Summer Chum Salmon Conservation Initiative

An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region

Supplemental Report No. 1

Revised Estimates of Escapement for Hood Canal and Strait of Juan de Fuca Natural Spawning Summer Chum Salmon Populations

Jeff Haymes
Washington Department of Fish and Wildlife

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Department of Fish and Wildlife
600 Capitol Way North
Olympia, Washington 98501-1091

Introduction

The status of summer chum in the Hood Canal and Strait of Juan de Fuca regions of Washington state became a significant source of concern to both fishery management agencies and the general public in the 1980's, as runsizes experienced precipitous declines. Some streams even experienced complete extirpation of their summer chum spawning populations in this time period. In 1997 the National Marine Fisheries Service (NMFS) Endangered Species Act (ESA) review of chum populations in Washington, Oregon, and California identified the summer chum populations in the Hood Canal and Strait region to be a unique "Evolutionarily Significant Unit" (ESU) (Johnson et al. 1997). This ESU (the Hood Canal summer chum ESU) was given a "Threatened" status listing in 1998 by NMFS due to population trends within the ESU, and other concerns (US Dept. of Commerce 1999).

In response to the summer chum populations trends and pending ESA processes the Washington Department of Fish and Wildlife (WDFW), and the member Tribes of the Point No Point Treaty Council (PNPTC) initiated a program in 1997 to develop a recovery plan for the summer chum populations in the region. A co-manager's summer chum restoration committee was assembled for development of the recovery plan, and proceeded to identify several data analysis needs. One of the identified needs was to re-examine the historical escapement estimations for these populations, and develop a new historical escapement database that applied consistent and well documented analytical techniques to the revised estimates.

WDFW and Washington Treaty Indian Tribes cooperatively conduct annual escapement estimation programs for many Washington salmon populations. The field data collection and analysis methods used to derive the escapement estimates are both species, and region and/or stock-specific. It is assumed that escapement estimates derived for most salmon stocks in more recent years have generally higher precision than those for earlier years because field data collection, survey effort, and data analysis methods have become more standardized, and increased knowledge and experience of the biologists conducting the estimates has resulted in more appropriate and consistent analysis of the annual field census data.

In 1997-98 revised estimates of escapement were derived for the 1968 to 1997 return years, utilizing a uniform group of analytical techniques and assumptions. An ordinal rating of the uncertainty in each estimate was also assigned, based on assessment uncertainties associated with each estimate. The same estimation approaches were subsequently applied to the 1998 summer chum escapement estimates for watersheds in the Hood Canal ESU (and will continue to be used for future years).

Following is a brief review of anadromous salmonid escapement estimation methodologies traditionally used by WDFW, a description of the rating system developed for the revised estimates, a review of the historical survey effort expended for summer chum salmon in the Hood Canal summer chum ESU, and a presentation and discussion of the revised and new estimates for the 1968 to 1998 return years.

Review of Escapement Estimation Methodologies Used for Washington Chum Salmon

Puget Sound salmon escapement census methods have historically included fish and/or redd counts, fishway counts, and carcass or live fish tagging and recovery (Ames 1984). Assessment of spawning escapements for management purposes were most commonly done in the time period prior to the mid-1970s by calculation of "fish/mile" estimates derived from the peak survey counts[1] of live and dead fish in selected surveyed stream reaches (WDF 1964). Estimates of total spawning escapements of naturally spawning salmon to individual Washington streams (based on defensible quantitative methods) were rarely generated prior to the 1970's. The exceptions were for the few streams where weir or fishway count data were available, or when mark-and-recapture escapement estimation studies were performed.

In the late 1970's the "Area-Under the-Curve" (AUC) methodology was adopted for estimating escapements of many Washington pink and chum populations. This method was used by itself in smaller stream basins, or in conjunction with expansion values derived from tagging studies to derive basin-side estimates on some of the larger Puget Sound tributaries, such as the Skagit, Stillaguamish, Snohomish, and Nisqually Rivers. In 1978 Washington Department of Fisheries (WDF – now WDFW) staff reviewed the historical chum survey data collected to date in the Hood Canal and Southern Puget Sound regions, and derived new or revised escapement estimates for most of the major chum bearing stream basins for the time period 1968 to 1977. This process was repeated for the northern Puget Sound region in 1984. AUC has since been used as a primary escapement estimate derivation tool for most Puget Sound chum, pink, sockeye, coho, and chinook populations, where periodic live fish or spawning redd counts are the primary population data available.

The Area-Under-the-Curve (AUC) escapement methodology is based upon the principle that members of a salmon population have an average residence time in the spawning area of the stream between arrival, and post-spawning death that can be used to convert a series instantaneous observations of live fish abundance collected through the spawning season into an estimate of total spawning escapement for the surveyed stream. There are several variants of this method; the WDFW approach is as described here. The point estimates of live fish abundance collected during spawning surveys in a stream reach are plotted on a graph (x-axis = time period, y-axis = number of live fish), and a line is fit through the data points. This line, which describes the assumed or observed instantaneous daily abundance of live fish throughout the run in each surveyed stream reach, is typically fit in a curvilinear form for chums and pinks, because the abundance pattern through the season on the spawning grounds is typically "bell shaped"[2]. During each spawning survey a subjective estimate of the percentage of fish actually present in the survey index visible to the observer(s) is made. Both the actual observed live values, and estimates of the assumed total abundance present at the time of each survey (derived from the percentage visibility values) are plotted. The line is

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[1] Which may or may not reflect the actual peak abundance of fish in the index reach, since annual scheduling of the peak survey was based primarily upon professional judgment, and expectations of previous observed run timing patterns.

[2] A "bell shaped" pattern of live chum abundance on the spawning grounds through the season is typical for Washington chums, unless fishing activities or unusual environmental conditions alter fish entry to the spawning areas, or in-stream mortality rates occurs at an unusual rate (J. Haymes, WDFW Olympia WA, pers. comm.).

fit to "split the difference" between the two values. This approach accounts for the significant water visibility variations that often occur from survey to survey in an index reach over the season, and to insure that estimates of abundance between streams that have somewhat different visibility characteristics through the survey season, and/or between seasons are more comparable.

This method differs somewhat from the approach that Alaska Fish and Game uses for AUC analysis typically fit a straight line from observation point to observation point of live fish abundance, with no subjective interpretation of abundance in-between the points, beyond the assumption that fish abundance changes at a constant rate between the points (Hilborn et al. 1999). WDFW does use the "straight line fit" approach for salmon species that frequently don't show a bell shaped abundance curve in the index reaches (sockeye, coho, chinook, and steelhead); which is assumed to be a result of the more extended run timing and/or stream life of these species.

In all cases (regardless of the line fitting technique used), the two-dimensional surface area between the date axis of the chart and the line is calculated after the line is fit, and the "area" value under the curve (fish x days) is divided by the assumed or measured average survey life (residence time of the fish in the spawning reach of the stream; a 10 day value is typically used for Puget Sound chum stocks) to derive an estimate of season total abundance of spawners in the reach[3]. Figure 1 shows an example of a escapement curve file generated by the WDFW AUC escapement estimation program. More detailed discussions of the AUC methodology can be found in several publications, including Ames (1984), English et al. (1992), and Lady (1996).

The WDFW chum AUC estimation process is currently done using a PC based DOS program written by Jim Packer (WDFW, Olympia WA). The program plots the survey observations from a selected stream reach on a graph. The AUC line is traced through the survey observations by the user with a mouse, and the area described by the curve is calculated.

The precision of the AUC method is dependent upon several general points: 1) the number of survey observations must be adequate enough so the instantaneous abundance of live fish in the census area throughout the spawning season can be effectively modeled by the line drawn through the point observations, 2) stream visibility must be good enough to effectively census the live fish that are present, 3) the actual average residence time between entry to the spawning area of the stream and post-spawning death (survey life) must be similar to the assumed average residence time, and 4) large numbers of fish must not be passing through to spawning areas outside of the survey reach during the census periods.

The most critical subjective decisions required with the AUC estimation method are determination of the "survey life" value to be used, and the process of estimating the instantaneous abundance of live fish through time between the point survey observations. Spawning activity for chums usually initiates soon after river entry in the small, short streams typical of Hood Canal and the Strait. Total residence time in the

[3] Counts of visible spawning redds can be substituted for fish counts, and an estimate of average redd "life" (period of time redd is visible to an observer between construction and when it is no longer discernable as a redd due to substrate changes caused by water flow) substituted for fish residence time to derive an estimate of season total redd abundance from a series of point redd counts.

spawning area before death is typically assumed to average 10 days by WDFW biologists[4]. This assumption is based on stream life data from 4 separate studies of Washington chum populations (Salo and Noble 1952, Svoda and Harrington - Tweit 1983, and unpublished WDF studies in Ames 1984). AUC escapement estimates based upon fixed stream life assumptions have been criticized as having the potential for significant error, given year-to-year and population-to-population variations in stream life can occur (English et. al. 1991, Lady 1994, Perrin et al. 1990). Stream life variations are influenced by inter-annual and inter-stream environmental variation, and genetically controlled inter-population differences. WDFW uses fixed stream life values on the principle that it is not practical to monitor stream life annually for each stream, given human resources and cost considerations, and the expectation that current methods produce estimates that are "good enough for management" (J. Haymes, WDFW Olympia WA, pers. comm.).

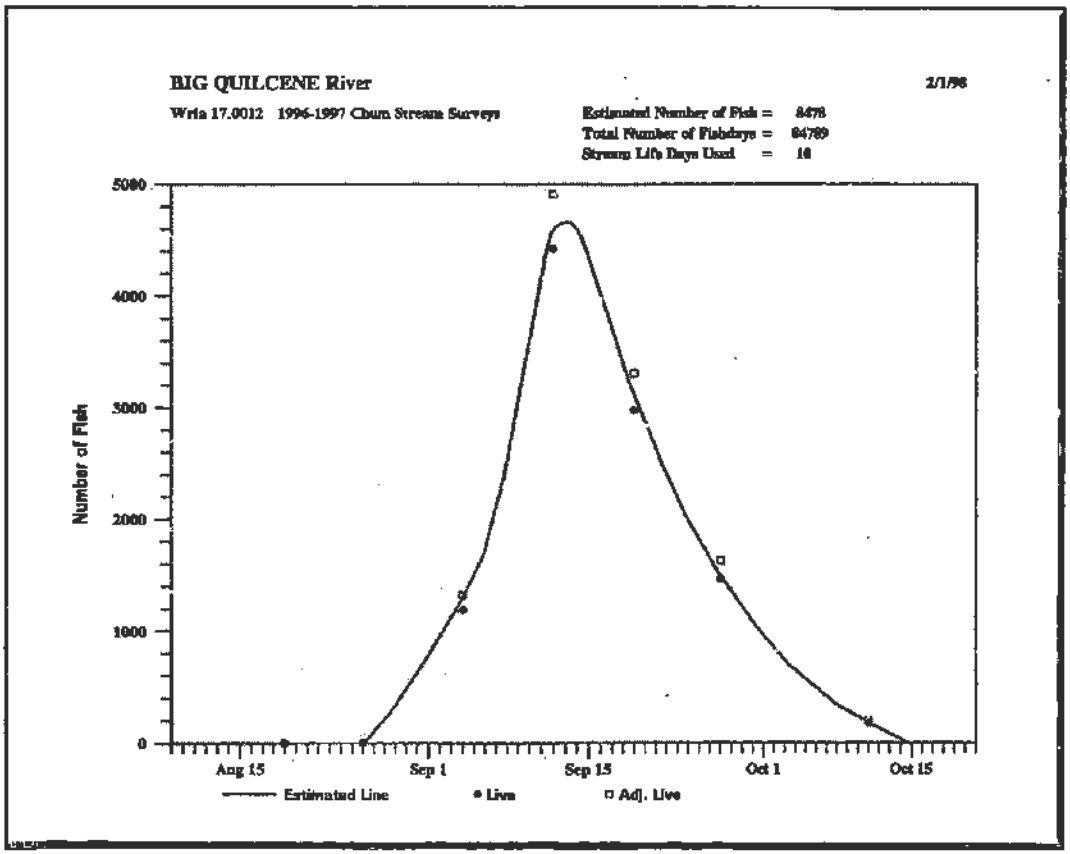

Figure 1. AUC curve example.

[4] In larger streams chums may enter freshwater and hold in the mainstem river sections for up to several weeks before entering the spawning areas. It appears that the residence time in the spawning reaches areas of these larger river basins are still about 10 days, however (Jim Ames, WDFW Olympia WA, pers. comm.).

In some years a stream has only one or two usable survey observations collected during the entire spawning season, or most of the surveys are of poor quality, due to environmental conditions (chronically poor visibility, numerous freshet events, etc.) and/or manpower constraints. Alternative approaches to the standard AUC analysis method are then required for estimating the escapement. One approach is to expand the one point estimate to a estimate of escapement using a mathematical model of expected run timing. This approach requires selecting an historical AUC estimate from the same stream reach, or from a stream that has similar spawning timing characteristics, and using the rate of change values from the "surrogate" AUC line in combination with the one available survey observation to generate a derived AUC curve. The method is described below.

a) Let

N_o = actual number of live fish observed in the one available survey observation
i = number of days before or after the date of the survey observation N_o (i = +/- 1, 2, 3...).
k = number of days since start of surrogate stream AUC curve (k = 1, 2, 3...)
N_k = actual or estimated number of live fish present described by AUC line on day k in surrogate stream reach, and

b) Rate of daily change in live fish abundance for surrogate AUC estimate = $R_i = N_k / (N_{k-1})$

c) Total fish-day estimate for stream with only one survey observation = $F_T = N_0 + \Sigma N_i(i>0) + \Sigma N_i (i<0)$

Where
N_i = Estimated number of fish at each day i before or after date of N_o
$N_i(i>0) = N_i * R_{i+1}$
$N_i(i<0) = N_{i+1}/R_{i+1}$

d) Escapement $= N_T = F_T / L$

Where
L = Assumed average residence life of fish on the spawning grounds (usually 10 days).

Other, related approaches when only one survey observation is available are 1) to visually fit a curve through the single available live fish count, after examining escapement curves derived for other streams from the same or different years, that are thought to be representative of the live fish abundance rate-of-change patterns through time, or 2) expanding the point live count by the "proportion of total escapement value" from a surrogate escapement curve on the same Julian date the point count was collected. All these approaches assume similar spawning timing, and rate of change of abundance through time for both the population being estimated, and the population that provides the surrogate population rate-of-change data. Other approaches used by WDFW staff to estimate escapements when the quantity and/or quality of survey data was insufficient to apply the AUC approach, or if the AUC analysis produced results that seemed incorrect were to 1) use the live + dead value(s) from the available survey(s) as a minimal estimate of escapement, or 2) collect and analyze spawning redd counts. The least desirable approach to deriving an escapement estimate (but which is commonly used when no useful field data is available) is to examine the historical proportion of the escapement of a given stream to that observed in a nearby stream or group of

streams that is assumed to have experienced similar survival and exploitation rate patterns, and use that proportion to derive an estimate for the year(s) survey data is not available.

Serial redd counts are not typically used for escapement estimation of chums, pinks, and sockeye since they are a "mass spawning fish", and individual redds are usually difficult or impossible to identify in areas of high spawning densities. However this approach can be used in some situations when spawning activity in a stream is occurring in a low density pattern due to small runsizes, or where substrate characteristics discourage mass spawning. In these situations the redds are usually separated into discrete units that can be individually enumerated. The newly constructed redds observed on each survey are each marked with a plastic tape "flag" attached to overhanging vegetation adjacent to the redd to identify it has been counted. To estimate the season total escapement the total number of new redds observed for the season are summed, an assumption about the number of redds constructed per female is then derived to estimate the number of females present, then the number of males per female is determined by use of sex ratios based on commercial fishery or weir sampling data, or other information. The redd count method is a useful approach for estimating small escapements because the AUC method appears to perform poorly when runsizes are very small (<50 fish). For example, estimates of escapement in Snow Cr. (WRIA 17.0219) in the mid - 1990's based on redd count observations are (relatively) much higher than live fish count - based AUC estimates (J. Haymes, WDFW Olympia WA, unpublished data). This is probably the result of several factors. Small numbers of fish will have much unoccupied hiding cover available, small census errors with live fish counts are proportionally much more significant than with larger run sizes, and there is a loss of the "smoothing" effect of larger numbers of fish that compensates for unmeasured short term changes in the relative number of fish present through time. The rate of under-counting of live fish in streams with small escapements is probably highly variable from stream to stream, depending on characteristics of the stream (stream size, amount of hiding cover, water visibility, amount of predation activity disturbing the fish, and other factors).

Given there is inter-stream and inter-annual variability in the quality of most salmonid census data collected, and that there are elements of subjectivity in application of the AUC escapement estimation method, it was determined by the members of the WDFW/PNPTC summer chum technical committee that a comprehensive review and revision of the summer chum escapement estimates was needed to provide the highest quality and most precise escapement database for the recovery planning process. An ordinal rating system (Zar 1984) for the relative quality of each individual escapement estimate was developed during the revision process, to provide users of the escapement data with an indicator of the relative quality of each estimate (good, fair, poor, etc...).

Escapement Estimate Rating System

The question frequently arises as to the utility of generating escapement estimates when limited, poor, or no field data is available, as any estimates made in this situation are likely to have a low level of precision and accuracy. However, having at least a "ballpark" estimate of escapement for each major population unit is important for run reconstructions, estimating exploitation rates, and other biological and/or management statistics. Unfortunately there is rarely a "tag" attached to point estimates of catch or abundance that provide an indication the quality of the data, from either a rigorous quantitative standpoint (i.e. standard deviation estimates or some other variance statistic), or a more subjective rating (i.e. good, bad, ugly). The

methodologies used by the authors to derive the Hood Canal summer chum ESU chum escapement estimates do not lend themselves to any (straightforward) quantitative estimates of variance, so a somewhat more subjective ordinal approach was developed, which is described here.

The purpose of the rating system is to provide users of the escapement estimate values with a method of assessing the relative level of uncertainty around the point estimates of annual escapement for each stream basin. The potential degree of variation and uncertainty associated with AUC derived escapement estimates is based upon several factors:

1. Number and temporal spacing of surveys – As discussed earlier, AUC estimates are derived by drawing a line through the live fish counts collected over the season to determine the season total fish*days accumulated during the spawning run. Because the line connecting the point survey observations represents a **subjective** estimate of live fish abundance through time, there is actually a range of estimates possible between the point estimates of abundance. This subjectivity can be somewhat mitigated by having an adequate number of survey observations available to define the changes in live fish abundance throughout the spawning period with no big gaps. For chum populations that typically have a 1-1.5 month period of spawning activity, 4 to 8 surveys spaced 7 to 10 days apart usually provide an adequate number of surveys to effectively document the changes in abundance of live fish in the survey reach through the spawning period.

   Bi-modal or otherwise non-typical fish entry (i.e. non-bell shaped") abundance patterns on the spawning grounds need a higher density of surveys to adequately capture changes in abundance through time. Irregular fish entry patterns to the stream may created by environmental conditions, such as a period of abnormally warm or cold water, or commercial fishery removals that exploit the return at a differential rate over time.

2. Fish visibility - As water visibility declines due to turbidity and/or flow increases, ambiguity regarding the census accuracy increases. This is especially critical during the pre-peak spawning period, when a much larger percentage of the fish are likely to be in deeper holding areas of the stream, and therefore hard to see in less-than-optimal visibility conditions.

3. Survey (stream) life - This value is critical for accurate conversion of the area under the curve value (fish * days) to an estimate of actual escapement for the entire spawning period. As discussed earlier, **average** residence time of chums in spawning areas between arrival and death in the Puget Sound region has been observed to be 10 days.

   Unusual variations in average stream life from the "average" can sometimes be identified by obviously unrealistic results from the AUC estimation process, such as when a total escapement estimate for the stream basin, derived with apparently adequate survey data is less than the highest live + dead count. In this situation the estimate usually is defaulted to the peak live + dead count as a minimal estimate of escapement, and it generally needs to be considered of fair or poor quality. In general, a live + dead count to close to or exceeding the total AUC estimate indicates 1) the stream life of the run was apparently of very short duration because fish access was restricted by flow or a temporary barrier that prevented fish from entering the spawning reach until the last moment, and/or 2) the stream retained

carcasses very effectively because it was small and / or didn't experience any high flows during the spawning period (in which case the AUC estimate may be similar to the peak dead count if the majority of the spawning occurred in a short time frame, and the dead fish weren't flushed out or scavenged).

4. Differential effectiveness of surveyors counting fish – Each surveyor tends to have differing abilities/skills enumerating fish, which will affect accuracy of escapement estimates (Jones III et al, 1998). The rate of undercounting will typically increase with increasing densities of fish (Dangel and Jones, 1988 *In* Jones III et al. 1998). The counting errors will be different from survey to survey and stream to stream due to varying environmental conditions and habitat characteristics of each stream, and there is a learning characteristic to the observation efficiency of each surveyor (J. Haymes, WDFW Olympia WA, pers. comm.). WDFW attempts to use the same surveyors on a given stream reach throughout the season, and even from year to year if possible, to maximize observer consistency.

The design of the Puget Sound chum escapement estimation program is intended to encourage precision (consistency of the estimates over time) by using standardized field data collection and data analysis techniques. However, accuracy (nearness of the estimates to the actual escapements) is a much more problematic target, since assumptions usually have to be made during analysis of the field data to account for variables that are not regularly measured due to technical and/or economic limitations. To have consistently accurate escapement estimates using the AUC method: 1) the stream life value would have to be measured for each stream and year instead of using a fixed average value, to capture significant variations in this value that may occur for certain streams and years, 2) the fish count data would have to be free of point and systematic errors, and 3) the survey counts would have to be done often enough on each stream to capture all or most of significant variations in live fish abundance during the spawning period. Of course, in the real world none of these assumptions are met due to practical limitations in field data collection for a large geographic area. As discussed earlier, the WDFW anadromous salmonid escapement estimation program goal (in most situations) is to produce estimates "good enough for management". Where specific research demands higher levels of accuracy, more intensive data collection and analysis approaches are used (J. Haymes, WDFW Olympia WA, pers. comm.).

The escapement rating categories for the escapement estimates summarized in this report attempt to identify where there is the potential for significant variation from the point escapement estimate, with the higher uncertainty ratings generally related to increasing uncertainty about the AUC line fit to the point estimates of live fish abundance. The variation ranges categorized in the rating descriptions below are rough guidelines only. They are based upon sample data manipulations that probed the range of (practical) alternative AUC line fits to survey data sets, and/or professional judgment regarding inconsistencies in the survey observations. The ratings are not intended for comparison of the precision of the estimates between years, or to define the accuracy of the estimates. Given these factors, the rating system is based upon ordinal scale, each rating category representing a range of uncertainty. The rating categories are: 1) Poor – High potential variation in estimate (up to +/- 100 % or more), 2) Fair - Considerable uncertainty exists in the estimate, depending on interpretation of the available data. There may be a +/- 30-50 % (or more) range in the possible estimates based on alternative interpretation of the data, 3) Good – Only a moderately low level of potential variation is possible in the estimate (+/- 10-30 % variation), and 4) Very good - A very low level of potential variation is implied, due to a low range (< +/- 10 %) of possible variation of the AUC line fit.

For streams where estimates were derived for separate reaches within the stream basin the escapement ratings for the total stream escapement estimate are a combination of the ratings of the estimate for each stream reach, with the ranking from the stream section with the highest spawning activity given the most weight in the rating for the overall escapement rating for the stream. Following is a description of the criteria used to assign the quality ranking values for the revised Hood Canal and Strait of Juan de Fuca summer chum escapement estimates.

Poor rating - This rating applies to any estimate based on only one or two field surveys. Estimates of this type are usually based on a curve model expansion of a single usable survey, subjective hand fitting of a curve through the single data point, or use of the live + dead count from the one or two available surveys as a minimal estimate of escapement. In these situations any estimate is going to be largely theoretical.

Estimates rated "poor" represent (at best) "educated guesses" of escapement, with large (up to 100 % +) variations in potential variation from the point estimate.

Fair rating - Typically, these are situations with only two to three field survey observations during the period of significant spawning activity. Also, survey timing or visibility problems may have reduced the usefulness of the available observations. Two surveys can provide a fair quality AUC based estimate of escapement if both surveys occur near the apparent peak of significant spawning activity, and if they provide a reasonably clear picture of the temporal and spatial distribution of the peak spawning period. Educated guesses still need to be made about the starting and ending periods of the curve, but potential variability in these areas of the curve has a much lower influence on the total estimate than abundance ambiguities during the peak period of spawning.

Fair estimates have a +/- 30-50 % potential variation from the point estimate. The potential variation can become quite extreme when only two or three survey observations are available for the season, and there are large temporal gaps in the surveys. If two observations occurred during the major spawning period, an estimate that is probably "somewhere in the ballpark" of the actual escapement can be derived by constructing the AUC curve with application of knowledge about the average starting, peak, and completion of spawning activity for the stream. However, this is a largely subjective process. Even estimates derived from 5 or 6 survey observations can have a high potential variation in the AUC line fit if the peak period of spawning activity was missed by the surveyors due to high stream flow, chronically poor visibility and/or survey staffing problems. The uncertainty components in the field survey observations that lead to "fair" or "poor" ratings for estimates are typically: 1) less than optimal visibility, 2) irregular nature to observation(s) such as a survey observation that doesn't fit into the ascending or descending abundance pattern of the surveys before and after the observation in question, and/or 3) longer-than-desirable temporal spacing between two or more of the observations.

Good rating – Chum AUC estimates that have low potential variation are usually based on three or more survey observations collected during the period of significant spawning activity, with the surveys close enough together (typically 10 days apart or less apart) to remove any major ambiguities about live fish abundance through time. In addition, one or more of the surveys should be at or near the peak of spawning activity to provide a reference for amplitude and timing of the peak spawning abundance period. This can be indicated by a dead : live ratio between 0.5 and 1.0. This typically indicates spawning is well advanced

towards the peak period of activity, but has not yet passed the peak spawning period[5]. There should be survey observations available near the beginning and end of the spawning activity period to define initiation and completion date periods, and abundance during these periods.

Enough ambiguity will still exit in the survey data that +/- 10-30 % variations in the estimate from the point estimate will be possible given the potential range of alternative interpretations of the data.

Very Good rating – Estimates with this rating are based on: 1) four or more field surveys that are distributed through the entire spawning period , 2) the surveys capture the points in the run close to the starting, peak, and ending portions of the spawning period, the 3) surveys are all generally at or < 10 days apart, and two or more surveys occur at or very close to the peak spawning period to clearly define the peak abundance period of live fish both in amplitude and through time. A very low level of potential variation is implied, with less than +/- 10 % from the point estimate possible.

Historical Monitoring of Hood Canal and Strait of Juan De Fuca Summer Chum Escapements

The first quantitative observations of summer chum spawning abundance recorded in the WDFW spawning survey database were collected in 1943 (J. Haymes, WDFW Olympia WA, pers. comm.). Early observation records (1943-47) were confined to the Dosewallips, Duckabush, and Hamma Hamma Rivers. Information in the database for these observations is mostly limited to summaries of the total number of live and dead fish observed in the survey reach, river mile reach surveyed, and the date of observation. There were no Hood Canal or Strait summer chum stream observations recorded for the time period 1948 to 1950. In 1951 an "index reach" survey system was developed by WDF to monitor stream escapements of salmon in each region of Washington on an annual basis (Egan 1982), and the scope of survey effort was expanded through the early 1950's time period to meet the objectives of this program. The index reaches encompassed (somewhat) fixed sections of selected streams. One to three surveys were typically conducted annually on each index reach. It is assumed that the selection of streams surveyed, sections surveyed, and timing of the survey(s) were based on review of available information and professional judgment that the survey reaches were representative of the spawning escapements of one or more salmon species to each geographic region of the state.

The Boldt Decision in 1974 prompted the former Washington Department of Fisheries (WDF) and Washington Department of Game (WDG) to revise many of their salmon and steelhead escapement estimation techniques in the mid-1970s, due to the need for more accurate and/or precise estimates of salmon escapements to meet new fishery management objectives and obligations. Consequently, survey effort was greatly increased in this time period. Many Treaty Indian tribes also developed or expanded fishery management programs in this time period and began to participate more extensively in spawning

[5] However, using the ratio of live to dead from survey data to assess the proportion of the spawning run completed is difficult with summer chums, because the carcasses seem to be rapidly removed by wildlife scavenging activity on most streams. It is rare to have a summer chum survey where the dead counts exceed the live counts after the peak of spawning activity, unlike what is commonly observed during fall chum run surveys.

survey efforts. Also, in this time period a standardized alphanumeric information coding system was developed for summarizing environmental conditions and other observations observed during field surveys (Table 1, Appendix 16), provide identification codes for each of the agencies conducing the surveys (Table 2, Appendix 16), and provide a numerical code for each species (Table 3, Appendix 16) (R. Egan, WDFW Olympia WA, pers. comm.).

Figure 2 summarizes the historical reported annual chum spawning survey effort for summer chum streams in the Hood Canal ESU that have received dedicated, long-term annual summer chum survey effort for the time period 1945-98. These are Anderson Cr., Dewatto Cr., Tahuya R., Union R., Hamma Hamma R., Duckabush R., Dosewallips R., Big Quilcene R., Little Quilcene R., Snow Cr., Salmon Cr., and JimmyComeLately Cr. Only surveys conducted in the annual time period Aug. 1 to Oct. 31 are included. In general live fish counted after ~ Oct. 20 are very likely to be early returning fall chum salmon, and not used in the summer chum escapement estimates. Survey information for late October is included in the field data summary tables and charts because it is a transitional period in the streams from summer to fall chum stock entry. Table A (Appendix 16) summarizes all historical chum survey data present in the WDFW survey database for streams in the Hood Canal and eastern Strait of Juan de Fuca regions (WRIA 15 > 15.0369, WRIAs 16-18), again for the time period Aug. 1 – Oct. 31[6].

Summary of Revised Escapement Estimates for Hood Canal and Strait of Juan De Fuca Wild Summer Chum Populations

Figure 3 summarizes the annual aggregate natural spawning summer chum escapement estimates for the Hood Canal and Strait of Juan de Fuca regions for 1974-1998 (the 1968-1973 time period is omitted because of the limited number of individual stream escapement estimates available in this time period). Table 1 summarizes the revised natural spawning escapement estimates for each of the summer run chum populations in Hood Canal and the Strait of Juan de Fuca that were/are monitored at a sufficient level to derive escapement estimates, for the period 1968-1998 (Anderson Cr., Dewatto Cr., Tahuya R., Union R., Hamma Hamma R., Duckabush R., Dosewallips R., Big Quilcene R., Little Quilcene R., Snow Cr., Salmon Cr., and JimmyComeLately Cr.). The methods used (AUC, weir counts, etc.), and the uncertainty rating for each estimate are also summarized in this table. Detailed descriptions of the methodologies and results of the escapement estimation process for the annual estimates for each stream in the Hood Canal chum ESU,

[6] It is important to note that the survey summary in Appendix 16 Table 3 is not representative of all the historical spawning survey effort expended in the Hood Canal and Strait of Juan de Fuca region during the summer chum spawning period. Regularly repeated surveys were conducted for other species in the August 1 – Oct. 31 time period on many streams within the Hood Canal ESU, but survey cards reporting the absence of chum were/are typically only filled out by surveyors when doing dedicated chum indices. For example, on the mainstem/South Fork Skokomish River (WRIA 16.0001) there were 301 chinook surveys reported during the August - Oct. 31 time period between 1952-99, but only 45 surveys for chum were officially reported, the majority of which were incidental observations of live and/or dead chum concurrent to the directed chinook surveys, or where the surveyor submitted a "zero count" card for chums (i.e. there were 301 - 43 = 358 surveys that could be considered chum surveys that observed no fish, but were not reported as chum surveys in the WDFW database).

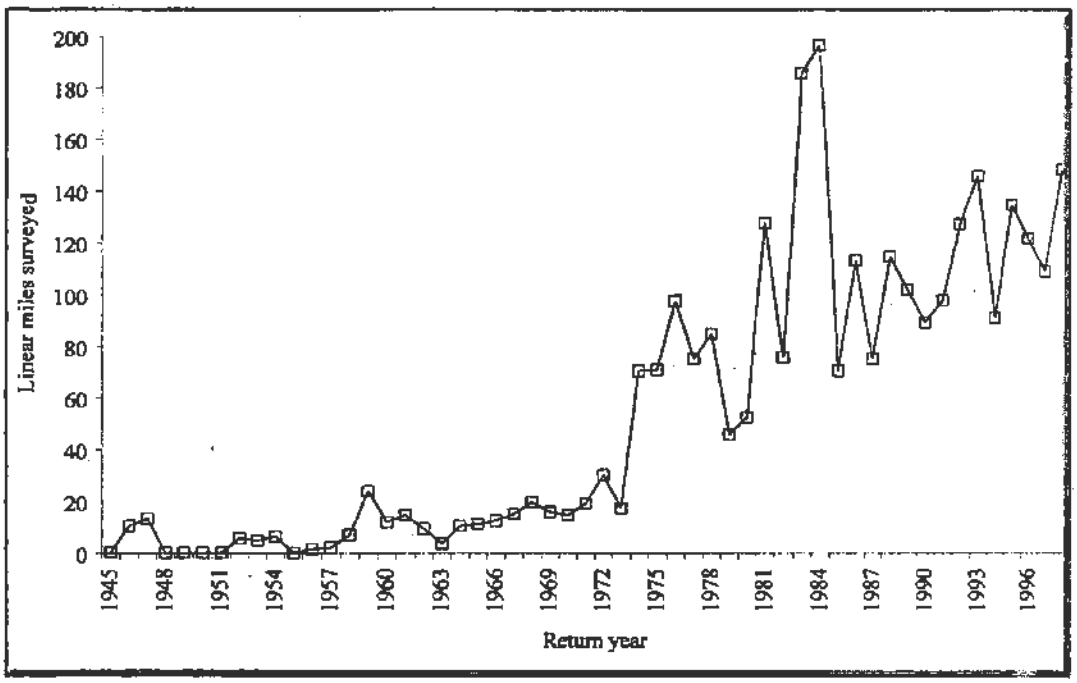

Figure 2. Annual reported distance surveyed on Hood Canal and Strait of Juan de Fuca summer chum streams 1945-98.

