency | Weir Count | Escapement Estimate | | | | | Percent Error | | | | |
|--------------------------|----------------|-------------|---------------------|------------|---------------------|------------|----------------|---------|--------------|---------------|----------------|------|------|------|
| | | | | | Trap-ezoidal | Log-normal | Pseudo-poisson | Beta | Trap-ezoidal | Log-normal | Pseudo-poisson | Beta | | |
| <u>1990</u> | | | | | | | | | | | | | | |
| Irish Creek | 18 | 18.1 | 0.499 | 44,900 | 54,987 | 56,721 | 35,458 | 64,183 | 55,447 | 22% | 26% | -21% | 43% | 23% |
| Herring Creek | 12 | 11.4 | 0.888 | 4,927 | 4,338 | * | 8,153 | 5,294 | 504,531 | -12% | ** | 65% | 7% | ** |
| Cathead Creek | 12 | 9.8 | 0.825 | 7,971 | 7,213 | 7,049 | 5,721 | 6,125 | 6,949 | -10% | -12% | -28% | -23% | -13% |
| <u>1991</u> | | | | | | | | | | | | | | |
| Irish Creek | 17 | 16.0 | 0.177 | 95,034 | 140,442 | 140,377 | 80,960 | 112,036 | 136,691 | 48% | 48% | -15% | 18% | 42% |
| Loomis Creek | 10 | 6.8 | 0.322 | 20,315 | 23,630 | 51,630 | 29,784 | 24,544 | 36,045 | 16% | ** | 47% | 21% | 77% |
| Chenega Creek | 5 | 10.2 | 0.234 | 49,769 | 58,941 | 60,333 | 54,601 | 57,130 | 60,570 | 18% | 21% | 10% | 15% | 22% |
| Pt. Countess Creek | 10 | 9.7 | 0.456 | 15,028 | 13,834 | 13,756 | 12,928 | 13,191 | 13,653 | -8% | -8% | -14% | -12% | -9% |
| Hayden Creek | 10 | 11.7 | 0.485 | 18,372 | 13,031 | 13,219 | 9,738 | 11,159 | 13,237 | -29% | -28% | -47% | -39% | -28% |
| Herring Creek | 10 | 11.8 | 0.371 | 13,022 | 16,524 | 18,795 | 35,327 | 13,892 | 17,845 | 27% | 44% | 171% | 7% | 37% |
| Cathead Creek | 10 | 11.0 | 0.246 | 9,629 | 8,502 | 8,414 | 8,578 | 8,628 | 8,340 | -12% | -13% | -11% | -10% | -13% |
| Hawkins Creek | 9 | 15.6 | 0.406 | 40,433 | 37,383 | 36,458 | 31,350 | 33,696 | 35,962 | -8% | -10% | -22% | -17% | -11% |
| <u>1992</u> | | | | | | | | | | | | | | |
| Irish Creek | 14 | 21.5 | 0.554 | 8,205 | 3,367 | 8,788 | 8,677 | 8,302 | 9,331 | -59% | 7% | 6% | 1% | 14% |
| Loomis Creek | 10 | 9.6 | 0.177 | 3,845 | 3,495 | 4,791 | 4,791 | 4,791 | 4,834 | -9% | 25% | 25% | 25% | 26% |
| Totemoff Creek | 9 | 14.7 | 0.535 | 8,428 | 7,842 | 6,653 | 7,230 | 6,653 | 6,937 | -7% | -21% | -14% | -21% | -18% |
| Chenega Creek | 6 | 14.2 | 0.245 | 10,658 | 11,130 | 12,245 | 8,835 | 12,245 | 12,245 | 4% | 15% | -17% | 15% | 15% |
| Hayden Creek | 9 | 9.0 | 0.359 | 2,708 | 2,580 | 3,283 | 36,942 | 2,024 | 3,022 | -5% | 21% | ** | -25% | 12% |
| Herring Creek | 9 | 13.7 | 0.388 | 911 | 1,289 | 1,289 | 1,289 | 842 | 1,289 | 41% | 41% | 41% | -8% | 41% |
| Cathead Creek | 9 | 11.9 | 0.685 | 3,937 | 3,367 | 4,381 | 8,677 | 8,302 | 4,380 | -14% | 11% | 120% | 111% | 11% |
| Average Percent Error | | | | | | | | | | 0% | 19% | 17% | 6% | 13% |
| Average Absolute Percent | | | | | | | | | | 19% | 30% | 40% | 23% | 24% |

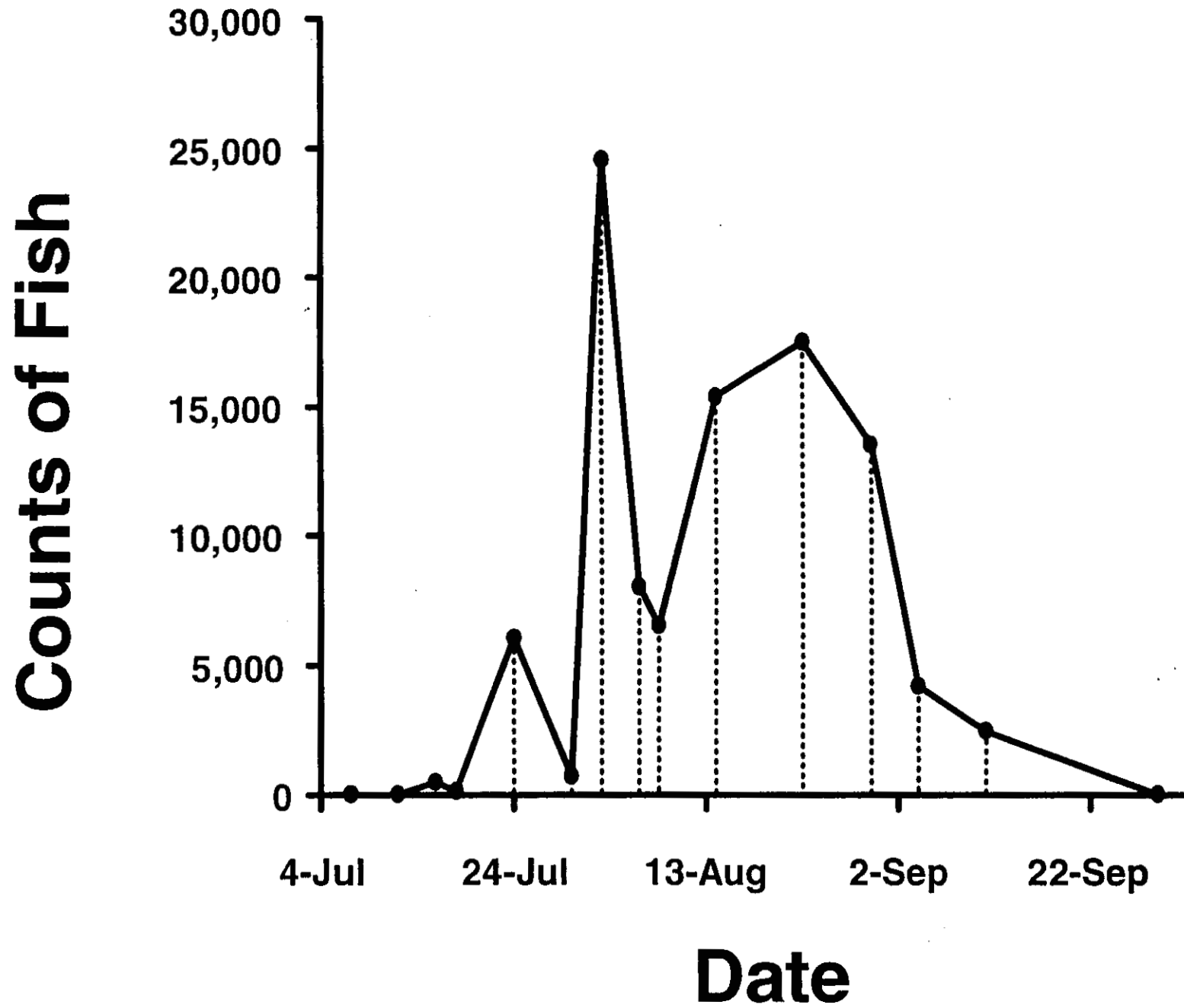


Figure 1.

Counts of Fish

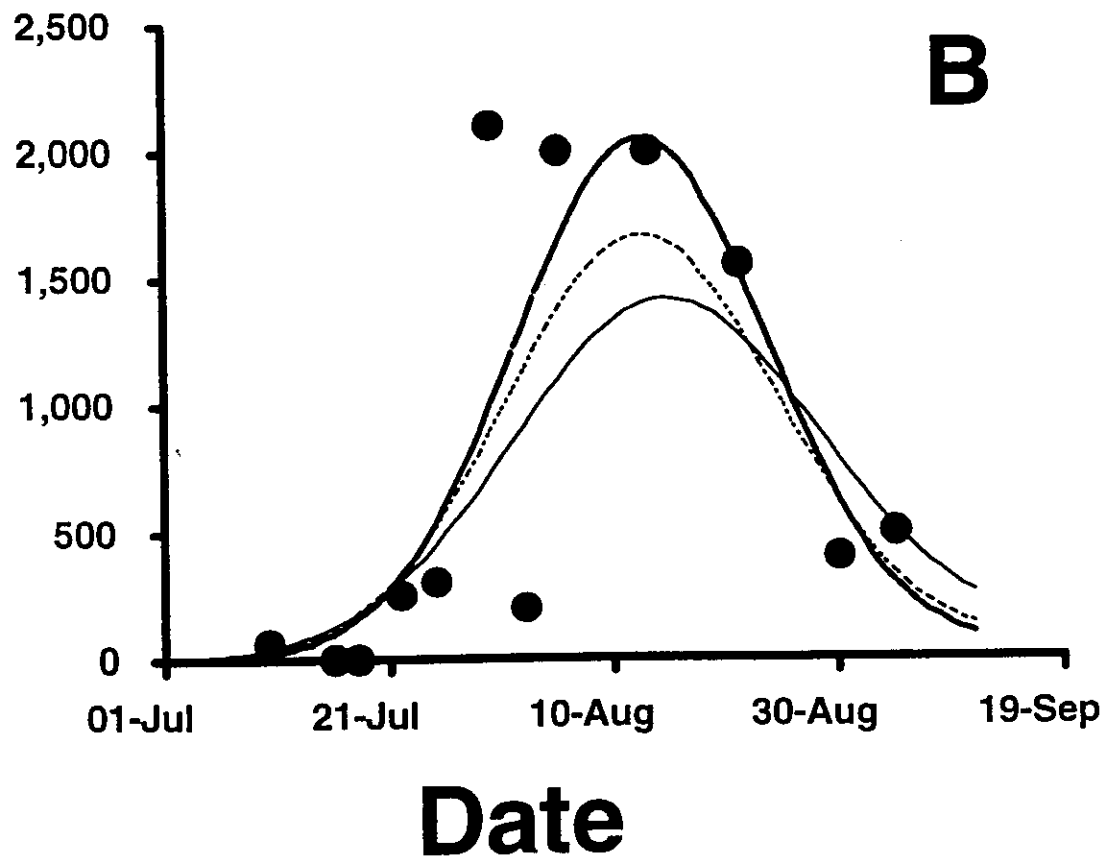
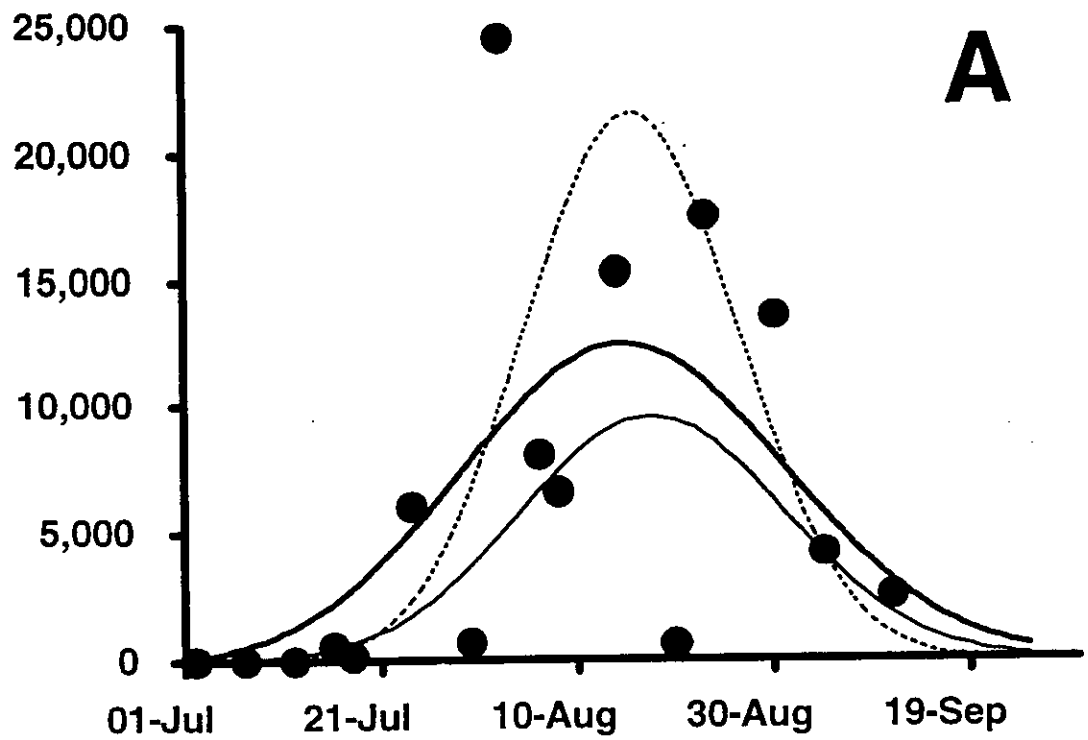


Figure 2.