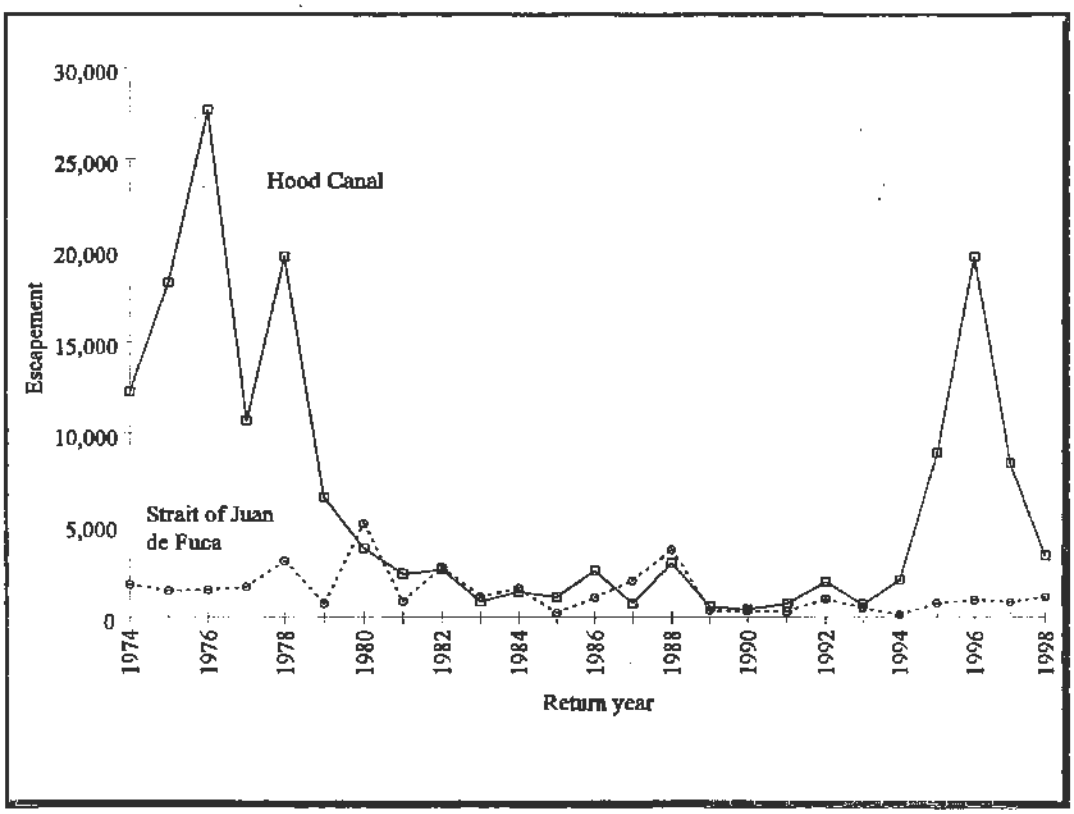

Figure 3. Hood Canal and Strait of Juan de Fuca summer chum spawning escapements 1974-98.

and summary tables of the annual survey records are presented in Appendix sections 1-15[7]. Definitions for the numerical codes that describe environmental conditions and other observations collected during the field surveys are presented in Table 1 Appendix 16, the codes for the agencies that collected the observations are in Table 2 Appendix 16, and definitions of the species codes are in Table 3 Appendix 16.

In summary, a period of relatively large escapements in the Hood Canal region in the mid - 1970's was followed by a period of very poor escapements in the 1980's, a recent rebound in the 1995-96 period, and then a decline in the 1997-98 period. Unfortunately during the mid-1980's period the populations in several east shore Hood Canal tributaries become extirpated (Anderson Cr., Dewatto R., Big Beef Cr., and Tahuya R.). Since this time period the majority of the total escapement for the Hood Canal region has occurred only in the west shore Hood Canal streams, with small to moderate numbers in the Union R. (100-300 fish). The Strait of Juan de Fuca streams have experienced relatively stable escapements overall. However, individual streams in this region, particularly Snow and Jimmy-Come-Lately Cr. have periodically experienced extremely low escapements through this time period (< 100 fish).

For a longer term (mid-1900s to present) perspective on escapements to the Hood Canal region, Figure 4 summarizes the annual peak summer chum count (mid - September to mid - October period) for three selected Hood Canal streams that had adequate numbers of historical survey observations to facilitate a long term trend analysis (Dewatto, Hamma Hamma, and Duckabush Rivers). The peak counts are not directly comparable to each other because each observation may or may not represent the absolute peak abundance for the year. Also, these values should not be rigorously compared to AUC estimates of total abundance for the years 1974 to present, because the peak counts generally represent less than the total escapement to the stream. However, these observations do provide some indication on the relative abundance of summer chums over a longer time frame than the period formal escapement estimates have been derived.

[7] Due to space limitations in this report the AUC estimate plots are not included in this report. Electronic and paper copies of the AUC plots are on file at the Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia WA. 98501.

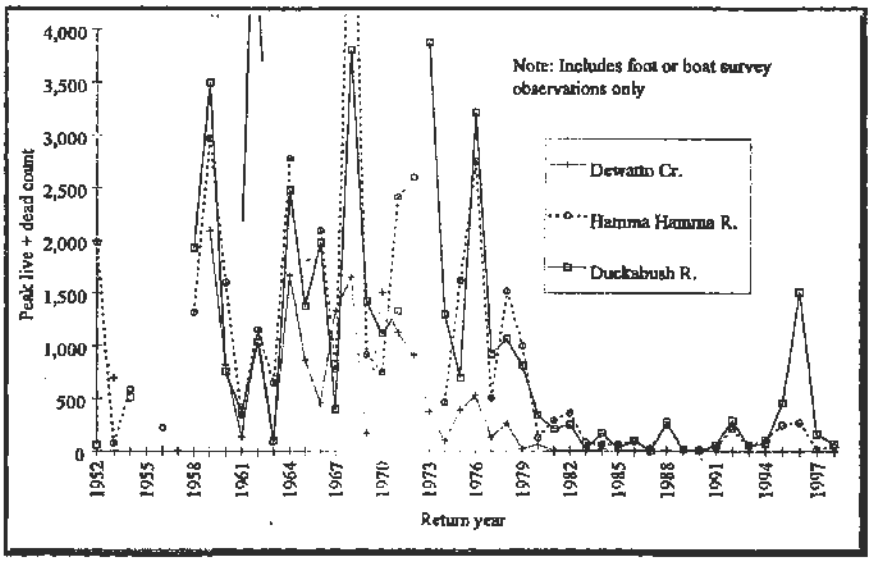

Figure 4. Peak live + lead counts of summer chum in Dewatto Cr. (WRIA 15.0420), Hamma Hamma R. (WRIA 16.0251), and Duckabush R. (WRIA 16.0351), 1952-98.

Summer Chum Presence in Other Streams in the ESU

Summer chum have been observed in several other streams in the ESU, generally sporadically and in small numbers. These observations were typically made during surveys targeted at other salmonid species. Most of these observations are likely the result of straying fish from other river systems, as suggested by t sporadic nature to the observations, and the small numbers of fish that were typically observed. However, review of historical records did lead to the addition of three streams to the list of watersheds in the ESU that appear to have contained substantial summer chum populations historically and/or currently. These are the Dungeness R., Skokomish R., and Finch Cr. Insufficient data exists, however to determine historical abundance in these watersheds in detail.

The Dungeness River had sufficient observations of chum in the September/October time period to suggest that a self-sustaining population is present in the river. There are 70 historical survey observations of chum in the Dungeness R. in the annual time period Aug. 1 – Oct. 31 in the WDFW survey database (Table 4, Appendix 16). The Skokomish River historically had a summer chum run present in some years, as indicated by historical in-river commercial fishery catch data, and spawning ground data. The most significant spawning ground observation was 233 summer chum on Sept. 20, 1976 (Table 4, Appendix 16). Given 1) there are only a limited number of survey observations of summer chum in this river basin, and 2) there were a fair number of chinook surveys conducted annually in the watershed during the typical summer chum spawning period that would have noted the presence of summer chums, the runsizes generally were likely typically small in the recent historical time period (1960's-present). Finch Cr. historically had returns of up to several hundred summer chum in the 1950's/60's time period, as indicated by summer chum capture data at the Finch Cr. (Hoodsport) hatchery rack (Tynan and Ames 1997). Both the Skokomish and Finch Cr. stocks are considered currently extirpated.

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...e 1: Hood Canal and Strait of Juan de Fuca wild summer chum escapement esti... ...s

	Return year							
	1968	1969	1970	1971	1972	1973	1974	1975
Big Beef Cr.	100	100	178	159	177	244	75	1,152
Method	Weir	Weir	Weir	Weir	Weir	Weir	Weir	Weir
Rating	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood
Anderson Cr.	N/A	N/A	65	125	225	N/A	0	195
Method	N/A	N/A	AUC	Curve model	Curve model	N/A	Live+dead	AUC
Rating	N/A	N/A	Fair	Poor	Poor	N/A	Fair	Fair
Dewatto R.	2,275	280	2,666	2,012	1,403	691	181	613
Method	AUC	Curve model	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Fair	Poor	Fair	Fair	Fair	Fair	Fair/Good	Fair
Tahuya R.	N/A	N/A	N/A	N/A	4,487	N/A	880	1,389
Method	N/A	N/A	N/A	N/A	Curve model	N/A	AUC	AUC
Rating	N/A	N/A	N/A	N/A	Poor	N/A	Fair	Good
Union R.	N/A	N/A	N/A	N/A	N/A	N/A	68	84
Method	N/A	N/A	N/A	N/A	N/A	N/A	AUC	Avg. 1974, 76 esc.
Rating	N/A	N/A	N/A	N/A	N/A	N/A	Fair	Poor
Lilliwaup R.	N/A	N/A	N/A	318	716	N/A	616	706
Method	N/A	N/A	N/A	Live+dead	Curve model	N/A	L+D & exp.	AUC
Rating	N/A	N/A	N/A	Poor	Poor	N/A	Poor	Good
amma Hamma R.	13,239	2,919	1,390	4,282	5,346	N/A	2,448	7,341
Method	Curve model	AUC	Curve model	Curve model	Curve model	N/A	AUC+expansion	AUC+expansion
Rating	Poor	Fair	Poor	Poor	Poor	N/A	Fair/Poor	Fair/Poor
John's Cr.	309	185	N/A	N/A	N/A	N/A	N/A	N/A
Method	Live+dead	AUC	N/A	N/A	N/A	N/A	N/A	N/A
Rating	Poor	Fair	N/A	N/A	N/A	N/A	N/A	N/A
Duckabush R.	4,693	3,871	2,301	3,904	13,546	5,761	3,581	2,245
Method	Curve model	AUC+supp L&D	Curve model	AUC	AUC	Curve model	AUC	AUC
Rating	Poor	Poor	Poor	Poor	Fair	Poor	Fair	Fair
Dosewallips R.	N/A	N/A	N/A	N/A	1,733	623	3,593	2,250
Method	N/A	N/A	N/A	N/A	AUC	Live+dead	Regression	Regression
Rating	N/A	N/A	N/A	N/A	Poor	Poor	Poor	Poor
Big Quilcene R.	5,797	1,307	655	1,798	2,067	3,107	795	1,405
Method	Curve model	Curve model	Curve model	Curve model	AUC	Curve model	AUC	AUC
Rating	Poor	Poor	Poor	Poor	Good	Poor	Fair	VGood
Little Quilcene R.	897	N/A	12	71	300	238	44	868
Method	AUC	N/A	Curve model	Curve model	AUC+expansion	Curve model+exp	Live+dead	AUC+expansion
Rating	Fair	N/A	Poor	Poor	Fair/Poor	Poor	Poor	Fair/Poor
Snow Cr.	N/A	N/A	N/A	N/A	436	N/A	818	327
Method	N/A	N/A	N/A	N/A	AUC+exp	N/A	AUC	Live+dead
Rating	N/A	N/A	N/A	N/A	Poor	N/A	Fair	Poor
Salmon Cr.	N/A	N/A	N/A	249	534	636	512	755
Method	N/A	N/A	N/A	Live+dead/expan.	AUC/curve model	Live+dead/expan.	AUC+expansion	AUC+Other
Rating	N/A	N/A	N/A	Poor	Fair	Poor	Fair/Poor	Fair/Poor
JimmyComeLately	N/A	N/A	N/A	N/A	N/A	N/A	438	348
Method	N/A	N/A	N/A	N/A	N/A	N/A	Regression	Regression
Rating	N/A	N/A	N/A	N/A	N/A	N/A	Poor	Poor

Table 1: Hood Canal and Strait of Juan de Fuca wild summer chum escapement estimates (continued)

	Return year							
	1976	1977	1978	1979	1980	1981	1982	1983
Big Beef Cr.	1,281	302	680	191	123	90	0	0
Method	Weir	Weir	Weir	Weir	Weir	Weir	Weir	Weir
Rating	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood
Anderson Cr.	234	26	16	6	2	1	0	0
Method	AUC	Regression	Live+dead	Live+dead	Live+dead	Live+dead	Regression	Live+dead
Rating	Fair	Poor	Poor	Poor	Poor	Good	Poor	Fair
Dewatto R.	741	225	544	49	117	41	21	15
Method	AUC	AUC+supp. L&D	AUC	Live+dead	AUC	AUC	Live+dead	AUC
Rating	Fair	Fair	Fair	Poor	Fair/Good	Good	Fair	Fair
Tahuya R.	3,200	726	266	117	178	140	86	86
Method	AUC	AUC	Curve model	AUC	AUC	Live+dead	AUC	AUC
Rating	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Good
Union R.	100	75	35	90	208	41	153	170
Method	AUC	AUC	Curve model	Avg. 1977, 78, 80, 81	AUC	Live+dead	Avg. 1980, 81, 83, 84	AUC+supp L&D
Rating	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Good
Lilliwaup R.	1,612	420	1,331	163	247	293	84	18
Method	Curve model	AUC	AUC	Curve model	AUC	AUC	AUC	Live+dead
Rating	Poor	Poor	Good	Poor	Good	Fair	Good	Poor
amma Hamma R.	7,648	1,649	8,135	3,052	329	677	790	184
Method	AUC+expansion	AUC+expansion	AUC+expansion	AUC+expansion	AUC	AUC	AUC	AUC
Rating	Fair/Poor	Fair/Poor	Fair/Poor	Fair/Poor	Good	VGood	Good	Good
John's Cr.	N/A	26	80	44	N/A	249	11	6
Method	N/A	Live+dead	AUC	AUC	N/A	AUC	Live+dead	Live+dead
Rating	N/A	Poor	Fair	Fair	N/A	Good	Poor	Good
Duckabush R.	6,095	2,453	1,898	1,190	827	557	690	80
Method	AUC	AUC	Curve model	AUC	AUC	AUC	AUC	AUC
Rating	Fair	Poor	Poor	Good	Fair	Fair	Fair	Good
Dosewallips R.	3,271	3,215	1,901	1,190	1,216	63	507	64
Method	AUC+supp L&D	AUC	Regression	Regression	AUC	Live+dead	AUC	AUC
Rating	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Fair
Big Quilcene R.	2,445	821	2,978	345	375	138	156	64
Method	AUC	Curve model	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Fair	Poor	Fair	Fair	Fair/Good	VGood	Fair	Fair
Little Quilcene R.	1,088	773	1,816	110	154	84	125	176
Method	AUC	AUC	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair
Snow Cr.	608	538	629	133	709	242	766	154
Method	AUC	AUC	AUC	Expansion+Weir	(Live+dead)+Weir	Curve model	AUC	AUC
Rating	Good	Fair	Good	Poor/Fair	Poor/Fair	Poor	Good	Fair
Salmon Cr.	521	701	1,664	458	3,074	439	1,386	731
Method	AUC	AUC	Expansion+Weir	Expansion+Weir	(Live+dead)+Weir	Curve model	AUC/Live+dead	AUC
Rating	VGood	Good	Poor/Good	Fair	Fair	Poor	Good/Poor	Fair
JimmyComeLately	365	405	778	170	1,326	203	599	254
Method	Regression	Regression	Regression	Regression	Regression	Regression	Live+dead	AUC
Ratin	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Fair

Table 1: Hood Canal and Strait of Juan de Fuca wild summer chum escapement estimates (continued)

	Return year							
	1984	1985	1986	1987	1988	1989	1990	1991
Big Beef Cr.	22	0	0	6	0	0	0	0
Method	Weir	Weir	Weir	Weir	Weir	Weir	Weir	Weir
Rating	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood
Anderson Cr.	1	0	0	0	0	0	0	0
Method	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Assumed 0	Assumed 0	Assumed 0
Rating	VGood	Fair	Good	Good	VGood	Poor	Poor	Poor
Dewatto R.	44	19	20	5	23	2	0	31
Method	AUC	AUC	AUC	Live+dead	AUC	Live+dead	Live+dead	AUC
Rating	Fair	Fair	Fair	Fair	Good	Good	Good	Fair
Tahuya R.	142	122	109	91	145	9	6	5
Method	AUC	AUC	AUC	AUC	AUC	Live+dead	Live+dead	Live+dead
Rating	Good	Fair	VGood	Good	Fair	Good	Good	Fair
Union R.	194	334	1,892	497	629	450	275	208
Method	AUC+supp L&D	urve mod+supp L&D	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Fair	Poor	Good	Good	Good	Good	Fair/Good	Fair/Good
Lilliwaup R.	187	92	97	32	275	43	2	30
Method	AUC	Curve model	AUC	AUC	AUC	AUC	Live+dead	Live+dead
Rating	Good	Poor	Good	Good	Good	Good	Fair	Poor
amma Hamma R.	165	231	173	26	428	16	90	68
Method	AUC+expansion	AUC+expansion	AUC	Live+dead	Live+dead	AUC	AUC	AUC
Rating	Good/Poor	Fair/Poor	VGood	Poor	VGood	Good	Fair	VGood
John's Cr.	5	N/A	0	N/A	12	N/A	0	0
Method	Live+dead	N/A	Live+dead	N/A	Live+dead	N/A	Live+dead	Live+dead
Rating	Poor	N/A	Good	N/A	Good	N/A	Fair	Fair
Duckabush R.	299	30	177	12	497	60	42	102
Method	AUC	Live+dead	AUC	AUC	AUC	Live+dead	AUC	AUC
Rating	Good	Poor	VGood	Good	Good	Good	Fair	Fair
Dosewallips R.	212	236	57	9	661	16	8	250
Method	AUC	AUC	AUC	Live+dead	AUC	Live+dead	Live+dead	Live+dead
Rating	Poor	Poor	Good	Fair	Fair	Fair	Fair	Fair
Big Quilcene R.	60	44	15	8	120	1	6	49
Method	Live+dead	Live+dead	Live+dead	Live+dead	AUC	Live+dead	Live+dead	AUC
Rating	Fair	Poor	Fair	Poor	Fair	Good	Good	Good
Little Quilcene R.	83	1	12	71	177	1	0	1
Method	AUC	Live+dead	AUC	Curve model	AUC	Live+dead	Live+dead	Live+dead
Rating	Fair	Fair	Good	Poor	Good	Good	Good	Good
Snow Cr.	384	20	213	465	723	21	33	12
Method	AUC	Live+dead	AUC	AUC	AUC	Live+dead	AUC	Redd count
Rating	Fair	Poor	VGood	Good	Good	Good	Good	Fair
Salmon Cr.	828	151	582	1,062	1,915	194	245	172
Method	AUC	Curve model	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Good	Poor	Good	Good	Good	Fair	Fair	Fair
JimmyComeLately	367	61	292	464	1,052	173	63	125
Method	AUC	Live+dead	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Good	Poor	Good	Fair	Good	Good	Good	Good

Table 1: Hood Canal and Strait of Juan de Fuca wild summer chum escapement estimates (continued)

	Return year						
	1992	1993	1994	1995	1996	1997	1998
Big Beef Cr.	0	0	0	0	0	0	2
Method	Weir	Weir	Weir	Weir	Weir	Weir	Weir
Rating	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood	Vgood
Anderson Cr.	0	0	0	0	0	0	0
Method	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead
Rating	Fair	Good	Good	Good	Fair	Good	Good
Dewatto R.	0	1	0	0	0	6	12
Method	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	AUC
Rating	VGood	VGood	Good	Good	Good	Fair	Fair
Tahuya R.	0	0	0	0	5	0	0
Method	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead	Live+dead
Rating	VGood	VGood	Good	Fair	Fair	Fair	Fair
Union R.	140	251	738	721	494	410	223
Method	AUC	AUC	AUC	AUC	AUC	AUC	AUC
Rating	Good	VGood	Good	Good	Good	Good	Fair
Lilliwaup R.	90	72	105	79	40	10	4
Method	AUC	AUC	AUC	AUC	AUC-Broodstck adj.	AUC-Broodstck adj.	Rack
Rating	Fair	Good	Fair	Fair	Fair	Poor	Good
amma Hamma R.	123	69	370	475	774	55	95
Method	AUC	AUC	AUC	AUC	AUC	AUC	AUC-Broodstck adj.
Rating	Good	VGood	VGood	Good	Good	Fair	Vgood
John's Cr.	0	0	N/A	1	N/A	49	0
Method	Assumed 0	Assumed 0	N/A	Live+dead	N/A	Live+dead	N/A
Rating	Poor	Poor	N/A	Poor	N/A	Poor	Good
Duckabush R.	617	105	263	825	2,650	475	226
Method	AUC	AUC	AUC	AUC	AUC	AUC	AUC
Rating	VGood	Good	Good	Fair	Fair	Fair	Fair
Dosewallips R.	655	105	225	2,787	6,976	47	336
Method	AUC	AUC	AUC	AUC+supp L&D	AUC	Live+dead	AUC
Rating	Fair/Good	Fair	Good	Good	Good	Poor	Vgood
Big Quilcene R.	320	97	349	4,029	8,479	7,339	2,244
Method	AUC-Broodstck adj	AUC-Broodstck adj.	AUC-Broodstck adj.	AUC	AUC	AUC	AUC
Rating	Good	VGood	Good	Good	VGood	Fair	Good
Little Quilcene R.	9	12	0	54	265	29	265
Method	AUC	AUC	Live+dead	AUC	AUC	Live+dead	AUC
Rating	Good	Good	Fair	Good	Good	Fair	Good
Snow Cr.	21	11	2	25	160	67	28
Method	Live+dead	Live+dead	Live+dead	AUC	Redd count/Weir	Redd count/Weir	Redd count/Weir
Rating	Good	Good	Good	Good	Fair/Good	Fair	Fair
Salmon Cr.	371	400	137	538	785	724	1,013
Method	AUC+exp	AUC	AUC	Redd count/Weir	Redd count/Weir	Redd count/Weir	Redd count/Weir
Rating	Fair	Good	Good	Good	Good	Good	Good
JimmyComeLately	616	110	15	223	30	61	98
Method	AUC	AUC	AUC	AUC	AUC	AUC	AUC
Rati/	Good	Good	Good	[illegible]od	Good	Good	VGood

Appendix 1 - Anderson Cr. (WRIA 15.0412) summer chum natural spawning escapement summary

Introduction

Reach normally spawned by summer chums apparently ranged from river mile 0.0 - 1.1 (Stock is currently extirpated). Main spawning period was typically from mid - September to mid - October. Beaver dam construction was observed by WDFW spawning survey crews to cause chronic upstream passage problems during the summer chum spawning period from the mid -1980□s to present. Survey data directly used in estimation process is highlighted in ***bold italics*** in the annual survey summary tables.

Summer 1968

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No estimate was attempted from this data, due to the availability of only one survey during summer chum spawning period. The survey observation was also early in the typical spawning period.

Original estimate = 68 (AUC).

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	68	9	18	0.0	0.8	0.8	14	0	14	0	INDX	FOOT	0	0	0	0	23	13	00	00

Summer 1969

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original estimate = 65 (no description of method available).

Summer 1970

Reach - **River mile 0.0-0.8**
Estimate = 65
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Two survey observations were available. The following uncertainties were present in the AUC curve derivation process: 1) Ascending and descending sections of AUC curve were not directly defined by the survey data. The start and endpoints of the curve, and slope of the ascending and descending portions of the curve were arrived at from subjective assessment of typical starting and ending periods for Hood Canal summer chums in the context of the available survey information. 2) Amplitude of peak period was subjectively determined. It was assumed to fall between the Sept. 24 and Oct. 9 surveys, based on the typical peak spawning timing for Hood Canal summer chum.

Original estimate = 77 (AUC).

Table 2: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	70	9	24	0.0	0.8	0.8	21	0	21	99	INDX	FOOT	1	0	0	0	13	23	00	00
15 0412	70	10	9	0.0	0.8	0.8	22	2	24	90	INDX	FOOT	0	0	0	0	20	13	00	00

Summer 1971

Reach - **River mile 0.0-0.8**
Estimate = 125
Method - Single survey expansion by a timing model - 1975 WRIA 15.0446 run timing data
Quality rating - Poor
Comments - The AUC method was not used, due to insufficient number of survey observations. The 1975 WRIA 15.0446 run timing was selected to model the assumed run timing of the 1971 WRIA 15.0412 summer chum spawning run because the 1975 WRIA 15.0446 AUC curve has starting, peak, and ending periods that are typical for this population.

Original estimate = 92 (AUC).

Table 3: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	71	9	22	0.0	0.8	0.8	38	2	40	95	INDX	FOOT	0	0	0	0	20	13	00	00

Summer 1972

Reach - **River mile 0.0-0.8**
Estimate = 225
Method - Single survey expansion by a timing model - 1975 WRIA 15.0446 run timing data
Quality rating - Poor
Comments - The AUC method was not used, due to insufficient number of survey observations. The 1975 WRIA 15.0446 run timing was selected to model the assumed run timing of the 1972 WRIA 15.0412 summer chum spawning run because the 1975 WRIA 15.0446 AUC curve has starting, peak, and ending periods that are typical for this population.

Original estimate = 185 (AUC)

Table 4: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	72	10	5	0.0	0.8	0.8	93	8	101	95	INDX	FOOT	0	0	0	0	20	13	00	00

Summer 1973

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No estimate was attempted from this data, due to the availability of only one survey during summer chum spawning period. The survey was late in the typical spawning period, and limited in reach covered.

Original estimate = 146 (AUC).

Table 5: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	73	10	18	0.0	0.2	0.2	0	63	63	95	INDX	FOOT	0	0	0	0	12	00	00	00

Summer 1974

Reach - **River mile 0.0-1.1**
Estimate = 0
Method - Sept. 10 + Sept. 19 + Oct. 1 + Oct. 28 live + dead counts
Quality rating - Fair
Comments - September spawning activity was reasonably monitored by the two surveys on Sept. 10 and Sept. 19. Reported monitoring effort for October spawning activity was limited. There was only one spot survey on Oct. 1, and the next survey was Oct. 28.

A survey card note for Oct. 1 noted water was extremely low, and fish entry was probably being discouraged up to this point.

Original estimate = 0.

Table 6: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	74	9	10	0.0	1.1	1.1	0	0	0	95	SUPP	FOOT	0	0	0	0	13	20	00	00
15 0412	74	9	19	0.0	1.1	1.1	0	0	0	95	SUPP	FOOT	0	0	0	0	57	00	00	00
15 0412	74	10	1	0.1	0	-0.1	0	0	0	99	SPOT	FOOT	4	0	0	0	60	00	00	00
15 0412	74	10	28	0.0	1.2	1.2	0	0	0	0	SUPP	FOOT	6	0	0	0	41	59	60	00

Summer 1975

Reach - **River mile 0.0-1.1**
Estimate = 195
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Two survey observations were available. The following uncertainties were present in the AUC curve derivation process: 1) Start point and ascending section of AUC curve were undefined by survey data. This was derived subjectively, using a typical mid-Sept. starting date. 2) Amplitude and timing of peak region of curve was subjectively defined, by assuming spawning peaked in early October, soon after the Sept. 30 survey observation. The number of dead observed on the Sept. 30 survey were ~ 15 % of the total fish count, which is suggestive of a pre-peak survey, but where spawning activity is reasonably under way. It was assumed number of live chum observed on Sept. 30 survey was close to the peak live abundance.

Original estimate = 251 (AUC).

Table 7: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	75	9	30	0.0	1.1	1.1	124	23	147	85	INDX	FOOT	0	0	0	0	00	00	00	00
15 0412	75	10	14	0.0	1.1	1.1	7	39	46	80	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1976

Reach - **River mile 0.0-1.1**
Estimate = 234
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Two survey observations were available. The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak region of curve was subjectively defined by assuming spawning peaked in late September, soon after the Sept. 27 survey observation. The number of dead observed on the Sept. 27 survey were ~ 17 % of the total fish count, which is suggestive of a pre-peak survey, but where spawning activity is reasonably under way. It was assumed number of live chum observed on Sept. 27 survey was close to the peak live abundance. 2) Descending section and endpoint of AUC curve were undefined by survey data. This was derived subjectively, using a typical endpoint of around Oct. 20, and the assumption of an average rate of decline in live fish abundance from the peak to the endpoint.

Original estimate = 169.

Table 8: 1976 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	76	9	8	0.0	1.0	1.0	2	0	2	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	76	9	17	0.0	1.1	1.1	41	4	45	90	INDX	FOOT	0	0	0	0	00	00	00	00
15 0412	76	9	27	0.0	1.0	1.0	96	19	115	90	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1977

Reach - **RM 0.0-1.1**
Estimate = 26
Method - Regression - Big Beef vs. Anderson 1974-76, 78-81. [15.0412 = -29.5 + 0.184 * [15.0389]]
Quality rating - Poor
Comments - None

Original estimate = 0.

Table 9: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	77	10	3	0.4	0.5	0.1	0	0	0	90	SUPP	FOOT	0	0	0	0	21	00	00	00

Summer 1978

Reach - **River mile 0.0-1.1**
Estimate = 16
Method - Sept. 9 live + dead count
Quality rating - Poor
Comments - Two surveys were conducted. However, only one of the surveys occurred during a period live fish were present. The Oct. 9 survey indicated spawning was completed by this point, due to a [zero] live count. The low fish count suggests any attempted expansion method would be problematic, due to the entry pattern irregularities that usually accompany small runsizes. Therefore, the live + dead count method was used for a minimal estimate.

Original estimate = 105 (AUC).

Table 10: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*78*	*9*	*13*	*0.0*	*1.1*	*1.1*	*16*	*0*	*16*	*95*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*00*	*00*	*00*
15 0412	78	10	9	0.0	1.1	1.1	0	8	8	95	INDX	FOOT	1	0	0	0	20	00	00	00

Notes:
Sept. 13 survey card noted a possible migration block 0.1 mile downstream from a stream channel enhancement project (river mile 0.8-1.1). See Dec. 27, 1979, Nov. 13, 1980 card notes for location info. on enhancement project section location.

Summer 1979

Reach - **River mile 0.0-1.3**
Estimate = 6
Method - Sept. 27 live + dead count
Quality rating - Poor
Comments - The low fish count suggests any attempted expansion method would be problematic, due to the entry pattern irregularities that usually accompany small runsizes. Therefore, the live + dead count method was used for a minimal estimate. The survey observation was close to the typical peak spawning period, so this may have accounted for most of the run.

Original estimate = 20 (Educated guess).

Table 11: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*79*	*9*	*27*	*0.1*	*1.3*	*1.2*	*3*	*3*	*6*	*99*	*INDX*	*FOOT*	*3*	*0*	*0*	*0*	*20*	*00*	*00*	*00*

Summer 1980

Reach - **River mile 0.0-1.1**

Estimate = 2
Method - (Sept. 17 + Sept. 27) live + dead counts
Quality rating - Poor
Comments - The low fish count suggests any attempted expansion method would be problematic, due to the entry pattern irregularities that usually accompany small runsizes. Therefore, the live + dead count method was used for a minimal estimate. The survey observation was close to the typical peak spawning period however, so this may have accounted for most of the run.

Original estimate = 20 (Educated guess).

Table 12: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*80*	*9*	*17*	*0.0*	*1.1*	*1.1*	*0*	*0*	*0*	*95*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*00*	*00*	*00*
15 0412	*80*	*9*	*27*	*0.0*	*1.1*	*1.1*	*2*	*0*	*2*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*00*	*00*	*00*	*00*

Notes:
Sept. 17 survey card noted 4 redds (species unknown), but no fish visible.

Summer 1981

Reach - **River mile 0.0-1.1**
Estimate = 1
Method - (Sept. 9 + Sept. 23 + Oct 6 + Oct. 14) live + dead counts
Quality rating - Good
Comments - These surveys should have accounted for majority of spawning activity, because the surveys were well distributed through spawning period.

Original estimate = 20 (Educated guess).

Table 13: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	81	9	9	0.0	1.1	1.1	0	1	1	95	INDX	FOOT	0	0	0	0	20	00	00	40
15 0412	81	9	23	0.0	1.1	1.1	0	0	0	98	INDX	FOOT	0	0	0	0	11	20	00	40
15 0412	81	10	6	0.0	0.5	0.5	0	0	0	5	INDX	FOOT	0	0	0	0	00	29	34	40
15 0412	81	10	14	0.0	1.1	1.1	0	0	0	99	INDX	FOOT	0	0	0	0	11	20	00	40
15 0412	81	10	27	0.0	1.1	1.1	0	0	0	50	INDX	FOOT	0	0	0	0	24	33	34	40

Summer 1982

Reach - **RM 0.0-1.8**
Estimate = 0
Method - Regression - Big Beef vs. Anderson 1974-76, 78-81. [□15.0412 = -29.5 + 0.184 * □15.0389□]
Quality rating - Poor
Comments - Assumed no fish present due to minimal or no fish present in surrounding years in this stream. No survey observations were recorded for majority of summer chum spawning period. The first survey was conducted Oct. 18, which is late in the typical spawning period.

Original estimate = 50 (Method appeared to be Educated guess).

Table 14: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	82	10	18	0.4	0.8	0.4	0	0	0	95	INDX	FOOT	0	0	0	0	20	33	60	00
15 0412	82	10	28	0.1	1.1	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	21	33	38	00

Summer 1983

Reach - **River mile 0.0-2.0**
Estimate = 0
Method - (Sept. 22 + Oct. 5 + Oct. 12) live + dead counts.
Quality rating - Fair
Comments - September survey coverage was limited, with only one survey (Sept. 22), but overall timing and distribution of surveys for most of summer chum spawning period was adequate to account for any significant spawning activity.

Original estimate = 0.

Table 15: 1983 chum survey data through Nov. 1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	83	9	22	0.0	1.5	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	42	20	60	40
15 0412	83	10	5	0.0	2.0	2.0	0	0	0	90	INDX	FOOT	0	0	0	0	60	00	00	40
15 0412	83	10	5	0.1	1.1	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	00	00
15 0412	83	10	12	0.0	2.0	2.0	0	0	0	80	INDX	FOOT	0	0	0	0	60	00	00	40
15 0412	83	11	1	0.1	1.1	1.0	0	0	0	0	INDX	FOOT	0	0	0	0	60	00	00	00

Notes:
Sept. 22 survey card noted a beaver dam was present 0.5 miles from mouth.

Summer 1984

Reach - **River mile 0.0-1.1**
Estimate = 1
Method - (Sept. 7, 18, 26, Oct. 3, 10, 16, 23) live + dead counts.
Quality rating - Very good
Comments - Excellent survey coverage throughout typical spawning period. Live fish observed on Oct. 30 was assumed to be a fall chum.

Original estimate = 20 (Method appeared to be educated guess).

Table 16: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	84	9	7	0.2	1.2	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	33	60	40
15 0412	84	9	18	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	13	48	60	00
15 0412	84	9	26	0.0	1.0	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	84	10	3	0.0	1.0	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	84	10	10	0.0	1.0	1.0	1	0	1	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	84	10	16	0.0	1.1	1.1	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	84	10	23	0.0	1.1	1.1	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	84	10	30	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	4	0	0	0	60	41	00	00
15 0412	84	10	30	0.0	1.1	1.1	1	0	1	99	SUPP	FOOT	0	0	0	0	20	00	00	00

Notes:
Sept. 7 survey card noted an impassable beaver dam at river mile 0.2.
Sept. 18 survey card noted: 1) An impassable beaver dam somewhere in stream (probably at river mile 0.2 ed.), that was removed on that date by a blockage removal crew, and 2) Two redds (unknown species) but no fish below beaver dam site.
Sept. 30 survey card noted an impassable beaver dam at river mile 0.1.

Summer 1985

Reach - **River mile 0.0-1.1**

Estimate = 0
Method - (Oct. 1, 9) live + dead counts.
Quality rating - Fair
Comments - There was a lack of recorded survey effort in September, so there is some possibility any fish entry in this period was missed. October was monitored fairly well by 3 surveys.

Original estimate = 0.

Table 17: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	85	10	1	0.0	0.8	0.8	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	85	10	9	0.0	1.1	1.1	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	85	10	29	0.0	1.1	1.1	0	0	0	90	INDX	FOOT	0	0	0	0	26	00	00	00

Summer 1986

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - (Sept. 18, 25, Oct. 6, 17) live + dead counts.
Quality rating - Good
Comments - Survey coverage was good throughout the usual main spawning period.

Original estimate = 0.

Table 17: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	86	9	18	0.1	1.1	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	20	60	00	00
15 0412	86	9	25	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	00	00	00	00
15 0412	86	10	6	0.0	1.0	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	86	10	17	0.0	0.3	0.3	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - (Sept. 24, Oct. 6, 22) live + dead counts.
Quality rating - Good
Comments - Spawning period reasonably monitored by 3 surveys that covered the majority of the typical spawning period.

Original estimate = 0.

Table 18: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	87	9	24	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	87	10	6	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	87	10	22	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1988

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - (Sept. 9, 22, Oct. 3, 12, 20) live + dead counts.
Quality rating - Very good
Comments - No fish observed in 6 surveys.

Original estimate = 0.

Table 19: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	88	9	9	1.0	0.0	-1.0	0	0	0	99	SPOT	FOOT	0	0	0	0	20	60	00	00
15 0412	88	9	22	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	88	10	3	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	00	00	00	00
15 0412	88	10	12	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	88	10	20	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0412	88	10	31	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	00	61	00	00

Notes:
Sept. 9 spot check was at river mile 0.5 and 1.0.

Summer 1989

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Poor
Comments - Only one survey during typical summer chum spawning period (and it was on the late side of the run period). Assumed escapement was zero due apparent extirpation of the run in recent years.

Original estimate = 0.

Table 20: 1989 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*89*	*10*	*18*	*0.0*	*1.0*	*1.0*	*0*	*0*	*0*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*00*

Notes:
Sept. 18 survey card noted large beaver dam at ~ river mile 0.4-0.6.

Summer 1990

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Poor
Comments - Only one survey during typical summer chum spawning period. Assumed escapement was zero due apparent extirpation of the run in recent years, and lack of fish observed on Sept. 26.

Original estimate = 0.

Table 21: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*90*	*9*	*26*	*0.0*	*1.0*	*1.0*	*0*	*0*	*0*	*90*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*20*	*60*	*00*	*00*
15 0412	90	10	26	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	21	00	00	00

Notes:
Survey cards noted apparent fish passage problem, with one beaver dam observed at river mile 0.1, and one at river mile ~ 0.4-0.6. Both were thought to be impassable by surveyors.

Summer 1991

Reach - **River mile 0.0-0.2**
Estimate = 0
Method - See comments.
Quality rating - Poor
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Original estimate = 0.

Table 22: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	*91*	*10*	*9*	*0.2*	*0.2*	*0.0*	*0*	*0*	*0*	*95*	*SPOT*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*65*	*00*	*00*
15 0412	*91*	*10*	*18*	*0.2*	*0.2*	*0.0*	*0*	*0*	*0*	*95*	*SPOT*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*20*	*00*	*00*
15 0412	91	10	28	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00

Notes:
Oct. 9 and Oct. 18 survey cards noted stream flow was very low, and fish movement unlikely.

Summer 1992

Reach - **River mile 0.0-1.1**
Estimate = 0
Method - See comments.
Quality rating - Fair
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Original estimate = 0.

Table 23: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	92	9	2	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00
15 0412	92	9	23	0.0	0.1	0.1	0	0	0	90	SPOT	FOOT	1	0	0	0	20	60	00	00
15 0412	92	10	8	0.0	0.8	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00

Notes:
Sept. 2 survey card noted a large, apparently impassable beaver dam at about river mile 0.1.
Sept. 23 survey card noted the addition of another beaver dam upstream of the first one observed Sept. 2.
Oct. 8 survey card reported surveyors opened up dam to fish passage.

Summer 1993

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Good
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Original estimate = 0.

Table 24: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	93	9	15	0.0	0.1	0.1	0	0	0	95	SPOT	FOOT	0	0	0	0	20	48	60	00
15 0412	93	10	5	0.0	1.0	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	20	48	60	00
15 0412	93	10	22	0.0	0.1	0.1	0	0	0	95	SPOT	FOOT	0	0	0	0	48	60	65	00

Notes:
Sept. 15, Oct. 5, Oct. 22 survey cards noted a large, apparently mostly impassable (possibly passable at very high tides) beaver dam at about river mile 0.1.

Summer 1994

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Good
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Original estimate = 0.

Table 25: 1994 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	94	9	14	0.0	0.6	0.6	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	48	00
15 0412	94	9	26	0.0	0.6	0.6	0	0	0	95	INDX	FOOT	0	0	0	0	00	48	60	00
15 0412	94	10	14	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00

Notes:
Sept. 14, Sept. 26, Oct. 14 survey cards noted a series of large, apparently impassable beaver dams at about river mile 0.1 - 0.3. Surveyors tried modifying them for fish passage.

Summer 1995

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Good
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Original estimate = 0.

Table 26: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	95	8	30	0.0	0.5	0.5	0	0	0	95	INDX	FOOT	0	0	0	0	00	20	60	00
15 0412	95	9	13	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0412	95	9	26	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0412	95	10	17	0.0	1.0	1.0	0	0	0	55	INDX	FOOT	0	0	0	0	25	60	00	00

Notes:
Aug. 30 survey card noted beaver dams were present in lower river, but they were passable.
Sept. 13 survey observed 2 fresh redds and 2 small redds/test digs, all of unknown species origin.

Summer 1996

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Fair
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations. There is a large gap in the survey coverage between the Sept. 16 and Oct. 15 surveys, which is the typical peak spawning period. All chum observed on Oct. 30 survey were assumed to be fall chum.

Original estimate = 0.

Table 27: 1996 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	96	9	6	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00
15 0412	96	9	16	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	7	0	0	0	20	48	60	00
15 0412	96	10	15	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	4	0	0	0	20	48	60	00
15 0412	96	10	30	0.0	1.0	1.0	786	2	788	90	INDX	FOOT	4	0	0	0	23	00	00	00
15 0412	96	10	30	1.0	2.0	1.0	474	3	477	90	SUPP	FOOT	4	0	0	0	23	00	00	00

Notes:
Sept. 6 survey card noted an impassable beaver dam at ~ river mile 0.3-0.4.
Sept. 16 survey noted 4 or 5 beaver dams in lower stream, plus other smaller ones upstream.

Summer 1997

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Good
Comments - Assumed escapement was zero due apparent extirpation of the population, and survey observations.

Table 28: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0412	97	9	8	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	48	00
15 0412	97	9	29	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0412	97	10	13	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0412	97	10	27	0.0	1.0	1.0	9	0	9	95	INDX	FOOT	0	0	0	0	20	60	61	00

Notes:
Sep[illegible] survey card noted impassable Beaver dam at river mile 0.1.
Sep[illegible]9 survey card noted one redd of unknown species origin observed on Sept. 29 survey, and that beaver dams were removed in late Sept./early Oct. by WDFW removal crew.

Summer 1998

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - See comments.
Quality rating - Good
Comments - Assumed escapement was zero due apparent extirpation of the population, and no fish observed in 4 survey observations from Sept. 4 to Oct. 16. Assumed the 7 fish observed on Oct. 26 were early fall chum.

Table 27: 1998 chum survey data through Nov. 3

WRIA		Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
15	0412	09/04/98	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	
15	0412	09/24/98	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60		
15	0412	10/08/98	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	1	0	0	0	20	60		
15	0412	10/16/98	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60		
15	0412	10/26/98	0.0	1.0	1.0	7	0	7	95	INDX	FOOT					48	20	60	
15	0412	11/03/98	0.0	1.0	1.0	109	0	109	90	INDX	FOOT	4	0	0	0	20	60	61	

Appendix 2 - Dewatto Cr. (WRIA 15.0420) summer chum natural spawning escapement summary

Introduction

The primary spawning habitat utilized by summer chums was the river mile 0.3 - 1.8 reach (Stock is currently extirpated). . The stream reach below river mile 0.3 is tidally influenced, with little suitable spawning habitat. Main spawning period was typically from mid-September to mid - October.

The previous escapement estimates used a "Index * 0.25" expansion factor to estimate spawning upstream of the regularly surveyed RM 0.0 - 1.8 index reach, and (possibly) was intended to estimate theoretical tributary spawning. I did not find any data that showed evidence of significant summer chum spawning above river mile 1.8, or in the tributaries, so no expansion factors were used to in the revised escapement estimates to account for spawning outside of the index reach. Survey data directly used in estimation process is highlighted in **bold italics** in the annual survey summary tables.

Summer 1968

Reach - **River mile 0.0-1.8**
Estimate = 2,275
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point of spawning period not clearly defined by data. A Sept. 2 start date was assumed, because there were 75 fish observed as of Sept. 7. The Sept. 7 survey is a spot survey (when curve was derived it was assumed abundance on this date was approximately double the 75 live observed on this spot survey), and 2) Timing of peak period was subjectively derived with the assumption that peak of spawning occurred between Sept. 18 and Sept. 27 surveys. This assumption was based on the transition in the dead : live ratio from < 1 to > 1 between these two surveys.

Original estimates: "Index (RM 0.0-1.8?)" = 2,740 (AUC), "Supplemental reach (reach location was undefined, assumed to be RM 1.8 +)" = 685 (Index * 0.25). Total estimate was 3,425.

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	*68*	*9*	*7*	*0.0*	*0.0*	*0.0*	*75*	*0*	*75*	*0*	*SPOT*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*13*	*00*	*00*
15 0420	*68*	*9*	*18*	*0.3*	*1.8*	*1.5*	*1,338*	*112*	*1,450*	*0*	*INDX*	*FOOT*	*1*	*0*	*0*	*0*	*24*	*13*	*00*	*00*
15 0420	*68*	*9*	*27*	*0.3*	*1.8*	*1.5*	*732*	*921*	*1,653*	*0*	*INDX*	*FOOT*	*1*	*0*	*0*	*0*	*23*	*13*	*00*	*00*

Summer 1969

Reach - **River mile 0.0-1.8**
Estimate = 280
Method - Single survey expansion by a timing model - 1975 WRIA 15.0446 AUC data
Quality rating - Poor
Comments - The 1975 WRIA 15.0446 run timing was selected to model the assumed run timing of the 1969 summer chum spawning run because the 1975 WRIA 15.0446 AUC curve has starting, peak, and ending periods that are typical for this population.

Original estimates: "Index (RM 0.0-1.8?)" = 592 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 148 (Index * 0.25). Total = 740.

Table 2: 1969 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	69	9	25	0.3	1.8	1.5	169	7	176	70	INDX	FOOT	1	0	0	0	21	13	00	00

Summer 1970

Reach - **River mile 0.0-1.8**
Estimate = 2,666
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data. Start point was subjectively derived from examination of Sept. 24 survey, in which there were just a few dead. Assumption was then made that fish had entered within the last 10 days, and 2) Amplitude and timing of peak period of spawning were subjectively derived. It was assumed peak of spawning occurred between Sept. 24 and Oct. 9 surveys, due to transition in the dead : live ratio from < 1 to > 1 between these two surveys.

Original estimates: "Index (RM 0.0-1.8?)" = 2,610 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 653 (Index * 0.25). Total = 3,263.

Table 3: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	70	9	24	0.3	1.8	1.5	1,438	69	1,507	80	INDX	FOOT	1	0	0	0	22	13	00	00
15 0420	70	10	9	0.3	1.8	1.5	118	754	872	90	INDX	FOOT	1	0	0	0	20	13	00	00

Summer 1971

Reach - **River mile 0.0-1.8**
Estimate = 2,012
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Starting point of AUC curve undefined by data. Ascending section of AUC curve undefined by data. Start point was subjectively derived from examination of Sept. 22 survey, in which there were just a few dead. Assumption was then made that fish had entered within the last 10 days, and 2) Descending section of AUC curve undefined by data. The peak of spawning was assumed to have occurred on about the Sept. 30 survey, due to the shape of the curve leading into this observation (the slope is declining towards 0), and the time period of the observation. Flow was noted as "medium" in first survey, so carcass flushing may have occurred early in run which may explain the low dead : live ratio on the Sept. 30 survey, even though it is assumed to be the peak spawning period.

Original estimates: "Index (RM 0.0-1.8?)" = 1,996 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 499 (Index * 0.25). Total = 2,495.

Table 4: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	71	9	22	0.3	1.8	1.5	628	20	648	95	INDX	FOOT	1	0	0	0	23	51	13	00
15 0420	71	9	30	0.3	1.8	1.5	928	198	1,124	90	INDX	FOOT	1	4	0	0	20	13	00	00

Summer 1972

Reach - **River mile 0.0-1.8**
Estimate = 1,403
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Starting point of AUC curve undefined by data, 2) Amplitude and timing of peak period of spawning open to interpretation, and 3) Descending section and endpoint of AUC curve undefined by data. Start point was subjectively derived from examination of Sept. 27 survey, in which there were just a few dead. Assumption was then made that fish had entered within the last 10 days. Endpoint was subjectively derived as the typical endpoint for spawning in this population (mid Oct.). Live abundance on Oct. 5 was assumed to represent the approximate peak abundance and time of the peak spawning period, due to time period of survey observation.

Original estimates: "Index (RM 0.0-1.8?)" = 1,534 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 384 (Index * 0.25). Total = 1,918.

Table 5: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	72	9	27	0.3	1.8	1.5	517	22	539	90	INDX	FOOT	1	4	0	0	20	13	00	00
15 0420	72	10	5	0.3	1.8	1.5	749	164	913	90	INDX	FOOT	1	4	0	0	20	13	00	00

Summer 1973

Reach - **River mile 0.0-1.8**
Estimate = 691
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Starting point of AUC curve undefined by data, 2) Amplitude and timing of peak period of spawning open to interpretation. Start point was subjectively derived from examination of Sept. 27 survey, in which there were just a few dead. Assumption was then made that fish had entered within the last 10 days. Endpoint was subjectively derived as the typical endpoint for spawning in this population (mid Oct.).

Original estimates: "Index (RM 0.0-1.8?)" = 1,042 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 261 (Index * 0.25). Total = 1,303.

Table 6: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	73	9	27	0.3	1.8	1.5	338	35	373	90	INDX	FOOT	0	0	0	0	13	00	00	00
15 0420	73	10	18	0.3	1.8	1.5	30	136	166	80	INDX	FOOT	4	0	0	0	13	00	00	00

Summer 1974

Reach - **River mile 0.0-1.8**
Estimate = 181
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair / Good
Comments - All data points are located on ascending section of AUC curve. However, enough of AUC curve is defined by survey data that possible alternative interpretations of AUC curve will not result in gross differences in escapement value. Peak spawning timing and abundance was assumed to be represented by the Oct. 1 survey, due to the timing of the observation, and the

moderate proportion that dead fish comprised of the total Oct. 1 chum count (28 %) All live fish observed on Oct. 28 survey were assumed to be fall chum, due to date of observation.

Original estimates: "Index (RM 0.0-1.8?)" = 176 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 44 (Index * 0.25). Total = 220.

Table 7: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	74	9	10	0.3	1.8	1.5	3	0	3	90	INDX	FOOT	0	0	0	0	13	20	31	00
15 0420	74	9	19	0.1	1.8	1.7	38	0	38	75	INDX	FOOT	0	0	0	0	40	07	60	00
15 0420	74	10	1	0.0	1.8	1.8	80	22	102	90	INDX	FOOT	1	0	0	0	60	07	00	00
15 0420	74	10	28	0.4	0.5	0.1	2	7	9	70	INDX	FOOT	0	0	0	0	85	00	00	00

Summer 1975

Reach - **River mile 0.0-1.8**
Estimate = 613
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Starting point of AUC curve not defined by data. Since there were no dead on Sept. 15 survey, start point of AUC curve was assumed to be about 7-8 days before this point. 2) Amplitude and timing of peak open to some interpretation. The Sept. 30 survey was assumed to be post-peak, due to large number of dead. The dead: live ratio was still less than one but, dead summer chum rarely seem to accumulate on this stream to a 1:1 ratio until well after the peak, if at all. Enough of AUC curve is defined by survey data that possible alternative interpretations of AUC curve will not result in gross differences in escapement estimate.

Original estimates: "Index (RM 0.0-1.8?)" = 584 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 146 (Index * 0.25), Total = 730.

Table 8: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	75	9	15	0.0	1.8	1.8	117	0	117	95	INDX	FOOT	0	0	0	0	20	13	00	00
15 0420	75	9	30	0.0	1.8	1.8	253	137	390	80	INDX	FOOT	0	0	0	0	00	00	00	00
15 0420	75	10	14	0.3	1.8	1.5	1	116	117	90	INDX	FOOT	1	0	0	0	12	20	00	00

Summer 1976

Reach - **River mile 0.0-1.8**
Estimate = 738
Method - AUC
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude of peak open to considerable interpretation. 2) Some timing ambiguity to peak period, and 3) Only fair visibility on peak survey (70 %). Enough of AUC curve is defined by survey data that possible alternative interpretations of AUC curve will not result in gross differences in escapement estimate.

Original estimates: "Index (RM 0.0-1.8?)" = 764 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 191 (Index * 0.25). Total = 955.

Table 9: 1976 river mile 0.0-1.8 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	76	9	8	0.0	1.8	1.8	81	6	87	85	INDX	FOOT	0	0	0	0	20	00	00	00
15 0420	76	9	17	0.0	1.8	1.8	341	66	407	70	INDX	FOOT	4	0	0	0	60	00	00	00
15 0420	76	9	27	0.0	1.8	1.8	237	295	532	90	INDX	FOOT	0	0	0	0	00	00	00	00

Reach - **River mile 1.8-2.3**
Estimate = 3
Method - Sept. 27 live + dead.
Quality rating - Poor
Comments - Minimal estimate. Only one survey with no expansion.

Table 10: 1976 river mile 1.8-2.3 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	76	9	27	1.8	2.1	0.3	3	0	3	99	SUPP	FOOT	0	0	0	0	00	00	00	00

Summer 1977

Reach - **River mile 0.0-1.8**
Estimate = 225
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point and ascending section of AUC curve undefined by data. Due to lack of dead on Sept. 16 survey, start of AUC curve fish was assumed to be about 7 days earlier., 2) Peak was based on a educated guess that some more fish were going to arrive (based on Oct. 3 live + dead count of 106, which is not much lower than Sept. 16 live count, and there is usually heavy wildlife scavenging on summer chums).

Original estimates: "Index (RM 0.0-1.8?)" = 444 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 111 (Index * 0.25), Total = 555.

Table 11: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	77	9	16	0.0	0.9	0.9	132	2	134	90	SUPP	FOOT	0	0	0	0	60	00	00	00
15 0420	77	10	3	0.0	1.8	1.8	21	85	106	97	INDX	FOOT	1	0	0	0	11	20	60	00
15 0420	77	10	12	0.0	1.8	1.8	7	32	39	95	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1978

Reach - **River mile 0.0-1.8**
Estimate = 544
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point and ascending section of AUC curve undefined by data. The few dead on Sept. 13 survey suggested AUC curve should start about 10 days prior to this point. 2) Amplitude and timing of peak period of AUC curve open to considerable interpretation. Spawning was assumed to have peaked between Sept. 13 and Sept. 27 surveys, due to decline in live counts on second survey, and change in dead : live ratio from < 1 to 1:1. Enough of AUC curve is defined by survey data that possible alternative interpretations of AUC curve will not result in gross differences in escapement value.

Original estimates: "Index (RM 0.0-1.8?)" = 567 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 142 (Index * 0.25). Total = 709.

Table 12: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	78	9	13	0.0	1.8	1.8	253	11	264	80	INDX	FOOT	1	4	0	0	00	00	00	00
15 0420	78	9	27	0.0	1.8	1.8	89	81	170	80	INDX	FOOT	1	4	0	0	00	00	00	00
15 0420	78	10	9	0.0	1.8	1.8	10	141	151	85	INDX	FOOT	1	0	0	0	20	60	00	00

Summer 1979

Reach - **River mile 0.0-1.8**
Estimate = 49
Method - (Sept. 27 + Oct. 18) live + dead.
Quality rating - Poor
Comments - AUC estimate not possible due to low numbers of fish, wide spacing of surveys (21 days), and post-peak nature of dead count in first survey (9 live, 15 dead).

Original estimates: "Index (RM 0.0-1.8?)" = 100 (Educated guess), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 25 (Index * 0.25). Total = 125.

Table 13: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	79	9	27	0.0	0.5	0.5	9	15	24	98	INDX	FOOT	1	0	0	0	60	00	00	00
15 0420	79	10	18	0.0	1.8	1.8	15	10	25	75	INDX	FOOT	1	4	0	0	20	31	00	00

Summer 1980

Reach - **River mile 0.0-1.8**
Estimate = 117
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair / good
Comments - Amplitude and timing of peak period in AUC curve open to some interpretation, although possible range of variation would not change estimate by a large amount. Sept. 17 survey was assumed to be pre-peak due to low dead : live ratio. Fish observed on Oct. 23 survey were assumed to be summer chum, since live count dropped back to zero on Oct. 29 survey.

Original estimates: "Index (RM 0.0-1.8?)" = 165 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 41 (Index * 0.25). Total = 206.

Table 14: 1980 chum survey data through Oct. 29

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	80	9	8	0.2	1.8	1.6	3	0	3	80	INDX	FOOT	0	0	0	0	00	00	00	00
15 0420	80	9	17	0.0	1.8	1.8	58	3	61	90	INDX	FOOT	4	0	0	0	00	00	00	00
15 0420	80	10	3	0.2	1.8	1.6	2	27	29	80	INDX	FOOT	4	0	0	0	00	00	00	00
15 0420	80	10	23	0.0	1.8	1.8	13	26	39	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	80	10	29	0.0	1.8	1.8	0	2	2	90	INDX	FOOT	4	0	0	0	00	00	00	00

Summer 1981

Reach - **River mile 0.0-1.8**
Estimate = 41
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both WDFW and PNPTC conducted surveys. I used PNPTC data due to the larger number of surveys (except for the use of Oct. 16 WDFW survey in curve to fill in a open region in survey data).

Original estimates: "Index (RM 0.0-1.8?)" = 100 (Educated guess), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 25 (Index * 0.25). Total = 125.

Table 15: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	81	9	9	0.0	1.8	1.8	10	3	13	98	INDX	FOOT	0	0	0	0	20	00	00	40
15 0420	81	9	15	0.0	1.3	1.3	6	3	9	85	INDX	FOOT	0	0	0	0	20	41	40	40
15 0420	81	9	22	0.3	1.0	0.7	11	1	12	95	INDX	FOOT	1	0	0	0	00	20	00	40
15 0420	81	9	24	0.0	1.8	1.8	10	0	10	98	INDX	FOOT	1	0	0	0	20	60	00	00
15 0420	81	10	2	3.0	3.2	0.2	0	0	0	85	SUPP	FOOT	0	0	0	0	20	00	00	00
15 0420	81	10	6	1.0	3.2	2.2	0	0	0	40	INDX	FOOT	0	0	0	0	00	24	34	40
15 0420	81	10	7	0.0	1.0	1.0	0	0	0	60	INDX	FOOT	0	0	0	0	00	24	00	40
15 0420	81	10	13	0.3	2.8	2.5	3	0	3	80	SUPP	FOOT	0	0	0	0	00	00	00	40
15 0420	81	10	16	0.0	1.8	1.8	16	6	22	75	INDX	FOOT	0	0	0	4	00	00	00	00
15 0420	81	10	27	0.3	3.4	3.1	1	0	1	30	INDX	FOOT	4	0	0	0	06	30	34	40
15 0420	81	10	28	0.3	0.0	-0.3	0	0	0	0	SPOT	FOOT	0	0	0	0	28	39	00	00

Summer 1982

Reach - **River mile 0.0-1.8**
Estimate = 21
Method - (Live + dead On Oct. 4) + (live on Oct. 14 survey) + (dead on Oct. 26 survey).
Quality rating - Fair
Comments - Didn't use AUC method due to very small number of fish observed. Live fish on Oct. 14 were assumed to be fresh fish, due to dead count equaling total of live + dead on Oct. 4 survey.

Original estimates: "Index (RM 0.0-1.8?)" = 50 (Educated guess), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 13 (Index * 0.25), Total = 63.

Table 16: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	82	9	13	0.0	0.2	0.2	0	0	0	95	SUPP	FOOT	1	0	0	0	20	00	00	00
15 0420	82	10	4	0.0	1.8	1.8	4	3	7	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	82	10	14	0.0	1.8	1.8	3	7	10	90	INDX	FOOT	0	0	1	4	20	31	33	00
15 0420	82	10	19	0.0	1.8	1.8	3	0	3	85	INDX	FOOT	0	0	1	4	20	33	31	00
15 0420	82	10	26	0.0	1.8	1.8	0	4	4	60	INDX	FOOT	4	0	0	0	24	31	33	00

Summer 1983

Reach - **River mile 0.0-1.8**
Estimate = 15
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - PNPTC and WDF both collected survey data. Used WDF data due to larger number and temporal distribution of surveys. The following uncertainties were present in the AUC curve derivation process: 1) Start point of AUC curve not defined by data, and 2) Small counts reduce potential accuracy of estimate, due to the large magnitude of even small census errors with the low numbers of fish present, and irregularities in fish entry patterns that are more common with low runsizes.

Original estimates: "Index (RM 0.0-1.8?)" = 21 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 5 (Index * 0.25). Total = 26.

Table 17: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
15 0420	83	9	20	0.0	1.8	1.8	4	0	4	90	INDX	FOOT	1	0	0	0	20	00	00	00
15 0420	83	9	28	0.1	1.8	1.7	3	1	4	95	INDX	FOOT	1	0	0	0	20	00	00	00
15 0420	83	10	3	0.3	1.8	1.5	3	2	5	80	INDX	FOOT	1	4	0	0	20	51	60	40
15 0420	83	10	5	0.1	1.8	1.7	7	2	9	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	83	10	9	0.0	1.8	1.8	3	3	6	70	INDX	FOOT	4	0	0	0	00	00	00	40
15 0420	83	10	18	0.1	1.8	1.7	3	3	6	95	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	83	10	25	0.1	1.8	1.7	0	1	1	85	INDX	FOOT	0	0	0	4	20	31	51	00
15 0420	83	10	31	0.0	3.2	3.2	5	1	6	60	INDX	FOOT	4	0	0	0	00	00	00	40

Summer 1984

Reach - **River mile 0.0-1.8**
Estimate = 44
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - PNPTC and WDF both collected survey data. Used WDF data due to larger number and temporal distribution of surveys. Small numbers of fish reduce potential accuracy of estimate, due to the large magnitude of even small census errors when the low numbers of fish are present. There was also poor visibility (40 %) on one of peak surveys (Oct. 10).

Original estimates: "Index (RM 0.0-1.8?)" = 56 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 14 (Index * 0.25), Total = 70.

Table 18: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	84	9	11	0.0	1.8	1.8	2	0	2	95	INDX	FOOT	1	0	0	0	20	00	00	00
15 0420	84	9	14	0.0	0.5	0.5	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	40
15 0420	84	9	20	0.0	1.8	1.8	19	1	20	90	INDX	FOOT	1	0	0	0	20	00	00	00
15 0420	84	9	26	0.0	1.8	1.8	4	0	4	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	84	9	26	0.0	1.8	1.8	13	2	15	95	INDX	FOOT	4	0	0	0	20	00	00	40
15 0420	84	10	3	0.0	1.8	1.8	8	10	18	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	84	10	10	0.0	1.8	1.8	14	0	14	40	INDX	FOOT	1	4	0	0	24	00	00	00
15 0420	84	10	14	0.0	1.8	1.8	5	2	7	85	INDX	FOOT	1	4	0	0	20	31	60	40
15 0420	84	10	16	0.0	1.8	1.8	5	2	7	65	INDX	FOOT	4	0	0	0	23	00	00	00
15 0420	84	10	22	0.0	0.9	0.9	0	2	2	90	INDX	FOOT	4	0	0	0	20	33	60	40
15 0420	84	10	23	0.0	1.8	1.8	1	1	2	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	84	10	29	0.0	0.9	0.9	2	3	5	90	INDX	FOOT	4	0	0	0	20	00	00	40
15 0420	84	10	30	0.0	1.8	1.8	0	1	1	70	INDX	FOOT	4	0	0	0	31	00	00	00

Summer 1985

Reach - **River mile 0.0-1.8**
Estimate = 19
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data. Assumed curve started <10 days prior to Sept. 23 survey due to minimal number of dead on this survey, and 2) Small numbers of fish reduce potential accuracy of estimate, due to the large magnitude of even small census errors with the low numbers of fish present.

Original estimates: "Index (RM 0.0-1.8?)" = 23 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 6 (Index * 0.25), Total = 29.

Table 19 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	*85*	*9*	*23*	*0.0*	*1.8*	*1.8*	*11*	*1*	*12*	*90*	*INDX*	*FOOT*	*1*	*4*	*0*	*0*	*20*	*00*	*00*	*00*
15 0420	*85*	*10*	*1*	*0.0*	*1.8*	*1.8*	*9*	*1*	*10*	*90*	*INDX*	*FOOT*	*1*	*4*	*0*	*0*	*20*	*00*	*00*	*00*
15 0420	*85*	*10*	*9*	*0.0*	*1.8*	*1.8*	*0*	*2*	*2*	*90*	*INDX*	*FOOT*	*1*	*4*	*0*	*0*	*20*	*00*	*00*	*00*
15 0420	85	10	17	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	1	3	4	0	20	50	00	00
15 0420	85	10	29	0.0	1.8	1.8	0	0	0	65	INDX	FOOT	0	0	0	0	26	31	00	00

Summer 1986

Reach - **River mile 0.0-1.8**
Estimate = 20
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Small numbers of fish reduce potential accuracy of estimate, due to the large magnitude of even small census errors with the low numbers of fish present.

Original estimates: "Index (RM 0.0-1.8?)" = 20 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 5 (Index * 0.25). Total = 25.

Table 20: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	86	9	10	0.4	0.0	-0.4	0	0	0	90	SPOT	FOOT	0	0	0	0	00	00	00	00
15 0420	*86*	*9*	*18*	*0.3*	*1.8*	*1.5*	*1*	*0*	*1*	*99*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*20*	*00*	*00*	*00*
15 0420	*86*	*9*	*25*	*0.3*	*1.8*	*1.5*	*12*	*0*	*12*	*95*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*00*	*00*	*00*	*00*
15 0420	*86*	*10*	*6*	*0.0*	*1.8*	*1.8*	*7*	*1*	*8*	*95*	*INDX*	*FOOT*	*1*	*4*	*0*	*0*	*20*	*00*	*00*	*00*
15 0420	86	10	17	0.0	1.8	1.8	0	3	3	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	86	10	28	0.0	1.8	1.8	0	0	0	70	INDX	FOOT	4	0	0	0	21	31	00	00

Summer 1987

Reach - **River mile 0.0-1.8**
Estimate = 5
Method - Oct. 22 live + dead count.
Quality rating - Fair
Comments - None.

Original estimates: "Index (RM 0.0-1.8?)" = 20 (Educated guess), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 5 (Index * 0.25). Total = 25.

Table 21: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	87	9	24	0.3	1.8	1.5	0	2	2	90	INDX	FOOT	1	4	0	0	20	60	01	00
15 0420	87	10	6	0.3	1.8	1.5	1	3	4	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	87	10	22	0.3	1.8	1.5	3	2	5	90	INDX	FOOT	1	4	0	0	20	00	00	00

Summer 1988

Reach - **River mile 0.0-1.8**
Estimate = 23
Method - AUC
Quality rating - Good
Comments - Endpoint of AUC curve not defined by data, but range of possible completion points does not

results in large change in final estimate. However, small counts reduce potential accuracy of estimate, due to the large magnitude of even small census errors with the low numbers of fish present. Live fish observed on Oct. 20 are assumed to be fall chum.