Counts of Fish

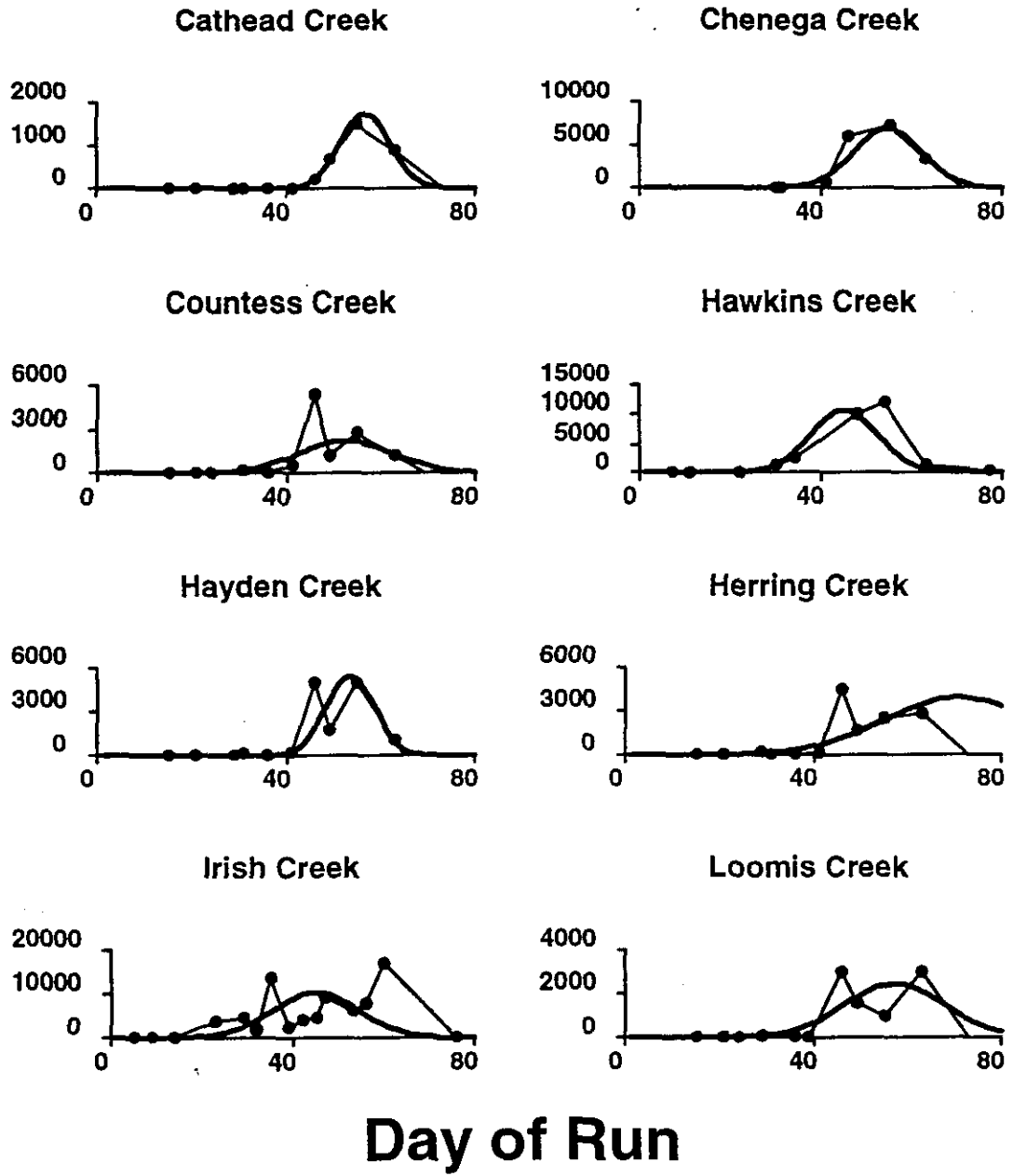
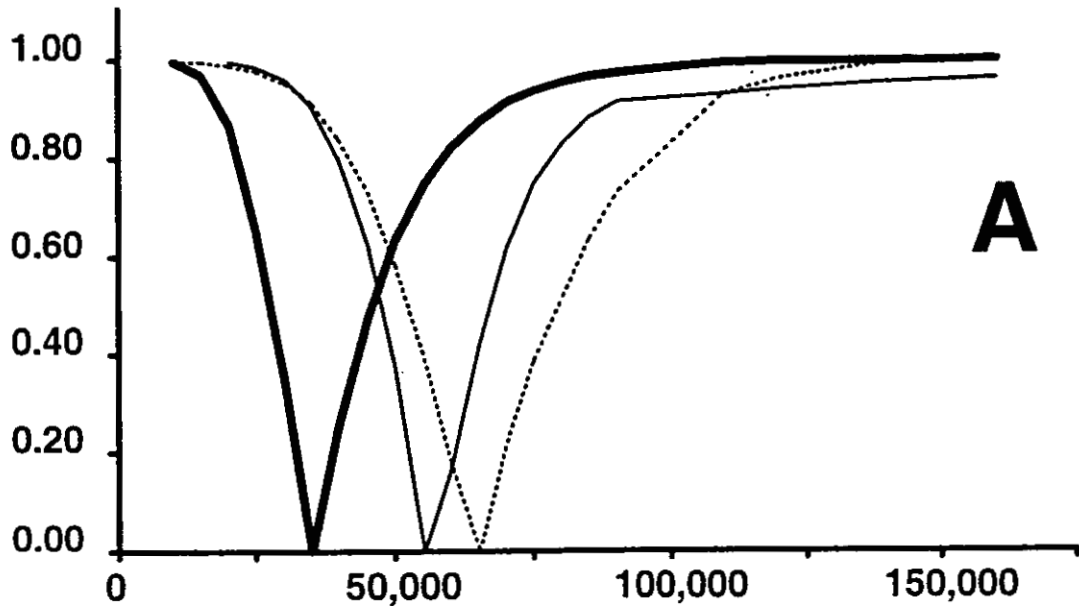
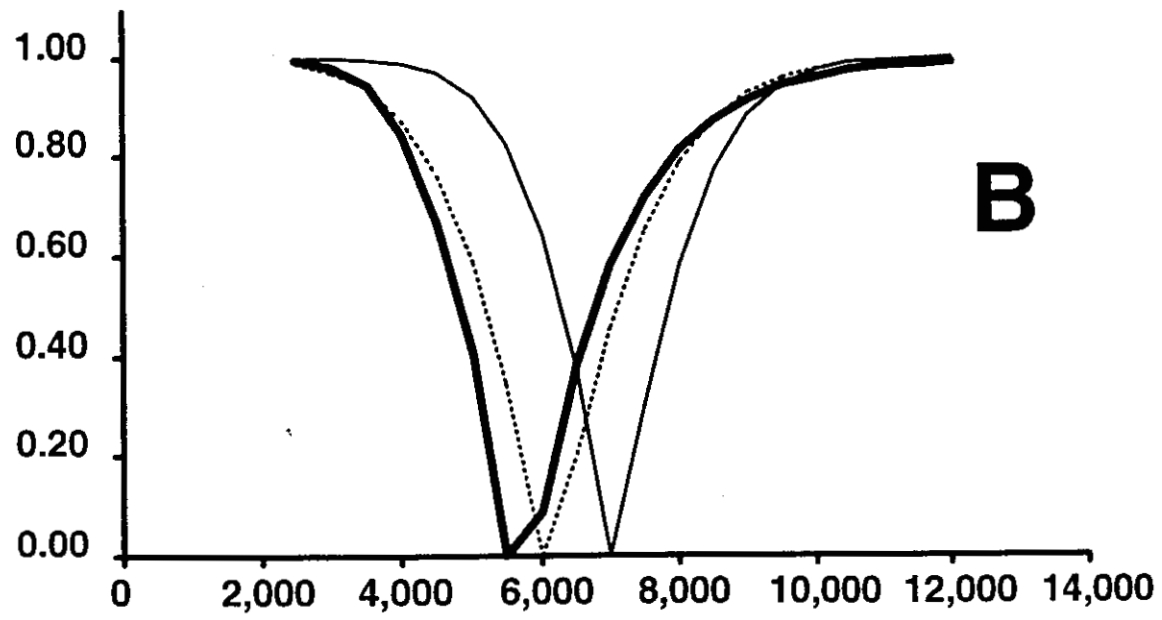


Figure 3.