Original estimates: "Index (RM 0.0-1.8?)" = 25 (AUC), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 6 (Index * 0.25). Total = 31.

Table 22: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	88	9	9	0.0	1.8	1.8	2	0	2	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0420	88	9	22	0.3	1.8	1.5	8	1	9	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0420	88	10	3	0.3	1.8	1.5	7	3	10	90	INDX	FOOT	1	4	0	0	61	00	00	00
15 0420	88	10	12	0.3	1.8	1.5	5	8	13	90	INDX	FOOT	1	4	0	0	20	61	00	00
15 0420	88	10	20	0.3	1.8	1.5	52	7	59	90	INDX	FOOT	1	4	0	0	20	61	00	00
15 0420	88	10	31	0.3	1.8	1.5	37	2	39	90	INDX	FOOT	4	0	0	0	20	61	00	00

Summer 1989

Reach - **River mile 0.0-1.8**
Estimate = 2
Method - Oct. 5 live + dead.
Quality rating - Good
Comments - Assumed fish observed on Oct. 30 survey were fall chum due to period of observation.

Original estimates: "Index (RM 0.0-1.8?)" = 3 (Unknown), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 1 (Index * 0.25). Total = 4:

Table 23: 1989 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	89	9	15	0.3	1.8	1.5	0	0	0	0	INDX	FOOT	0	0	0	0	20	60	00	00
15 0420	89	9	25	0.3	1.8	1.5	1	0	1	85	INDX	FOOT	4	0	0	0	20	60	00	00
15 0420	89	10	5	0.2	1.8	1.6	2	0	2	90	INDX	FOOT	1	4	0	0	20	60	00	00
15 0420	89	10	18	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	89	10	30	0.0	2.1	2.1	8	1	9	80	INDX	FOOT	4	0	0	0	21	00	00	00

Summer 1990

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - (Sept. 26, Oct. 6) live +dead.
Quality rating - Good
Comments - None.

Original estimate = 0

Table 24: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	90	9	26	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	90	10	8	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0420	90	10	26	0.0	1.8	1.8	0	0	0	70	INDX	FOOT	0	0	0	0	24	00	00	00

Summer 1991

Reach - **River mile 0.0-1.8**
Estimate = 31
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data, 2) Amplitude and timing of peak portion of AUC curve undefined by the data. Due to low dead count on first (Oct. 9) survey, it was assumed first fish entry was in late Sept. Also assumed first survey was peak of spawning, due to time period of this observation. All live chum observed on Oct. 28 survey were assumed to be fall chum, due to time period of observation.

Original estimates: "Index (RM 0.0-1.8?)" = 45 (Unknown), "Supplemental reach (Undefined, assumed to be RM 1.8 +)" = 11 (Index * 0.25). Total = 56.

Table 25: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	91	10	9	0.3	1.8	1.5	28	3	31	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	91	10	18	0.1	1.8	1.7	5	0	5	90	INDX	FOOT	4	0	0	0	20	60	00	00
15 0420	91	10	25	0.0	1.8	1.8	0	0	0	80	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	91	10	28	0.0	1.3	1.3	0	0	0	80	INDX[1]	FOOT	4	0	0	0	00	20	00	00
15 0420	91	10	28	0.3	1.8	1.5	18	0	18	75	INDX[2]	FOOT	4	0	0	0	20	60	61	00

Comments:
1) Conducted by WDFW coho survey crew
2) Conducted by WDFW chum survey crew

Summer 1992

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - (Sept. 2, 14, 22, Oct. 2, 8, 6, 16) live + dead.
Quality rating - Very good
Comments - Assumed all chum observed on Oct. 23 survey were fall chum, due to lack of fish observed up to this point, and apparent extirpation of summer chum run.

Original estimate = 0.

Table 26: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	92	9	2	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0420	92	9	14	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	61	00
15 0420	92	9	22	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	61	00
15 0420	92	10	2	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0420	92	10	8	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	1	4	20	48	60	00
15 0420	92	10	16	0.0	1.0	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	00	20	60	00
15 0420	92	10	23	0.3	1.8	1.5	21	0	21	90	INDX	FOOT	0	0	0	4	23	60	61	00

Notes:
Sept. 22, Oct. 8, 16 survey cards noted an impassable beaver dam at ~ river mile 1.0. Dam was open to fish passage by Sept. 23 survey.

Summer 1993

Reach - **River mile 0.0-1.8**
Estimate = 1
Method - (Sept. 15, 27, Oct. 5, 13, 22) live + dead.
Quality rating - Very good

Comments - None.

Original estimate = 0.

Table 27: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	93	9	15	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0420	93	9	27	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	0	0	0	0	31	60	61	00
15 0420	93	10	5	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	31	60	00
15 0420	93	10	13	0.3	1.8	1.5	0	1	1	95	INDX	FOOT	0	0	0	4	20	48	61	00
15 0420	93	10	22	0.3	1.0	0.7	0	0	0	95	INDX	FOOT	0	0	0	4	20	60	65	00

Notes:
Sept. 27, Oct. 5, 13 survey cards noted an impassable beaver dam at ~ river mile 1.0. Dam was modified for fish passage on Oct. 22.

Summer 1994

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - Sept. 14, 26, Oct. 14 live + dead.
Quality rating - Good
Comments - None.

Original estimate = 0.

Table 28: 1994 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	94	9	14	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0420	94	9	26	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	0	0	0	0	20	47	60	00
15 0420	94	10	14	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	00	00

Summer 1995

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - Sept. 13, 26, Oct. 17 live + dead.
Quality rating - Good
Comments - None.

Original estimate = 0.

Table 29: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	95	9	13	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0420	95	9	26	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	00	00
15 0420	95	10	17	0.3	1.8	1.5	0	0	0	60	INDX	FOOT	4	0	0	0	24	60	00	00

Notes:
Survey cards noted continued beaver dam construction activity around river mile 1.0. Dams were noted to have been removed between removed between Sept. 26 and Oct. 15 survey.

Summer 1996

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - (Sept. 6, 16, 23, Oct. 4) live + dead
Quality rating - Good
Comments - Fish observed on Oct. 15 survey were considered fall chum, due to absence of fish up to this point, and a indication of a strong early fall chum run to this stream, as suggested by the large number of chum observed on the Oct. 30 survey (1,196 live, 9 dead).

Original estimate = 0.

Table 30: 1996 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
15 0420	96	9	6	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	7	0	0	0	20	47	60	00
15 0420	96	9	16	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	7	0	0	0	20	00	00	00
15 0420	96	9	23	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0420	96	10	4	0.3	1.8	1.5	0	0	0	85	INDX	FOOT	0	0	0	0	20	34	00	00
15 0420	96	10	15	0.3	1.8	1.5	23	1	24	80	INDX	FOOT	4	0	0	0	23	60	61	00
15 0420	96	10	30	0.3	1.8	1.5	1,196	9	1,205	85	INDX	FOOT	4	0	0	0	23	31	33	00

Summer 1997

Reach - **River mile 0.0-1.8**
Estimate = 6
Method - (Sept. 8, 29) live.
Quality rating - Fair
Comments - Assumed fish observed on Oct. 13, 20, and 27 were early fall chum, due to lack of dead in either survey to indicate any spawning activity, and the absence of summer chum spawners during the parent brood years for this return year (1992-94). High flows throughout season may have drawn fall chum in early, as suggested by the observation of chinook and coho on the Oct 13 survey, which is unusual for this small stream, this early in the season.

Table 31: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0420	97	9	8	0.3	1.8	1.5	6	0	6	90	INDX	FOOT	1	4	0	0	20	60	61	00
15 0420	97	9	29	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	1	4	0	0	20	60	31	00
15 0420	97	9	29	0.6	1.8	1.2	0	1	1	0	SUPP	FOOT	4	6	0	0	21	31	51	00
15 0420	97	10	13	0.3	1.8	1.5	38	0	38	90	INDX	FOOT	1	3	4	0	23	60	61	00
15 0420	97	10	20	0.6	1.8	1.2	8	0	8	0	SUPP	FOOT	4	0	0	0	24	33	00	00
15 0420	97	10	27	0.3	1.8	1.5	35	0	35	90	INDX	FOOT	4	0	0	0	20	60	61	00

Summer 1998

Reach - **River mile 0.0-1.8**
Estimate = 12
Method - AUC
Quality rating - Fair
Comments - Curve defined OK by data, but low numbers of fish means there is potential for large **relative** error in estimation, due to difficulty of censusing small numbers of fish accurately. Endpoint ambiguous, due to fall chum overlap (assumed live on Oct. 16 were early fall chum).

Table 32: 1998 chum survey data through Nov. 3

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
15 0420	09/04/98	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	4	0	0	0	20			
15 0420	***09/15/98***	***0.3***	***1.8***	***1.5***	***0***	***0***	***0***	***95***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***20***			
15 0420	***09/24/98***	***0.3***	***1.8***	***1.5***	***9***	***0***	***9***	***95***	***INDX***	***FOOT***	***4***	***1***	***0***	***0***	***20***	***60***	***61***	
15 0420	***10/08/98***	***0.3***	***1.8***	***1.5***	***2***	***1***	***3***	***90***	***INDX***	***FOOT***	***4***	***1***	***0***	***0***	***20***	***60***	***61***	
15 0420	10/16/98	0.3	1.8	1.5	3	1	4	90	INDX	FOOT	1	4	0	0	20	61		
15 0420	10/26/98	0.3	1.8	1.5	40	1	41	95	INDX	FOOT	1	4	0	0	60	20		
15 0420	11/03/98	0.3	1.8	1.5	356	31	387	90	INDX	FOOT	1	4	0	0	20	61		

Notes:
09/24/98 – 3 active chum redds noted in lower 0.6 miles of river.
10/08/98 – 1 active chum redd noted in lower 0.6 miles of river.

Appendix 3 - Tahuya R. (WRIA 15.0446) summer chum natural spawning escapement summary

Introduction

This stream had one of the longer spawning habitat reaches accessible to summer chum in Hood Canal (stock is currently extirpated). The most commonly used summer chum spawning habitat in this stream was the river mile 0.3 - 1.0 reach, with low to moderate levels of spawning activity in the river mile 1.0 - 2.0 reach. The stream reach below river mile 0.3 is tidally influenced, with little suitable spawning habitat. The upper limit of typical summer chum usage was not well documented before extirpation of the population. A Sept. 27, 1973 survey observed 333 live and 15 dead summer chum in the river mile 6.5-7.5 reach. However, this observation is considered anomalous, and may even be an erroneously dated fall chum survey, or a result of some other data recording error. In the mid 1980s-to-present period beaver dams were frequently noted by WDFW spawning surveyors to impede fish passage upstream of ~ river mile 1.0-2.0. Fall chums have been observed up to river mile 20.0 (Nov. 24, 1986 spot check survey). Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate. First spawning surveys were conducted in late October.

Original estimate: "Index (RM 0.0 - 3.7)" = 3,964 (Peak L+D for surveyed reach * proportion of index reach surveyed - See attached notes), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 1,699 (Index * 0.429). Total = 5,663.

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	68	10	24	2.0	2.5	0.5	37	22	59	0	SUPP	FOOT	1	0	0	0	13	00	00	00
15 0446	68	10	31	0.0	0.2	0.2	200	16	216	0	INDX	FOOT	0	0	0	0	20	15	01	00
15 0446	68	10	31	6.5	7.5	1.0	6	41	47	0	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1969

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original estimate: "Index (RM 0.0 - 3.7)" = 1,284 [(sum of Dewatto escapements for 1968, 70-77 / sum Tahuya escapement for same time period) * year *X* Dewatto escapement - See attached notes], "Supplemental reach (Undefined, assumed to be 3.7 +)" = 550 (Index * 0.429). Total = 1,834.

Summer 1970

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate. Also, available survey data is for stream reaches at upper end or above the index reach.

Original estimate: "Index (RM 0.0 - 3.7)" = 2,747 (Peak L+D for surveyed reach * proportion of index reach surveyed - See attached notes), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 1,177 (Index * 0.429). Total = 3,924.

Table 2: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	70	9	24	3.0	4.0	1.0	337	26	363	90	SUPP	FOOT	1	4	0	0	23	13	00	00
15 0446	70	10	9	2.0	2.5	0.5	21	107	128	90	SUPP	FOOT	1	0	0	0	20	13	00	00

Summer 1971

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate. Available survey data is for a stream reach upstream of the current index reach. Any estimate derived for this short stream reach would represent a unknown proportion of the total spawning population.

Original estimate: "Index (RM 0.0 - 3.7)" = 2,903 (Peak L+D for surveyed reach * proportion of index reach surveyed - See attached notes), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 1,244 (Index * 0.429). Total = 4,147.

Table 3: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	71	9	30	3.0	4.0	1.0	360	29	389	90	SUPP	FOOT	0	0	0	0	13	00	00	00

Summer 1972

Reach - **River mile 0.0-1.9**
Estimate = 2,655
Method - Single survey expansion by a timing model - 1975 AUC run timing data
Quality rating - Poor
Comments - Used 1975 WRIA 15.0446 AUC run timing because has starting, peak, and ending periods that are typical for this population.

Original estimate: "Index (RM 0.0 - 3.7)" = 7,500 (Peak L+D for surveyed reach * proportion of index reach surveyed - See attached notes), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 3,214 (Index * 0.429), Total = 10,714.

Table 4: 1972 river mile 0.0-1.9 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	72	10	5	0.0	1.9	1.9	1,099	116	1,215	85	SUPP	FOOT	1	4	0	0	21	13	00	00

Reach - **River mile 1.9-3.1**
Estimate = 1,832
Method - Single survey expansion by a timing model - 1975 AUC run timing data
Quality rating - Poor
Comments - Used 1975 WRIA 15.0446 AUC run timing because has starting, peak, and ending periods that are typical for this population.

Table 5: 1972 river mile 1.9-3.1 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	72	9	27	1.9	3.1	1.2	951	8	959	90	SUPP	FOOT	1	4	0	0	20	13	00	00

Summer 1973

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate, and available survey data is for a stream reach far upstream of the current index reach.

Original estimates: "Index (RM 0.0 - 3.7)" = 2,260 [(sum of Dewatto escapements for 1968, 70-77 / sum Tahuya escapement for same time period) * year X Dewatto escapement - See attached notes], "Supplemental reach (Undefined, assumed to be 3.7 +)" = 969 (Index * 0.429). Total = 3,229.

Table 6: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	73	9	27	6.5	7.5	1.0	333	15	348	98	INDX	FOOT	1	0	0	0	00	00	00	00

Summer 1974

Reach - **River mile 0.0-3.7**
Estimate = 880
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of the peak spawning period is open to some interpretation. It was subjectively determined to be after the Oct. 1 survey, due to very low dead : live ratio on this survey, and the peak number of spawning fish was assumed to be slightly more than the live count on Oct. 1 (to be conservative). 2) Live chum observed Oct. 25 survey may be a mix of summer and fall chum, due to time period (they were assumed to be all summer chum when AUC curve was derived). 3) Oct. 1 (peak) survey lower end of survey reach is river mile 0.8. Hopefully this reflects surveyor stopping survey at bottom end of spawning distribution, so that fish were not missed (AUC estimate may be conservative if there were many fish below this point that were not censused) - The majority of fish were noted to be between river mile 1.0 and mouth in notes on some of survey cards. This was also noted to be best chum spawning habitat section by the surveyors.

Original estimates: "Index (RM 0.0 - 3.7)" = 1,330 (AUC), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 570 (index * 0.429). Total = 1,900.

Table 7: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	74	9	10	1.8	2.0	0.2	0	0	0	90	SUPP	FOOT	0	0	0	0	13	20	60	00
15 0446	74	9	19	0.3	2.3	2.0	46	0	46	60	SUPP	FOOT	0	0	0	0	31	60	00	00
15 0446	74	10	1	0.8	3.7	2.9	370	17	387	85	SUPP	FOOT	1	0	0	0	60	00	00	00
15 0446	74	10	25	0.0	0.3	0.3	0	0	0	95	INDX	HELI	0	0	0	0	14	11	01	00
15 0446	74	10	25	0.2	3.7	3.5	52	52	104	75	SUPP	FOOT	4	0	0	0	20	31	60	00

Summer 1975

Reach - **River mile 0.0-3.7**
Estimate = 1,389
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - This was considered a good quality estimate because the three available surveys define the start, peak, and endpoint areas of the AUC curve. Amplitude and peak of AUC curve is open to some possible interpretation, but significant variation from current design is unlikely unless run timing was strongly aberrant.

Original estimates: "Index (RM 0.0 - 3.7)" = 1,446 (AUC), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 620 (Index * 0.429). Total = 2,066.

Table 8: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	75	9	15	0.4	3.7	3.3	127	1	128	75	SUPP	FOOT	0	0	0	0	13	20	48	00
15 0446	75	9	30	0.0	3.7	3.7	744	188	932	80	SUPP	FOOT	0	0	0	0	00	00	00	00
15 0446	75	10	14	0.3	3.7	3.4	25	207	232	60	INDX	FOOT	1	0	0	0	12	23	31	00

Notes:
Sept. 19 survey card noted an impassable beaver dam at – river mile 3.5.

Summer 1976

Reach - **River mile 0.0-3.7**
Estimate = 2,788
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - AUC curve shape fairly well defined by 4 surveys. Endpoint not clearly defined by survey data, but this will have little effect on total estimate. Endpoint was derived by extending slope of line at Oct. 13 survey out to intersection with x-axis.

Majority of fish were noted to be downstream of river mile 2.9 on Oct. 13 survey card.

Original estimates: "Index (RM 0.0 - 3.7)" = 2,714 (AUC), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 1,163 (Index * 0.429). Total = 3,877.

Table 9: 1976 river mile 0.0-3.7 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	76	9	8	0.0	3.7	3.7	198	0	198	85	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	76	9	17	0.4	3.7	3.3	693	60	753	70	INDX	FOOT	0	0	0	0	31	00	00	00
15 0446	76	9	27	0.4	3.7	3.3	832	447	1,279	75	INDX	FOOT	0	0	0	0	00	00	00	00
15 0446	76	10	13	0.4	5.3	4.9	338	1,436	1,774	90	INDX	FOOT	1	4	0	0	20	61	00	00

Reach - **River mile 3.7-7.5**
Estimate = 412
Method - Sept. 27 river mile 3.7-7.5 survey live + dead.
Quality rating - Poor
Comments - Did not attempt to expand this observation with run timing data from lower stream reach, given peak spawning in upper reach appeared earlier in the river mile 3.7-7.5 reach than in river mile 0.0-3.7 reach, as indicated by dead : live ratio of 7:1 on Sept. 27 in this reach, vs. A 2:1 dead : live ratio for river mile 0.0-3.7 survey on same date.

Table 10: 1976 river mile 3.7-7.5 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	76	9	27	3.7	7.5	3.8	52	360	412	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1977

Reach - **River mile 0.0-3.7**
Estimate = 726
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Ascending section of AUC curve is probably conservative, due to use of actual live fish value from Sept. 26 survey as a starting point for AUC curve, even though this was a spot survey, and not a complete index count. Timing of peak spawning period open to some interpretation. Sept. 26 survey was subjectively assumed to be just before the peak of spawning because of low dead : live ratio on this date, and the much lower count on Oct. 5 survey suggested spawning peaked several days before Oct. 5.

Original estimates: "Index (RM 0.0 - 2.3)" = 912 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 391 (Index * 0.429). Total = 1,303.

Table 11: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	77	9	16	0.0	0.0	0.0	30	0	30	0	SPOT	FOOT	0	0	0	0	00	00	00	00
15 0446	77	9	26	0.0	1.0	1.0	407	3	410	80	INDX	FOOT	1	4	0	0	20	60	00	00
15 0446	77	9	26	1.0	2.3	1.3	92	3	95	80	INDX	FOOT	1	4	0	0	20	60	00	00
15 0446	77	10	5	0.3	3.7	3.4	147	45	192	85	INDX	FOOT	1	4	0	0	00	00	00	00
15 0446	77	10	12	0.0	2.3	2.3	33	25	58	80	INDX	FOOT	4	0	0	0	21	60	00	00

Summer 1978

Reach - **River mile 0.0-3.7**
Estimate = 266
Method - Curve model – 1975 AUC timing data
Quality rating - Fair
Comments - There was an old handwritten note in WDFW escapement files that stated PNPTC had a rack installed this year (for broodstock collection?). According to info on note rack was operated by PNPTC, starting Sept. 20 and running for 3 weeks, and was supposedly fish tight for all but one day. Nick L. at PNPTC was unable to locate documentation for this weir as of this date, so this estimate was not used.

Original estimates: "Index (RM 0.0 - 2.3)" = 250 (Rack), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 0 (No expansion used this year). Total = 250.

Table 12: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	78	9	27	0.3	3.7	3.4	138	17	155	65	INDX	FOOT	1	4	0	0	60	00	00	00

Summer 1979

Reach - **River mile 0.0-2.3**
Estimate = 117
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Ascending section of AUC curve is probably conservative, due to use of actual live fish value from Sept. 27 survey as a starting point for AUC curve, even though this was a spot survey, and not a complete index count. Timing and amplitude of peak period of AUC curve open to some interpretation. Assumed Oct. 2 survey was a few days before peak, due to dead : live ratio <1.

Sept. 27 survey card noted Port Gamble Tribe had a weir installed that was taking summer chums for a hatchery program. Norm documentation was found to date for this weir.

Original estimates: "Index (RM 0.0 - 2.3)" = 189 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 81 (Index * 0.429). Total = 270.

Table 13: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	79	9	27	1.9	0.0	-1.9	6	0	6	0	SPOT	FOOT	0	0	0	0	60	00	00	00
15 0446	79	10	2	0.0	2.3	2.3	69	26	95	90	INDX	FOOT	1	4	0	0	60	00	00	00
15 0446	79	10	18	0.2	2.3	2.1	22	6	28	80	INDX	FOOT	4	0	0	0	21	60	00	00
15 0446	79	11	1	0.0	2.3	2.3	0	0	0	90	INDX	FOOT	0	0	0	0	60	00	00	00

Summer 1980

Reach - **River mile 0.0-2.7**
Estimate = 178
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point, ascending section of AUC curve not defined by data (assumed a start point about 10 days prior to Oct. 3, due to limited number of dead on Oct. 3), 2) Amplitude and timing of peak portion of AUC curve not well defined, and 3) apparent overlap problem with fall run chum at end of AUC curve makes endpoint of summer AUC curve open to interpretation. Note the increasing live fish count of live fish on Oct. 29 that infers fall chum had begun to enter the river.

Original estimates: "Index (RM 0.0 - 2.7)" = 315 (AUC), "Supplemental reach (Undefined, assumed to be 2.7 +)" = 135 (Index * 0.429), Total = 450.

Table 14: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	80	10	3	0.2	2.7	2.5	77	7	84	70	INDX	FOOT	4	0	0	0	00	00	00	00
15 0446	80	10	16	0.2	2.7	2.5	45	51	96	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	80	10	23	0.2	2.7	2.5	35	72	107	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	80	10	29	0.3	2.7	2.4	83	29	112	85	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-2.7**
Estimate = 140
Method - (Sept. 22 + Oct. 16) live + dead counts
Quality rating - Poor
Comments - Both WDF and PNPTC conducted spawning surveys. Data could not be used for an AUC estimate. Many of surveys are spot checks, most of surveys were conducted after mid - October, survey mileage is inconsistent between surveys, and live counts are low and erratic.

Original estimates: "Index (RM 0.0 - 3.7)" = 358 (AUC), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 153 (Index * 0.429). Total = 511.

Table 15: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	***81***	***9***	***22***	***0.0***	***3.7***	***3.7***	***53***	***0***	***53***	***80***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***42***	***20***	***72***	***40***
15 0446	81	9	24	0.0	0.0	0.0	0	0	0	99	SPOT	FOOT	0	0	0	0	20	60	65	00
15 0446	81	9	24	0.2	0.0	-0.2	20	0	20	95	SPOT	FOOT	4	0	0	0	20	60	65	00
15 0446	81	9	24	1.9	0.0	-1.9	1	0	1	99	SPOT	FOOT	0	0	0	0	20	60	65	00
15 0446	81	9	24	2.9	0.0	-2.9	0	0	0	99	SPOT	FOOT	0	0	0	0	20	60	65	00
15 0446	81	10	6	0.0	1.7	1.7	0	0	0	10	INDX	FOOT	0	0	0	0	00	27	34	40
15 0446	***81***	***10***	***14***	***0.2***	***3.7***	***3.5***	***23***	***2***	***25***	***60***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***00***	***23***	***31***	***40***
15 0446	81	10	16	0.2	2.3	2.1	77	10	87	80	INDX	FOOT	0	0	0	4	00	00	00	00
15 0446	81	10	20	1.5	4.5	3.0	25	4	29	80	INDX	FOOT	4	0	0	0	00	06	20	40
15 0446	81	10	26	1.5	4.5	3.0	15	7	22	80	INDX	FOOT	4	0	0	0	00	06	20	40
15 0446	81	10	28	0.3	0.0	-0.3	0	0	0	0	SPOT	FOOT	0	0	0	0	28	39	00	00

Summer 1982

Reach - **River mile 0.0-2.3**
Estimate = 86
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data. Run was assumed to start in mid - September, since run entry typically starts in this period, and some dead fish were observed on Oct. 4 survey. 2) Timing and amplitude of peak region of AUC curve open to some interpretation. Oct. 4 survey was assumed to be peak point of abundance, due to this being the typical peak spawning period, and much lower Oct. 12 live count suggests a rapid decline in abundance between these surveys.

Original estimates: "Index (RM 0.0 - 2.3)" = 150 (Educated guess), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 64 (Index * 0.429), Total = 214.

Table 16: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	82	9	13	0.2	0.0	-0.2	0	0	0	95	SPOT	FOOT	0	0	0	0	20	00	00	00
15 0446	***82***	***10***	***4***	***0.1***	***2.3***	***2.2***	***52***	***13***	***65***	***90***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***00***	***00***	***00***
15 0446	***82***	***10***	***12***	***0.0***	***2.3***	***2.3***	***12***	***5***	***17***	***90***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***23***	***33***	***31***	***00***
15 0446	***82***	***10***	***21***	***0.3***	***3.7***	***3.4***	***9***	***9***	***18***	***75***	***INDX***	***FOOT***	***0***	***0***	***1***	***4***	***60***	***34***	***24***	***00***
15 0446	***82***	***10***	***27***	***0.3***	***2.3***	***2.0***	***2***	***2***	***4***	***85***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***33***	***31***	***23***	***00***

Summer 1983

Reach - **River mile 0.0-2.3**
Estimate = 86
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both WDF and PNPTC conducted spawning surveys. Used WDF data, due to inconsistencies in the tribal data - the tribal fish counts are consistently lower, even though the surveys cover one extra mile of spawning habitat. Used Sept. 20 survey as a starting point for AUC curve. This was a spot survey, so the starting point live fish value for the AUC curve is conservative.

Original estimates: "Index (RM 0.0 - 2.3)" = 101 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 43 (Index * 0.429). Total = 144.

Table 17: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	83	9	3	0.3	0.0	-0.3	0	0	0	70	SPOT	FOOT	0	0	0	0	60	00	00	00
15 0446	***83***	***9***	***20***	***0.3***	***0.0***	***-0.3***	***2***	***0***	***2***	***80***	***SPOT***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
15 0446	83	9	27	0.0	3.7	3.7	20	3	23	60	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	***83***	***9***	***28***	***0.2***	***2.7***	***2.5***	***31***	***3***	***34***	***90***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***20***	***31***	***53***	***00***
15 0446	83	10	4	0.0	3.7	3.7	28	7	35	70	INDX	FOOT	4	0	0	0	21	60	00	40
15 0446	***83***	***10***	***5***	***0.2***	***2.7***	***2.5***	***59***	***4***	***63***	***85***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
15 0446	83	10	11	0.0	3.7	3.7	27	4	31	80	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	83	10	18	0.0	3.7	3.7	3	5	8	80	INDX	FOOT	4	0	0	0	20	60	00	40
15 0446	***83***	***10***	***18***	***0.2***	***2.7***	***2.5***	***0***	***2***	***2***	***85***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
15 0446	83	10	25	0.0	3.7	3.7	2	2	4	80	INDX	FOOT	4	0	0	0	20	60	00	40
15 0446	83	10	25	0.2	2.7	2.5	0	1	1	85	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1984

Reach - **River mile 0.0-2.3**
Estimate = 142
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both WDF and PNPTC conducted spawning surveys. Used WDF data. All live fish observed on the Oct. 23 survey were assumed to be fall chums, due to increase in live count from Oct. 16 survey. Early November surveys continued to see similar numbers of live fish as the Oct. 23 survey.

Sept. 28 survey card noted most of spawning was observed between river mile 1.0-2.0, and no fish observed above river mile 2.0.

Original estimates: "Index (RM 0.0 - 3.7)" = 443 (AUC), "Supplemental reach (Undefined, assumed to be 3.7 +)" = 190 (Index * 0.429), Total = 633. Note that original AUC curve included all surveys through late November as summer chum.

Table 18: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	84	9	11	0.2	2.3	2.1	5	0	5	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0446	84	9	14	0.2	1.5	1.3	2	0	2	95	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	84	9	20	0.0	1.0	1.0	26	0	26	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	84	9	26	0.0	1.0	1.0	33	1	34	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	84	9	28	0.3	1.5	1.2	43	2	45	80	INDX	FOOT	4	0	0	0	20	31	60	40
15 0446	84	9	28	1.5	2.5	1.0	29	1	30	90	INDX	FOOT	1	4	0	0	20	31	60	40
15 0446	84	10	5	0.1	2.3	2.2	81	20	101	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	84	10	8	0.0	3.7	3.7	40	35	75	90	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	84	10	10	0.3	3.7	3.4	25	11	36	35	INDX	FOOT	1	4	0	0	34	60	00	40
15 0446	84	10	11	0.1	2.3	2.2	33	19	52	75	INDX	FOOT	1	4	0	0	23	00	00	00
15 0446	84	10	15	0.0	3.7	3.7	10	19	29	95	INDX	FOOT	4	0	0	0	60	00	00	40
15 0446	84	10	16	0.0	2.3	2.3	8	23	31	80	INDX	FOOT	1	4	0	0	23	00	00	00
15 0446	84	10	22	0.2	1.5	1.3	14	15	29	90	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	84	10	22	1.5	3.7	2.2	1	3	4	90	INDX	FOOT	4	0	0	0	20	60	00	40
15 0446	84	10	23	0.0	2.3	2.3	23	14	37	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	84	10	29	0.0	1.5	1.5	48	4	52	90	INDX	FOOT	4	0	0	0	20	00	00	40
15 0446	84	10	29	1.5	3.7	2.2	1	3	4	90	INDX	FOOT	4	0	0	0	20	00	00	40

Summer 1985

Reach - **River mile 0.0-2.3**
Estimate = 122
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Inconsistent length of coverage in surveys. 2) Ascending section of AUC curve undefined by survey data. A typical mid-September start of spawning was assumed. 3) First (peak) survey only covered RM 0.0-0.5 reach.

Original estimates: "Index (RM 0.0 - 2.3)" = 150 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 64 (Index * 0.429). Total = 214.

Table 19: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	85	9	23	0.0	0.5	0.5	73	2	75	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0446	85	10	1	0.0	2.3	2.3	31	6	37	90	INDX	FOOT	0	0	1	4	20	00	00	00
15 0446	85	10	9	0.3	2.3	2.0	27	5	32	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0446	85	10	17	0.5	1.8	1.3	3	6	9	75	INDX	FOOT	1	4	0	0	23	00	00	00

Summer 1986

Reach - **River mile 0.0-2.3**
Estimate = 109
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimates: "Index (RM 0.0 - 2.3)" = 107 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 46 (Index * 0.429), Total = 153.

Table 20: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	86	9	10	2.2	3.3	1.1	0	0	0	90	SUPP	FOOT	0	0	0	0	60	00	00	00
15 0446	86	9	18	0.2	2.3	2.1	5	0	5	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	86	9	25	0.2	1.8	1.6	40	1	41	90	INDX	FOOT	0	0	0	0	00	00	00	00
15 0446	86	10	3	0.3	2.3	2.0	50	16	66	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	86	10	10	0.2	2.3	2.1	38	10	48	90	INDX	FOOT	1	4	0	0	20	48	60	00
15 0446	86	10	17	0.2	2.3	2.1	8	6	14	90	INDX	FOOT	4	1	0	0	20	00	00	00
15 0446	86	10	28	0.2	2.3	2.1	11	2	13	70	INDX	FOOT	4	0	0	0	21	31	00	00

Notes: Sept. 10 and 18, Oct. 10 survey cards noted an impassable beaver dam at river mile 2.0.

Summer 1987

Reach - **River mile 0.0-2.3**
Estimate = 91
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Amplitude of peak open to some interpretation, but range of possible variation would not result in a major change in total estimate. Peak period of curve was derived by completion of line suggested by ascending and descending slopes of AUC curve.

Sept. 24 survey card noted all fish were observed downstream of river mile 1.0. Oct. 6 survey card noted all fish were downstream of beaver dams at river mile 2.0, and most of fish were observed below river mile 1.0.

Original estimates: "Index (RM 0.0 - 2.3)" = 99 (AUC), "Supplemental reach (Undefined, assumed to be 2.3 +)" = 42 (Index * 0.429). Total = 141.

Table 21: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	87	9	16	0.2	2.3	2.1	4	2	6	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	87	9	24	0.0	2.3	2.3	40	0	40	90	INDX	FOOT	4	0	0	0	20	60	61	00
15 0446	87	10	6	0.0	2.0	2.0	34	9	43	90	INDX	FOOT	4	0	0	0	20	60	00	00
15 0446	87	10	22	0.0	1.5	1.5	0	5	5	95	INDX	FOOT	4	0	0	0	20	00	00	00

Notes:
Sept. 16, 24, Oct. 6 survey cards noted an impassable beaver dam at river mile 2.0

Summer 1988

Reach - **River mile 0.0-2.3**
Estimate = 145
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Amplitude and timing of peak open to considerable interpretation. Typical parabolic run timing shape was assumed when interpolating peak section of AUC curve. Endpoint of summer chum spawning not clearly identifiable due to lack of a lack of a zero/near zero live count survey (live count increases between the Oct. 20 and Oct 31 surveys). All fish observed on Oct. 20 survey were assumed to be summer chum, and all fish on Oct. 31 survey fall chum. AUC curve was terminated in late October, following the slope of the line described by the Oct. 12 and Oct. 20 surveys to the x axis.

Oct. 2 and Oct. 20 survey cards noted most fish were downstream of river mile 1.0.

Original estimates: "Index (RM 0.0 - 2.6)" = 143 (AUC), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 61 (Index * 0.429). Total = 204.

Table 22: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
15 0446	88	9	9	0.2	0.0	-0.2	0	0	0	99	SPOT	FOOT	0	0	0	0	20	60	00	00
15 0446	88	9	22	0.3	2.6	2.3	30	3	33	90	INDX	FOOT	4	0	0	0	20	60	61	00
15 0446	88	10	12	0.0	2.6	2.6	40	69	109	85	INDX	FOOT	1	4	0	0	20	61	00	00
15 0446	88	10	20	0.0	2.6	2.6	17	23	40	80	INDX	FOOT	1	4	0	0	20	61	00	00
15 0446	88	10	31	0.0	2.6	2.6	54	16	70	90	INDX	FOOT	4	0	0	0	20	61	00	00

Notes:
Sept. 22 survey card noted numerous beaver dams upstream of river mile 2.0.

Summer 1989

Reach - **River mile 0.0-2.6**
Estimate = 9
Method - (Oct. 5 + Oct. 18) live + dead counts
Quality rating - Good
Comments - Very low fish counts make use of AUC method impractical. Sufficient number of surveys were conducted during season to document runsize was very small.

Oct. 18 survey card noted all fish were observed downstream of river mile 1.0.

Original estimates: "Index (RM 0.0 - 2.6)" = 9 (AUC), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 4 (Index * 0.429). Total = 13.

Table 23: 1989 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	89	9	15	0.0	2.6	2.6	0	0	0	80	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	89	9	25	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	89	9	29	0.0	2.6	2.6	0	0	0	0	INDX	FOOT	4	0	0	0	20	00	00	00
15 0446	89	10	5	0.0	2.6	2.6	4	1	5	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0446	89	10	18	0.0	2.6	2.6	4	0	4	90	INDX	FOOT	4	0	0	0	20	00	00	00

Notes:
Sept. 15 survey card noted two impassable beaver dams downstream of "the horse ranch bridge" (river mile 1.6).

Summer 1990

Reach - **River mile 0.0-2.6**
Estimate = 6
Method - (Sept. 26 + Oct. 8) live + dead counts.
Quality rating - Good
Comments - Very low fish counts make use of AUC method impractical. Sufficient number of surveys were conducted during season to document runsize was very small.

All fish noted to be downstream of river mile 1.0 on Sept. 26, Oct. 8 survey cards.

Original estimates: "Index (RM 0.0 - 2.6)" = 10 (Educated guess), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 4 (Index * 0.429). Total = 14.

Table 24: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	90	9	26	0.0	2.6	2.6	1	1	2	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	90	10	8	0.0	2.6	2.6	4	0	4	90	INDX	FOOT	4	0	0	0	20	61	00	00
15 0446	90	10	26	0.3	2.6	2.3	0	0	0	75	INDX	FOOT	0	0	0	0	23	00	00	00

Notes:
Sept. Oct. 8 survey card noted several beaver dams scattered through survey reach.

Summer 1991

Reach - **River mile 0.0-2.6**
Estimate = 5
Method - (Oct. 9 + Oct. 18) live + dead count
Quality rating - Fair
Comments - Very low fish counts make use of AUC method impractical. Sufficient number of surveys were conducted during season to document runsize was very small. A few fish may have been missed due to lack of Sept. surveys, but lack of dead on Oct. 9 survey, and generally very low runsizes in recent years suggests there would not have been a significant number of fish present in September.

Original estimates: "Index (RM 0.0 - 2.6)" = 15 (Educated guess), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 6 (Index * 0.429), Total = 21.

Table 25: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	91	10	9	0.0	2.6	2.6	5	0	5	90	INDX	FOOT	3	4	0	0	20	60	00	00
15 0446	91	10	18	0.3	2.6	2.3	0	0	0	85	INDX	FOOT	4	0	0	0	60	20	00	00
15 0446	91	10	28	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1992

Reach - **River mile 0.0-2.6**
Estimate = 0
Method - (Sept. 9, 22, Oct. 2, 8, and 16) live + dead counts.
Quality rating - Very good
Comments - Assumed all live fish observed on Oct. 23 survey were fall chums, due to lack of fish observed up to this date.

Original estimate = 0.

Table 26: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	92	9	2	0.2	2.6	2.4	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0446	92	9	22	0.1	2.6	2.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	92	10	2	0.2	2.6	2.4	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
15 0446	92	10	8	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	0	0	0	0	20	48	60	00
15 0446	92	10	16	0.0	1.7	1.7	0	0	0	95	INDX	FOOT	0	0	0	0	00	20	60	00
15 0446	92	10	23	0.0	1.7	1.7	20	0	20	85	INDX	FOOT	0	0	0	4	00	23	60	00

Notes:
Sept. 22 survey card noted impassable beavers dams at river mile 0.5 and 1.0.
Oct. 8 survey card noted impassable dams at river mile 1.0 and more dams upstream of this point.
Oct. 16 survey card noted dam was still present at river mile 1.0

Summer 1993

Reach - **River mile 0.0-1.2**
Estimate = 0
Method - (Sept. 15, 27, Oct. 5, 13, and 22) live + dead counts.
Quality rating - Very good
Comments - None.

Original estimate = 0.

Table 27: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	93	9	15	0.0	1.5	1.5	0	0	0	95	INDX	FOOT	0	0	0	0	00	20	60	00
15 0446	93	9	27	0.0	1.2	1.2	0	0	0	95	INDX	FOOT	0	0	0	0	00	60	31	00
15 0446	93	10	5	0.0	1.2	1.2	0	0	0	95	INDX	FOOT	0	0	0	0	00	20	60	00
15 0446	93	10	13	0.0	1.2	1.2	0	0	0	95	INDX	FOOT	0	0	0	0	20	31	00	00
15 0446	93	10	22	0.0	1.9	1.9	0	0	0	90	INDX	FOOT	0	0	0	4	20	60	00	00

Notes:
Sept. 5 survey card noted continued beaver activity at river mile 1.0 area.

Summer 1994

Reach - **River mile 0.0-2.6**
Estimate = 0
Method - (Sept. 14, 26, and Oct. 14) live + dead counts.
Quality rating - Good
Comments - None.

Original estimate = 0.

Table 28: 1994 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	94	9	14	0.0	2.6	2.6	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	94	9	26	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	0	0	0	4	20	47	60	00
15 0446	94	10	14	0.0	2.6	2.6	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00

Notes:
Beaver dam construction activity at ~ river mile 1.0 noted on Sept. 26 survey card, but they were considered passable by surveyors on both 26 and Oct. 14 survey cards .

Summer 1995

Reach - **River mile 0.0-2.6**
Estimate = 0
Method - (Aug. 17, Sept. 14, 26) live + dead counts.
Quality rating - Fair
Comments - Assumed fish observed on Oct. 17 and 25 were fall chums, due to apparent extirpation of summer chum run in recent years, and lack of dead on either of these surveys to indicate any spawning activity.

Original estimates: "Index (RM 0.0 - 2.6)" = 3 (Method not documented), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 1 (Index * 0.429). Total = 4.

Table 29: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	95	8	17	0.0	2.6	2.6	0	0	0	85	INDX	FOOT	4	7	0	0	20	60	00	00
15 0446	95	9	14	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	95	9	26	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	7	0	0	0	20	60	00	00
15 0446	95	10	17	0.2	2.6	2.4	3	0	3	70	INDX	FOOT	4	0	0	0	24	60	61	00
15 0446	95	10	25	0.0	2.6	2.6	32	0	32	70	INDX	FOOT	4	0	0	0	24	60	61	00

Notes:
Sept. 26 survey card noted beaver dam construction at ~ river mile 0.4. Surveyor modified dam to allow passage.

Summer 1996

Reach - **River mile 0.0-2.6**
Estimate = 5
Method - Live + dead Sept. 23 survey
Quality rating - Fair
Comments - Assumed fish observed on Oct. 15 were fall chum, due to zero count on Oct. 4 survey, lack of dead on Oct. 15 survey, and large number of fall chum observed in river in early November (3,547 live and 123 dead on Nov. 6).

All chum observed on Sept. 23 survey were noted to be in lower 0.5 miles of river. Oct. 15 survey card noted 3 of chum were observed upstream of river mile 1.0, 8 of chum below river mile 1.0.

Original estimates: "Index (RM 0.0 - 2.6)" = 5 (Educated guess), "Supplemental reach (Undefined, assumed to be 2.6 +)" = 2 (Index * 0.429). Total = 7.

Table 30: 1996 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	96	9	6	0.0	0.1	0.1	0	0	0	95	SPOT	FOOT	0	0	0	0	20	65	00	00
15 0446	96	9	16	0.0	2.6	2.6	0	0	0	95	INDX	FOOT	7	0	0	0	20	48	60	00
15 0446	***96***	***9***	***23***	***0.0***	***2.6***	***2.6***	***5***	***0***	***5***	***90***	***INDX***	***FOOT***	***4***	***7***	***0***	***0***	***20***	***00***	***00***	***00***
15 0446	96	10	4	0.0	2.6	2.6	0	0	0	80	INDX	FOOT	0	0	0	0	20	60	00	00
15 0446	96	10	15	0.0	2.6	2.6	11	0	11	85	INDX	FOOT	4	8	0	0	20	60	61	00

Notes:
Sept. 16 survey card noted an impassable beaver dam at ~ river mile 1.0.
Beaver dam at river mile 1.0 was noted to have been modified for fish passage on Oct. 4.

Summer 1997

Reach - **River mile 0.0-2.6**
Estimate = 0
Method - See comments
Quality rating - Fair
Comments - Lack of parent escapements, zero fish count on Sept. 8 lead to assumption of a zero escapement. Assumed all live fish observed on Oct. 17 survey were fall chum, due to lack of dead on survey to suggest spawning activity, and apparent extirpation of summer chum run.

Table 31: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0446	***97***	***9***	***8***	***0.0***	***0.0***	***0.0***	***0***	***0***	***0***	***90***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***00***	***20***	***60***	***00***
15 0446	97	10	17	0.0	2.6	2.6	4	0	4	85	INDX	FOOT	4	0	0	0	23	60	61	00

Summer 1998

Reach - **River mile 0.0-2.6**
Estimate = 0
Method - Live + dead
Quality rating - Fair
Comments - Assumed zero fish due to lack of fish observed in 4 surveys in Sept. 4-Oct. 8 time period. Assumed fish observed on Oct. 16 and 26 were early fall chum.

Table 32: 1998 chum survey data through Nov. 10

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
15 0446	*09/04/98*	*0.0*	*2.6*	*2.6*	*0*	*0*	*0*	*95*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*20*			
15 0446	*09/15/98*	*0.0*	*2.6*	*2.6*	*0*	*0*	*0*	*95*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*20*			
15 0446	*09/24/98*	*0.0*	*2.6*	*2.6*	*0*	*0*	*0*	*95*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*			
15 0446	*10/08/98*	*0.0*	*2.6*	*2.6*	*0*	*0*	*0*	*95*	*INDX*	*FOOT*	*4*	*1*	*0*	*0*	*20*			
15 0446	10/16/98	0.0	2.6	2.6	1	0	1	95	INDX	FOOT	4	0	0	0	20	61		
15 0446	10/26/98	0.3	2.6	2.3	9	0	9	95	INDX	FOOT	4	0	0	0	20	60	61	
15 0446	11/03/98	0.0	2.6	2.6	423	3	426	90	INDX	FOOT	4	0	0	0	20	60	61	
15 0446	11/10/98	0.0	2.6	2.6	1,450	21	1,471	80	INDX	FOOT					60			

Introduction

This stream has the early documented spawning timing of any stream in Hood Canal. Spawning frequently peaks in mid - September, which is usually only the start of significant summer chum entry for many Hood Canal streams. The majority of summer chum spawning appears to occur in the river mile 0.3-2.0 reach. Tidal influence extends up to about river mile 0.2, with little significant spawning habitat present in this reach. Chum have been observed up to the river mile 5.3-5.6 reach (One fish was observed in this upper stream reach on an Oct. 30, 1975 survey - unknown if this was a summer or fall chum). There is a small wooden dam that blocks further upstream chum passage at river mile 6.2, and a there is a waterfall at river mile 6.6 that is a historic anadromous fish barrier. No significant fish passage impediments have been noted by spawning survey crews in the mainstem downstream of the dam over the years, except for one report of a log jam on an Oct. 20, 1984 survey card note.

The estimates for the period 1972-1977, and 1979 to 1982 may be low to varying degrees, due to the fact the surveys usually only extended upstream to river mile 1.8 – historical survey data that was summarized in segmented sections (1978, 1983, 1984, 1985) shows that a fair portion of the total spawning activity can occur upstream of river mile 1.8. However, the ratio of spawning activity between the upper and lower reaches for these years is highly variable, and derivation of a set expansion factor would be prone to high variation, so no attempt was made the adjust the 1972-77, and 79-82 estimates upward. Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate. First spawning surveys were conducted in late October, well past the average peak spawning period for this stream.

Original estimate: Index (RM 0.0-1.8) = 152 (AUC), Supplemental (RM 1.8 +) = 17 (Index * 0.111). Total = 169.

Table 1: 1968 chum survey data through Oct. 22

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	68	10	19	0.3	1.8	1.5	62	33	95	0	INDX	FOOT	1	0	0	0	20	13	00	00
15 0503	68	10	22	6.0	6.5	0.5	24	8	32	0	SUPP	FOOT	0	0	0	0	21	00	00	00

Summer 1969

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original estimate: Index (RM 0.0-1.8) = 57 (derived from Dewatto escapement for 1969, see attached notes), Supplemental (RM 1.8 +) = 6 (Index * 0.111). Total = 63.

Summer 1970

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period. Fish observed on Oct. 26 survey were all assumed to be fall chum.

Original estimate: Index (RM 0.0-1.8) = 121 (derived from Dewatto escapement for 1970, see attached notes), Supplemental (RM 1.8 +) = 13 (Index * 0.111). Total = 134.

Table 2: 1970 summer chum survey data through Oct. 26

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	70	10	26	0.3	1.8	1.5	50	10	60	75	INDX	FOOT	1	4	0	0	22	13	00	00

Summer 1971

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original estimate: Index (RM 0.0-1.8) = 128 (derived from Dewatto escapement for 1971, see attached notes), Supplemental (RM 1.8 +) = 14 (Index * 0.111). Total = 142.

Summer 1972

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - The one available survey appears to have occurred considerably past the peak of spawning, given the high dead : live ratio, and the period the survey was conducted is well past the usual peak period for many years for this stream.

Original estimate: Index (RM 0.0-1.8) = 122 (AUC), Supplemental (RM 1.8 +) = 14 (Index * 0.111). Total = 136.

Table 3: 1972 summer chum survey data through Oct. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	72	10	5	0.3	1.8	1.5	21	46	67	95	INDX	FOOT	1	4	0	0	20	13	00	00
15 0503	72	10	5	1.8	2.3	0.5	5	14	19	90	SUPP	FOOT	1	0	0	0	20	00	00	00

Summer 1973

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to derive an estimate. First spawning survey was conducted in late October, well past the average peak spawning period for this stream.

Original estimate: Index (RM 0.0-1.8) = 100 (derived from Dewatto escapement for 1973, see attached notes), Supplemental (RM 1.8 +) = 11 (Index * 0.111). Total = 111.

Table 4: 1973 summer chum survey data through Oct. 17

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	73	10	17	0.3	1.6	1.3	0	8	8	90	INDX	FOOT	1	4	0	0	13	00	00	00

Summer 1974

Reach - **River mile 0.0-1.6**
Estimate = 68
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Only fair visibility on all of surveys (65-75 %). Amplitude of peak period of AUC curve open to some uncertainty because of this. 2) Descending section of AUC curve not defined by survey data. An typical mid-October end-date was selected for the AUC curve.

Original estimate: Index (RM 0.0-1.8) = 63 (AUC), Supplemental (RM 1.8 +) = 7 (Index * 0.111). Total = 70.

Table 5: 1974 chum survey data through Oct. 29

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	74	9	10	0.3	1.6	1.3	6	1	7	65	INDX	FOOT	0	0	0	0	13	20	31	00
15 0503	74	9	11	3.9	4.2	0.3	0	0	0	0	SUPP	FOOT	0	0	0	0	20	57	00	00
15 0503	74	9	19	0.4	1.6	1.2	20	2	22	75	INDX	FOOT	0	0	0	0	60	30	20	00
15 0503	74	10	1	0.4	1.6	1.2	21	11	32	70	SUPP	FOOT	1	0	0	0	06	00	00	00
15 0503	74	10	29	0.4	1.6	1.2	17	4	21	75	INDX	FOOT	0	0	0	0	31	00	00	00

Summer 1975

Reach - **RM 0.0-1.8**
Estimate = 84
Method - Average of 1974, 1976 escapements.
Quality rating - Poor
Comments - Escapements looked pretty stable for this period, so the assumption was made the it was similar to the surrounding years. Insufficient survey data for an estimate. Lack of fish observed in the Sept. 30 and Oct. 7 **spot** surveys suggests run was quite small though.

Original estimate: Index (RM 0.0-1.8) = 64 (derived from Dewatto escapement for 1973, see attached notes), Supplemental (RM 1.8 +) = 7 (Index * 0.111). Total = 71.

Table 6: 1975 chum survey data through Oct. 21

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	75	9	30	0.0	0.0	0.0	0	0	0	90	SPOT	FOOT	0	0	0	0	60	00	00	00
15 0503	75	10	7	0.0	0.0	0.0	0	1	1	90	SPOT	FOOT	0	0	0	0	00	00	00	00
15 0503	75	10	21	0.3	1.8	1.5	9	4	13	65	INDX	FOOT	4	0	0	0	31	00	00	00

Summer 1976

Reach - **River mile 0.0-1.9**
Estimate = 100
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined. Typical early September start period was assumed, due to presence of fair number of dead fish on Sept. 17 survey, which indicated a number of fish had been in the stream for over 10 days. 2) Amplitude and timing of peak period of AUC curve not well defined by survey data. Fairly high dead : live ratio suggests spawning should have peaked a little after Sept. 17. 3) Poor visibility (60 %) on peak survey (Sept. 17) introduced uncertainty about the amplitude of the peak section of the curve. 4) The Sept. 17 survey data suggests an unusual distribution of spawners, because the river mile 0.3-1.8 count is 21 live and 12 dead, while a short supplemental survey from river mile 1.8-1.9 observed 20 live, and 3 dead.

Original estimate: Index (RM 0.0-1.8) = 53 (AUC), Supplemental (RM 1.8 +) = 6 (Index * 0.111). Total = 59.

Table 7: 1976 chum survey data through Oct. 1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	76	9	17	0.3	1.8	1.5	21	12	33	50	INDX	FOOT	1	0	0	0	30	31	60	00
15 0503	76	9	17	1.8	1.9	0.1	20	3	23	60	SUPP	FOOT	0	0	0	0	30	31	00	00
15 0503	76	10	1	0.3	1.8	1.5	7	14	21	80	INDX	FOOT	1	4	0	0	31	60	50	00
15 0503	76	10	1	1.8	2.3	0.5	3	3	6	70	SUPP	FOOT	1	0	0	0	60	00	00	00

Summer 1977

Reach - **River mile 0.0-1.8**
Estimate = 75
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by survey data. A typical early Sept. start of spawning was assumed. 2) Amplitude and timing of peak period of spawning not well defined. A typical peak of spawning around ~ Sept. 20 was assumed. 4) Only fair visibility (70 %) on peak survey introduced further uncertainty to amplitude of curve peak.

Original estimate: Index (RM 0.0-1.8) = 68 (AUC), Supplemental (RM 1.8 +) = 8 (Index * 0.111). Total = 76.

Table 8: 1977 chum survey data through Oct. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
15 0503	77	9	26	0.0	1.8	1.8	30	20	50	70	INDX	FOOT	0	0	0	0	20	33	60	00
15 0503	77	10	5	0.0	1.8	1.8	8	33	41	90	INDX	FOOT	4	0	0	0	20	31	60	00

Summer 1978

Reach - **River mile 0.0-1.8**
Estimate = 35
Method - Single survey expansion by a timing model - 1997 AUC timing data
Quality rating - Poor
Comments - Used 1997 AUC timing data. This was considered a typical example of spawning timing for this stream.

Original estimate: Index (RM 0.0-1.8) = 89 (AUC), Supplemental (RM 1.8 +) = 10 (Index * 0.111). Total = 99.

Table 9: 1979 chum survey data for stream reach river mile 0.0-1.8 through Oct. 13

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	78	9	13	0.3	1.8	1.5	18	2	20	70	INDX	FOOT	0	0	0	0	00	00	00	00

Reach - **River mile 1.8 +**
Estimate = 29
Method - (Live + dead Sept. 11 survey) + (live + dead Oct. 9 survey)
Quality rating - Poor
Comments - Minimal estimate.

Table 10: 1978 chum survey data for stream reach > river mile 1.8 through Oct. 9

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	78	9	11	5.3	5.4	0.1	1	2	3	99	SUPP	FOOT	0	0	0	0	20	60	00	00
15 0503	78	9	15	5.3	6.0	0.7	0	3	3	90	SUPP	FOOT	0	0	0	0	00	00	00	00
15 0503	78	10	9	1.8	3.0	1.2	1	24	25	85	SUPP	FOOT	0	0	0	0	20	60	00	00

Summer 1979

Reach - **RM 0.0-1.8**
Estimate = 90
Method - Average of 1977, 78, 80, 81 escapements.
Quality rating - Poor
Comments - Same rationale as 1975 escapement estimation method. No survey data collected during summer chum spawning period.

Original estimate: Index (RM 0.0-1.8) = 50 (Educated guess), Supplemental (RM 1.8 +) = 6 (Index * 0.111). Total = 56.

Table 11: 1979 chum survey data through Oct. 26

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	79	10	26	0.3	1.6	1.3	3	2	5	50	INDX	FOOT	1	0	0	0	25	60	53	00

Summer 1980

Reach - **River mile 0.0-1.8**
Estimate = 208
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point of AUC curve not defined by data. A typical early September start point was used. 2) Amplitude and timing of peak spawning period open to some interpretation. Peak period of spawning was

assumed to fall in-between the Sept. 18 and Oct. surveys, due to decline in observed live between these two surveys. 3) Endpoint of AUC curve not defined by data. A typical second week of October endpoint to spawning was assumed.

Original estimate: Index (RM 0.0-1.8) = 217 (AUC), Supplemental (RM 1.8 +) = 24 (Index * 0.111). Total = 241.

Table 12: 1980 chum survey data through Oct. 24

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	***80***	***9***	***18***	***0.3***	***1.8***	***1.5***	***93***	***25***	***118***	***85***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***00***	***00***	***00***	***00***
15 0503	***80***	***10***	***1***	***0.3***	***1.8***	***1.5***	***47***	***18***	***65***	***80***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***00***	***00***	***00***	***00***
15 0503	80	10	24	0.3	1.8	1.5	0	18	18	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-1.8**
Estimate = 41
Method - Sept. 24 live + dead count.
Quality rating - Poor
Comments - The first two surveys only covered river mile 0.0-0.3 reach (it is unknown why these two surveys were conducted only in this short stream reach). Almost no chum were observed on these surveys, but there may have been fish unaccounted for upstream in the typical spawning reach from RM 0.3-1.8. This is suggested by the zero count on Sept. 21 in the river mile 0.0-0.3 reach, followed by a 31 live, 10 dead survey on Sept. 24 in the RM 0.3-1.8 reach (the presence of a fair number of dead fish suggests fish had been present in this reach for at least several days). Therefore, the Sept. 14 and Sept. 21 surveys are probably not suitable for guidance in drawing an AUC curve. Very short stream life is suggested by survey data. There was 31 live and 10 dead observed on Sept. 24 survey, and only 1 live and 5 dead on Oct. 5 survey. An AUC curve cannot be rendered for this data that gives a solution much different from the peak live + dead count, without assuming the presence of more fish in mid – September than indicated by the Sept. 14 and 21 surveys, and using a shorter stream life than 10 days. Live fish observed on Oct. 28 were assumed to be fall run chum.

Original estimate: Index (RM 0.0-1.8) = 57 (AUC), Supplemental (RM 1.8 +) = 6 (Index * 0.111). Total = 63.

Table 13: 1981 chum survey data through Oct. 28

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	81	9	14	0.0	0.3	0.3	2	0	2	95	SUPP	FOOT	4	0	0	0	20	00	00	40
15 0503	81	9	21	0.0	0.3	0.3	0	0	0	50	INDX	FOOT	1	0	0	0	00	28	31	40
15 0503	***81***	***9***	***24***	***0.3***	***1.8***	***1.5***	***31***	***10***	***41***	***90***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***24***	***31***	***00***	***00***
15 0503	81	10	5	0.3	1.8	1.5	1	5	6	95	INDX	FOOT	4	0	0	0	11	23	31	40
15 0503	81	10	15	5.3	6.0	0.7	0	0	0	85	SUPP	FOOT	4	0	0	0	20	32	00	00
15 0503	81	10	19	0.3	1.8	1.5	0	2	2	85	INDX	FOOT	4	0	0	0	20	31	00	40
15 0503	81	10	20	0.4	1.6	1.2	0	4	4	60	INDX	FOOT	0	4	0	3	00	00	00	00
15 0503	81	10	28	0.3	1.8	1.5	12	1	13	35	INDX	FOOT	4	0	0	0	30	00	00	40

Summer 1982

Reach - **RM 0.0-1.8**
Estimate = 153
Method - Average of 1980, 81, 83, 84 escapements.
Quality rating - Poor
Comments - There is no recorded spawning survey data available for September, which is the typical major spawning period for this stream.

Original estimate: Index (RM 0.0-1.8) = 38 (AUC), Supplemental (RM 1.8 +) = 4 (Index * 0.111). Total = 42.

Table 14: 1982 chum survey data through Oct. 27

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	82	10	5	0.3	1.8	1.5	3	5	8	85	INDX	FOOT	1	4	0	0	20	33	60	00
15 0503	82	10	12	0.3	1.8	1.5	11	12	23	90	INDX	FOOT	1	4	0	0	20	31	33	00
15 0503	82	10	19	0.3	1.8	1.5	2	5	7	80	INDX	FOOT	0	0	1	4	20	31	33	00
15 0503	82	10	27	0.3	1.8	1.5	10	5	15	85	INDX	FOOT	4	0	0	0	24	31	33	00

Summer 1983

Reach - **River mile 0.0-1.8**
Estimate = 156
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Slight ambiguity about timing and amplitude of peak spawning period. AUC curve was derived with assumption peak was right after Sept. 20 (peak) survey, given dead : live ratio was still considerably below 1:1 on Sept. 20.

Original estimate: Index (RM 0.0-1.8) = 180 (AUC), Supplemental (RM 1.8 +) = 20 (Index * 0.111). Total = 200.

Table 15: 1983 chum survey data through Oct. 31 for river mile 0.0-1.8

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	83	9	8	0.6	0.0	-0.6	0	0	0	70	SPOT	FOOT	0	0	0	0	60	00	00	00
15 0503	83	9	20	0.0	1.8	1.8	105	35	140	80	INDX	FOOT	0	0	0	0	21	00	00	00
15 0503	83	9	28	0.3	1.8	1.5	29	59	88	90	INDX	FOOT	1	0	0	0	20	00	00	00
15 0503	83	10	5	0.3	1.8	1.5	4	3	7	85	INDX	FOOT	1	0	0	0	20	00	00	00
15 0503	83	10	5	0.3	1.8	1.5	13	48	61	65	INDX	FOOT	1	0	0	0	21	00	00	40
15 0503	83	10	5	1.9	0.0	-1.9	0	0	0	95	SPOT	FOOT	0	0	0	0	20	60	00	00
15 0503	83	10	12	0.3	1.8	1.5	1	10	11	85	INDX	FOOT	1	4	0	0	20	00	00	00
15 0503	83	10	18	0.3	1.8	1.5	7	10	17	85	INDX	FOOT	1	0	0	0	20	31	00	00
15 0503	83	10	25	0.3	1.8	1.5	1	9	10	95	INDX	FOOT	0	0	0	4	20	00	00	00
15 0503	83	10	31	0.3	1.8	1.5	2	0	2	75	INDX	FOOT	1	4	0	0	31	00	00	00

Reach - **River mile 1.8-3.0**
Estimate = 14
Method - Oct. 21 live + dead count
Quality rating - Poor
Comments - Minimal estimate.

Table 16: 1983 chum survey data through Oct. 21 for river mile 1.8-3.0

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	83	10	21	1.8	3.0	1.2	0	14	14	65	SUPP	FOOT	1	4	0	0	31	00	00	40

Summer 1984

Reach - **River mile 0.0-1.8**
Estimate = 110
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both WDF and PNPTC collected spawning survey data. Used WDF data because there were more data points than in PNPTC data set. Some ambiguity about ascending section of AUC curve, since the Sept. 5 **spot** survey probably didn't account for all of the chum present. However, it was used as the start point for the AUC curve, lacking other information. There are some inconsistencies between PNPTC and WDF data on peak survey counts (WDF Sept. 19 survey observed 50 live and 29 dead, while PNPTC survey on Sept. 21 observed 83 live and 14 dead).

All live fish observed on Oct. 23 and Oct. 30 surveys were assumed to be fall chum, due to assumption that the extremely low live fish count on Oct. 16 marked the end of summer chum spawning period.

Original estimate: Index (RM 0.0-1.8) = 245 (AUC), Supplemental (RM 1.8 +) = 27 (Index * 0.111). Total = 272.

Table 17: 1984 chum survey data through Oct. 30 for river mile 0.0-1.8

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	84	9	5	1.3	0.0	-1.3	4	0	4	0	SPOT	FOOT	0	0	0	0	13	24	00	00
15 0503	84	9	11	0.3	1.8	1.5	54	8	62	95	INDX	FOOT	0	0	0	0	20	00	00	00
15 0503	84	9	19	0.3	1.8	1.5	50	29	79	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0503	84	9	21	0.0	0.3	0.3	0	0	0	99	INDX	FOOT	0	0	0	0	20	31	00	40
15 0503	84	9	21	0.3	1.8	1.5	83	14	97	90	INDX	FOOT	0	0	0	0	20	31	00	40
15 0503	84	9	28	0.3	2.3	2.0	18	64	82	85	INDX	FOOT	4	0	0	0	20	00	00	00
15 0503	84	10	1	0.3	1.8	1.5	17	66	83	70	INDX	FOOT	4	0	0	0	20	31	00	40
15 0503	84	10	5	0.3	2.3	2.0	2	33	35	85	INDX	FOOT	1	4	0	0	20	00	00	00
15 0503	84	10	9	0.3	1.8	1.5	2	27	29	75	INDX	FOOT	4	0	0	0	20	60	00	40
15 0503	84	10	11	0.3	2.3	2.0	6	16	22	40	INDX	FOOT	1	0	0	0	31	24	00	00
15 0503	84	10	16	0.3	1.8	1.5	1	12	13	75	INDX	FOOT	4	0	0	0	21	00	00	40
15 0503	84	10	18	0.3	1.8	1.5	1	14	15	90	INDX	FOOT	4	0	0	0	20	00	00	00
15 0503	84	10	23	0.3	1.8	1.5	9	11	20	85	INDX	FOOT	4	0	0	0	21	60	00	40
15 0503	84	10	23	0.3	1.8	1.5	5	6	11	85	SUPP	FOOT	4	0	0	0	20	00	00	00
15 0503	84	10	30	0.3	1.8	1.5	44	2	46	65	SUPP	FOOT	4	0	0	0	20	00	00	00
15 0503	84	10	30	0.3	1.8	1.5	53	4	57	70	INDX	FOOT	4	0	0	0	20	00	00	40
15 0503	84	10	30	1.8	3.0	1.2	0	2	2	90	INDX	FOOT	4	0	0	0	20	00	00	40

Notes:
Oct. 20 survey card noted a fish passage blockage (logjam?) at ~ river mile 0.8

Reach - **River mile 1.8-3.0**
Estimate = 84
Method - Oct. 1 live + dead count, Oct. 9 live count
Quality rating - Poor
Comments - All surveys were apparently conducted considerably past the peak spawning period in this reach, as evidenced by the high dead : live ratio on the first and subsequent surveys, so survey data was of limited utility, beyond a minimal estimate based on live + dead counts.

Table 18: 1984 chum survey data through Oct. 23 for river mile 1.8-3.0

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	84	9	21	1.8	3.0	1.2	13	59	72	95	INDX	FOOT	0	0	0	0	20	31	00	40
15 0503	***84***	***10***	***1***	***1.8***	***3.0***	***1.2***	***6***	***76***	***82***	***75***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***31***	***00***	***40***
15 0503	***84***	***10***	***9***	***1.8***	***3.0***	***1.2***	***2***	***26***	***28***	***75***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***60***	***00***	***40***
15 0503	84	10	16	1.8	3.0	1.2	0	11	11	90	INDX	FOOT	4	0	0	0	20	60	00	40
15 0503	84	10	23	1.8	3.0	1.2	0	2	2	85	INDX	FOOT	4	0	0	0	21	60	00	40

Summer 1985

Reach - **River mile 0.0-1.8**
Estimate = 249
Method - Single survey expansion by a timing model - 1997 AUC timing data
Quality rating - Poor
Comments - The 1997 run is considered a typical example of spawning timing for this stream.

Original estimate: Index (RM 0.0-1.8) = 66 (AUC), Supplemental (RM 1.8 +) = 7 (Index * 0.111). Total = 73.

Table 19: 1985 chum survey data through Oct. 3 for river mile 0.0-2.3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	***85***	***9***	***19***	***0.0***	***1.8***	***1.8***	***140***	***64***	***204***	***85***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***00***	***00***	***00***	***00***
15 0503	85	10	3	0.4	2.3	1.9	9	132	141	90	SUPP	FOOT	1	4	0	0	20	00	00	00

Reach - **River mile 1.8+**
Estimate = 85
Method - Live + dead on Oct. 10 survey
Quality rating - Poor
Comments - All surveys were apparently considerably past the peak spawning period is this reach, as evidenced by the high dead : live ratio on the Oct. 10 survey. Data was unsuitable for any further expansion - the highest live + dead count (Oct. 10) was used as a minimal estimate.