Chi-Square Probability



A

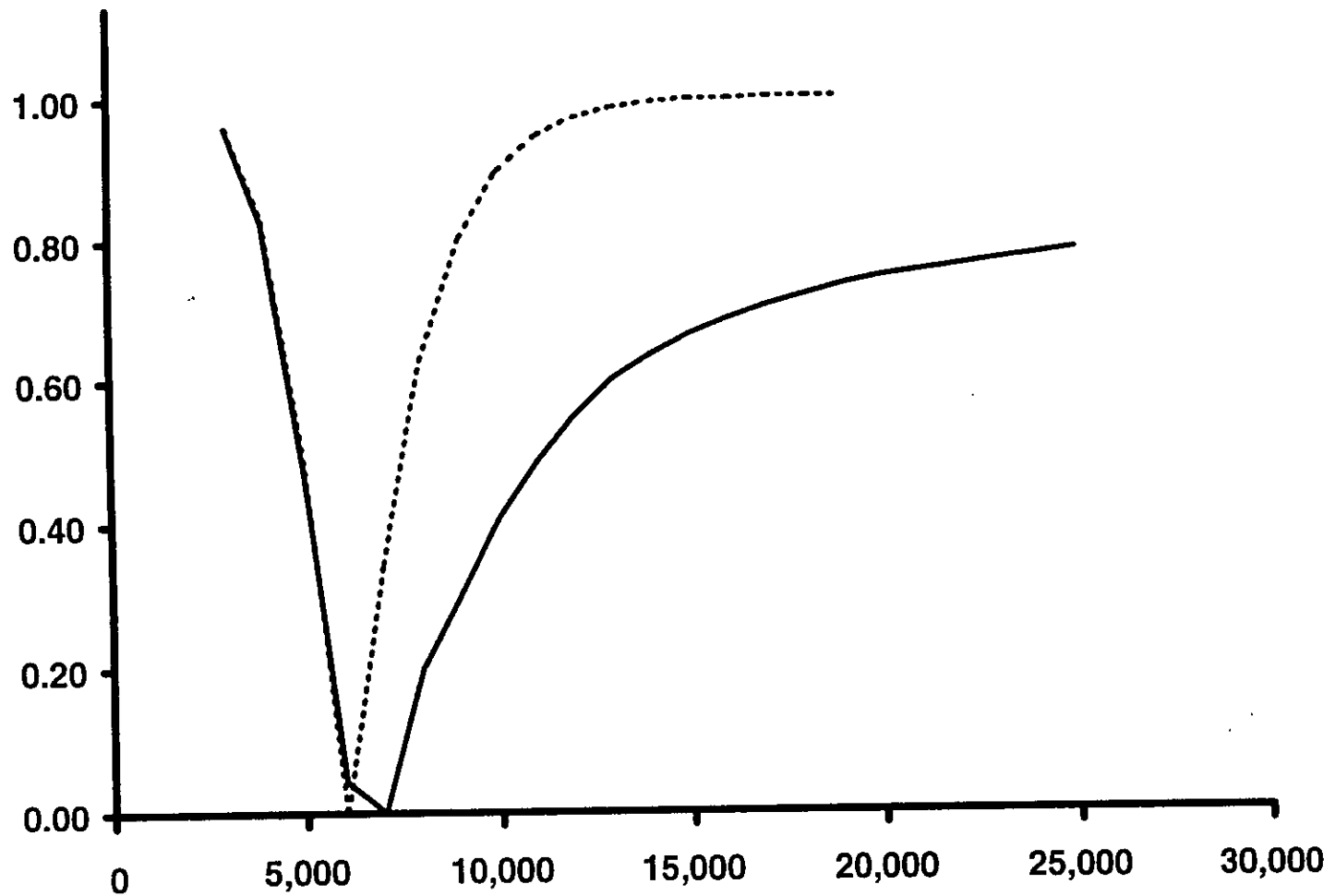


B

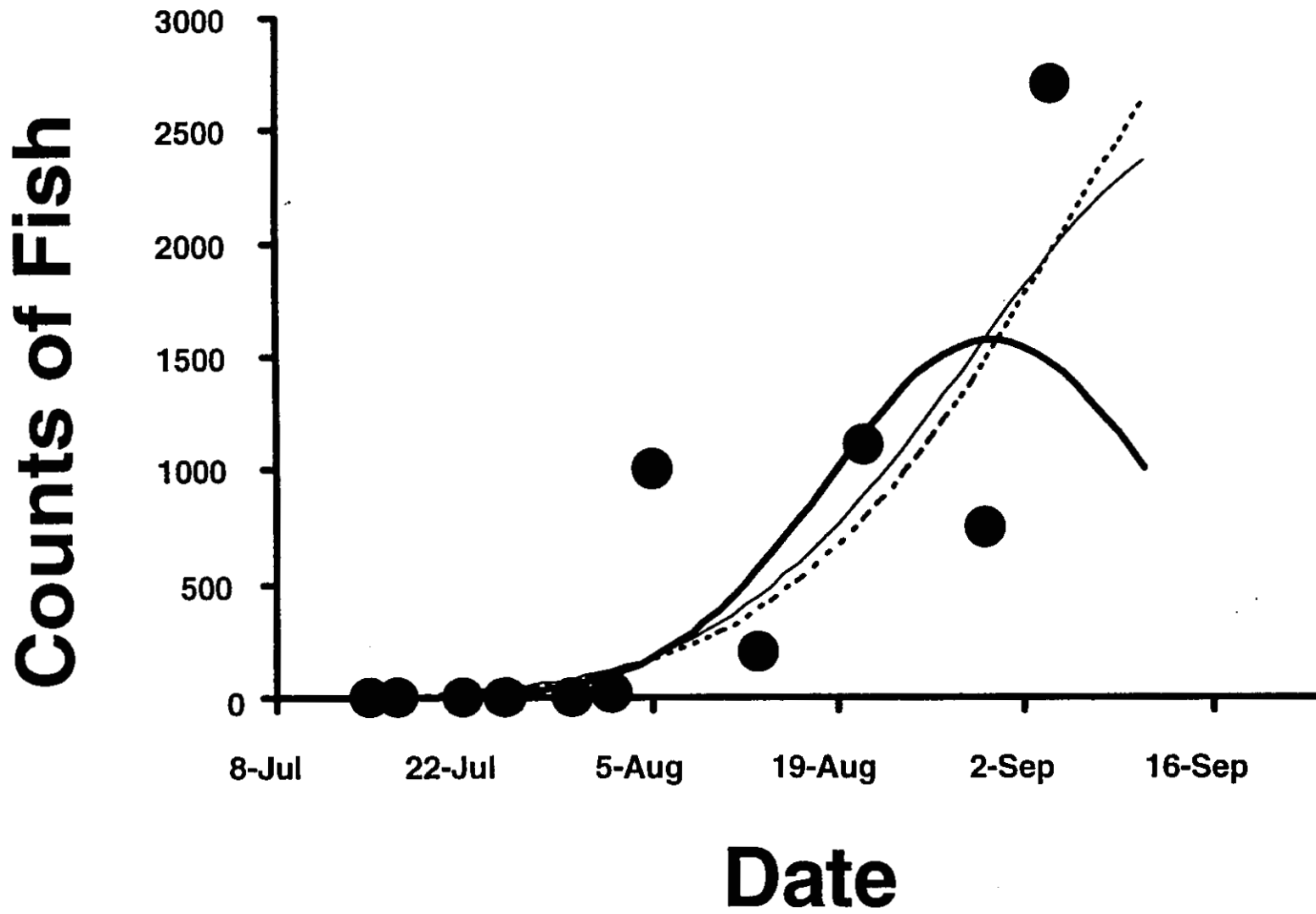
Escapement

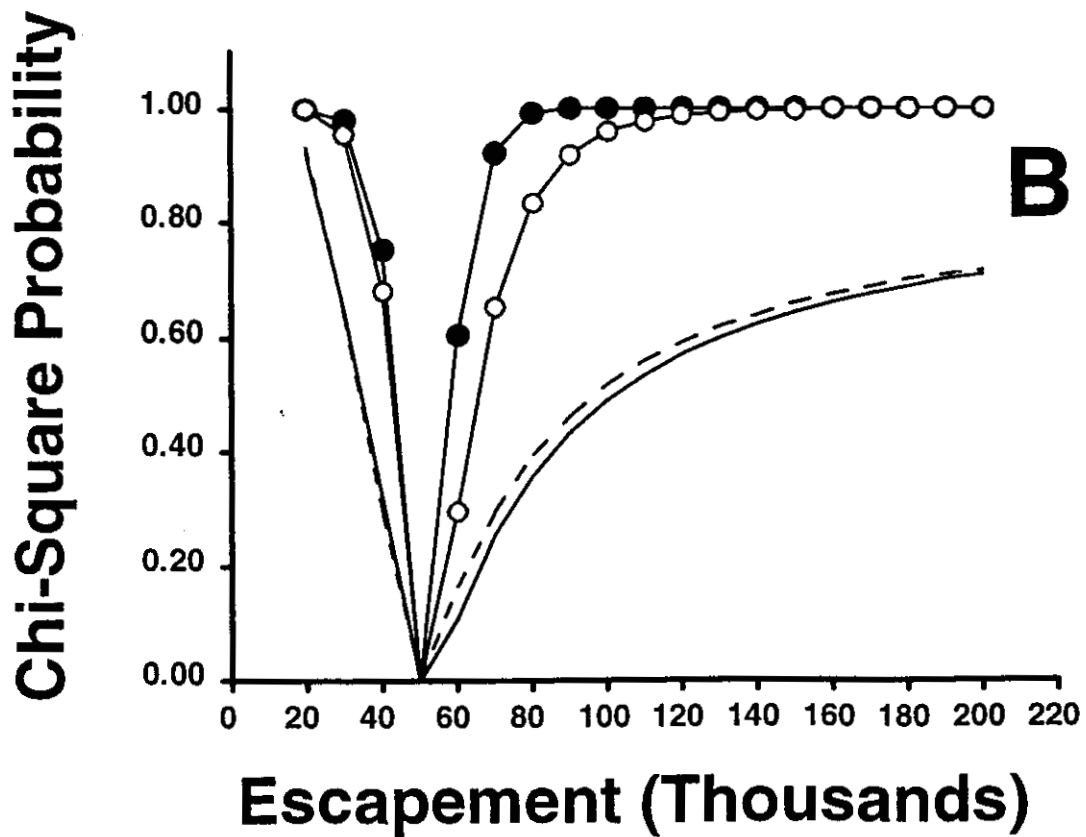
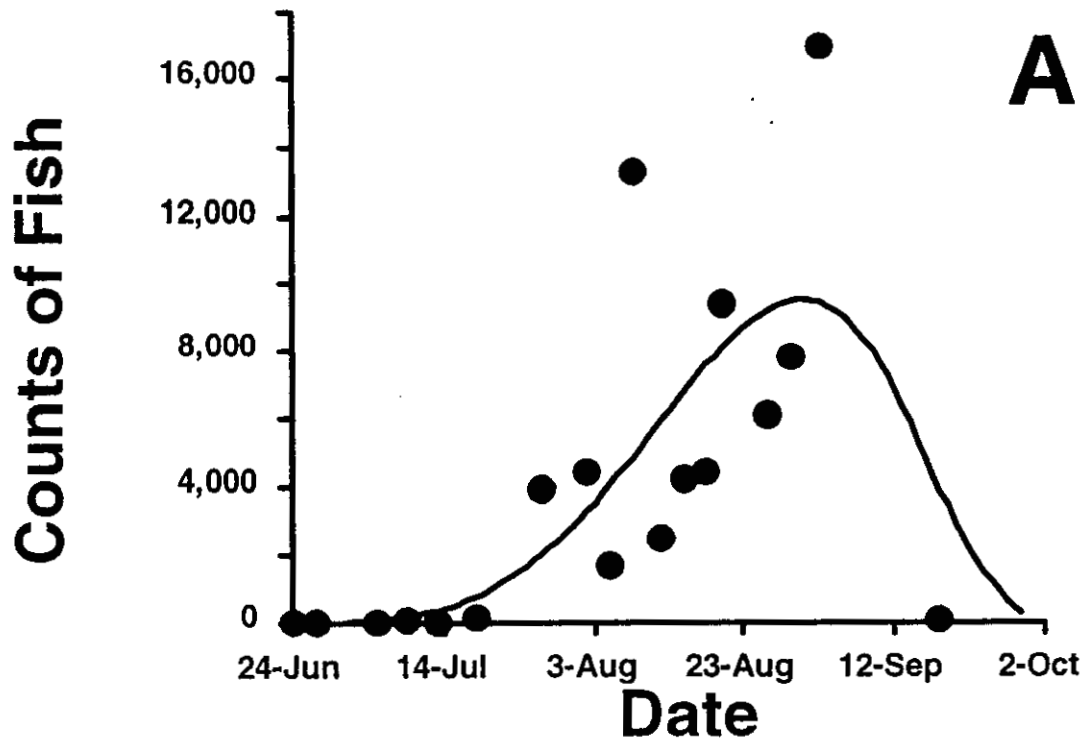
Figure 4

Chi-Square Probability



Total Escapement





Appendix M. Estimation of Salmon Escapement: Models with Entry, Mortality and Stochasticity.

**ESTIMATION OF SALMON ESCAPEMENT:
MODELS WITH ENTRY, MORTALITY
AND STOCHASTICITY**

TERRANCE J. QUINN II
Juneau Center, School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
11120 Glacier Hwy.
Juneau, AK 99801-8677
E-mail address: fftjq@aurora.alaska.edu

RICHARD GATES
Alaska Dept. of Fish and Game
Div. of Comm. Fish., Manage., and Devel.
333 Raspberry Road
Anchorage, AK 99518-1599
*Current address: Data Analysis Products Division
MathSoft, Inc.
1700 Westlake Ave. N, Suite 500
Seattle, WA 98109-9891
E-mail address: gates@statsci.com*

ABSTRACT. Understanding the dynamics of Prince William Sound pink salmon requires knowledge of the size of the spawning population in a stream over time. Periodic aerial surveys provide observations on the number of spawners, but the lack of daily observations requires a model to fill in the gaps. We develop a differential equation framework to represent the dynamics of escapement during the season. An exponential population growth model with a time-varying rate of growth is used for the number of spawners. The rate of growth consists of two primary components: the entry of salmon to the stream (escapement) and the mortality of spawners in the stream. The models for entry and mortality are also functions of time. The stochastic element of the model is based on a nonhomogeneous birth-and-death process which leads to a least squares estimation approach with either additive measurement or process errors. We illustrate the approach for a stream in Prince William Sound by fitting various models to observed spawner abundance, mortality counts from ground surveys and weir counts of the entry to the stream. We believe this approach could improve salmon escapement estimation, because the processes governing entry and mortality are explicitly considered.

1. Introduction. Anadromous salmonid populations return to their natal freshwater spawning grounds after a period of time in the ma-

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rine environment. The escapement process, in which spawners return to the freshwater environment, is central to salmonid assessment and management (Ricker [1975], Hilborn and Walters [1992]). The sum of escapement and harvest, called the return, is related to corresponding spawning stock size through a spawner-recruit model to establish management strategies (Eggers [1993]). Fixed escapement policies are commonly used in their management, and managers strive in-season to regulate harvest so that a sufficient number of spawners escape into streams (Mundy [1985], Zheng [1988], McPherson [1990]).

To obtain knowledge of the spawning population in a stream over time, periodic aerial or foot surveys provide observations on the number of spawners in a stream. However, observations of the number of spawners in the stream only provide a clue to the actual number of salmon that have entered the stream over time since each salmon lives several days or weeks in the stream before they spawn, then perish. Traditionally, a plot of survey counts against time is made, the points are connected and the area under the curve is calculated to arrive at the total spawner days (Perrin and Irvine [1990]). Dividing this number by an auxiliary estimate of average stream life, the average time a salmon remains alive in the freshwater, results in an estimate of escapement.

Several problems arise in the determination of escapement for a management area. Some streams can only be partially surveyed, others cannot be surveyed at all, observer bias and variability may be significant, and logistical and weather problems may result in few data points for a stream (Cousins et al. [1982], Dangel and Jones [1988], Symons and Waldichuk [1984], Bevan [1961], Eggers [1984]). We restrict our attention to the problem of determining the number of spawners in a given stream with survey counts.

The lack of daily counts in practice and the crudity of the area-under-the-curve methodology suggest that a model of the escapement process may be useful to provide more accurate and precise estimates of the number of spawners. Stream life is likely to vary during the spawning season, with fewer days spent in the stream toward the end of the run. The regularity of returns to spawning areas (Mundy [1985]) suggests that modeling can improve the escapement estimation process.

We develop a differential equation framework to represent the dynamics of escapement during the spawning season. The total number

of different fish over the season is the escapement. An exponential population growth model with a time-varying rate of growth is used for the number of spawners in a stream as a function of time. The model consists of two primary components: the entry of salmon into the stream and the mortality of spawners in the stream. The difference between the two represents the net addition or subtraction from the total number of spawners in the stream. We derive conditions for obtaining a valid escapement model (increasing from 0 salmon to a peak and then decreasing to 0) and present logistic, linear and constant cases for entry and mortality.

We appeal to the stochastic birth-and-death process in our modeling, where entry to the stream can be viewed as births and exit from the stream due to mortality can be viewed as deaths. The distribution for the number of spawners over time is presented as derived by Bailey [1964], as well as those for entry and mortality. The likelihood from this model is generalized to a least squares approach to provide more robust parameter estimation. We illustrate this model by application to survey data on pink salmon in Prince William Sound, Alaska.