Table 20: 1985 chum survey data through Oct. 30 for river mile 1.8+

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	***85***	***10***	***10***	***1.8***	***3.3***	***1.5***	***0***	***85***	***85***	***90***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
15 0503	85	10	18	0.3	2.5	2.2	1	0	1	75	INDX	FOOT	1	3	4	0	20	00	00	00
15 0503	85	10	30	5.3	6.0	0.7	1	0	1	65	SUPP	FOOT	4	0	0	0	24	31	00	00

Summer 1986

Reach - **River mile 0.0-2.3**
Estimate = 1,892
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point of AUC curve not defined by data. A late August start point was assumed, due to the presence of some dead fish on first survey on Sept. 9. 2) Amplitude and timing of peak open to some interpretation. However potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate.

Original estimate: Index (RM 0.0-2.3) = 1,759 (AUC), Supplemental (RM 2.3 +) = 195 (Index * 0.111). Total = 1,954.

Table 21: 1986 chum survey data through Oct. 29

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	86	9	9	0.1	2.3	2.2	485	46	531	90	INDX	FOOT	4	1	0	0	20	00	00	00
15 0503	86	9	19	0.1	2.3	2.2	786	320	1,106	90	INDX	FOOT	1	0	0	0	00	00	00	00
15 0503	86	10	2	0.2	2.3	2.1	164	493	657	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0503	86	10	8	0.2	2.3	2.1	125	472	597	95	INDX	FOOT	1	4	5	0	20	00	00	00
15 0503	86	10	16	0.3	2.1	1.8	40	485	525	90	INDX	FOOT	1	4	0	0	20	00	00	00
15 0503	86	10	29	0.3	2.1	1.8	9	19	28	80	INDX	FOOT	4	0	0	0	24	31	70	00

Summer 1987

Reach - **River mile 0.0-2.1**
Estimate = 497
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Slight potential for variation in interpretation of timing and amplitude of AUC curve.

Original estimate: Index (RM 0.0-2.1) = 560 (AUC), Supplemental (RM 2.1 +) = 62 (Index * 0.111). Total = 622.

Table 22: 1987 chum survey data through Oct. 6

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	87	9	1	0.3	2.1	1.8	35	4	39	90	INDX	FOOT	4	0	0	0	00	00	00	00
15 0503	87	9	16	0.3	2.1	1.8	287	44	331	90	INDX	FOOT	1	4	0	0	20	60	00	00
15 0503	87	9	24	0.3	2.1	1.8	108	103	211	90	INDX	FOOT	1	3	4	0	20	00	00	00
15 0503	87	10	6	0.3	2.1	1.8	8	84	92	95	INDX	FOOT	1	0	0	0	20	60	00	00

Summer 1988

Reach - **River mile 0.0-2.1**
Estimate = 629
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Ascending section of AUC curve undefined by data. Assumed late August start period, due to the presence of some dead fish on first (Sept. 8) survey that indicated some fish had been in the stream over 10 days. 2) Amplitude of peak open to some interpretation. However potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate.

Original estimate: Index (RM 0.0-2.1) = 630 (AUC), Supplemental (RM 2.1 +) = 70 (Index * 0.111). Total = 700.

Table 23: 1988 chum survey data through Oct. 28

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	88	9	8	0.3	2.1	1.8	248	20	268	99	INDX	FOOT	1	0	0	0	20	00	00	00
15 0503	88	9	19	0.3	2.1	1.8	208	155	363	85	INDX	FOOT	1	4	5	0	20	61	00	00
15 0503	88	9	28	0.3	2.1	1.8	67	119	186	90	INDX	FOOT	1	0	0	0	61	00	00	00
15 0503	88	10	6	0.3	2.1	1.8	15	192	207	80	INDX	FOOT	1	4	0	0	20	61	00	00
15 0503	88	10	18	0.3	2.1	1.8	12	93	105	85	INDX	FOOT	1	4	0	0	20	61	00	00
15 0503	88	10	28	0.3	2.1	1.8	2	13	15	90	INDX	FOOT	1	4	0	0	20	00	00	00

Summer 1989

Reach - **River mile 0.0-2.1**
Estimate = 450
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Ascending section of AUC curve undefined by data. Assumed late August start period, due to the presence of some dead fish on first (Sept. 6) survey that indicated some fish had been in the stream over 10 days.

Original estimate: Index (RM 0.0-2.1) = 469 (AUC), Supplemental (RM 2.1 +) = 52 (Index * 0.111). Total = 521.

Table 24: 1989 chum survey data through Oct. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	89	9	6	0.3	2.1	1.8	126	11	137	0	INDX	FOOT	1	0	0	0	20	00	00	00
15 0503	89	9	15	0.3	2.1	1.8	209	85	294	0	INDX	FOOT	1	3	0	0	20	00	00	00
15 0503	89	9	25	0.3	2.1	1.8	97	16	113	85	INDX	FOOT	1	0	0	0	20	60	00	00
15 0503	89	10	5	0.3	2.1	1.8	15	115	130	90	INDX	FOOT	1	3	4	0	20	60	00	00

Summer 1990

Reach - **River mile 0.0-2.1**
Estimate = 275
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair / Good
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data. Assumed late August start period, due to the presence of some dead fish on first (Sept. 6) survey that indicated some fish had been in the stream over 10 days. 2) Amplitude and timing of peak open to some interpretation. Shape of peak portion of curve derived from attempt to fit a "normal" curve shape though the three available data points.

Original estimate: Index (RM 0.0-2.1) = 273 (AUC), Supplemental (RM 2.1 +) = 30 (Index * 0.111). Total = 303.

Table 25: 1990 chum survey data through Oct. 8

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	90	9	6	0.3	2.1	1.8	96	4	100	90	INDX	FOOT	1	0	0	0	20	60	00	00
15 0503	90	9	18	0.3	2.1	1.8	115	39	154	90	INDX	FOOT	1	4	0	0	20	45	61	00
15 0503	90	9	28	0.3	2.1	1.8	18	40	58	85	INDX	FOOT	1	4	0	0	20	60	61	00
15 0503	90	10	8	0.3	2.1	1.8	1	65	66	85	INDX	FOOT	1	4	0	0	20	61	00	00

Summer 1991

Reach - **River mile 0.0-2.1**
Estimate = 208
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair/Good
Comments - Start point of AUC curve not defined by data. Assumed a typical late August start period. Potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate.

Original estimate: Index (RM 0.0-2.1) = 206 (AUC), Supplemental (RM 2.1 +) = 23 (Index * 0.111). Total = 229.

Table 26: 1991 chum survey data through Oct. 18

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	91	9	9	0.3	2.1	1.8	60	5	65	85	INDX	FOOT	0	0	0	0	21	60	00	00
15 0503	91	9	18	0.3	2.1	1.8	96	34	130	90	INDX	FOOT	1	3	5	0	20	31	00	00
15 0503	91	9	27	0.3	2.1	1.8	18	29	47	75	INDX	FOOT	1	3	5	0	60	61	21	00
15 0503	91	10	7	0.3	2.1	1.8	30	41	71	85	INDX	FOOT	1	3	5	0	60	20	00	00
15 0503	91	10	16	0.3	2.1	1.8	2	14	16	80	INDX	FOOT	1	4	0	0	20	00	00	00

Summer 1992

Reach - **River mile 0.0-2.1**
Estimate = 140
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC curve not defined by data. Assumed a typical late August start period. However potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate.

Assumed live fish observed on Oct. 16 survey were all fall chum, due to low live count (3 live) on Oct. 8 that indicated conclusion of summer chum spawning activity, and increasing survey counts after Oct. 16 survey that indicated arrival of fall fish.

Original estimate: Index (RM 0.0-2.1) = 139 (no documentation), Supplemental (RM 2.1 +) = 15 (Index * 0.111). Total = 154.

Table 27: 1992 chum survey data through Oct. 23

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	92	9	2	0.3	2.1	1.8	34	1	35	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0503	92	9	14	0.3	2.1	1.8	65	24	89	85	INDX	FOOT	0	0	0	1	20	60	61	00
15 0503	92	9	23	0.3	2.1	1.8	14	11	25	70	INDX	FOOT	0	0	0	0	21	60	61	00
15 0503	92	10	8	0.3	2.1	1.8	3	20	23	85	INDX	FOOT	0	0	0	4	20	60	61	00
15 0503	92	10	16	0.3	2.1	1.8	11	17	28	90	INDX	FOOT	0	0	0	0	20	61	00	00
15 0503	92	10	23	0.3	2.1	1.8	96	7	103	75	INDX	FOOT	0	0	0	0	24	00	00	00

Summer 1993

Reach - **River mile 0.0-2.1**
Estimate = 251
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimate: Index (RM 0.0-2.1) = 256 (AUC), Supplemental (RM 2.1 +) = 28 (Index * 0.111). Total = 284.

Table 28: 1993 chum survey data through Oct. 20

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	93	8	23	0.3	2.1	1.8	3	0	3	90	INDX	FOOT	0	0	0	0	20	60	61	00
15 0503	93	9	1	0.3	2.1	1.8	29	7	36	95	INDX	FOOT	0	0	0	1	20	61	00	00
15 0503	93	9	10	0.3	2.1	1.8	72	22	94	80	INDX	FOOT	0	0	0	0	20	61	00	00
15 0503	93	9	21	0.3	2.1	1.8	69	43	112	85	INDX	FOOT	0	0	0	0	20	60	61	00
15 0503	93	9	30	0.3	2.1	1.8	31	50	81	85	INDX	FOOT	1	3	4	0	20	00	00	00
15 0503	93	10	5	0.3	2.1	1.8	33	43	76	90	INDX	FOOT	0	0	0	1	20	31	61	00
15 0503	93	10	13	0.3	2.1	1.8	19	38	57	90	INDX	FOOT	1	3	4	5	20	31	61	00
15 0503	93	10	20	0.3	2.1	1.8	3	27	30	90	INDX	FOOT	0	0	0	4	20	31	60	00

Summer 1994

Reach - **River mile 0.0-2.1**
Estimate = 738
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC curve not defined by data. Assumed a late August start period, due to slope of line defined by the Sept. 6 and Sept. 16 surveys. Amplitude and timing of AUC curve open to some interpretation. However potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate.

Original estimate: Index (RM 0.0-2.1) = 727 (AUC), Supplemental (RM 2.1 +) = 81 (Index * 0.111). Total = 808.

Table 29: 1994 chum survey data through Oct. 17

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	94	9	6	0.3	2.1	1.8	143	5	148	90	INDX	FOOT	0	0	0	1	20	31	60	00
15 0503	94	9	16	0.3	2.1	1.8	308	51	359	95	INDX	FOOT	4	0	0	0	20	61	00	00
15 0503	94	9	30	0.3	2.1	1.8	91	151	242	90	INDX	FOOT	1	4	5	0	20	61	60	00
15 0503	94	10	7	0.3	2.1	1.8	38	106	144	85	INDX	FOOT	0	1	4	5	20	60	61	00
15 0503	94	10	17	0.3	2.1	1.8	22	86	108	90	INDX	FOOT	0	1	4	5	20	60	61	00

Summer 1995

Reach - **River mile 0.0-2.1**
Estimate = 721
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - None.

Original estimate: Index (RM 0.0-2.1) = 762 (AUC), Supplemental (RM 2.1 +) = 85 (Index * 0.111). Total = 847.

Table 30: 1995 chum survey data through Oct. 24

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	95	8	17	0.3	2.1	1.8	2	0	2	80	INDX	FOOT	4	7	0	0	24	60	61	00
15 0503	95	8	30	0.3	2.1	1.8	190	2	192	85	INDX	FOOT	3	5	0	0	23	60	61	00
15 0503	95	9	11	0.3	2.1	1.8	264	97	361	90	INDX	FOOT	1	3	4	0	20	60	61	00
15 0503	95	9	26	0.3	2.1	1.8	53	106	159	95	INDX	FOOT	1	4	0	0	20	60	61	00
15 0503	95	10	13	0.3	2.1	1.8	11	9	20	80	INDX	FOOT	4	0	0	0	21	60	61	00
15 0503-	95	10	24	0.3	2.1	1.8	89	10	99	90	INDX	FOOT	4	0	0	0	21	60	61	00

Summer 1996

Reach - **River mile 0.0-2.1**
Estimate = 494
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Some ambiguity about amplitude of peak portion of AUC curve. No definitive endpoint survey. AUC curve was completed around Oct. 20, based on typical situation that summer chum spawning in this river is almost always completed by Oct. 20 at the latest.

Original estimate: Index (RM 0.0-2.1) = 497 (AUC), Supplemental (RM 2.1 +) = 55 (Index * 0.111). Total = 552.

Table 31: 1996 chum survey data through Oct. 30

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	96	8	16	0.3	2.1	1.8	4	0	4	90	INDX	FOOT	0	0	0	0	20	60	00	00
15 0503	96	8	23	0.3	2.1	1.8	13	0	13	90	INDX	FOOT	5	0	0	0	20	60	61	00
15 0503	96	9	3	0.3	2.1	1.8	158	11	169	90	INDX	FOOT	1	4	0	0	20	34	60	00
15 0503	96	9	13	0.3	2.1	1.8	175	60	235	90	INDX	FOOT	1	4	5	0	20	60	61	00
15 0503	96	9	20	0.3	2.1	1.8	79	77	156	90	INDX	FOOT	0	0	0	0	21	00	00	00
15 0503	96	10	1	0.3	2.1	1.8	42	63	105	85	INDX	FOOT	0	0	0	0	20	00	00	00
15 0503	96	10	8	0.3	2.1	1.8	46	41	87	95	INDX	FOOT	4	8	0	0	20	61	00	00
15 0503	98	10	30	5.3	6.0	0.7	2	0	2	80	SUPP	FOOT	0	0	0	0	20	32	00	00

Summer 1997

Reach - **River mile 0.0-2.1**
Estimate = 410
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Slight potential for interpretation of amplitude and timing of peak of AUC curve. However, potential range of variation in shape of AUC curve will result in only proportionally small variation in final estimate. Oct. 23 live are assumed to be fall fish. Aug. 29 survey not used because it was a volunteer group survey.

Table 32: 1997 chum survey data through Oct. 28

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
15 0503	97	8	25	0.3	1.2	0.9	1	0	1	90	INDX	FOOT	1	0	0	0	00	20	00	00
15 0503	97	8	25	1.6	2.1	0.5	0	0	0	90	INDX	FOOT	1	0	0	0	00	20	60	00
15 0503	97	8	29	0.0	1.8	1.8	1	0	1	0	INDX	FOOT	1	0	0	0	11	23	31	00
15 0503	97	9	2	0.3	2.1	1.8	11	1	12	90	INDX	FOOT	1	3	0	0	20	60	00	00
15 0503	97	9	9	0.3	2.1	1.8	124	1	125	90	INDX	FOOT	1	0	0	0	20	60	61	00
15 0503	97	9	15	0.3	2.1	1.8	211	15	226	80	INDX	FOOT	1	0	0	0	21	31	61	00
15 0503	97	9	22	0.0	1.8	1.8	48	15	63	0	INDX	FOOT	4	0	0	0	15	24	32	00
15 0503	97	9	25	0.3	2.1	1.8	48	75	123	90	INDX	FOOT	1	4	0	0	21	60	61	00
15 0503	97	10	17	0.3	2.1	1.8	11	3	14	85	INDX	FOOT	4	0	0	0	23	61	00	00
15 0503	97	10	23	0.0	1.8	1.8	2	2	4	0	SUPP	FOOT	4	0	0	0	23	33	70	00
15 0503	97	10	28	0.3	2.1	1.8	20	3	23	90	INDX	FOOT	0	0	0	0	20	61	00	00

Summer 1998

Reach - **River mile 0.0-2.1**
Estimate = 223
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - No survey data prior to first of the two peaks in abundance required guesstimating the ascending section of the curve from typical expected early fish entry timing, and the lack of a supplemental survey upstream of the index leaves some ambiguity as to potential spawning activity in the river mile 1.8+ reach (although it is typically a small portion of total escapement).

Table 33: 1998 chum survey data through Nov. 5

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
15 0503	***09/01/98***	***0.3***	***2.1***	***1.8***	***74***	***3***	***77***	***95***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***60***	***61***	
15 0503	***09/09/98***	***0.3***	***2.1***	***1.8***	***42***	***20***	***62***	***95***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***60***	***61***	
15 0503	***09/17/98***	***0.3***	***2.1***	***1.8***	***74***	***25***	***99***	***95***	***INDX***	***FOOT***	***4***	***1***	***0***	***0***	***20***	***60***	***61***	
15 0503	***09/25/98***	***0.3***	***2.1***	***1.8***	***42***	***19***	***61***	***90***	***INDX***	***FOOT***	***4***	***3***	***1***	***0***	***20***	***60***	***61***	
15 0503	***10/07/98***	***0.3***	***2.1***	***1.8***	***14***	***10***	***24***	***95***	***INDX***	***FOOT***	***4***	***3***	***1***	***0***	***20***	***60***	***61***	
15 0503	10/14/98	0.3	2.1	1.8	27	3	30	65	INDX	FOOT	4	1	0	0	24	60	61	
15 0503	10/20/98	0.3	2.1	1.8	67	0	67	95	INDX	FOOT	4	1	0	0	20	61		
15 0503	10/28/98	0.3	2.1	1.8	453	29	482	85	INDX	FOOT					60	20		
15 0503	11/05/98	0.3	2.1	1.8	1,726	71	1,797	65	INDX	FOOT	4	0	0	0	24	60	61	

Notes:
09/01/98 – Card noted "surprisingly good flow"

Introduction

The anadromous reach in this stream is quite short, only extending up to a large waterfall at river mile 0.7. The primary spawning area for chum salmon extends from approximately river mile 0.4 to 0.7. The stream reach below this point is primarily very low gradient and tidally influenced, with limited suitable spawning habitat. Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original escapement estimate = 4,247 [(sum Lilliwaup for 1972,74-77)/(sum Dewatto for 1972, 74-77) * Dewatto for year X]

Summer 1969

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original escapement estimate = 918 [(sum Lilliwaup for 1972,74-77)/(sum Dewatto for 1972, 74-77) * Dewatto for year X]

Summer 1970

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original escapement estimate = 4,046 [(sum Lilliwaup for 1972,74-77)/(sum Dewatto for 1972, 74-77) * Dewatto for year X]

Summer 1971

Reach - **River mile 0.4-0.7**
Estimate = 318
Method - Oct. 29 dead count.
Quality rating - Poor
Comments - Considerable numbers of the dead summer chum may have decayed or been washed out of stream by this point. Also, the survey did not include the stream reach that carcasses would commonly be deposited in significant numbers (lower 0.4 miles of stream). Live chums observed on this survey were assumed to be fall chums due to date of observation.

Original escapement estimate = 3,094 [(sum Lilliwaup for 1972,74-77)/(sum Dewatto for 1972, 74-77) * Dewatto for year X]

Table 1: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	71	10	29	0.4	0.7	0.3	6	318	324	99	SUPP	FOOT	1	0	0	0	12	20	00	00

Summer 1972

Reach - **River mile 0.0-0.7**
Estimate = 716
Method - Single survey expansion by a timing model
Quality rating - Poor
Comments - Used 1988 AUC curve timing because dead : live ratio for the Sept. 25 time period in the 1988 AUC curve was similar to the Sept. 25 survey observation for this year.

Original escapement estimate = 1,022 (AUC).

Table 2: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	72	9	25	0.4	0.7	0.3	310	3	313	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1973

Reach - **N/A**
Estimate = No estimate available
Method - N/A
Quality rating - N/A
Comments - No survey data collected during summer chum spawning period.

Original escapement estimate = 1,616 [(sum Lilliwaup for 1972,74-77)/(sum Dewatto for 1972, 74-77) * Dewatto for year X]

Summer 1974

Reach - **River mile 0.0-0.3**
Estimate = 616
Method - Oct. 16 live + dead count X 2 (arbitrary expansion based on concept that surveys only covered one half of spawning area).
Quality rating - Poor
Comments - Neither of the two surveys conducted during October covered the major spawning reach at river mile 0.4-0.7. This is therefore a very minimal estimate of total abundance at best. All live fish observed on Oct. 28 were considered fall chums due to the date of observation.

Original escapement estimate = 814 (AUC).

Table 3: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	74	10	16	0.0	0.3	0.3	208	100	308	98	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	74	10	28	0.0	0.3	0.3	171	136	307	95	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1975

Reach - **River mile 0.0-0.7**
Estimate = 706
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Amplitude and timing of peak somewhat ambiguous, but possible range of variation in peak portion of AUC curve only results in a maximum variation from current value of < ~20 %.

Original escapement estimate = 844 (AUC).

Table 4: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	75	9	8	0.0	0.7	0.7	2	0	2	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	75	9	23	0.0	0.7	0.7	290	7	297	95	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	75	10	8	0.0	0.7	0.7	168	92	260	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	75	10	24	0.0	0.7	0.7	20	24	44	90	INDX	FOOT	0	0	0	0	23	00	00	00

Summer 1976

Reach - **River mile 0.0-0.7**
Estimate = 1,612
Method - Single survey expansion by a timing model - 1978 AUC timing data
Quality rating - Poor
Comments - Used 1878 timing data, with Sept. 21, 1976 live count because the two 1976 surveys suggested a similar spawning pattern to 1978. Sept. 21 survey card commented spawning had "apparently peaked" already, which fits in with pattern observed in Hood Canal this year - spawning terminated in early October 1976 on other Hood Canal streams that had more complete spawning survey data.

Original escapement estimate = 2,206 (AUC).

Table 5: 1976 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	76	9	13	0.2	0.7	0.5	411	11	422	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	76	9	21	0.0	0.7	0.7	763	147	910	95	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1977

Reach - **River mile 0.0-0.7**
Estimate = 420
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Large (29 days) gap between second and third surveys. 2) Amplitude and timing of peak region of AUC curve ambiguous because of problem #1, and 3) Descending limb of AUC curve mostly undefined by data, except for some indication of mid - October spawning activity (Oct. 17 survey). Curve was subjectively derived from knowledge of spawning patterns for other years.

Original escapement estimate = 532 (AUC).

Table 6: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	77	9	13	0.4	0.7	0.3	58	1	59	85	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	77	9	18	0.0	0.7	0.7	196	67	263	90	INDX	FOOT	1	0	0	0	00	00	00	00
16 0230	77	10	17	0.1	0.7	0.6	24	115	139	98	INDX	FOOT	1	3	0	0	12	20	60	00

Summer 1978

Reach - **River mile 0.0-0.7**
Estimate = 1,331
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Five surveys to define data, but amplitude of peak somewhat ambiguous. However, possible range of variation in peak portion of AUC curve only results in a maximum variation from current value of < ~20 %. Assumed live fish observed on Oct. 25 survey were fall chum due to time period of survey observation.

Original escapement estimate = 1,365 (AUC).

Table 7: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	78	9	5	0.2	0.7	0.5	110	0	110	95	INDX	FOOT	4	0	0	0	00	00	00	00
16 0230	78	9	19	0.2	0.7	0.5	529	67	596	80	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	78	10	5	0.0	0.7	0.7	108	317	425	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	78	10	11	0.0	0.7	0.7	24	377	401	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	78	10	18	0.0	0.7	0.7	4	430	434	90	INDX	FOOT	1	0	0	0	00	00	00	00
16 0230	78	10	25	0.0	0.7	0.7	33	181	214	90	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-0.7**
Estimate = 163
Method - Single survey expansion by a timing model - 1978 AUC timing data
Quality rating - Poor
Comments - Since only one survey was conducted during period of significant spawning activity, data was insufficient to draw an AUC curve that isn't largely subjective. Used 1878 timing data because the two 1976 surveys suggested a similar spawning pattern to 1978.

Original escapement estimate = 180 (AUC).

Table 8: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	79	9	20	0.2	0.7	0.5	76	21	97	85	INDX	FOOT	3	0	0	0	00	00	00	00
16 0230	79	10	10	0.0	0.7	0.7	2	25	27	95	INDX	FOOT	0	0	0	0	20	60	00	00
16 0230	79	10	15	0.1	0.7	0.6	0	8	8	90	INDX	FOOT	0	0	0	0	60	00	00	00
16 0230	79	10	24	0.1	0.7	0.6	0	0	0	30	INDX	FOOT	0	0	0	0	31	00	00	00

Summer 1980

Reach - **River mile 0.0-0.7**
Estimate = 247
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good

Comments - Start point of AUC curve not defined by data, but range of possible alternative start points (used "educated guess" for start point of curve derivation) does not significantly influence final estimate.

Original escapement estimate = 273 (AUC).

Table 9: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	80	9	15	0.2	0.7	0.5	44	0	44	90	INDX	FOOT	4	0	0	0	00	00	00	00
16 0230	80	9	25	0.0	0.6	0.6	72	5	77	99	INDX	FOOT	4	0	0	0	20	00	00	00
16 0230	80	10	7	0.2	0.7	0.5	88	33	121	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	80	10	17	0.2	0.7	0.5	16	69	85	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-0.7**
Estimate = 293
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Both WDF and PNPTC conducted spawning surveys. Used WDF data due to greater consistency in length of stream reach surveyed, and timing of surveys. Start point of AUC curve not clearly defined by data. A typical mid-September start point was assumed, based on lack of fish observed on Sept. 16 PNPTC survey.

Original escapement estimate = 492 (AUC).

Table 10: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	81	9	16	0.0	0.0	0.0	0	0	0	86	SPOT	FOOT	0	0	0	0	21	57	00	40
16 0230	81	9	16	0.0	0.5	0.5	0	0	0	99	SUPP	FOOT	0	0	0	0	21	57	00	40
16 0230	81	9	17	0.0	0.3	0.3	78	8	86	90	INDX	FOOT	4	0	0	0	00	00	00	40
16 0230	81	9	23	0.1	0.7	0.6	147	19	166	85	INDX	FOOT	3	0	0	0	00	00	00	00
16 0230	81	9	24	0.0	0.2	0.2	62	0	62	95	SUPP	FOOT	0	0	0	0	20	00	00	40
16 0230	81	10	1	0.2	0.7	0.5	139	54	193	90	INDX	FOOT	3	4	0	0	00	00	00	00
16 0230	81	10	2	0.0	0.2	0.2	22	25	47	95	SUPP	FOOT	0	0	0	0	20	00	00	40
16 0230	81	10	8	0.0	0.2	0.2	0	36	36	95	SUPP	FOOT	0	0	0	0	23	00	00	40
16 0230	81	10	15	0.0	0.2	0.2	0	20	20	95	SUPP	FOOT	0	0	0	0	20	00	00	40
16 0230	81	10	19	0.3	0.7	0.4	2	20	22	80	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	81	10	22	0.0	0.3	0.3	0	28	28	95	SUPP	FOOT	0	0	0	0	20	00	00	40
16 0230	81	10	29	0.0	0.2	0.2	0	0	0	80	INDX	FOOT	4	0	0	0	23	30	00	40

Summer 1982

Reach - **River mile 0.0-0.7**
Estimate = 84
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - None.

Original escapement estimate = 100 (Educated guess).

Table 11: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	82	9	14	0.2	0.7	0.5	10	1	11	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	82	9	27	0.1	0.7	0.6	39	7	46	99	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	82	10	15	0.2	0.7	0.5	7	11	18	90	INDX	FOOT	0	0	0	0	21	31	60	00

Summer 1983

Reach - **River mile 0.0-0.7**
Estimate = 18
Method - Sept. 29 live + dead + Oct. 12 live
Quality rating - Poor
Comments - Low numbers of fish observed and limited number of surveys make attempting an AUC estimate questionable, due to irregularities that are typically present in entry patterns of low runsizes.

Original escapement estimate = 50 (Educated guess).

Table 12: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	83	9	29	0.0	0.7	0.7	11	4	15	85	INDX	FOOT	3	4	0	0	20	60	00	00
16 0230	83	10	12	0.0	0.7	0.7	3	12	15	95	INDX	FOOT	1	3	0	0	20	00	00	00
16 0230	83	10	19	0.0	0.7	0.7	0	12	12	95	INDX	FOOT	3	0	0	0	20	00	00	00

Summer 1984

Reach - **River mile 0.0-0.7**
Estimate = 187
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Six surveys to define AUC curve, but lack of a clearly defined start date and data to support ascending limb of AUC curve prevented a "very good" rating.

Original escapement estimate = 217 (AUC).

Table 13: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	84	9	7	0.5	0.0	-0.5	0	0	0	99	SPOT	FOOT	0	0	0	0	20	00	00	00
16 0230	84	9	24	0.0	0.7	0.7	83	9	92	99	INDX	FOOT	4	0	0	0	20	00	00	00
16 0230	84	10	1	0.0	0.7	0.7	77	28	105	99	INDX	FOOT	4	0	0	0	20	00	00	00
16 0230	84	10	8	0.0	0.7	0.7	60	51	111	99	INDX	FOOT	1	0	0	0	20	00	00	00
16 0230	84	10	15	0.0	0.7	0.7	16	22	38	99	INDX	FOOT	4	0	0	0	20	00	00	00
16 0230	84	10	22	0.0	0.7	0.7	1	27	28	99	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	84	10	29	0.0	0.7	0.7	0	26	26	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1985

Reach - **River mile 0.0-0.7**
Estimate = 92
Method - Single survey expansion by a timing model - 1988 AUC timing data
Quality rating - Poor
Comments - Timing of run assumed to be similar to 1988, as indicated by low dead : live ratio on Oct. survey that indicated spawning hadn't peaked yet. Used Oct. 3, 1985 live count for expansion.

Original escapement estimate = 81 (AUC).

Table 14: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	85	10	3	0.0	0.7	0.7	39	15	54	99	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	85	10	14	0.3	0.7	0.4	6	21	27	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-0.7**
Estimate = 97
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Only the starting point of run is not clearly defined by data. Amplitude of peak is slightly ambiguous. Potential range of variation in either factor will have little effect on estimate. All fish observed on Oct. 30 were considered fall chum due to time period of observation.

Original escapement estimate = 102 (AUC).

Table 15: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	86	9	16	0.0	0.7	0.7	19	2	21	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	86	9	22	0.1	0.7	0.6	48	1	49	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0230	86	10	1	0.1	0.7	0.6	38	19	57	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	86	10	7	0.2	0.7	0.5	13	31	44	95	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	86	10	15	0.3	0.7	0.4	6	31	37	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	86	10	21	0.0	0.2	0.2	4	19	23	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0230	86	10	30	0.0	0.3	0.3	3	1	4	70	INDX	FOOT	0	0	0	0	27	30	38	00

Summer 1987

Reach - **River mile 0.0-0.7**
Estimate = 32
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - AUC curve was drawn flat between first and second data points because dead count on Sept. 30 survey suggest all fish from the first survey on Sept. 15 had died, and the Sept. 30 live count suggested about the same number of new fish had moved in since that time. Starting point of run open to some interpretation. A "professional guess" was used for start point of AUC curve.

Original escapement estimate = 40 (AUC).

Table 16: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	87	9	3	0.3	0.7	0.4	0	0	0	90	INDX	FOOT	3	0	0	0	00	00	00	00
16 0230	87	9	15	0.3	0.7	0.4	10	0	10	99	INDX	FOOT	3	0	0	0	20	00	00	00
16 0230	87	9	30	0.4	0.7	0.3	11	11	22	95	INDX	FOOT	3	0	0	0	00	00	00	00
16 0230	87	10	9	0.3	0.7	0.4	7	7	14	99	INDX	FOOT	3	0	0	0	20	00	00	00

Summer 1988

Reach - **River mile 0.0-0.7**
Estimate = 275
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Exact start and end periods open to some interpretation. Start and endpoints were derived by following slope of the line through the first and last survey data points to intersection with the x-axis. The starting and ending dates described by this process were consistent with typical start and end dates for this stream. All live fish observed on Oct. 26 survey were assumed to be fall chum, due to time period of observation.

Original escapement estimate = 268 (AUC).

Table 17: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	88	9	16	0.0	0.7	0.7	39	0	39	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0230	88	9	27	0.0	0.7	0.7	124	12	136	90	INDX	FOOT	0	0	0	0	61	00	00	00
16 0230	88	10	4	0.0	0.7	0.7	103	33	136	90	INDX	FOOT	4	0	0	0	61	00	00	00
16 0230	88	10	13	0.0	0.7	0.7	32	83	115	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0230	88	10	26	0.0	0.7	0.7	4	33	37	95	INDX	FOOT	4	0	0	0	20	60	61	00

Summer 1989

Reach - **River mile 0.0-0.7**
Estimate = 43
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Slight ambiguity in start timing (assumed 2 days after Sept. 8 – no dead were observed on Sept. 18 survey, so it was assumed fish entry had started < 10 days ago) and endpoint of run (used a typical endpoint - Oct. 20).

Original escapement estimate = 43 (AUC).

Table 18: 1989 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	89	9	8	0.0	0.7	0.7	0	0	0	80	INDX	FOOT	3	0	0	0	20	00	00	00
16 0230	89	9	18	0.0	0.7	0.7	9	0	9	95	INDX	FOOT	3	0	0	0	20	00	00	00
16 0230	89	9	28	0.0	0.7	0.7	18	1	19	80	INDX	FOOT	3	0	0	0	20	60	00	00
16 0230	89	10	9	0.3	0.7	0.4	10	7	17	90	INDX	FOOT	1	3	4	0	20	00	00	00
16 0230	89	10	20	0.0	0.7	0.7	0	2	2	70	INDX	FOOT	3	4	0	0	20	60	00	00

Summer 1990

Reach - **River mile 0.0-0.7**
Estimate = 2
Method - Oct. 9 live + dead count.
Quality rating - Fair
Comments - No surveys conducted in September. It is possible a few spawners were missed. All fish observed on Oct. 31 survey were assumed to be fall chum, due to date of survey.

Original escapement estimate = 5 (Educated guess).