2. Model development. Let $\mathcal{N}(t)$ denote the expected number of spawners in the stream at time t . It is assumed that the instantaneous change in the number of spawners is a function of the number of spawners and that the relative (per capita) instantaneous rate of change $\psi(t)$ in the spawners varies with time. These two assumptions imply the differential equation

$$(1) \quad \frac{1}{\mathcal{N}} \frac{d\mathcal{N}}{dt} = \psi(t)$$

holds. The rate $\psi(t)$ is the difference between the relative instantaneous rate of entry into the stream, $\lambda(t)$, and the relative instantaneous rate of mortality, $\mu(t)$, or

$$\psi(t) = \lambda(t) - \mu(t).$$

Thus, the differential equation (1) becomes

$$(2) \quad d\mathcal{N}/dt = \lambda(t)\mathcal{N} - \mu(t)\mathcal{N} = \lambda_N(t) - \mu_N(t),$$

where

$$\lambda_N(t) = \lambda(t)\mathcal{N}(t)$$

is the instantaneous absolute entry rate of spawners and

$$\mu_N(t) = \mu(t)\mathcal{N}(t)$$

is the instantaneous absolute mortality rate. Given the initial condition $\mathcal{N}(\tau) = \mathcal{N}_\tau$ at reference time τ , the solution to (2) is

$$\begin{aligned} \mathcal{N}(t) &= \mathcal{N}_\tau \exp\left(\int_\tau^t [\lambda(x) - \mu(x)] dx\right) \\ (3) \quad &= \mathcal{N}_\tau \exp\left(\int_\tau^t \lambda(x) dx - \int_\tau^t \mu(x) dx\right). \end{aligned}$$

Specific initial conditions used below are 1) time t_* corresponding to maximum number of spawners \mathcal{N}_* and 2) time τ_1 when the first spawner enters the stream, so that $\mathcal{N}(\tau_1) = \mathcal{N}_1 = 1$. We write $\mathcal{N}_t \equiv \mathcal{N}(t)$ as the spawner abundance at the start of day t for later use with data.

The entry of salmon to the stream is defined by the differential equation $d\mathcal{E}/dt = \lambda_N(t)$. As we will be interested in daily entry in numbers of fish, we define this as

$$\begin{aligned} \mathcal{E}_t &= \int_t^{t+1} \frac{d\mathcal{E}}{dx} dx \\ (4) \quad &= \int_t^{t+1} \lambda_N(x) dx \\ &= \int_t^{t+1} \lambda(x)\mathcal{N}(x) dx. \end{aligned}$$

The cumulative entry is

$$\mathcal{E}_{\text{cum}}(t) = \int_1^t (d\mathcal{E}/dx) dx = \sum_{x=1}^{t-1} \mathcal{E}_x.$$

Similarly, the mortality of salmon to the stream is given by $d\mathcal{M}/dt = \mu_N(t)$, so that daily mortality in numbers of fish is

$$\begin{aligned} \mathcal{M}_t &= \int_t^{t+1} \frac{d\mathcal{M}}{dx} dx \\ (5) \quad &= \int_t^{t+1} \mu_N(x) dx \\ &= \int_t^{t+1} \mu(x)\mathcal{N}(x) dx. \end{aligned}$$

The cumulative mortality from the start of spawning up to day t is

$$\mathcal{M}_{\text{cum}}(t) = \int_1^t (d\mathcal{M}/dx) dx = \sum_{x=1}^{t-1} \mathcal{M}_x.$$

Because the solution for spawner abundance is in terms of integrals of λ and μ , it turns out that the following approximations for \mathcal{E} and \mathcal{M} are useful:

$$\begin{aligned} (6) \quad \bar{\mathcal{E}}_t &= \bar{N}_t \int_t^{t+1} \lambda(x) dx \\ &= \bar{N}_t \left[\int_{\tau}^{t+1} \lambda(x) dx - \int_{\tau}^t \lambda(x) dx \right] \approx \mathcal{E}_t \end{aligned}$$

$$\begin{aligned} (7) \quad \bar{\mathcal{M}}_t &= \bar{N}_t \int_t^{t+1} \mu(x) dx \\ &= \bar{N}_t \left[\int_{\tau}^{t+1} \mu(x) dx - \int_{\tau}^t \mu(x) dx \right] \approx \mathcal{M}_t, \end{aligned}$$

where \bar{N}_t is average spawner abundance over the interval t to $t + 1$. This differential equation setting can be used to develop an intuitive difference equation as well. Integrating the differential equation (2) over t to $t + 1$ yields

$$\begin{aligned} (8) \quad \mathcal{N}_{t+1} - \mathcal{N}_t &= \int_t^{t+1} \frac{d\mathcal{N}}{dx} dx \\ &= \int_t^{t+1} \lambda_N(x) dx - \int_t^{t+1} \mu_N(x) dx \\ &= \mathcal{E}_t - \mathcal{M}_t, \end{aligned}$$

and with use of the above approximations, leads to

$$(9) \quad \mathcal{N}_{t+1} - \mathcal{N}_t \approx \bar{\mathcal{E}}_t - \bar{\mathcal{M}}_t.$$

Hence, spawner abundance on a given day is the spawner abundance on the previous day plus that day's entry minus that day's mortality.

Total escapement S is the number of different salmon that enter a stream to spawn over the spawning season. Because the total number of fish entering a stream must be balanced by the total number of fish that die, the total escapement is simply the cumulative entry over the spawning season, or equivalently, the integral over all days of the entry rate, and similarly for mortality. Thus,

$$(10) \quad \begin{aligned} S &= \mathcal{E}_{\text{cum}}(t_{\infty}) = \mathcal{M}_{\text{cum}}(t_{\infty}) \\ &= \int_1^{t_{\infty}} \lambda_N(t) dt = \int_1^{t_{\infty}} \mu_N(t) dt, \end{aligned}$$

where t_{∞} is the last day of the spawning season. The number of spawner days is the area under the spawner abundance curve and is denoted

$$(11) \quad T = \int N(t) dt.$$

The stream life of the escaping salmon is the time between when a salmon enters the stream to the day it dies in the stream and varies with the mortality rate. The average stream life of the salmon in the stream can be expressed as

$$(12) \quad \ell = T/S.$$

This can also be calculated for various periods of time to determine if stream life varies over the season.

For our escapement model, a valid spawner function takes on non-negative values and rises from the value of 0 to a unique maximum and then decreases to 0. Thus, from (1), a valid spawner function \mathcal{N} has a maximum at time τ_* , such that

$$(13) \quad \text{(a) } \psi_* = 0 \quad \text{and} \quad \text{(b) } \psi'_* < 0,$$

where $\psi_* = \psi(\tau_*)$ and $\psi'_* = (d\psi/dt)|_{t=\tau_*}$. As a consequence of $\psi(t) = \lambda(t) - \mu(t)$, it follows from (2) that

$$(14) \quad \text{(a) } \lambda_* = \mu_* \quad \text{and} \quad \text{(b) } \lambda'_* < \mu'_*,$$

using similar notation as for ψ .

It is clear that a valid spawner function depends on the functional forms chosen for λ and μ ; we propose a general framework in subsequent sections. From (13b) and (14b), it follows that at least one of λ or μ , and hence ψ , must be functions of time; if they were both constant, then their derivatives would both be zero. Both λ and μ are relative rates, so that the corresponding absolute rates are proportional to spawner abundance, as seen in (2).

For biological meaning, the absolute rate of entry $\lambda_N(t)$ should peak earlier than the number of spawners. This can only happen if the relative rate of entry $\lambda(t)$ is declining over time in the neighborhood of the maximum. For simplicity, we will consider monotonically nonincreasing functions, although in reality the relative rate probably increases at the start of the season. However, the amount of data available at this time is usually limited and the number of spawners is small, so the overall effect of the monotone choice is likely small. Analogously, the absolute rate of mortality $\mu_N(t)$ should peak later than the number of spawners, so that the relative rate of mortality $\mu(t)$ should increase over time, at least in the neighborhood of the maximum.

3. Models for entry.

Model E1. Schnute [1981] showed how the relative rate of change in the relative rate of increase could be modeled as a linear function to provide a flexible growth model. We use the same principle to model salmon entry into a stream and assume that the relative rate of change in the relative rate of entry is a negative, linearly increasing function:

$$(15) \quad \frac{1}{\lambda} \frac{d\lambda}{dt} = -(a - b\lambda), \quad a > 0, b > 0.$$

The major difference between our approach and Schnute's is that we are interested in $\lambda(t)$ itself and its contribution to spawning abundance in the presence of a competing mortality process, rather than in expressing the solution in terms of a cumulative increasing function representing cumulative entries. The absolute rate of change in the relative rate of increase is thus a quadratic function $d\lambda/dt = -(a - b\lambda)\lambda$, which represents the negative logistic curve, which has a reverse sigmoidal

shape. Hence the common solution in terms of reference time τ is

$$(16) \quad \lambda(t) = \frac{\lambda_{\tau} e^{-a(t-\tau)}}{1 - (b/a)\lambda_{\tau} + (b/a)\lambda_{\tau} e^{-a(t-\tau)}}.$$

The asymptotic beginning ($t \rightarrow -\infty$) relative rate of increase is then $\lambda_{-\infty} = a/b$, and $\lambda(t) \rightarrow 0$ as $t \rightarrow \infty$.

Model E2. The second entry model is a special case of E1 where $b = 0$; thus the relative rate of change in the relative rate of entry is constant and negative. Hence,

$$(17) \quad \frac{1}{\lambda} \frac{d\lambda}{dt} = -a, \quad a > 0.$$

The solution to this equation is the negative exponential function

$$(18) \quad \lambda(t) = \lambda_{\tau} e^{-a(t-\tau)}.$$

Model E3. The third entry model is a special case of E1 and E2 where $a = b = 0$; thus, the relative rate of change in the relative rate of entry is zero. Hence, the relative rate of entry itself is a constant, which we write

$$(19) \quad \lambda(t) = \lambda_{\tau}.$$

Since λ is constant, mortality rate μ must be a function of time for a valid escapement model.

For these three models, the relative rate of change in $\lambda(t)$, $(1/\lambda)(d\lambda/dt)$,

is shown in Figure 1a for a common initial condition λ_{τ} . In Figure 1b, the corresponding curves for absolute rate of change $d\lambda/dt$ are shown. In Figure 1c, the corresponding curves for relative rate $\lambda(t)$ are shown. The formulae for $\lambda(t)$ are summarized in Table 1.

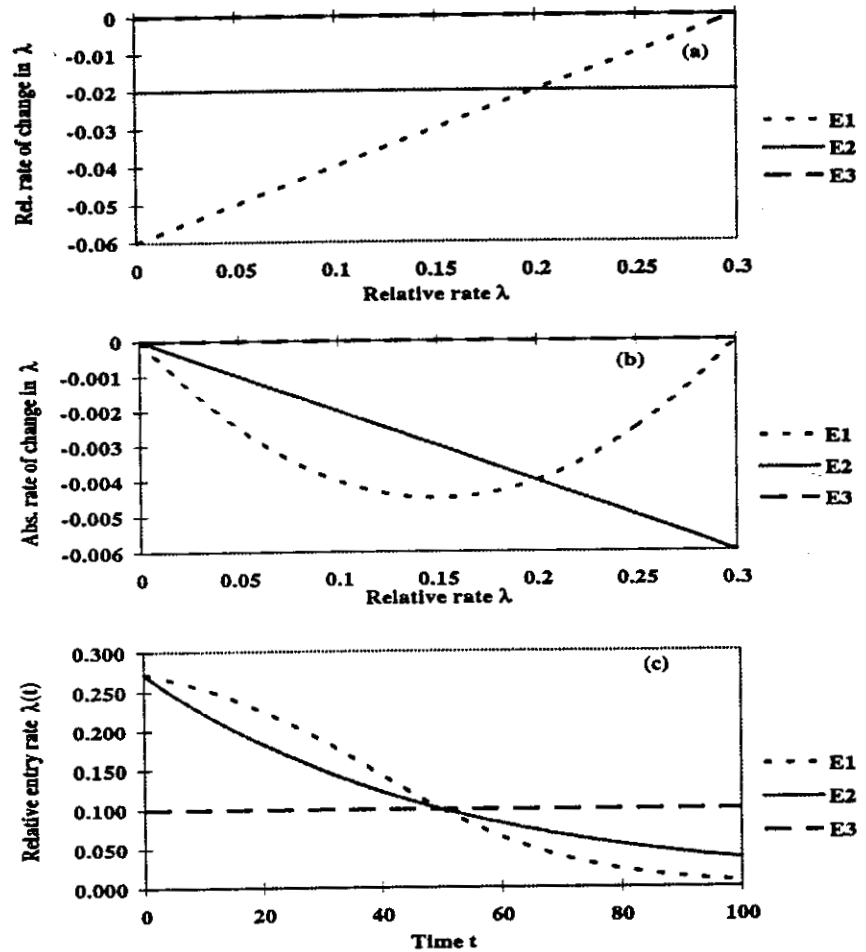


FIGURE 1. Three models for entry, E1, E2 and E3, showing (a) relative rate of change in λ as a function of λ , (b) corresponding absolute rate of change in λ and (c) corresponding curves for $\lambda(t)$ over time t . Parameter values for these graphs are $\tau = 50$ and $\lambda_r = 0.1$ for all models, $a = 0.06$ and $b = 0.2$ for Model E1 (hence $\lambda_\infty = 0.3$) and $a = 0.02$ for Model E2.