Table 19: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	***90***	***10***	***9***	***0.0***	***0.7***	***0.7***	***2***	***0***	***2***	***90***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***61***	***60***	***00***
16 0230	90	10	17	0.0	0.7	0.7	0	0	0	75	INDX	FOOT	4	0	0	0	60	23	00	00
16 0230	90	10	25	0.6	0.7	0.1	0	0	0	35	INDX	FOOT	0	0	0	0	00	24	00	00
16 0230	90	10	31	0.0	0.7	0.7	35	0	35	75	INDX	FOOT	4	0	0	0	23	61	00	00

Summer 1991

Reach - **River mile 0.0-0.7**
Estimate = 30
Method - (Sept. 18 + Oct. 16) live + dead counts
Quality rating - Poor
Comments - AUC method not used because of insufficient number of surveys per unit of time, and lack of surveys during typical period of peak spawning in early October to document spawning activity during this period.

Original escapement estimate = 79 (AUC).

Table 20: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	***91***	***9***	***18***	***0.0***	***0.7***	***0.7***	***15***	***0***	***15***	***90***	***INDX***	***FOOT***	***3***	***0***	***0***	***0***	***61***	***20***	***31***	***00***
16 0230	***91***	***10***	***16***	***0.3***	***0.7***	***0.4***	***10***	***5***	***15***	***80***	***INDX***	***FOOT***	***1***	***3***	***0***	***0***	***23***	***60***	***00***	***00***
16 0230	91	10	29	0.0	0.7	0.7	7	3	10	95	INDX	FOOT	4	0	0	0	20	61	00	00

Summer 1992

Reach - **River mile 0.0-0.7**
Estimate = 90
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Some ambiguity in amplitude and timing of peak region of AUC curve. 2) Ambiguity about endpoint of summer chum spawning, due to possible overlap with fall chum entry. There was an increase in live counts between Oct. 12 and Oct. 21 surveys that suggests an early incursion of fall fish. All live fish observed on Oct. 21 and 31 surveys were assumed to be fall chum. The summer chum AUC curve was terminated at ~ Oct. 21.

Original escapement estimate = 81 (AUC).

Table 21: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	92	9	10	0.2	0.7	0.5	8	0	8	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0230	92	9	18	0.0	0.7	0.7	39	7	46	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0230	92	9	29	0.2	0.7	0.5	28	26	54	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0230	92	10	7	0.0	0.7	0.7	8	21	29	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0230	92	10	12	0.2	0.7	0.5	15	39	54	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0230	92	10	21	0.0	0.7	0.7	17	12	29	90	INDX	FOOT	0	0	0	0	60	61	21	00
16 0230	92	10	30	0.0	0.7	0.7	211	14	225	80	INDX	FOOT	0	0	0	0	24	60	61	00

Summer 1993

Reach - **River mile 0.0-0.7**
Estimate = 72
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Definitely a conservative estimate, given AUC total is not much higher than Oct. 6 survey live + dead count of 45 live and 19 dead. All live fish observed on Oct. 29 survey were assumed to be fall chum, due to date of observation.

Original escapement estimate = 65 (AUC).

Table 22: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	93	9	2	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
16 0230	93	9	9	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	3	20	00	00	00
16 0230	93	9	22	0.0	0.7	0.7	6	0	6	90	INDX	FOOT	0	0	4	3	31	20	61	00
16 0230	93	10	6	0.0	0.7	0.7	45	19	64	95	INDX	FOOT	0	0	1	3	20	61	00	00
16 0230	93	10	18	0.0	0.7	0.7	0	4	4	95	INDX	FOOT	0	1	3	4	20	61	00	00
16 0230	93	10	29	0.0	0.7	0.7	8	2	10	95	INDX	FOOT	0	0	3	4	20	31	33	00

Summer 1994

Reach - **River mile 0.0-0.7**
Estimate = 105
Method - AUC
Quality rating - Fair
Comments - Ascending portion of AUC curve very well defined by data, but post-peak period is problematic to derive, due to lack of surveys between Oct. 12 and 28 to identify endpoint of summer spawning. A conservative endpoint of approximately Oct. 22 was selected for termination of AUC curve. Use of this endpoint gives AUC curve a post-peak AUC curve slope that is about as steep as is usually observed, so the total AUC estimate can be considered conservative. All live chum observed on Oct. 28 survey were assumed to be fall chum due to date of observation.

Original escapement estimate = 149 (AUC).

Table 23: 1994 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	94	9	12	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0230	94	9	20	0.0	0.7	0.7	15	0	15	90	INDX	FOOT	0	0	0	0	20	60	61	00
16 0230	94	10	4	0.0	0.7	0.7	35	7	42	90	INDX	FOOT	4	0	0	0	20	61	00	00
16 0230	94	10	12	0.0	0.7	0.7	48	14	62	95	INDX	FOOT	4	0	0	0	20	61	00	00
16 0230	94	10	28	0.0	0.7	0.7	18	8	26	95	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1995

Reach - **River mile 0.0-0.7**
Estimate = 79
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point of spawning undefined by data. A typical mid-September point was used. 2) Amplitude and timing of peak period not clearly defined by data. Moderately high dead : live ratio suggests Oct. 6 survey was at or just before peak period of spawning.

Original escapement estimate = 110 (AUC).

Table 24: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	95	9	25	0.0	0.7	0.7	52	9	61	90	INDX	FOOT	1	3	0	0	20	60	61	00
16 0230	95	10	6	0.0	0.7	0.7	18	7	25	95	INDX	FOOT	1	3	0	0	20	60	61	00
16 0230	95	10	23	0.0	0.7	0.7	1	4	5	95	INDX	FOOT	4	0	0	0	20	61	00	00

Summer 1996

Reach - **River mile 0.0-0.7**
Estimate = 40
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak period of curve not clearly defined by data, and 2) Endpoint of AUC curve not clearly defined by survey data. Peak was assumed to lie between Sept. 27 and Oct. 11 surveys due to the transition in the dead : live ratio from very low to moderately high. Amplitude of peak of curve subjectively derived from slope of line through these two survey points, and 3) Fall chum overlap. There is a large increase in the live count between the Oct. 11 and Oct. 24 surveys. The Oct. 24 fish are assumed to be mostly early arriving fall chum, so the AUC curve was subjectively terminated on ~ Oct. 23, which is a typical completion date for this stream.

Hatchery fish adjusted wild spawning estimate = (Total AUC fish*days - (rack return, capture * assumed 5 day stream life before entering rack, capture))/10 day stream life for wild chum = (697 - (60 * 5)) / 10. Assumed a 5 day average stream life because large number of the fish captured were reported at or near spawning condition, or spawned out.

Original escapement estimate = 69 (AUC).

Table 25: 1996 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	96	9	5	0.3	0.7	0.4	3	0	3	85	INDX	FOOT	4	0	0	0	00	20	60	00
16 0230	96	9	19	0.0	0.7	0.7	5	2	7	95	INDX	FOOT	4	0	0	0	20	00	00	00
16 0230	96	9	27	0.0	0.7	0.7	29	4	33	95	INDX	FOOT	1	4	0	0	20	61	00	00
16 0230	96	10	11	0.0	0.7	0.7	19	17	36	95	INDX	FOOT	1	4	0	0	20	61	00	00
16 0230	96	10	24	0.0	0.7	0.7	93	6	99	75	INDX	FOOT	1	0	0	0	24	00	00	00

Summer 1997

Reach - **River mile 0.0-0.7**
Estimate = 10
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Irregular AUC curve shape, which is probably an artifact of the overall low abundance of chums, and 2) Endpoint of AUC curve not clearly defined by survey data, due to fall chum entry. There is a large increase in the live count between the Oct. 7, Oct. 21 and Nov. 4 surveys. The Oct. 21 fish are assumed to be mostly early arriving fall chum due to the date, and indication of a strong early chum incursion, suggested by the upward increase in live fish from the Oct. 7 to Nov. 4 surveys. The AUC curve was subjectively terminated on ~ Oct. 13, which is a fairly early end to summer chum spawning on this stream, except in years of small runs or early peak spawning period.

Hatchery fish adjusted wild spawning estimate = (Total AUC fish*days - (rack return, capture * assumed 2 day stream life before entering rack, capture))/10 day stream life for wild chum = (128 - (16 * 2)) / 10. Assumed a 2 day average stream life because fish were all captured at a rack and should have entered quickly due to short nature of stream.

Table 26: 1997 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0230	97	8	25	0.0	0.7	0.7	0	0	0	99	INDX	FOOT	3	4	0	0	20	00	00	00
16 0230	97	9	2	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	1	3	0	0	20	00	00	00
16 0230	97	9	9	0.0	0.7	0.7	0	0	0	80	INDX	FOOT	3	0	0	0	20	43	60	00
16 0230	97	9	16	0.0	0.7	0.7	8	0	8	70	INDX	FOOT	1	3	4	0	21	34	60	00
16 0230	97	9	22	0.0	0.7	0.7	2	1	3	90	INDX	FOOT	1	3	4	0	20	61	00	00
16 0230	97	10	7	0.0	0.7	0.7	4	4	8	85	INDX	FOOT	1	3	4	0	23	00	00	00
16 0230	97	10	21	0.0	0.7	0.7	10	0	10	95	INDX	FOOT	1	4	0	0	20	60	61	00
16 0230	97	11	4	0.0	0.7	0.7	122	1	123	85	INDX	FOOT	4	0	0	0	23	60	61	00

Summer 1998

Reach - **River mile 0.0-0.7**
Estimate = 4
Method - Rack crew estimate of fish that sneaked past weir at high tide
Quality rating - Fair
Comments - Rack was installed all season at tidewater to capture all incoming summer chum for a stock restoration project. Four fish were observed upstream of weir by survey crew (a side channel allowed fish to sneak by at high tide). Twenty fish (11 M, 9 F) were captured at weir, and accounted for in "off-station" category.

Introduction

Good chum spawning habitat exists from river mile 0.3 upstream to the "Blue Hole" at ~ river mile 1.8 (a very deep pool at the lower end of a canyon). There is some limited spawning habitat from river mile 1.8 and 2.0 (the "Green Hole"). Stream gradient becomes much steeper upstream of the Blue Hole, and there is minimal chum spawning habitat. Tidal influence extends up to about river mile 0.3, with habitat below this point consisting primarily of a holding area for incoming fish, and some limited inter-tidal spawning area.

Dead: live count ratios from spawning survey data can be an unreliable indicator of the progression of the season's spawning activity in this stream because (as with the neighboring Dosewallips and Duckabush Rivers), the large size and "flashy" hydrologic character of this streams rapidly flushes carcasses out of the drainage. High pink densities in odd-return years often makes accurate census of summer chums in difficult (counts are typically conservative in these situations).

From 1983 to present survey data was periodically summarized into two reaches, river mile 0.0 - 1.0, and 1.0 - 1.8 on the field data summary cards. This information was originally combined to a single reach when reported in WDFW spawning ground database. To provide more information on distribution of spawning fish, data reported in accompanying tables displays fish counts stratified by reach where possible. John's Cr. is discussed separately. Previously, John's Cr. was summarized as part of a "Miscellaneous 12B streams" escapement category in WDF summer chum escapement summaries.

In the years 1974-79 spawning surveys were only conducted from river mile 0.0-1.0. To adjust for this missing census data when the estimates were derived for these years, AUC curves were generated for the RM 0.0-1.0 and 1.0-1.8 reaches for a selected group of years that the survey data was available stratified into the river mile 0.0-1.0 and 1.0-1.8 reaches (Table 1). The data is somewhat variable in terms of fish distribution between the two reaches – in three years (1988,1993,1995) the upper stream reach comprised a significant (40 % +) portion of the total spawning activity, in two years the upper reach contained a more minimal (< 20 %) portion of the total escapement. Ron Egan (WDFW) suggested that the ratio of spawning activity observed in the 1988, 1993, and 1995 return years is most representative of the regular spawning distribution. Also, early fall stream flows were consistently higher in the 1970's than the years that were analyzed, so this would suggest the fish would have encouragement to distribute further upstream than in dry years. PNPTC and WDFW staff decided to use the average of 1983, 88, 92, and 93 return years for deriving an average expansion ratio for estimating escapement to the upper reach in those years escapement data was not collected for the reach in question. It was therefore assumed for the 1974 to 1979, and 1984-85 return years that the river mile 1.0-1.8 spawning escapement estimates would be:

a) Avg. RM 1.0+ escape. = 0.394

b) 0.394 / 1-0.394 = RM 1.0 + escape for year x / RM 0.0 to 1.0 escape for year x, which when solved for the unknown value =

c) [(0.394) * (RM 0.0 to 1.0 escape. for year x)] / (1 - 0.394) = RM 1.0+ escape. for year x

Table 1: Hamma Hamma River summer chum escapement estimates for the river mile 0.0-1.0 and 1.0-1.8 stream reaches for the return years 1983, 1988, 1992-1996

	1983	1988	1992	1993	1994	1995	1996
RM 0.0-1.0	132	206	76	34	307	241	625
RM 0.0-1.0 %	0.688	0.510	0.639	0.586	0.853	0.560	0.839
RM 1.0-1.8	60	198	43	24	53	189	120
RM 1.0-1.8 %	0.312	0.490	0.361	0.414	0.147	0.440	0.161
Total[1]	192	404	119	58	360	430	745

Notes:

1: The sum of the two individual AUC escapement estimates will not (usually) equal the single AUC estimate usually used for computing the reported escapement estimate.

Survey data directly used in estimation process is highlighted in **bold** in the annual survey summary tables.

Summer 1968

Reach - **River mile 0.0-2.0**
Estimate = 13,239
Method - Single survey expansion by a timing model - 1978 AUC data
Quality rating - N/A
Comments - Used 1978 AUC timing data for estimate because it was one of the only good quality AUC curves that had clearly peaked prior to the Sept. 30, 1968 survey date (which appears to be a post-peak count by the dead : live ratio > 1). The 1968 Hamma Hamma, Duckabush R. and Big Quilcene R. the summer chum spawning survey data had the unusual situation of a dead count that approached the live count in the late-September/early October period (this was kind of early - review of historical survey data reveals the dead summer chum almost never accumulate sufficiently in these streams to equal or surpass the live counts until late in the spawning season.

Original estimate - Index (RM 0.0 - 2.0) = 11,520 (AUC), Supplemental reach (RM 2.0+) = 1,280 (Index * 0.111). Total = 12,800.

Table 2: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	*68*	*9*	*30*	*0.3*	*2.0*	*1.7*	*3,922*	*2,258*	*6,180*	*0*	*INDX*	*FOOT*	*1*	*0*	*0*	*0*	*23*	*13*	*00*	*00*

Summer 1969

Reach - **River mile 0.0-2.0**
Estimate = 2,919
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: No data to define ascending section of AUC curve. Assumed a typical mid-September start point. Peak of curve was assumed to fall between Sept. 28 and Oct. 14 because the very low dead count on the Sept. 28 survey suggests this was a pre-peak observation.

Original estimate - Index (RM 0.0 - 2.0) = 2,820 (AUC), Supplemental reach (RM 2.0+) = 313 (Index * 0.111). Total = 3,133.

Table 3: 1969 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	*69*	*9*	*28*	*0.3*	*2.0*	*1.7*	*917*	*4*	*921*	*70*	*INDX*	*FOOT*	*1*	*3*	*0*	*0*	*23*	*13*	*00*	*00*
16 0251	*69*	*10*	*14*	*1.0*	*2.0*	*1.0*	*685*	*48*	*733*	*75*	*INDX*	*FOOT*	*1*	*3*	*0*	*0*	*20*	*32*	*13*	*00*

Notes:
Oct. 14 survey was terminated at river mile 1.0 due to shadow and glare problems

Summer 1970

Reach - **River mile 0.0-1.7**
Estimate = 1,390
Method - Single survey expansion by a timing model - 1982 AUC data
Quality rating - Poor
Comments - Used 1982 AUC timing data because it represented the expected spawning timing for this

stream. Sept. 28 survey data suggested spawning had not peaked yet, and therefore should have experienced a similar peak spawning timing of early October that was observed in 1982.

Original estimate - Index (RM 0.0 - 2.0) = 1,910 (AUC), Supplemental reach (RM 2.0+) = 212 (Index * 0.111). Total = 2,122

Table 4: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	70	9	28	0.3	2.0	1.7	685	67	752	90	INDX	FOOT	1	0	0	0	20	13	00	00

Summer 1971

Reach - **River mile 0.0-2.0**
Estimate = 4,282
Method - Single survey expansion by a timing model - 1982 AUC data
Quality rating - Poor
Comments - Used 1982 AUC timing data because it represented the expected spawning timing for this stream. Sept. 28 survey data suggested spawning had not peaked yet, and therefore should have experienced a similar peak spawning timing of early October that was observed in 1982.

Original estimate - Index (RM 0.0 - 2.0) = 5,930 (AUC), Supplemental reach (RM 2.0+) = 659 (Index * 0.111). Total = 6,589.

Table 5: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	71	10	5	0.3	2.0	1.7	1,996	414	2,410	90	INDX	FOOT	1	3	5	0	20	13	00	00

Summer 1972

Reach - **River mile 0.0-2.0**
Estimate = 5,346
Method - Single survey expansion by a timing model - 1982 AUC data
Quality rating - Poor
Comments - Used 1982 timing data because data represented typical spawning timing for this stream.

Original estimate - Index (RM 0.0 - 2.0) = 7,775 (AUC), Supplemental reach (RM 2.0+) = 864 (Index * 0.111). Total = 8,639.

Table 6: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	72	10	6	0.3	2.0	1.7	2,309	289	2,598	85	INDX	FOOT	1	4	0	0	20	13	00	00

Summer 1973

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - Survey data was outside of typical range of major spawning activity, making it unsuitable for any expansion methods. The number of fish observed seems excessively high for this early in the run, unless run was extremely early and/or extremely large.

Original estimate - Index (RM 0.0 - 1.4) = 3,200 (AUC), Supplemental reach (RM 1.4+) = 356 (Index * 0.111). Total = 3,556.

Table 7: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	73	9	4	0.3	1.4	1.1	763	190	953	50	INDX	FOOT	1	3	6	0	00	00	00	00

Summer 1974

Reach - **River mile 0.0-1.0**
Estimate = 1,483
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - General shape of AUC curve is well defined by surveys. Mediocre visibility on peak survey (70 %) leaves some room for interpretation of amplitude of AUC curve peak. However, probing the range possible between the actual and observed visible live fish at this point only changes the total fish estimate a maximum of about 14 % from the estimate used here. Endpoint of AUC curve open to some interpretation. All live fish observed on Oct. 28 survey were assumed to be fall chum, due to time period of survey. Curve itself rates "fair/good", but large expansion to derive total estimate for entire stream reach makes overall estimate only "fair" (or even poor).

Original estimate - Index (RM 0.0 - 1.0) = 1,595 (AUC), Supplemental reach (RM 1.0+) = 177 (Index * 0.111). Total = 1,772.

Table 8: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	74	9	9	0.0	1.0	1.0	0	0	0	75	INDX	FOOT	1	0	0	0	13	23	00	00
16 0251	74	9	18	0.1	1.0	0.9	144	0	144	70	INDX	FOOT	1	0	0	0	60	20	00	00
16 0251	74	10	2	0.1	1.0	0.9	452	15	467	70	INDX	FOOT	1	0	0	0	60	00	00	00
16 0251	74	10	16	0.1	1.0	0.9	324	73	397	90	INDX	FOOT	1	0	0	0	20	00	00	00
16 0251	74	10	28	0.1	1.0	0.9	142	259	401	80	INDX	FOOT	0	0	0	0	20	00	00	00

Reach - **River mile 1.0-1.8**
Estimate = 965
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1975

Reach - **River mile 0.0-1.0**
Estimate = 4,447
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Fairly good number of surveys were conducted, but the two peak surveys both had fair to poor visibility (70 % on Sept. 23, 55 % on Oct. 8). Both amplitude and timing of peak period are open to considerable interpretation, due to visibility problems, and 15 day gap between the peak surveys (Sept. 23 and Oct. 8). Expansion to un-surveyed area also introduces a great deal of uncertainty (a overall "poor" rating is certainly a possibility).

Original estimate - Index (RM 0.0 - 1.0) = 5,315 (AUC), Supplemental reach (RM 1.0+) = 591 (Index * 0.111). Total = 5,906.

Table 9: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	75	9	12	0.3	1.0	0.7	16	0	16	60	INDX	FOOT	3	0	0	0	00	00	00	00
16 0251	75	9	23	0.0	1.0	1.0	1,356	10	1,366	70	INDX	FOOT	3	0	0	0	00	00	00	00
16 0251	75	10	8	0.0	1.0	1.0	1,137	482	1,619	55	INDX	FOOT	1	3	0	0	00	00	00	00
16 0251	75	10	24	0.3	1.0	0.7	13	13	26	70	INDX	FOOT	3	0	0	0	24	60	61	00

Reach - **River mile 1.0-1.8**
Estimate = 2,894
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1976

Reach - **River mile 0.0-1.0**
Estimate = 4,633
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Start and endpoint of AUC curve not defined by survey data. Beginning and endpoints of AUC curve were selected by extrapolating slope of AUC curve out from first and last surveys to interception with the x-axis. Suggested endpoints are within the range of typical starting and ending periods of spawning for this stream. Curve itself rates "good", but large expansion for un-surveyed stream reach makes overall estimate only "fair" (or even poor).

Original estimate - Index (RM 0.0 - 1.0) = 5,035 (AUC), Supplemental reach (RM 1.0+) = 559 (Index * 0.111). Total = 6,633.

Table 10: 1976 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	76	9	10	0.3	1.0	0.7	536	20	556	60	INDX	FOOT	0	0	0	0	20	31	32	00
16 0251	76	9	21	0.3	1.0	0.7	2,130	165	2,295	75	INDX	FOOT	0	0	0	0	60	00	00	00
16 0251	76	9	30	0.3	1.0	0.7	1,243	1,508	2,751	78	INDX	FOOT	0	0	0	0	00	00	00	00

Reach - **River mile 1.0-1.8**
Estimate = 3,015
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1977

Reach - **River mile 0.0-1.0**
Estimate = 999
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of AUC curve undefined by data. A typical mid-Sept. start point to curve was assumed. 2) Amplitude and timing of peak period of AUC curve open to considerable interpretation. Peak of spawning after Sept. 28 was assumed, due to very low number of dead observed on this survey, dead : live ratio > 1 on Oct. 10 survey, and much lower live count on Oct. 10 survey. Mediocre quality of AUC curve and large expansion for un-surveyed stream reach makes overall estimate only "fair" (or even poor).

Original estimate - Index (RM 0.0 - 1.0) = 1,630 (AUC), Supplemental reach (RM 1.0+) = 181 (Index * 0.111). Total = 1,811.

Table 11: 1977 river mile 0.0-1.0 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	77	9	28	0.2	1.0	0.8	500	6	506	70	INDX	FOOT	1	3	4	0	00	00	00	00
16 0251	77	10	10	0.2	1.0	0.8	235	390	625	85	INDX	FOOT	3	0	0	0	00	00	00	00
16 0251	77	10	17	0.2	1.0	0.8	21	32	53	90	INDX	FOOT	3	4	0	0	12	20	60	00

Reach - **River mile 1.0-1.8**
Estimate = 650
Method - (see introduction)
Quality rating - Poor
Comments - None.

Table 12: 1977 river mile 1.0-2.0 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	77	10	17	1.0	2.0	1.0	28	31	59	90	SUPP	FOOT	3	4	0	0	12	20	60	00

Summer 1978

Reach - **River mile 0.0-1.0**
Estimate = 4,928
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Poor to fair visibility on first two surveys (60 % on Sept. 7, 75 % on Sept. 22) leaves amplitude of peak of AUC curve open to some interpretation. However, effect of possible variations in shape of AUC curve would only change estimate a small amount. Assumed all live fish observed on Oct. 25 were fall chum. Curve itself rates "good", but large expansion for u-surveyed stream reach makes overall estimate only "fair" (or even poor).

Original estimate - Index (RM 0.0 - 1.0) = 4,800 (AUC), Supplemental reach (RM 1.0+) = 533 (Index * 0.111). Total = 5,333.

Table 13: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	78	9	7	0.2	1.0	0.8	635	0	635	60	INDX	FOOT	3	0	0	0	00	00	00	00
16 0251	78	9	22	0.2	1.0	0.8	1,471	48	1,519	75	INDX	BOAT	1	0	0	0	00	00	00	00
16 0251	78	10	5	0.0	1.0	1.0	901	320	1,221	80	INDX	FOOT	1	0	0	0	00	00	00	00
16 0251	78	10	12	0.0	1.0	1.0	180	393	573	80	INDX	FOOT	1	0	0	0	00	00	00	00
16 0251	78	10	18	0.2	2.0	1.8	84	365	449	90	INDX	FOOT	1	4	0	0	00	00	00	00
16 0251	78	10	25	0.3	1.0	0.7	79	328	407	75	INDX	FOOT	1	0	0	0	00	00	00	00

Reach - **River mile 1.0-1.8**
Estimate = 3,207
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1979

Reach - **River mile 0.0-1.0**
Estimate = 1,849
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Most of AUC curve well defined by data. Amplitude and timing of peak is open to some interpretation. Start point not clearly defined by data. Assumed late August start point due to slope of ascending line described by Sept. 6 and Sept. 12 surveys. Curve itself rates "good", but large expansion for un-surveyed stream reach makes overall estimate only "fair" (or even poor).

Original estimate - Index (RM 0.0 - 1.0) = 1,965 (AUC), Supplemental reach (RM 1.0+) = 218 (Index * 0.111). Total = 2,183.

Table 14: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	79	9	6	0.1	1.0	0.9	251	0	251	90	INDX	FOOT	3	0	0	0	00	00	00	00
16 0251	79	9	12	0.2	1.0	0.8	329	0	329	80	INDX	BOAT	3	0	0	0	00	00	00	00
16 0251	79	9	24	0.1	1.0	0.9	822	177	999	80	INDX	BOAT	1	3	0	0	00	00	00	00
16 0251	79	10	5	0.1	1.0	0.9	176	165	341	80	INDX	FOOT	3	0	0	0	23	61	00	00
16 0251	79	10	15	0.0	1.0	1.0	71	316	387	80	INDX	FOOT	1	3	0	0	00	00	00	00
16 0251	79	10	24	0.0	1.0	1.0	0	10	10	30	INDX	FOOT	3	0	0	0	27	70	30	00

Reach - **River mile 1.0-1.8**
Estimate = 1,203
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1980

Reach - **River mile 0.0-2.0**
Estimate = 329
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Most of AUC curve well defined by data. Amplitude and timing of peak is open to some interpretation. Beginning and endpoints of AUC curve were selected by following slope of AUC curve through the first and last survey points to intersection with the x-axis (they are consistent with typical spawning and ending periods for summer chum spawning in this stream).

Original estimate - Index (RM 0.0 - 1.9) = 450 (AUC), Supplemental reach (RM 1.9+) = 50 (Index * 0.111). Total =500.

Table 15: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	80	9	15	0.3	1.0	0.7	38	0	38	90	INDX	FOOT	1	4	0	0	00	00	00	00
16 0251	80	9	30	0.3	1.9	1.6	123	8	131	75	INDX	FOOT	4	0	0	0	00	00	00	00
16 0251	80	10	17	0.3	1.0	0.7	36	83	119	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-2.0**
Estimate = 677
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - Both WDF and PNPTC council conducted spawning surveys. Used PNPTC survey data. Most of AUC curve well defined by data. Amplitude and timing of peak section of curve is open to some interpretation. Beginning and endpoints of AUC curve were selected by following slope of curve outward from first and last surveys to intersection with x-axis.

Original estimate - Index (RM 0.0 - 2.0) = 717 (AUC), Supplemental reach (RM 2.0+) = 80 (Index * 0.111). Total = 797.

Table 16: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	81	9	9	1.0	1.5	0.5	8	0	8	99	INDX	FOOT	3	0	0	0	23	00	00	40
16 0251	81	9	16	0.0	2.0	2.0	37	3	40	75	INDX	FOOT	1	3	0	0	13	16	21	40
16 0251	81	9	23	0.7	2.0	1.3	257	7	264	90	INDX	FOOT	1	3	4	0	06	23	66	40
16 0251	81	9	29	0.2	1.0	0.8	10	0	10	50	INDX	FOOT	3	0	0	0	60	00	00	00
16 0251	81	10	1	0.0	2.0	2.0	297	1	298	88	INDX	FOOT	1	3	4	0	16	23	53	40
16 0251	81	10	2	0.0	1.0	1.0	76	4	80	65	INDX	FOOT	1	3	0	0	27	31	00	00
16 0251	81	10	16	0.0	2.0	2.0	38	13	51	80	INDX	FOOT	1	3	4	0	00	00	00	40
16 0251	81	10	16	0.2	2.0	1.8	6	4	10	90	INDX	FOOT	0	3	0	4	00	00	00	00
16 0251	81	10	22	0.0	2.0	2.0	0	5	5	85	INDX	BOAT	3	4	0	0	23	00	00	40

Summer 1982

Reach - **River mile 0.0-2.0**
Estimate = 790
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0 - 1.0) = 809 (AUC), Supplemental reach (RM 1.0+) = 90 (Index * 0.111). Total = 899.

Table 17: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	82	9	14	0.2	1.0	0.8	41	0	41	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0251	82	9	27	0.1	1.0	0.9	354	13	367	90	INDX	FOOT	1	0	0	0	00	00	00	00
16 0251	82	10	6	0.1	1.0	0.9	289	70	359	70	INDX	FOOT	1	0	0	0	00	00	00	00
16 0251	82	10	13	0.2	2.0	1.8	96	112	208	85	INDX	FOOT	0	0	0	1	21	31	33	00

Summer 1983

Reach - **River mile 0.0-2.0**
Estimate = 184
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both PNPTC and WDF conducted surveys. Used PNPTC data due to the higher frequency of surveys. Survey data from a river mile 2.0-2.2 survey on Oct. 6 was not used in AUC curve, because this stream reach would be above the Green Hole - it seems unlikely the number of chum reported (26 live, 15 dead) would be in this stream reach (which is at the extreme upper end of the spawning habitat utilized by summer chums), especially given that surveys from river

mile 0.0-2.0 on same date saw only 13 live and 8 dead. It is possible this data was actually collected from a lower stream reach and mis-coded for the river reach surveyed, or were mis-identified and/or recorded salmon of another species. All live fish observed on the Oct. 28 survey were considered fall chum.

Original estimate - Index (RM 0.0 - 2.0) = 212 (AUC), Supplemental reach (RM 2.0+) = 24 (Index * 0.111). Total = 236.

Table 18: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	83	9	8	0.4	0.0	-0.4	20	0	20	80	SPOT	FOOT	3	0	0	0	00	00	00	00
16 0251	83	9	9	0.0	1.2	1.2	8	0	8	70	INDX	FOOT	1	3	0	0	20	32	00	22
16 0251	83	9	9	1.2	2.0	0.8	4	0	4	95	SUPP	FOOT	1	3	0	0	20	00	00	22
16 0251	83	9	14	0.0	1.2	1.2	6	0	6	75	INDX	FOOT	1	3	0	0	20	32	00	22
16 0251	83	9	14	1.2	2.0	0.8	5	0	5	85	SUPP	FOOT	1	3	4	0	20	33	00	22
16 0251	83	9	16	0.1	1.0	0.9	70	0	70	90	INDX	FOOT	1	3	0	0	20	00	00	00
16 0251	83	9	23	0.0	1.2	1.2	71	1	72	70	INDX	FOOT	1	3	4	0	20	60	00	40
16 0251	83	9	23	1.2	1.4	0.2	3	0	3	70	INDX	FOOT	3	0	0	0	06	20	60	40
16 0251	83	9	23	1.4	2.0	0.6	22	2	24	85	INDX	FOOT	1	3	4	0	20	31	60	40
16 0251	83	9	30	0.0	1.2	1.2	59	0	59	80	INDX	FOOT	1	3	0	0	60	00	00	40
16 0251	83	9	30	1.2	2.0	0.8	22	4	26	60	INDX	FOOT	1	3	0	0	60	00	00	40
16 0251	83	10	6	0.0	1.2	1.2	5	3	8	95	INDX	FOOT	1	3	0	0	21	60	00	40
16 0251	83	10	6	0.2	2.0	1.8	23	7	30	95	INDX	FOOT	1	3	4	0	20	00	00	00
16 0251	83	10	6	1.2	2.0	0.8	8	15	23	95	INDX	FOOT	1	3	0	0	21	60	00	40
16 0251	83	10	6	2.0	2.2	0.2	26	15	41	90	INDX	FOOT	1	3	0	0	21	60	00	40
16 0251	83	10	13	0.2	2.0	1.8	7	20	27	90	INDX	FOOT	1	3	4	5	20	00	00	00
16 0251	83	10	14	0.0	1.2	1.2	6	18	24	70	INDX	FOOT	1	3	0	0	20	33	00	40
16 0251	83	10	14	1.2	2.0	0.8	10	18	28	90	INDX	FOOT	1	3	0	0	20	60	00	40
16 0251	83	10	19	0.2	2.0	1.8	0	31	31	90	INDX	FOOT	1	3	4	5	20	00	00	00
16 0251	83	10	21	0.0	1.2	1.2	2	33	35	70	INDX	FOOT	1	3	4	0	20	32	60	40
16 0251	83	10	21	1.2	2.0	0.8	2	56	58	85	INDX	FOOT	3	4	0	0	20	60	00	40
16 0251	83	10	26	0.2	2.0	1.8	6	11	17	90	INDX	FOOT	1	3	4	5	20	00	00	00
16 0251	83	10	28	0.0	1.2	1.2	5	19	24	70	INDX	FOOT	1	3	4	0	20	33	60	40
16 0251	83	10	28	1.2	2.0	0.8	1	27	28	85	INDX	FOOT	1	3	4	0	20	33	60	40

Summer 1984

Reach - **River mile 0.0-1.0**
Estimate = 100
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC curve not defined by data. Used a typical mid-September start point. Amplitude and timing of peak spawning period open to some interpretation. Overall, however there really isn't much room to manipulate the AUC curve shape to significantly change the estimate.

Original estimate - Index (RM 0.0 - 1.0) = 113 (AUC), Supplemental reach (RM 1.0+) = 13 (Index * 0.111). Total = 126.