TABLE 1. Equations for relative rate of entry (λ) and mortality (μ) for various models and their respective integrals.

| <i>Model</i> | <i>Variable</i> | <i>Formula</i> |
|--------------|-------------------------------|--|
| E1 | $\lambda(t)$ | $\frac{\lambda_{\tau} e^{-a(t-\tau)}}{1 - (b/a)\lambda_{\tau} + (b/a)\lambda_{\tau} e^{-a(t-\tau)}}$ |
| E2 | $\lambda(t)$ | $\lambda_{\tau} e^{-a(t-\tau)}$ |
| E3 | $\lambda(t)$ | λ_{τ} |
| M1 | $\mu(t)$ | $\frac{\mu_{\tau} e^{c(t-\tau)}}{1 - (d/c)\mu_{\tau} + (d/c)\mu_{\tau} e^{c(t-\tau)}}$ |
| M2 | $\mu(t)$ | $\mu_{\tau} e^{c(t-\tau)}$ |
| M3 | $\mu(t)$ | μ_{τ} |
| M4 | $\mu(t)$ | $c + d \cdot \lambda(t)$ |
| E1 | $\int_{\tau}^t \lambda(x) dx$ | $\frac{1}{b} \ln \left[\frac{a}{a - b\lambda_{\tau} + b\lambda_{\tau} e^{-a(t-\tau)}} \right]$ |
| E2 | $\int_{\tau}^t \lambda(x) dx$ | $(\lambda_{\tau}/a)(1 - e^{-a(t-\tau)})$ |
| E3 | $\int_{\tau}^t \lambda(x) dx$ | $\lambda_{\tau}(t - \tau)$ |
| M1 | $\int_{\tau}^t \mu(x) dx$ | $-\frac{1}{d} \ln \left[\frac{c}{c - d\mu_{\tau} + d\mu_{\tau} e^{c(t-\tau)}} \right]$ |
| M2 | $\int_{\tau}^t \mu(x) dx$ | $(\mu_{\tau}/c)(e^{c(t-\tau)} - 1)$ |
| M3 | $\int_{\tau}^t \mu(x) dx$ | $\mu_{\tau}(t - \tau)$ |
| M4 | $\int_{\tau}^t \mu(x) dx$ | $c(t - \tau) + d \cdot \int_{\tau}^t \lambda(x) dx$ |

4. Models for mortality. We develop three mortality models which are analogous to those for entry, except that the relative rate of change functions are now positive and nonincreasing. In addition, we present a model which connects the entry and mortality processes.

Model M1. Here the relative rate of change in the relative rate of mortality is a positive, linearly decreasing function:

$$(20) \quad \frac{1}{\mu} \frac{d\mu}{dt} = c - d \cdot \mu, \quad c > 0, d > 0.$$

The absolute rate of change in the relative rate of increase is thus a quadratic function $d\mu/dt = (c - d \cdot \mu)\mu$, which represents the positive logistic curve. Hence the common solution in terms of reference time τ is

$$(21) \quad \mu(t) = \frac{\mu_{\tau} e^{c(t-\tau)}}{1 - (d/c)\mu_{\tau} + (d/c)\mu_{\tau} e^{c(t-\tau)}}.$$

The asymptotic ($t \rightarrow \infty$) relative rate of increase is then $\mu_{\infty} = c/d$.

Model M2. The second mortality model is a special case of M1 where $d = 0$; thus the relative rate of change in the relative rate of entry is constant and positive. Hence,

$$(22) \quad \frac{1}{\mu} \frac{d\mu}{dt} = c, \quad c > 0,$$

with solution

$$(23) \quad \mu(t) = \mu_{\tau} e^{c(t-\tau)}.$$

Model M3. The third mortality model is a special case of E1 and E2 where $c = d = 0$; thus, the relative rate of change in the relative rate of mortality is zero. Hence, the relative rate of mortality itself is a constant, which we write

$$(24) \quad \mu(t) = \mu_{\tau}.$$

Since μ is constant, entry rate λ must be a function of time for a valid escapement model.

Model M4. The fourth mortality model is qualitatively much different than the previous models. Here we assume that the two processes are linked linearly and can be written

$$(25) \quad \mu(t) = c + d \cdot \lambda(t).$$

For a valid escapement model, $\psi(\tau_*) = 0$, which implies $\mu_* = \lambda_*$, so that from (25), $\mu_* = c/(1 - d)$. Because this must be positive and

$c > 0$ in other mortality models, the domain of d is $-\infty < d < 1$. Biologically, this domain has two situations of different interpretation. If $d < 0$, then mortality is a decreasing function of entry. Because entry decreases as a function of time, this implies that mortality increases as a function of time. If, on the other hand, $0 < d < 1$, mortality is an increasing function of entry and decreases as a function of time. However, the change in μ is less than the change in λ , which allows a valid escapement model to exist. This can be seen by writing from (25),

$$\frac{d\mu}{dt} = d \cdot \frac{d\lambda}{dt}.$$

For comparison with other mortality models, the relative rate of change in μ can be written

$$\frac{1}{\mu} \frac{d\mu}{dt} = \frac{d \cdot \lambda}{c + d \cdot \lambda} \frac{1}{\lambda} \frac{d\lambda}{dt}.$$

Here the relative rate of change in μ is functionally related to the relative rate of change in λ , with the functionality proportional to the magnitude of $d \cdot \lambda/\mu$.

For Models M1, M2 and M3, the relative rate of change in $\mu(t)$, $(1/\mu)(d\mu/dt)$, is shown in Figure 2a for a common initial condition μ_τ . In Figure 2b, the corresponding curves for absolute rate of change $d\mu/dt$ are shown. In Figure 2c, the corresponding curves for relative rate $\mu(t)$ are shown. In addition, the curve for $\mu(t)$ for Model M4 is shown for the case that $\lambda(t)$ follows Model E2, as shown in Figure 1c. (The rates of change as a function of μ for model M4 are not shown in Figures 2a and 2b, because the functional dependence is on λ , not μ .) The formulae for $\mu(t)$ are summarized in Table 1.

5. Combined models. From inspection of (3), the solution for spawner abundance $\mathcal{N}(t)$ requires the integrals of λ and μ . For each entry model and mortality model, the integral is given in Table 1. Note that for mortality model M4, the integral of μ is just a linear function of the integral of λ . Thus, for a given combination of an entry model and a mortality model, the equation for spawner abundance is obtained by subtracting the integral of μ from the integral of λ using the integrals in Table 1, exponentiating the result, and then multiplying by the initial condition \mathcal{N}_τ . The absolute rates of entry and mortality, $\lambda_N(t)$ and $\mu_N(t)$, are then obtained by multiplying $\lambda(t)$ and $\mu(t)$ by

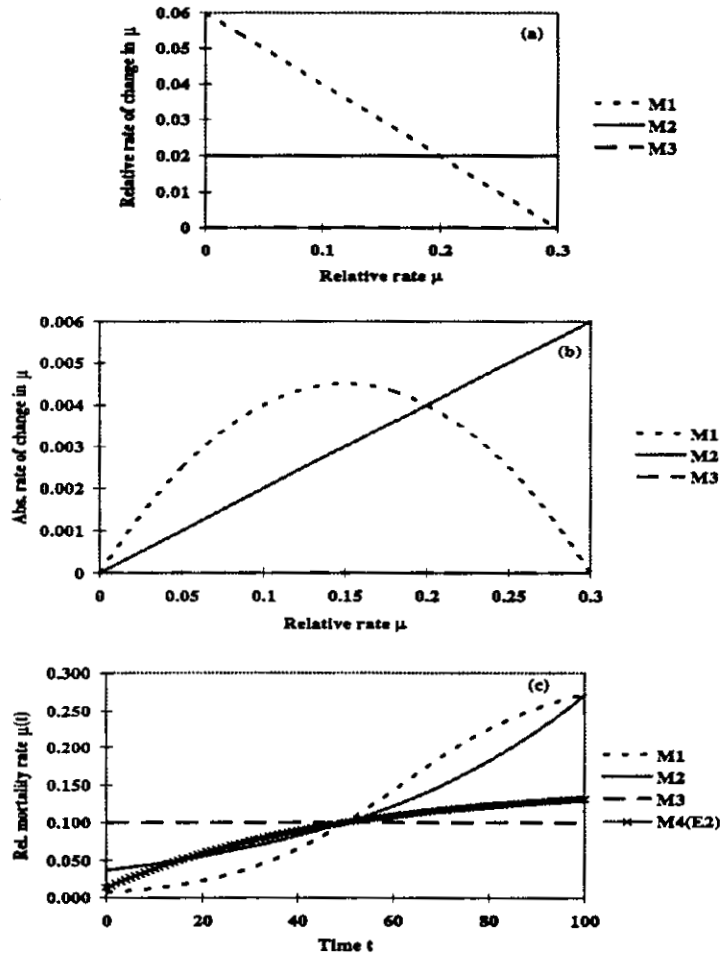


FIGURE 2. Four models for mortality, M1, M2, M3 and M4, showing (a) relative rate of change in μ as a function of μ (for the first three models), (b) corresponding absolute rate of change in μ and (c) corresponding curves for $\mu(t)$ over time t . Model M4 is shown for the case where entry follows Model E2. Parameter values for these graphs are $\tau = 50$ and $\mu_\tau = 0.1$ for all models, $c = 0.06$ and $d = 0.2$ for Model M1 (hence $\mu_\infty = 0.3$), $c = 0.02$ for Model E2, and $c = -0.15$ and $d = -0.5$ for Model M4.

$\mathcal{N}(t)$, as noted in (2). The daily entry and mortality then follow from (4)–(7). Finally, total escapement, total spawner days, and stream life are obtained from (10)–(12).

Without regard to variance and correlation parameters, the total number of parameters for various combinations of entry and mortality models ranges from 4 to 7. There is one absolute abundance parameter \mathcal{N}_τ , one to three entry model parameters, and one to three mortality model parameters. If one of the two models has a single parameter, then the other must have at least two to obtain a valid escapement model. The number of parameters can be reduced by one by appropriate choice of time τ . If $\tau = \tau_*$ (time of maximum abundance), then $\lambda_* = \mu_*$. If $\tau = \tau_1$ (time when abundance is equal to 1 fish), then $\mathcal{N}_1 = 1$.

To illustrate the steps in developing the abundance and rate equations, we develop the equations for two combinations of entry and mortality. The first combined model is E2M2, in which both entry and mortality are exponential functions given in Sections 3 and 4. The number of spawners from (3), (18) and (23) is

$$(26) \quad \mathcal{N}(t) = \mathcal{N}_\tau \exp \left\{ \frac{\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) - \frac{\mu_\tau}{c} (e^{c(t-\tau)} - 1) \right\}.$$

From (2) and (20), the absolute rate of entry is

$$(27) \quad \begin{aligned} \lambda_N(t) &= \lambda(t)\mathcal{N}(t) \\ &= \lambda_\tau \mathcal{N}_\tau \exp \left\{ -a(t-\tau) + \frac{\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) \right. \\ &\quad \left. - \frac{\mu_\tau}{c} (e^{c(t-\tau)} - 1) \right\}, \end{aligned}$$

and the absolute rate of mortality is

$$(28) \quad \begin{aligned} \mu_N(t) &= \mu(t)\mathcal{N}(t) \\ &= \mu_\tau \mathcal{N}_\tau \exp \left\{ c(t-\tau) + \frac{\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) \right. \\ &\quad \left. - \frac{\mu_\tau}{c} (e^{c(t-\tau)} - 1) \right\}. \end{aligned}$$

The second combined model is E2M4, in which both entry and mortality are linked. The spawner curve from (3), (18) and (25) is

$$(29) \quad \begin{aligned} \mathcal{N}(t) &= \mathcal{N}_\tau \exp \left\{ \int_\tau^t \lambda(x) dx - \int_\tau^t (c + d\lambda(x)) dx \right\} \\ &= \mathcal{N}_\tau \exp \left\{ -c(t - \tau) + \frac{(1-d)\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) \right\}, \end{aligned}$$

with absolute rate of entry

$$(30) \quad \lambda_N(t) = \lambda_\tau \mathcal{N}_\tau \exp \left\{ -(a+c)(t-\tau) + \frac{(1-d)\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) \right\}$$

and mortality function

$$(31) \quad \begin{aligned} \mu_N(t) &= \mathcal{N}_\tau (c + d\lambda_\tau e^{-a(t-\tau)}) \\ &\cdot \exp \left\{ -c(t - \tau) + \frac{(1-d)\lambda_\tau}{a} (1 - e^{-a(t-\tau)}) \right\}, \end{aligned}$$

where $-\infty < d < 1$. If $d < 0$, the domain of $\mu_N(t)$ is $t \in (\tau - (1/a) \ln(c/(|d|\lambda_\tau)), \infty)$.

We illustrate the combined models by using the same curves generated in Figures 1 and 2 and show the results for combinations of Model E2 for entry and the four mortality models. Figure 3a depicts spawner abundance $\mathcal{N}(t)$, Figure 3b depicts absolute entry rate $\lambda_N(t)$ and Figure 3c depicts absolute mortality rate $\mu_N(t)$. All combinations are constrained by the condition that $\mathcal{N}(50) = 1000$, where the time of maximum spawner abundance is $\tau_* = 50$. From examination of Figure 2c, it is apparent that Model M3 has the highest early mortality and lowest later mortality, Model M1 has the lowest early mortality and highest later mortality, and the other two models are intermediate. In order for there to be the same number of spawners at τ_* , early spawner abundance for Model M3 must be higher to compensate for the higher mortality. Furthermore the peaks of entry and mortality are earlier for Model M3. The lower late mortality for Model M3 compared to the other models means that spawner abundance is higher in the later period. Similarly, the consequences of the sigmoidal shape for mortality in Model M1 (Figure 2c) are later peaks of entry and mortality and a reduced variance in the distribution of spawner abundance over time.

Also, the magnitude of the peak entry is smaller and the magnitude of the peak mortality is higher for Model M1 compared to the other models.

This illustration is dependent upon the parameters chosen. A wide variety of behavior in peaks and magnitudes can be obtained through different parameter and constraint choices.

6. Stochasticity and error. While the preceding approach is sufficient for describing the expected behavior of salmon entry, mortality and escapement, the variability in these processes is also critical. Process error is certainly present in salmon escapement, as they enter the stream irregularly due to stream conditions, tidal influences, and schooling behavior. Measurement error is also likely to be present because counting of salmon along streams or from the air is likely to be a function of weather and sightability conditions. We first concentrate on the process error component by considering a stochastic process and related least squares estimation approach. We then contrast the process error model with a measurement error model for spawner abundance using a similar least squares approach.

A birth-and-death process. The differential equation setting described in Sections 2–4 lends itself quite naturally to a stochastic process treatment. Bailey [1964, Sections 8.6, 9.3] derives the relevant theory applicable to the above models, where spawner abundance is assumed to follow a nonhomogeneous birth-and-death process where the birth rate is $\lambda(t)$ and the death rate is $\mu(t)$ at time t . The assumptions of this process are:

1. The probability of a fish entering the stream in the time interval $[t, t + \Delta t]$ is $\lambda(t)\mathcal{N}(t)\Delta t + o(\Delta t) = \lambda_N(t)\Delta t + o(\Delta t)$, where $o(\Delta t)$ is a small deviation, such that $o(\Delta t)/\Delta t \rightarrow 0$ as $\Delta t \rightarrow 0$.
2. The probability of a fish dying in the time interval $[t, t + \Delta t]$ is $\mu(t)\mathcal{N}(t)\Delta t + o(\Delta t) = \mu_N(t)\Delta t + o(\Delta t)$.
3. The probability of more than one fish entering or dying in the time interval $[t, t + \Delta t]$ is $o(\Delta t)$.

The simplest form for the probability function uses the spawner curve (3) obtained from the initial condition $\mathcal{N}(\tau_1) = \mathcal{N}_1 = 1$. Denoting N as the random number of spawners in the stream and

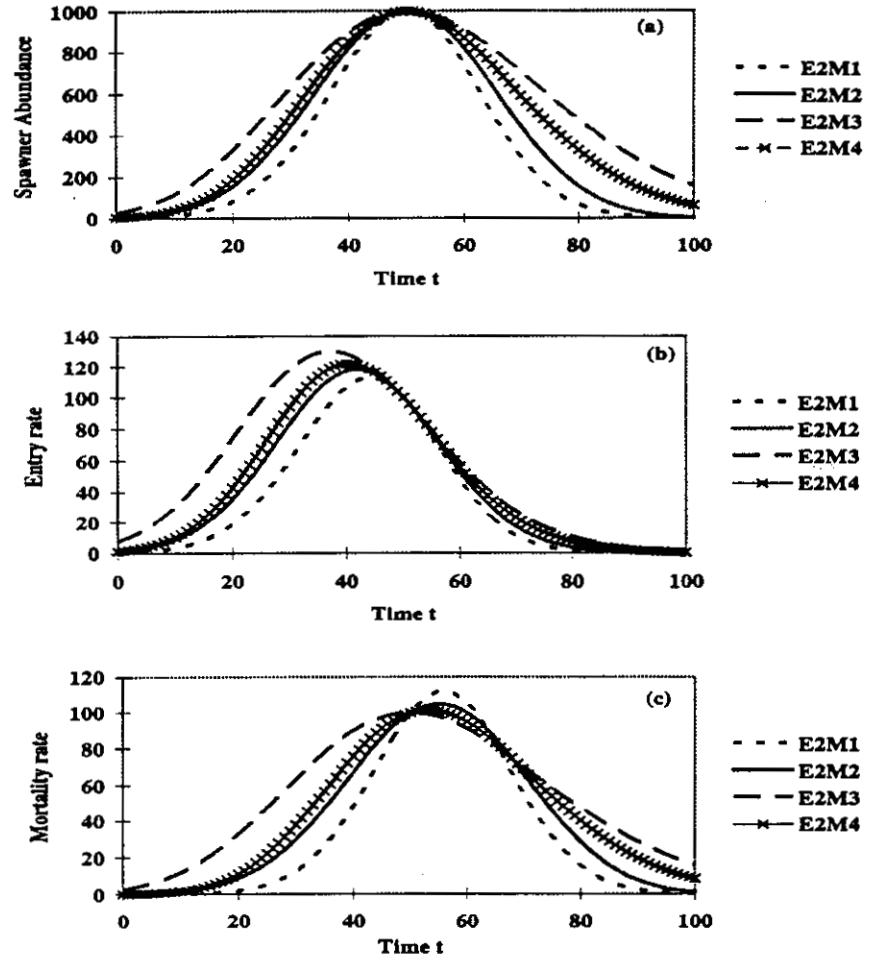


FIGURE 3. Combined entry-mortality models for entry model E2 shown in Figure 1 and the four mortality models shown in Figure 2: E2M1, E2M2, E2M3 and E2M4; (a) spawner abundance $\mathcal{N}(t)$, (b) absolute entry rate $\lambda_N(t) = \lambda(t)\mathcal{N}(t)$, and (c) absolute mortality rate $\mu_N(t) = \mu(t)\mathcal{N}(t)$. Because $\lambda_\tau = \mu_\tau = 0.1$, then $\tau = 50$ corresponds to the time τ_* of maximum spawner abundance \mathcal{N}_* , which has the value 1000.

$p_N(n | t) = P\{N = n | t\}$ as the probability of observing $N = n$ spawners in the stream at time t , we have from Bailey [1964, equation (9.32)]

$$(32) \quad \begin{aligned} p_N(n | t) &= \sum_{j=0}^1 \binom{1}{j} \binom{n-j}{0} \alpha^{1-j} \beta^{n-j} (1-\alpha-\beta)^j \\ &= (1-\alpha)(1-\beta)\beta^{n-1} \\ p_N(0 | t) &= \alpha, \end{aligned}$$

where

$$(33) \quad \begin{aligned} \alpha &= 1 - \frac{1}{e^{\rho(t)} + A(t)} \\ \beta &= 1 - \frac{e^{\rho(t)}}{e^{\rho(t)} + A(t)} \end{aligned}$$

and

$$(34) \quad \begin{aligned} \rho(t) &= \int_{\tau_1}^t [\mu(x) - \lambda(x)] dx \\ A(t) &= \int_{\tau_1}^t \lambda(x) e^{\rho(x)} dx. \end{aligned}$$

The expected number of spawners given t is

$$(35) \quad E[N | t] = \mathcal{N}(t) = e^{-\rho(t)}$$

with variance

$$(36) \quad \begin{aligned} \sigma_N^2(t) &= e^{-2\rho(t)} \int_{\tau_1}^t e^{\rho(x)} [\lambda(x) + \mu(x)] dx \\ &= \mathcal{N}^2(t) \int_{\tau_1}^t \frac{\lambda(x) + \mu(x)}{\mathcal{N}(x)} dx. \end{aligned}$$

The assumptions above specify that the salmon entering the stream and those perishing at time t are independent nonhomogeneous Poisson processes, with parameters $\lambda_N(t)$ and $\mu_N(t)$, respectively. For entry

and mortality we denote E_t and M_t as the random number of fish entering the stream and dying during day t , and we observe $E_t = e_t$ and $M_t = m_t$. From (4) and (5), we expect \mathcal{E}_t salmon entering the stream on day t and \mathcal{M}_t salmon dying so that the Poisson probability functions are

$$(37) \quad \begin{aligned} p_E(e_t | t) &= \frac{\mathcal{E}_t^{e_t} e^{-\mathcal{E}_t}}{e_t!} \\ p_M(m_t | t) &= \frac{\mathcal{M}_t^{m_t} e^{-\mathcal{M}_t}}{m_t!}. \end{aligned}$$

Alternately, given the average number of spawners observed in the stream on day t , \bar{n}_t , the expected number of salmon that entered the stream on that day would be approximately $\bar{n}_t \int_t^{t+1} \lambda(x) dx$ and the expected number of salmon that perished would be $\bar{n}_t \int_t^{t+1} \mu(x) dx$. These values can be substituted for \mathcal{E}_t and \mathcal{M}_t in p_E and p_M in (37), and an interval estimate for the number of salmon entering the stream and dying on a particular day can be computed for a given level of confidence. Here it is assumed that n_t is measured without error.

To demonstrate, consider Model E2M2. Let $\tau_* = 220$ (day of the year), $\mathcal{N}_* = 5000$, $\lambda_* = \mu_* = 0.1$, $a = 0.05$ and $c = 0.005$; these values are illustrative of a possible salmon stream in Alaska. Figure 4 shows the spawner, entry and mortality curves calculated from (26), (4) and (5). The total escapement T from (11) is approximately 17702, and the average stream life of the spawners ℓ from (12) is approximately 9.8 days; these were obtained numerically.

To evaluate $p_N(n | t \in [185, \dots, 260])$ for $n \in [500, \dots, 6000]$, we write $\lambda(t) = \lambda_1 e^{-a(t-\tau_1)}$ and $\mu(t) = \mu_1 e^{c(t-\tau_1)}$, where τ_1 is the day such that $\mathcal{N}(\tau_1) = \mathcal{N}_1 = 1$, then solve for $\tau_1 = 181$, $\mu_1 = 0.0823$ and $\lambda_1 = 0.703$. This corresponding surface as a function of n and t is shown in Figure 5. The bold line on the surface plot corresponds to the maximum probability of n given t . For a given t , $p_N(n | t)$ is geometric for increasing n since α and β are constants. The plot shows that there is a higher probability of high abundance in the middle of the time domain than at the extremes, as expected. Finally, we calculate the standard deviation for the number of spawners from (36) for three values of t : $\sigma_N(220) = 5702$, $\sigma_N(196) = 567$ and $\sigma_N(256) = 569$; the corresponding expected spawner abundances are $\mathcal{N}(220) = 5000$,

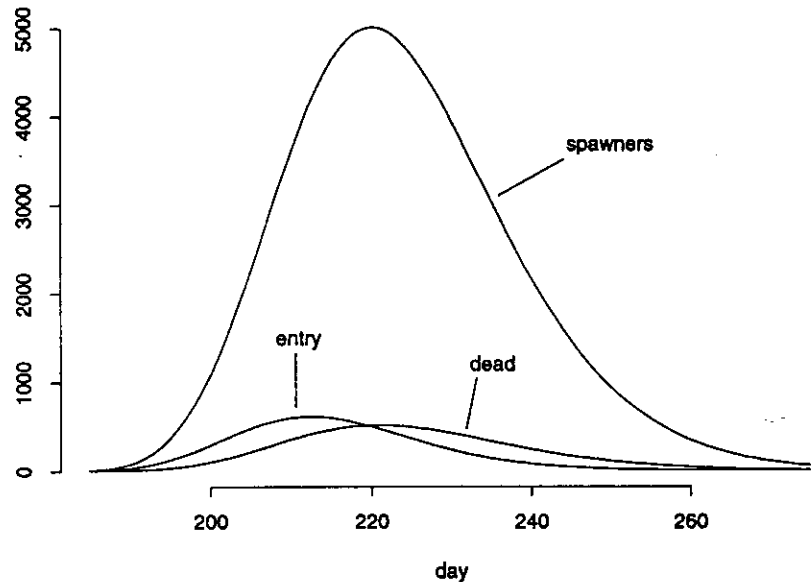


FIGURE 4. Expected spawner abundance, entry and mortality for the model E2M2 with stochastic error and parameter values given by $\tau_* = 220$, $\lambda_* = \mu_* = 0.1$, $a = 0.05$, $c = 0.005$ and $N_* = 5000$.

$\mathcal{N}(196) = 463$ and $\mathcal{N}(256) = 514$. As expected, the standard deviation is higher in the middle of the time domain when spawner abundance is higher.

Least squares-process error. The method of maximum likelihood is a possible criterion for parameter estimation where the joint likelihood is the product of the components (32) and (37). However, the likelihood approach is difficult to use when the data have different levels of precision and accuracy and contain autocorrelation. We, therefore, pursued estimating the parameters using the more flexible least squares criterion while still maintaining the principle of a stochastic process from the last section. It is well known that, for a variable following a Poisson distribution as in the previous section, that a square root transformation results in an approximately normal distribution. We

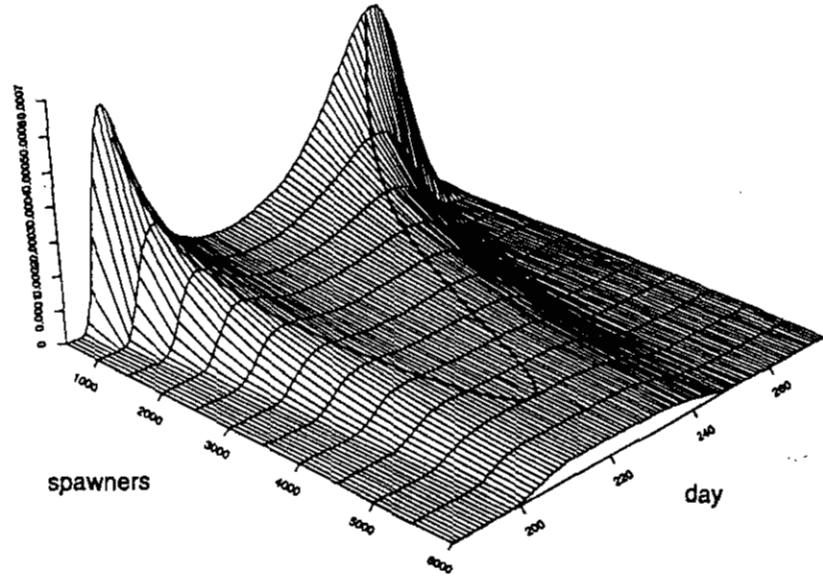


FIGURE 5. Surface plot of the probability $p_N(n | t)$ that spawner abundance N is at the value n given t . The solid line shows the maximum probability for each time t . The model is E2M2 with parameter values given in Figure 4.

found that using the least squares procedure outlined below produces robust estimates.

A model for observed spawner abundance should allow greater variance when spawner abundance is greater. The nonconstant variance in spawner abundance follows directly from inspection of (36). In our model, we account for nonconstant variance by performing the square root transformation. In addition, the series of spawner abundances are likely to be autocorrelated, because spawner abundance is the result of cumulative entry and mortality processes. This can be seen formally by using (2) to obtain

$$(38) \quad \begin{aligned} N(t + \delta t) &\approx N(t) + \lambda_N(t)\delta t - \mu_N(t)\delta t \\ &= N(t)(1 + \lambda(t)\delta t - \mu(t)\delta t), \end{aligned}$$

for some small δt . To account for nonconstant variance and autocorre-

lation, we model observed spawner abundance, n_t , as

$$(39) \quad \begin{aligned} \sqrt{n(t)} &= \sqrt{\mathcal{N}(t)} + \varepsilon_t \\ &= \sqrt{\mathcal{N}(t)} + \phi\varepsilon_{t-1} + \delta_t \\ &= \sqrt{\mathcal{N}_\varepsilon(t)} + \delta_t, \end{aligned}$$

where $\sqrt{\mathcal{N}_\varepsilon(t)} = \sqrt{\mathcal{N}(t)} + \phi\varepsilon_{t-1}$, the ε_t are autocorrelated with $E[\varepsilon_t] = 0$, $\text{Var}(\varepsilon_t) = \sigma_\varepsilon^2$ and $\text{Cov}(\varepsilon_t, \varepsilon_{t-1}) = \phi$, and the δ_t are independent with $E[\delta_t] = 0$ with variance $\text{Var}(\delta_t) = \sigma_\delta^2$.

The relation (38) also demonstrates that entry and mortality are dependent on the number of spawners in the stream at time t . Here we make the process error assumption that variations in observed spawner abundance are real and not a result of measurement error in counting. Then the observed number of spawners n_t is the actual number, and models for entry and mortality will be made condition on n_t . We denote the expected entry and mortality on day t given spawner abundance n as $\mathcal{E}_{t|n}$ and $\mathcal{M}_{t|n}$, respectively. We model the observed entry e_t and mortality m_t by

$$\sqrt{e(t)} = \sqrt{\mathcal{E}_{t|n}} + \gamma_t$$

and

$$(40) \quad \sqrt{m(t)} = \sqrt{\mathcal{M}_{t|n}} + \omega_t,$$

where γ_t and ω_t are independent with expectation zero and variances σ_γ^2 and σ_ω^2 , respectively. Approximations for $\mathcal{E}_{t|n}$ and $\mathcal{M}_{t|n}$ obtained from (6) and (7) are conditioned on observing n_t and n_{t+1} spawners on days t and $t+1$, resulting in

$$\tilde{\mathcal{E}}_{t|n} = \frac{n_t + n_{t+1}}{2} \int_t^{t+1} \lambda(x) dx$$

and

$$(41) \quad \tilde{\mathcal{M}}_{t|n} = \frac{n_t + n_{t+1}}{2} \int_t^{t+1} \mu(x) dx.$$

The entry model, mortality model and reference time τ determine the parameters to be estimated. If τ is chosen to be the time of

maximum spawner abundance τ_* , then the parameterization includes $\tau_*, \lambda_* = \mu_*$ and \mathcal{N}_* . If τ is chosen to be the day τ_1 when spawner abundance \mathcal{N}_1 is 1, then the parameterization includes τ_1, λ_1 and μ_1 . The entry and escapement models contribute additional parameters a, b, c and d depending on model choices. Also, the model includes the autocorrelation parameter ϕ in (39).

Finally, estimates of these parameters are obtained from the least squares criterion that seeks to minimize the weighted sums of squares of errors

$$\begin{aligned}
 SSE(\mathbf{n}, \mathbf{s}, \mathbf{m}) &= SSE_N(\mathbf{n}) + SSE_{E|N}(\mathbf{e}) + SSE_{M|N}(\mathbf{m}) \\
 &= \sum_t \frac{1}{\sigma_\delta^2} [\sqrt{n_t} - \sqrt{\hat{\mathcal{N}}_e(t)}]^2 \\
 (42) \quad &+ \sum_t \frac{1}{\sigma_\gamma^2} [\sqrt{e_t} - \sqrt{\hat{e}_{t|n}}]^2 \\
 &+ \sum_t \frac{1}{\sigma_\omega^2} [\sqrt{m_t} - \sqrt{\hat{\mathcal{M}}_{t|n}}]^2,
 \end{aligned}$$

where the bold notation indicates vectors of observed values and the hat notation indicates replacing the parameters imbedded within (39) and (41) with their estimates.

In classical least squares, the three variances $\{\sigma^2\}$ in (42) are either assumed equal or assumed known. If there is no *a priori* information on the magnitude of the variances, then two approaches are possible. In the first, the three variances are assumed constant, taken out of (42), and the one variance is estimated as the residual mean square. The square root transformation makes the magnitude of the three data sources somewhat comparable, so this approach is not unreasonable. In the second, the method of iterative reweighting can be used to estimate the three variances (Seber and Wild [1989, pages 279–280]). In this approach, initial variances are chosen, and (42) is minimized as a function of the other model parameters, given the variances. The variances are then estimated from the residual mean squares of each data set, and the process is repeated until all estimates have converged.

Least squares–measurement error. An alternative point of view is that variations in spawner abundance counts are due to measurement error.

The presumption here would be that true spawner abundance (as well as entry and mortality) has a smooth dome-shaped pattern like those in Figures 3a and 4. The methods described in the last section still apply, only without the conditionality on observed spawner abundance. Thus, $\mathcal{E}_{t|n}$ and $\mathcal{M}_{t|n}$ in the process error model are replaced with \mathcal{E}_t and \mathcal{M}_t from (4) and (5) (or their approximations \mathcal{E}_t and \mathcal{M}_t from (6) and (7)) in the measurement error model. This is equivalent to using expected spawner abundance in place of observed spawner abundance in those conditional statements. As a fine point, we note that to implement this model, the value $\mathcal{N}(t)$ is placed at the start of the day and interpreted as a discrete measurement at that instant (i.e., \mathcal{N}_t). For entry and mortality, the consequences of interpreting the errors as measurement or process error are rather moot, as further calculations of escapement and stream life would use the smooth curves in any case.

TABLE 2. Summary statistics for various entry-mortality models for measurement error and process error structures. Listed are the number of parameters estimated, the residual degrees of freedom, the total residual sum of squares SSE from (42), the residual mean square MSE, F-test of statistical similarity versus model E2M1, and corresponding P-value. For both error structures, model E2M1 is the most parsimonious.

| <i>Model</i> | <i>Par.</i> | <i>Res. df</i> | <i>SSE</i> | <i>MSE</i> | <i>F</i> | <i>P</i> |
|-------------------------|-------------|----------------|------------|------------|----------|----------|
| Measurement error model | | | | | | |
| E1M1 | 8 | 199 | 4186.0 | 21.04 | | |
| E2M1 | 7 | 200 | 4186.0 | 20.93 | | |
| E2M2 | 6 | 201 | 4322.0 | 21.50 | 6.49 | 0.012 |
| E2M3 | 5 | 202 | 4703.2 | 23.28 | 12.36 | 0.000 |
| E2M4 | 6 | 201 | 4607.5 | 22.92 | 20.14 | 0.000 |
| Process error model | | | | | | |
| E1M1 | 8 | 199 | 4367.9 | 21.95 | | |
| E2M1 | 7 | 200 | 4367.9 | 21.84 | | |
| E2M2 | 6 | 201 | 4625.0 | 23.01 | 11.77 | 0.001 |
| E2M3 | 5 | 202 | 5640.3 | 27.92 | 29.13 | 0.000 |
| E2M4 | 6 | 201 | 5270.7 | 26.22 | 41.34 | 0.000 |

7. **Illustration.** The data used to demonstrate the model were collected by the Alaska Department of Fish and Game in response

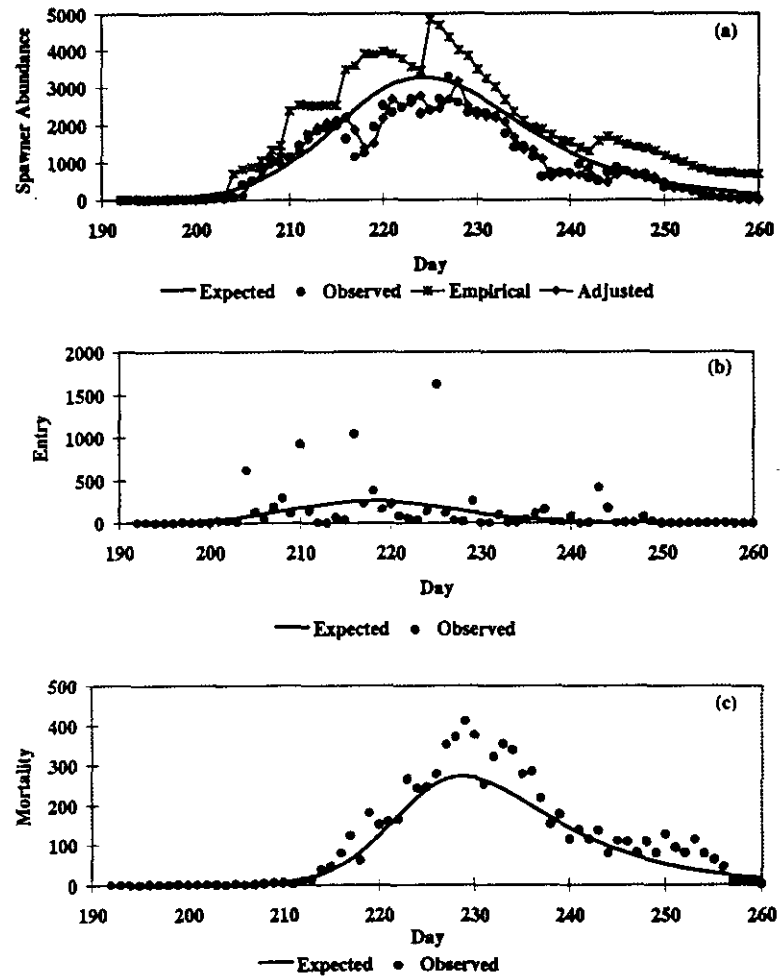


FIGURE 6. Observations and estimates of (a) spawner abundance, (b) entry, and (c) mortality for the most parsimonious model E2M1 with measurement error. "Expected" refers to estimates of the expected value $N(t)$. "Empirical" refers to spawner abundance estimated by adding observed entry and subtracting observed mortality over time. "Adjusted" refers to the estimate of $N_e(t)$, the expected spawner abundance corrected for autocorrelation.

to the 1989 Exxon Valdez oil spill in Alaska's Prince William Sound. Daily counts of spawning salmon (Figure 6a), counts of salmon entering the stream (Figure 6b), and counts of dead salmon (Figure 6c) were made for the 1992 pink salmon spawning season from Totemoff Creek (Sharr and Sharp, [in preparation]). In daily stream surveys, a crew of two individuals walked up a stream counting the number of salmon in the stream independently. The estimated spawner abundance is then the average of the two estimates. On the way back to the mouth of the stream, the crew counted the number of dead carcasses, cut off their tails and pitched them into the woods to prevent double counting. Moreover, a fish weir was built at the mouth of each surveyed stream to enumerate the salmon entering the stream. Note that the observations are highly variable; in particular, there are strong pulses of entry on some days.

Also shown in Figure 6a are empirical estimates of spawning abundance derived from only entry and mortality data. We start with a spawning abundance of 0 salmon at the start of the season and then each succeeding day add in the entry and subtract the mortality, as in (8). It is clear that the data sets are not totally comparable. The empirical counts exceed the spawner counts in the middle of the season and never drop to zero. The pulses of entry are not balanced by mortality and do not correspond with observed spawner counts. One use of our modeling approach is to reconcile these data to the extent possible.

Models were fitted with either the measurement or process error assumption using the parameterization with $\tau = \tau_*$. Estimation occurred in a hierarchical fashion, starting with the most general model E1M1 and working toward more parsimonious models. For model E2M4, we used the constraint $\mu_* = c/(1-d)$ and constrained parameters so that mortality would be positive across the range of observed times. Table 2 shows residual sums of squares and related statistics. For both error structures, models E1M1 and E2M1 had nearly identical sums of squares, so that E2M1 is the more parsimonious model. Other combinations of this entry model with other mortality models (E2M2, E2M3 and E2M4) fitted the data significantly poorer than E2M1 as indicated by an F-test (Table 2). Results for entry model E3 in combination with mortality models were also worse and are not shown. Thus, the most parsimonious model is E2M1.

correlations are obtained by bootstrapping the errors from the original fit 100 times, where the expected number of spawners, salmon entering the stream, and those dying are generated using equations (39) and (41). The standard deviations are small compared to the original estimates, suggesting fairly precise estimates. However, the correlations among some parameter estimates are high, suggesting that several combinations of parameter values could explain the data equally well. The bias estimates (bootstrap mean minus the original estimate) are usually less than half the standard deviations, suggesting that the estimates are fairly accurate.

The area under the entry curve, the estimated escapement from (10), for Model E2M1 with measurement error is 6229, with a bootstrap mean of 6628 and standard deviation of 522. With process error, the area under the smooth entry curve is 5341, with a bootstrap mean of 5204 and standard deviation of 1581. Alternate estimates of escapement for the process error model are the sums of the daily entry and mortality curves, which include the process errors (represented by the jagged lines in Figures 7b and 7c). The sum of the predicted daily entries is 5165, and the sum of the predicted daily mortalities is 7067. Because these predicted values are derived from observed spawner abundances, no longer do they agree as when using the smooth curves. The observed escapement (sum of the observed entry) is 8359, which is higher than the estimated values, because the model does not fully account for the pulses of entry observed in Figure 7b.

Dividing the number of spawner days (the area under the spawner curve from (11)) by the escapement yields an average stream life from (12) of 13.9 days for the measurement error model and 12.1 (smooth), 13.0 (jagged entry), and 8.5 (jagged mortality) for the process error model. For comparison, empirical estimates of stream life can be found by summing observed and empirical spawner abundances and dividing by observed escapement, resulting in 8.2 and 15.0 days, respectively. Empirical spawner abundance is derived from only entry and mortality data, as explained above. It's obvious that the selection of data has a big influence on the estimation of escapement, spawner abundance, and stream life.

8. Discussion. This modeling effort is the first attempt to dissect the escapement counting process into its two components of entry

The measurement error model has a lower sum of squares than the process error model for each entry-mortality combination (Table 2). The differences between the two error structures are illustrated with model E2M1 by plotting estimated spawner abundance, entry and mortality in Figures 6a, 6b and 6c for the measurement error model and in Figures 7a, 7b and 7c for the process error model. For spawner abundance \hat{N}_t and estimated spawner abundance $\hat{N}_{e,t}$ corrected for autocorrelation from (39) are shown. The estimated spawner abundance represents the expected spawner abundance without process error. The corrected spawner abundance is more similar to observed spawner abundance, showing the benefit of including autocorrelation in both the process and measurement error models.

Not only is the total sum of squares lower for the measurement error model, but each component of the sum of squares is also lower than for the process error model. For example, the components $SSE(\mathbf{n})$, $SSE(\mathbf{e})$ and $SSE(\mathbf{m})$ for model E2M1 with measurement error are 726.7, 3239.9 and 219.4, while for model E2M1 with process error, they are 731.1, 3371.0 and 265.8. However, the process error model fits the mortality data much better in the middle of the time range than the measurement error model, because high daily mortalities are a consequence of high corresponding spawner abundances. The measurement error model uses the smoothed dome-shape spawner abundance curve as the basis of entry and mortality calculations, whereas the process error model uses the counts themselves.

The emergence of the process error model as the better error structure, at least in the middle of the time domain, is heartening in that it suggests that the mortality and abundance data are somewhat consistent. All models fitted to these data fail to predict the entry bursts shown in Figures 6b and 7b. Whether this is due to errors in the weir counts or underestimation of spawner abundance and mortality is unknown. The latter is more likely, because unobserved mortality can occur due to predation and scavenging. Perhaps an alternate type of model would have no error in entry data and measurement error in the other components, but this was beyond the scope of this study. Another potential improvement would be to include a calibration coefficient to scale mortality in relation to the other two components.

We use the bootstrap technique of Efron [1982] to estimate bias, variability and correlations of our parameter estimates. Table 3 shows

TABLE 3. Parameter estimates and bootstrap statistics based on 100 repetitions for the E2M1 model: (a) measurement error model, (b) process error model.

| (a) Measurement error model | | | | | | |
|-----------------------------|-----------------|-------------|------------------|--------|--------|----------|
| <i>Parameter</i> | <i>Estimate</i> | <i>Mean</i> | <i>Std. Dev.</i> | | | |
| μ_τ | 0.0661 | 0.0753 | 0.0153 | | | |
| a | 0.0684 | 0.0502 | 0.0169 | | | |
| c | 0.222 | 0.213 | 0.0279 | | | |
| d | 1.85 | 1.73 | 0.312 | | | |
| τ | 224 | 224 | 0.634 | | | |
| N_τ | 3276 | 3054 | 556 | | | |
| ϕ | 0.901 | 0.894 | 0.0894 | | | |
| <i>Correlations</i> | μ_τ | a | c | d | τ | N_τ |
| a | -0.756 | | | | | |
| c | 0.301 | -0.308 | | | | |
| d | -0.358 | 0.293 | 0.641 | | | |
| τ | 0.341 | -0.097 | -0.462 | -0.478 | | |
| N_τ | -0.865 | 0.768 | -0.188 | 0.356 | -0.324 | |
| ϕ | -0.474 | 0.243 | 0.007 | 0.408 | -0.148 | 0.434 |
| (b) Process error model | | | | | | |
| <i>Parameter</i> | <i>Estimate</i> | <i>Mean</i> | <i>Std. Dev.</i> | | | |
| μ_τ | 0.0742 | 0.0843 | 0.0258 | | | |
| a | 0.0593 | 0.0376 | 0.0246 | | | |
| c | 0.214 | 0.191 | 0.0553 | | | |
| d | 1.04 | 0.542 | 0.484 | | | |
| τ | 223 | 224 | 1.07 | | | |
| N_τ | 2805 | 2570 | 837 | | | |
| ϕ | 0.895 | 0.849 | 0.0985 | | | |
| <i>Correlations</i> | μ_τ | a | c | d | τ | N_τ |
| a | -0.463 | | | | | |
| c | 0.205 | -0.285 | | | | |
| d | -0.088 | 0.012 | 0.744 | | | |
| τ | 0.163 | -0.224 | -0.500 | -0.387 | | |
| N_τ | -0.457 | 0.510 | -0.386 | -0.073 | 0.313 | |
| ϕ | 0.057 | -0.150 | 0.483 | 0.219 | -0.501 | -0.594 |

the least squares estimates and estimated correlations for model E2M1 for both error structures. The bootstrap means, standard errors and

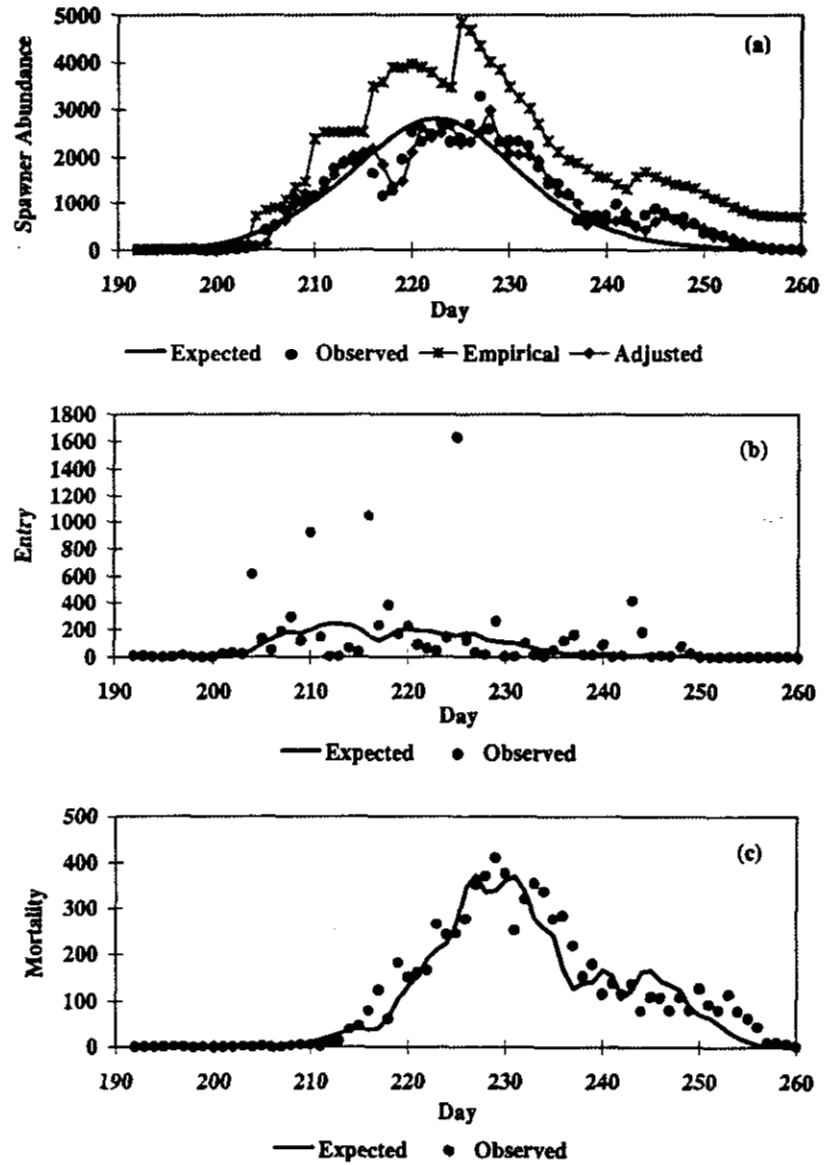


FIGURE 7. Observations and estimates of (a) spawner abundance, (b) entry, and (c) mortality for the most parsimonious model E2M1 with process error. Captions are as in Figure 6.

and mortality. The differential equation setting provides a general framework for describing those underlying processes, and the stochastic process provides a means for describing the variability within each process. A related technique is the run reconstruction method (Schnute and Sibert [1983], Starr and Hilborn [1988], Mundy et al. [1993], Templin et al. [1996]), in which salmon catches and escapement data are used to reconstruct the temporal and spatial abundance of salmon as they return to natal habitats. Various pools of fish are constructed for the catch and the escapement, and fish move into the pools forward or backward in time depending on the specifications of the movement and residence time of fish. Our method provides one means for initializing the run reconstruction, starting at the escapement pool(s) and working backward in time. The results showed that it is possible to estimate the parameters of entry, mortality, and escapement timing and magnitude, as long as sufficient data are available.

The model attempts to reconcile the competing data sources and can be used to highlight contradictory aspects of the data. In our example, it was possible to fit the timing and magnitude of the three data sources, but the model did not fully account for the pulses in the entry data. Comparing observed and empirical spawner abundances in Figure 6a or Figure 7a suggests that entry and mortality data are not consistent. Observed spawner abundance is near 0 at the end of the series, while empirical spawner abundance is still high. This suggests that either entry is overestimated or mortality is underestimated.

In addition, the Poisson assumptions of the stochastic process may not have been strictly satisfied, which would require independent actions by the fish. More likely is that the process of entry is a clustered one, wherein several fish enter the stream at the same time. We partially compensated for this by transforming the data, which allowed for nonconstant variance over time, and by using least squares with autocorrelated errors for estimation, which relaxed the independence assumption.

Further improvements to the estimation algorithm are desirable. Both measurement and process error are likely to occur in the data sources, and a model that allowed for both would be an improvement. A Kalman filter approach might be possible to develop, or the use of the SIR algorithm might be contemplated. More complicated variance patterns also might lead to improved estimates. Although the square root

transformation allows for variation proportional to the mean from the Poisson distribution, this may not fully capture the true variation over time. Using the theory of stochastic differential equations, Lande [1983] and Lande et al. [1985] suggest that demographic and environmental stochasticity should result in variation proportional to abundance and the square of abundance, respectively. The former occurs due to the random nature of entry and mortality processes. The latter occurs due to changes in the entry and mortality processes over time which affect all individuals equally. In our model we accounted only for the demographic component; however, the inclusion of autocorrelation seems to provide a temporal variance pattern in spawner abundance that was similar to that observed.

Our goal in describing the escapement process through differential equation models is to provide a more sophisticated and biologically-based approach for determining total escapement and stream life than the area-under-the-curve approach. To utilize this model to provide baseline information on a particular stream or type of stream, it is obviously necessary to collect data on at least two of the three variables: spawner abundance, entry, and mortality.

Few streams have the amount of data available as did our example. (Had the Exxon Valdez oil spill not occurred, the research that led to these data would not have been conducted.) Nevertheless, we believe our approach can be used to improve the process of escapement determination for Alaska salmon streams. Because groups of streams with similar timing characteristics can be classified (Sam Sharr, ADF&G, personal communication), intense efforts to determine mortality and entry parameters could be made on only a few streams in a group. This information could then be used as auxiliary information or Bayesian priors in fitting spawner abundance data from aerial surveys from the bulk of the streams using the first summation in (42). It is clear that parameter N_s would need to be estimated from each stream. The interesting question to be solved is which other parameters vary from stream to stream; the answer can only come from field activities.

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