Table 19: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	84	9	6	0.2	1.0	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	33	00	40
16 0251	84	9	7	0.8	1.0	0.2	0	0	0	90	SUPP	FOOT	0	0	0	0	00	00	00	00
16 0251	84	9	25	0.2	1.0	0.8	40	1	41	99	INDX	FOOT	4	0	0	0	20	00	00	00
16 0251	84	10	1	0.2	1.0	0.8	56	8	64	90	INDX	FOOT	1	4	0	0	20	00	00	00
16 0251	84	10	15	0.1	1.0	0.9	2	0	2	50	INDX	FOOT	4	0	0	0	24	00	00	00
16 0251	84	10	22	0.1	1.0	0.9	0	3	3	85	INDX	FOOT	0	0	0	0	23	00	00	00
16 0251	84	10	29	0.1	1.0	0.9	1	9	10	85	INDX	FOOT	4	0	0	0	23	00	00	00

Reach - **River mile 1.0-1.8**
Estimate = 65
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1985

Reach - **River mile 0.0-1.0**
Estimate = 140
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC curve not defined by data. An early Sept. start point was used, derived from slope of line through first survey. Amplitude and timing of peak spawning period open to some interpretation, but there really isn't much room to manipulate the AUC curve shape to significantly change the total estimate.

Original estimate - Index (RM 0.0 - 1.0) = 152 (AUC), Supplemental reach (RM 1.0+) = 17 (Index * 0.111). Total = 169.

Table 20: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0251	85	9	16	0.0	1.0	1.0	46	0	46	85	INDX	BOAT	3	0	0	0	00	00	00	00
16 0251	85	9	30	0.0	1.0	1.0	44	22	66	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0251	85	10	10	0.0	1.0	1.0	20	33	53	90	INDX	FOOT	3	4	0	0	20	00	00	00

Reach - **River mile 1.0-1.8**
Estimate = 91
Method - (see introduction)
Quality rating - Poor
Comments - None.

Summer 1986

Reach - **River mile 0.0-1.6**
Estimate = 173
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimate - Index (RM 0.0 - 1.6) = 175 (AUC), Supplemental reach (RM 1.6+) = 19 (Index * 0.111). Total = 194.

Table 21: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	86	9	16	0.0	1.0	1.0	31	0	31	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0251	86	9	22	0.1	1.0	0.9	41	2	43	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0251	86	10	1	0.2	1.8	1.6	77	20	97	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0251	86	10	7	0.2	1.8	1.6	41	31	72	95	INDX	FOOT	4	0	0	0	00	00	00	00
16 0251	86	10	15	0.2	2.0	1.8	20	32	52	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0251	86	10	21	0.2	2.0	1.8	15	53	68	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-1.8**
Estimate = 26
Method - Sept. 28 live + dead count
Quality rating - Poor
Comments - An AUC curve fit though this data it does not equal Sept. 28 live + dead count, even if Oct. 21 live fish observation is included (a portion of which may be early fall chum, as suggested by increase in live fish count from Oct. 8 survey).

Original estimate - Index (RM 0.0 - 1.8) = 39 (AUC), Supplemental reach (RM 1.8+) = 4 (Index * 0.111). Total = 43.

Table 22: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	87	9	28	0.3	1.8	1.5	17	8	25	90	INDX	FOOT	1	3	0	0	20	00	00	00
16 0251	87	10	8	0.3	1.8	1.5	2	12	14	70	INDX	FOOT	1	3	4	0	00	00	00	00
16 0251	87	10	21	0.3	1.8	1.5	4	0	4	95	INDX	FOOT	1	3	4	0	20	00	00	00

Summer 1988

Reach - **River mile 0.0-1.8**
Estimate = 428
Method - AUC - 10 DAY STREAM LIFE.
Quality rating - Very good
Comments - All reaches of AUC curve are well defined by data, except endpoint. There is little room for alternative variations in the end section of the AUC curve however, so possible variation in the overall estimate from any ambiguity from in this section of the AUC curve is small. Assumed all live fish observed on Oct. 26 survey were fall chum, due to date of survey.

Original estimate - Index (RM 0.0 - 1.0) = 470 (AUC - recorded as 500 in escapement spreadsheet), Supplemental reach (RM 1.0+) = 56 (Index * 0.111). Total = 556.

Table 23: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	88	9	16	0.3	1.0	0.7	24	0	24	95	INDX	FOOT	1	0	0	0	20	61	00	00
16 0251	88	9	16	1.0	1.8	0.8	16	1	17	95	INDX	FOOT	1	0	0	0	20	61	00	00
16 0251	88	9	27	0.3	1.0	0.7	72	5	77	75	INDX	FOOT	1	4	0	0	61	00	00	00
16 0251	88	9	27	1.0	1.8	0.8	40	5	45	75	INDX	FOOT	1	4	0	0	61	00	00	00
16 0251	88	10	4	0.3	1.0	0.7	82	36	118	85	INDX	FOOT	1	4	5	0	61	00	00	00
16 0251	88	10	4	1.0	1.8	0.8	113	19	132	85	INDX	FOOT	1	4	5	0	61	00	00	00
16 0251	88	10	13	0.3	1.0	0.7	36	115	151	70	INDX	FOOT	1	0	0	0	20	60	61	00
16 0251	88	10	13	1.0	1.8	0.8	42	64	116	70	INDX	FOOT	1	0	0	0	20	60	61	00
16 0251	88	10	26	0.3	1.0	0.7	17	67	74	80	INDX	FOOT	1	4	0	0	20	31	61	00
16 0251	88	10	26	1.0	1.8	0.8	11	0	11	80	INDX	FOOT	1	4	0	0	20	31	61	00

Summer 1989

Reach - **River mile 0.0-1.8**
Estimate = 16
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Irregular curve shape, probably at least in part an artifact of very small runsize.

Original estimate - Index (RM 0.0 - 1.8) = 19 (AUC), Supplemental reach (RM 1.8+) = 2 (Index * 0.111). Total = 21.

Table 24: 1989 chum survey data through Nov. 2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	89	9	8	0.3	1.8	1.5	0	0	0	80	INDX	FOOT	0	0	0	3	20	00	00	00
16 0251	89	9	18	0.3	1.8	1.5	1	0	1	85	INDX	FOOT	3	0	0	0	20	00	00	00
16 0251	89	9	28	0.3	1.8	1.5	9	4	13	90	INDX	FOOT	1	3	0	0	20	00	00	00
16 0251	89	10	9	0.3	1.8	1.5	2	2	4	90	INDX	FOOT	1	3	4	0	20	60	00	00
16 0251	89	10	20	0.3	1.0	0.7	3	10	13	65	INDX	FOOT	1	3	4	0	20	00	00	00
16 0251	89	10	20	1.0	1.8	0.8	0	0	0	65	INDX	FOOT	1	3	4	0	20	00	00	00
16 0251	89	11	2	0.3	1.0	0.7	1	3	4	60	INDX	FOOT	3	0	0	0	00	23	00	00
16 0251	89	11	2	1.0	1.8	0.8	0	0	0	80	INDX	FOOT	3	0	0	0	00	23	00	00

Summer 1990

Reach - **River mile 0.0-1.8**
Estimate = 90
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point of AUC curve not defined by survey data. A typical mid-Sept. start point was assumed. 2) Oct. 25 survey is troublesome, because it is in the typical transition zone to fall fish entry , but is also the highest count of the season (28 live, 6 dead). However, the Oct. 31 count shows a decline in live fish (7 live, 0 dead), which suggests that at least a portion of the Oct. 25 fish were summer chum.

Original estimate - Index (RM 0.0 - 1.8) = 97 (AUC), Supplemental reach (RM 1.8+) = 11 (Index * 0.111). Total = 108.

Table 25: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	90	9	20	0.3	1.0	0.7	5	1	6	85	INDX	FOOT	1	4	0	0	20	60	61	00
16 0251	90	9	20	1.0	1.8	0.8	7	0	7	85	INDX	FOOT	1	4	0	0	20	60	61	00
16 0251	90	10	2	0.3	1.0	0.7	10	0	10	85	INDX	FOOT	1	4	0	0	20	61	00	00
16 0251	90	10	2	1.0	1.8	0.8	6	0	6	85	INDX	FOOT	1	4	0	0	20	61	00	00
16 0251	90	10	15	0.3	1.0	0.7	5	1	6	70	INDX	FOOT	1	4	0	0	24	60	61	00
16 0251	90	10	15	1.0	1.8	0.8	13	0	13	70	INDX	FOOT	1	4	0	0	24	60	61	00
16 0251	90	10	25	0.3	1.8	1.5	28	6	34	40	INDX	FOOT	1	4	0	0	25	60	00	00
16 0251	90	10	31	0.0	1.8	1.8	7	0	7	75	INDX	RAFT	4	0	0	0	24	00	00	00

Summer 1991

Reach - **River mile 0.0-1.8**
Estimate = 68
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None

Original estimate - Index (RM 0.0 - 1.8) = 71 (AUC), Supplemental reach (RM 1.8+) = 8 (Index * 0.111). Total = 79.

Table 26: 1991 chum survey data through Nov. 1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	91	9	12	0.3	1.0	0.7	4	0	4	85	INDX	FOOT	3	0	0	0	60	20	00	00
16 0251	91	9	12	1.0	1.8	0.8	0	0	0	85	INDX	FOOT	3	0	0	0	60	20	00	00
16 0251	91	9	23	0.3	1.0	0.7	19	3	22	85	INDX	RAFT	3	4	0	0	60	00	00	00
16 0251	91	9	23	1.0	1.8	0.8	4	0	4	85	INDX	RAFT	3	4	0	0	60	00	00	00
16 0251	91	10	3	0.3	1.8	1.5	26	10	36	85	INDX	RAFT	1	3	4	0	20	00	00	00
16 0251	91	10	10	0.4	1.0	0.6	7	14	21	85	INDX	FOOT	1	3	4	0	60	20	00	00
16 0251	91	10	10	1.0	1.8	0.8	7	8	15	85	INDX	FOOT	1	3	4	0	60	20	00	00
16 0251	91	10	17	0.3	1.0	0.7	5	10	15	90	INDX	FOOT	1	3	4	0	60	20	00	00
16 0251	91	10	17	1.0	1.8	0.8	1	3	4	90	INDX	FOOT	1	3	4	0	60	20	00	00
16 0251	91	10	24	0.3	1.0	0.7	0	2	2	85	INDX	FOOT	1	3	4	0	60	00	00	00
16 0251	91	10	24	1.0	1.8	0.8	0	0	0	85	INDX	FOOT	1	3	4	0	60	00	00	00
16 0251	91	11	1	0.4	1.0	0.6	0	2	2	80	INDX	FOOT	1	3	4	0	60	20	00	00
16 0251	91	11	1	1.0	1.8	0.8	0	0	0	80	INDX	FOOT	1	3	4	0	60	20	00	00

Summer 1992

Reach - **River mile 0.0-1.8**
Estimate = 123
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC curve is not defined by data, but possible range of start points has little effect on total estimated escapement. An early Sept. start point was assumed by extrapolating the AUC curve line to the x-axis from the slope of the line at the first survey. Notes on Sept. 21 survey card noted 99 % of fish were on redds, which suggests this is the peak spawning period. This is reflected in the early peak spawning period suggested by the AUC curve. The survey data suggests a big shot of early fall run chum entared stream by the Oct. 22 survey - number of live observed ascended from a low count on Oct. 15 (2 live, 3 dead), to a much higher count of 213 live and 2 dead on Oct. 22. The number of fish observed continued to increase with the next survey, with a 755 live count on Nov. 4. Few dead during this period indicated few of fish were spawning in this period.

Original estimate - Index (RM 0.0 - 1.8) = 119 (AUC), Supplemental reach (RM 1.8+) = 13 (Index * 0.111). Total = 132.

Table 27: 1992 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	92	9	10	0.3	1.0	0.7	20	0	20	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0251	92	9	10	1.0	1.8	0.8	11	0	0	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0251	92	9	21	0.3	1.0	0.7	21	1	22	85	INDX	FOOT	1	0	0	0	20	60	61	00
16 0251	92	9	21	1.0	1.8	0.8	20	0	20	85	INDX	FOOT	1	0	0	0	20	60	61	00
16 0251	92	9	21	1.8	2.0	0.2	9	0	9	80	SUPP	FOOT	1	0	0	0	20	61	00	00
16 0251	92	9	29	0.3	1.0	0.7	32	2	34	95	INDX	FOOT	0	0	0	1	20	60	61	00
16 0251	92	9	29	1.0	1.8	0.8	0	0	0	95	INDX	FOOT	0	0	0	1	20	60	61	00

16 0251	92	10	7	0.3	1.0	0.7	8	3	11	75	INDX	FOOT	0	0	0	0	20	61	00	00
16 0251	92	10	7	1.0	1.8	0.8	0	3	3	75	INDX	FOOT	0	0	0	0	20	61	00	00
16 0251	92	10	15	0.3	1.0	0.7	1	3	4	N/A	INDX	FOOT	0	0	0	0	20	61	00	00
16 0251	92	10	15	1.0	1.8	0.8	1	0	1	N/A	INDX	FOOT	0	0	0	0	20	61	00	00
16 0251	92	10	22	0.3	1.0	0.7	212	1	213	70	INDX	FOOT	0	0	0	0	61	23	00	00
16 0251	92	10	22	1.0	1.8	0.8	1	1	2	70	INDX	FOOT	0	0	0	0	61	23	00	00
16 0251	92	11	4	0.3	1.8	1.5	755	11	766	75	INDX	RAFT	4	0	0	0	20	00	00	00

Summer 1993

Reach - **River mile 0.0-1.8**
Estimate = 69
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - Endpoint of AUC curve not clearly defined by data due to fall chum entry overlap, but alternative possibilities for this section of AUC curve have a minimal effect on total estimate. Assumed all live fish observed Oct. 27 survey were fall chum, due to date of observation.

Original estimate - Index (RM 0.0 - 1.8) = 85 (AUC), Supplemental reach (RM 1.8+) = 9 (Index * 0.111). Total = 94.

Table 28: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	93	8	26	0.3	1.8	1.5	0	0	0	95	INDX	FOOT	0	0	0	3	23	60	61	00
16 0251	93	9	10	0.3	1.8	1.5	0	0	0	85	INDX	FOOT	0	0	0	3	20	60	61	00
16 0251	93	9	21	0.3	1.8	1.5	5	1	6	90	INDX	FOOT	0	1	3	4	20	60	61	00
16 0251	93	9	30	0.3	1.0	0.7	9	0	9	95	INDX	FOOT	0	0	1	3	20	60	61	00
16 0251	93	9	30	1.0	1.8	0.8	9	0	9	95	INDX	FOOT	0	0	1	3	20	60	61	00
16 0251	93	10	6	0.3	1.0	0.7	26	2	28	95	INDX	FOOT	0	1	3	4	20	61	00	00
16 0251	93	10	6	1.0	1.8	0.8	17	0	17	95	INDX	FOOT	0	1	3	4	20	61	00	00
16 0251	93	10	18	0.3	1.0	0.7	9	1	10	95	INDX	FOOT	0	1	3	4	20	61	00	00
16 0251	93	10	18	1.0	1.8	0.8	2	3	5	95	INDX	FOOT	0	1	3	4	20	61	00	00
16 0251	93	10	27	0.3	1.0	0.7	9	2	11	90	INDX	FOOT	0	0	3	4	20	33	61	00
16 0251	93	10	27	1.0	1.8	0.8	2	0	2	90	INDX	FOOT	0	0	3	4	20	33	61	00
16 0251	93	11	4	0.3	1.0	0.7	18	1	19	90	INDX	FOOT	0	0	3	4	20	31	61	00
16 0251	93	11	4	1.0	1.8	0.8	9	1	10	90	INDX	FOOT	0	0	3	4	20	31	61	00

Summer 1994

Reach - **River mile 0.0-1.8**
Estimate = 370
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimate - Index (RM 0.0 - 1.8) = 361 (AUC), Supplemental reach (RM 1.8+) = 40 (Index * 0.111). Total = 401.

Table 29: 1994 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	94	9	8	0.3	1.0	0.7	17	0	17	95	INDX	FOOT	0	0	0	4	20	60	61	00
16 0251	94	9	8	1.0	1.8	0.8	8	0	8	95	INDX	FOOT	0	0	0	4	20	60	61	00
16 0251	94	9	19	0.3	1.0	0.7	83	0	83	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0251	94	9	19	1.0	1.8	0.8	16	1	17	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0251	94	9	28	0.3	1.0	0.7	94	4	98	90	INDX	FOOT	0	0	1	4	20	33	61	00
16 0251	94	9	28	1.0	1.8	0.8	21	3	24	90	INDX	FOOT	0	0	1	4	20	33	61	00

16	0251	94	10	7	0.3	1.0	0.7	89	19	108	90	INDX	FOOT	1	4	0	0	20	00	00	00
16	0251	94	10	7	1.0	1.8	0.8	7	3	10	90	INDX	FOOT	1	4	0	0	20	00	00	00
16	0251	94	10	17	0.3	1.0	0.7	32	6	38	90	INDX	FOOT	4	0	0	0	20	61	00	00
16	0251	94	10	17	1.0	1.8	0.8	3	2	5	90	INDX	FOOT	4	0	0	0	20	61	00	00
16	0251	94	11	4	0.0	1.8	1.8	374	1	375	80	INDX	RAFT	0	0	1	4	23	60	00	00

Notes:
On Sept. 8 survey 2 of 17 fish were active on redds in river mile 0.3-1.8 reach, 3 of 8 fish on river mile 1.8-1.8 reach.

Summer 1995

Reach - **River mile 0.0-1.8**
Estimate = 475
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Amplitude and timing of peak portion of AUC curve open to some interpretation. However, range of possible curve derivations only produces a small variation in escapement estimate.

Original estimate - Index (RM 0.0 - 1.8) = 509 (AUC), Supplemental reach (RM 1.8+) = 57 (Index * 0.111). Total = 566.

Table 30: 1995 chum survey data through Oct. 31

WRIA		Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16	0251	95	7	28	0.3	1.8	1.5	0	0	0	85	INDX	FOOT	3	0	0	0	23	60	00	00
16	0251	95	8	7	1.2	1.5	0.3	0	0	0	40	INDX	FOOT	0	0	0	0	00	27	60	00
16	0251	95	8	16	0.3	1.8	1.5	0	0	0	90	INDX	FOOT	3	0	0	0	23	60	61	00
16	0251	95	8	29	0.3	1.0	0.7	0	0	0	95	INDX	FOOT	3	6	0	0	23	60	61	00
16	0251	95	8	29	1.0	1.8	0.8	3	0	3	95	INDX	FOOT	3	6	0	0	23	60	61	00
16	0251	95	9	6	0.3	1.0	0.7	9	0	9	95	INDX	FOOT	1	3	6	0	20	60	61	00
16	0251	95	9	6	1.0	1.8	0.8	7	0	7	95	INDX	FOOT	1	3	6	0	20	60	61	00
16	0251	95	9	19	0.3	1.0	0.7	136	13	149	90	INDX	FOOT	1	3	4	0	20	60	61	00
16	0251	95	9	19	1.0	1.8	0.8	103	2	105	90	INDX	FOOT	1	3	4	0	20	60	61	00
16	0251	95	10	2	0.3	1.0	0.7	43	31	74	90	INDX	FOOT	1	3	4	0	20	60	61	00
16	0251	95	10	2	1.0	1.8	0.8	16	14	30	90	INDX	FOOT	1	3	4	0	20	60	61	00
16	0251	95	10	19	0.3	1.0	0.7	1	1	2	75	INDX	FOOT	1	3	4	0	24	60	61	00
16	0251	95	10	19	1.0	1.8	0.8	19	4	23	75	INDX	FOOT	1	3	4	0	24	60	61	00
16	0251	95	11	3	0.3	1.0	0.7	1,300	10	1,400	90	INDX	RAFT	4	0	0	0	23	60	61	00
16	0251	95	11	3	1.0	1.8	0.8	102	6	108	90	INDX	RAFT	4	0	0	0	23	60	61	00

Notes:
On Oct. 19 survey there was poor visibility in below river mile 1.0 due to glare and high flow conditions.

Summer 1996

Reach - **River mile 0.0-1.8**
Estimate = 774
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Endpoint not clearly defined by survey data, due to what looks like a big shot of fall chum on Oct. 21 survey. Endpoint of curve was conservatively placed at ~ Oct. 19. A hypothetical extension of endpoint out to a late October ending increases estimate by only about 13 %, demonstrating that uncertainty about this section of AUC curve does not have a large effect on escapement estimate.

Original estimate - Index (RM 0.0 - 1.8) = 738 (AUC), Supplemental reach (RM 1.8+) = 82 (Index * 0.111). Total = 820.

Table 31: 1996 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	96	9	5	0.3	1.0	0.7	0	0	0	95	INDX	FOOT	4	7	0	0	20	61	00	00
16 0251	96	9	5	1.0	1.8	0.8	7	0	7	95	INDX	FOOT	4	7	0	0	20	61	00	00
16 0251	96	9	18	0.3	1.0	0.7	238	3	241	85	INDX	FOOT	1	4	0	0	20	60	61	00
16 0251	96	9	18	1.0	1.8	0.8	9	0	9	85	INDX	FOOT	1	4	0	0	20	60	61	00
16 0251	96	9	30	0.3	1.0	0.7	177	13	190	N/A	INDX	FOOT	4	5	8	0	20	61	00	00
16 0251	96	9	30	1.0	1.8	0.8	47	3	50	N/A	INDX	FOOT	4	5	8	0	20	61	00	00
16 0251	96	10	7	0.3	1.0	0.7	154	43	197	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0251	96	10	7	1.0	1.8	0.8	62	16	78	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0251	96	10	21	0.3	1.0	0.7	1,033	28	1,061	75	INDX	FOOT	4	0	0	0	24	60	61	00
16 0251	96	10	21	1.0	1.8	0.8	77	2	79	75	INDX	FOOT	4	0	0	0	24	60	61	00
16 0251	96	11	5	0.3	1.0	0.7	10,300	70	10,370	80	INDX	RAFT	4	0	0	0	61	60	00	00
16 0251	96	11	5	1.0	1.8	0.8	2,390	0	2,390	80	INDX	RAFT	4	0	0	0	61	60	00	00

Notes:
On Sept. 18 survey >150 of observed live chum were at head of tidewater reach.
On Oct. 21 survey most of fish observed were bright chum moving through lower river, count was considered conservative.
On Nov. 5 survey count was considered conservative due to glare, low light conditions, and large numbers of fish.

Summer 1997

Reach - **River mile 0.0-1.8**
Estimate = 55
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - There are 5 survey observations during typical summer spawning period, but amplitude and timing of peak portion of curve are not clearly defined by surveys. Irregular entry pattern probably occurred due to small runsize.

Table 32: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0251	97	8	22	1.6	1.8	0.2	4	0	4	95	SUPP	FOOT	1	3	0	0	20	60	00	00
16 0251	97	9	3	0.3	1.8	1.5	NC	NC		90	INDX	FOOT	1	3	0	0	20	60	00	00
16 0251	97	9	10	0.3	1.0	0.7	9	0	9	95	INDX	FOOT	1	3	0	0	20	60	61	00
16 0251	97	9	10	1.0	1.8	0.8	15	0	15	95	INDX	FOOT	1	3	0	0	20	60	61	00
16 0251	97	9	24	0.3	1.8	1.5	9	0	9	85	INDX	RAFT	3	0	0	0	21	00	00	00
16 0251	97	10	7	0.3	1.0	0.7	0	2	2	75	INDX	RAFT	0	0	0	0	27	61	00	00
16 0251	97	10	7	1.0	1.8	0.8	7	8	2	75	INDX	RAFT	0	0	0	0	27	61	00	00
16 0251	97	10	16	0.3	1.6	1.3	5	0	5	70	INDX	RAFT	3	0	0	0	26	60	00	00

Notes:
On Aug. 22 survey all chum observed were in "Blue Hole" (river mile 1.8) - this was a spot check survey.
On Sept. 3 survey there were too many pinks to count chums accurately.

Summer 1998

Reach - **River mile 0.0-1.8**
Estimate = 95
Method - AUC (10 DAY STREAM LIFE) - broodstock take adjustment
Quality rating - Good
Comments - Curve well defined by data. Broodstock take adjustment issue has some ambiguity as to accuracy of method used to account for fish that are counted in surveys and then removed by broodstocking operations.

Adjusted escapement = [(1,110 FD – (32 broodstock take * 5 days assumed avg. residence before removal)) / 10 day stream life]

Table 33: 1998 chum survey data through Nov. 4

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
16 0251	08/12/98	0.3	1.8	1.5	0	0	0	95	INDX	FOOT					20			
16 0251	08/24/98	0.3	1.8	1.5	2	0	2	95	INDX	FOOT					20	60		
16 0251	09/02/98	0.5	1.0	0.5	2	1	3	95	INDX	FOOT	3	4	0	0	20	60	61	
16 0251	09/02/98	1.0	1.8	0.8	3	0	3	95	INDX	FOOT	3	4	0	0	20	60	61	
16 0251	09/10/98	0.3	1.0	0.7	16	2	18	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0251	09/10/98	1.0	1.8	0.8	4	0	4	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0251	09/21/98	0.3	1.0	0.7	39	1	40	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0251	09/21/98	1.0	1.8	0.8	7	0	7	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0251	10/01/98	0.3	1.0	0.7	16	17	33	95	INDX	FOOT	4	1	0	0	20	61		
16 0251	10/01/98	1.0	1.8	0.8	2	0	2	95	INDX	FOOT	4	1	0	0	20	61		
16 0251	10/09/98	0.3	1.0	0.7	5	5	10	70	INDX	FOOT	4	1	0	0	24	60	61	
16 0251	10/09/98	1.0	1.8	0.8	11	2	13	70	INDX	FOOT	4	1	0	0	24	60	61	
16 0251	10/19/98	0.3	1.0	0.7	1	4	5	75	INDX	FOOT	4	1	0	0	23	60	61	
16 0251	10/19/98	1.0	1.8	0.8	0	0	0	75	INDX	FOOT	4	1	0	0	23	60	61	
16 0251	10/27/98	0.3	1.0	0.7	153	2	155	95	INDX	FOOT					60	20		
16 0251	10/27/98	1.0	1.8	0.8	51	0	51	95	INDX	FOOT					60	20		
16 0251	11/04/98	0.3	1.0	0.7	126	0	126	95	INDX	RAFT	4	0	0	0	20	60	61	
16 0251	11/04/98	1.0	1.8	0.8	662	0	662	95	INDX	RAFT	4	0	0	0	20	60	61	

Notes:
08/24/98 – One female observed actively spawning upstream of the mouth of John Cr. other fish was observed downstream of the mouth of John Cr.
09/02/98 – Two redds observed upstream of RM 1.0. Lower end of survey stopped at RM 0.5 due to high tide.
09/21/98 – Three active redds upstream of RM 1.0.

Appendix 7 - John Cr. (WRIA 16.0253) summer chum natural spawning escapement summary

Introduction

John Cr. is a small river mile 1.0 left bank tributary of the Hamma Hamma R. (WRIA 16.0251). It receives small to moderate number of summer chum spawners in years, when the stream flow is adequate to allow access. The accessible habitat reach for summer chums is up to river mile 1.6 (dependent on stream flow). Most of spawning occurs in the lower 0.5 miles. Survey data suggests fish entry occurs in a pattern where majority of spawners for season enter stream in a short period of time; this is probably influenced largely by sudden stream flow increases after heavy rain periods (therefore stream life may be shorter than the typical 10 day value that is used for WDFW chum AUC estimates).

All the original escapement values were calculated by the assumption that John's Cr. was 0.8 % of the total escapement for Anderson, Dosewallips, Hamma Hamma mainstem, and Duckabush. Escapements for this stream were typically listed under the "Miscellaneous Area 12B" category in previous WDFW escapement summaries.

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **River mile 0.0-0.4**
Estimate = 309
Method - Sept. 30 live + dead
Quality rating - Poor
Comments - Dead/live ratio suggests spawning had peaked recently.

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	***68***	***9***	***30***	***0.0***	***0.4***	***0.4***	***63***	***246***	***309***	***0***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***23***	***00***	***00***	***00***

Summer 1969

Reach - **River mile 0.0-0.5**
Estimate = 185
Method - AUC
Quality rating - Fair
Comments - Only two surveys available to define AUC curve. Peak of AUC curve was placed on the Oct. 14 survey. The dead/live ratio had not yet reached 1:1, so this should have been the peak spawning period, given that the dead counts are typically reflective of the general period of the spawning activity progress in these small streams.

Table 2: 1969 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	***69***	***9***	***28***	***0.0***	***0.4***	***0.4***	***28***	***2***	***30***	***90***	***INDX***	***FOOT***	***1***	***3***	***0***	***0***	***20***	***00***	***00***	***00***
16 0253	***69***	***10***	***14***	***0.0***	***0.5***	***0.5***	***91***	***57***	***148***	***90***	***INDX***	***FOOT***	***1***	***3***	***0***	***0***	***20***	***00***	***00***	***00***

Summer 1970

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1971

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1972

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1973

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1974

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1975

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1976

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1977

Reach - **River mile 0.0-0.4**
Estimate = 26
Method - Sept. 28 live + dead count
Quality rating - Poor
Comments - Minimal estimate

Table 3: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	77	9	28	0.0	0.4	0.4	17	9	26	90	INDX	FOOT	3	0	0	0	00	00	00	00

Summer 1978

Reach - **River mile 0.0-0.4**
Estimate = 80
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - General quality and time density of surveys is good. However AUC estimate equals peak live + dead count on Sept. 22 (48 live, 29 dead), suggesting stream life was less than 10 days, given that AUC curve itself is reasonably robust looking.

Table 4: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	78	9	5	0.0	0.1	0.1	5	0	5	99	SUPP	FOOT	0	0	0	0	00	00	00	00
16 0253	78	9	22	0.0	0.3	0.3	48	29	77	90	INDX	FOOT	0	0	0	0	60	00	00	00
16 0253	78	10	5	0.0	0.4	0.4	0	13	13	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	78	10	12	0.0	0.3	0.3	1	11	12	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	78	10	18	0.0	0.2	0.2	1	13	14	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	78	10	25	0.0	0.4	0.4	0	7	7	95	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-0.4**
Estimate = 44
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - General quality and time density of surveys is fair to good. However, there are problems with the data: 1) AUC estimate for first of the two sections of the AUC curve is not much higher than the 27 fish observed on the Sept. 13 survey, suggesting stream life was less than 9 days, and 3) endpoint of curve is not defined by survey data. Curve was subjectively ended on Nov. 1. It was assumed chum observed on Oct. 24 were summer chum, given there was two items of information indicating fall chums had not yet entered the stream basin in significant numbers at the time of survey: 1) the next survey on Nov. 16 observed only a few fish (1 live and 3 dead), and 2) no live fish were observed in a survey on mainstem Hamma Hamma R. on Oct. 24.

Table 5: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	79	9	13	0.0	0.8	0.8	26	1	27	95	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	79	9	24	0.0	0.4	0.4	1	7	8	99	INDX	FOOT	3	0	0	0	20	60	00	00
16 0253	79	10	5	0.0	1.0	1.0	0	4	4	90	INDX	FOOT	3	0	0	0	00	00	00	00
16 0253	79	10	15	0.0	0.7	0.7	0	5	5	80	INDX	FOOT	3	0	0	0	00	00	00	00
16 0253	79	10	24	0.0	0.7	0.7	12	0	12	80	INDX	FOOT	3	0	0	0	26	60	00	00

Summer 1980

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1981

Reach - **River mile 0.0-1.0**
Estimate = 249
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both PNPTC and WDF conducted spawning surveys. Used PNPTC data due to larger number of surveys, and longer survey reach coverage for peak survey.

Table 6: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	81	9	9	0.0	0.3	0.3	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	40
16 0253	81	9	16	0.0	0.0	0.0	0	0	0	99	SPOT	FOOT	0	0	0	0	57	00	00	40
16 0253	81	9	29	0.0	0.1	0.1	102	2	104	90	INDX	FOOT	1	3	0	0	24	00	00	00
16 0253	81	10	1	0.0	1.0	1.0	175	10	185	89	INDX	FOOT	1	3	4	0	16	23	53	40
16 0253	81	10	16	0.0	0.7	0.7	3	11	14	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	81	10	16	0.0	1.0	1.0	10	8	18	95	INDX	FOOT	3	0	0	0	00	00	00	40
16 0253	81	10	22	0.0	1.0	1.0	3	9	12	95	INDX	FOOT	3	0	0	0	00	23	00	40
16 0253	81	10	29	0.0	1.6	1.6	7	11	18	80	INDX	FOOT	1	4	0	0	23	00	00	00

Summer 1982

Reach - **River mile 0.0-0.5**
Estimate = 11
Method - Oct. 6 live + dead count
Quality rating - Poor
Comments - Assumed fish observed on Oct. 28 were fall chum, due to time period of survey and lack of dead fish observed (indicating fish were not actively spawning at time of observation).

Table 7: 1982 chum survey data through Nov. 2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	82	9	14	0.1	0.0	-0.1	0	0	0	99	SPOT	FOOT	0	0	0	0	57	00	00	00
16 0253	82	10	6	0.0	0.5	0.5	11	0	11	90	INDX	FOOT	0	0	0	0	57	00	00	00
16 0253	82	10	28	0.0	1.6	1.6	10	1	11	85	INDX	FOOT	0	0	0	0	23	61	00	00
16 0253	82	11	2	0.0	0.4	0.4	13	1	14	95	INDX	FOOT	0	0	0	4	20	33	60	00

Summer 1983

Reach - **River mile 0.0-0.4**
Estimate = 6
Method - (Sept. 23 PNPTC live + dead) + (Oct. 6 WDFW live count)
Quality rating - Good
Comments - High survey density should have accounted for the majority of spawning activity for season. Assumed dead on Oct. 6 may have been counted on Sept. 23, so they were excluded from estimate.

Table 8: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	83	9	16	0.0	0.3	0.3	0	0	0	99	INDX	FOOT	0	0	0	0	57	00	00	00
16 0253	83	9	23	0.0	0.2	0.2	2	2	4	80	SUPP	FOOT	3	0	0	0	20	33	60	40
16 0253	83	10	6	0.0	0.3	0.3	1	3	4	95	SUPP	FOOT	3	0	0	0	21	60	00	40
16 0253	83	10	6	0.0	0.2	0.2	2	2	4	95	INDX	FOOT	3	0	0	0	20	00	00	00
16 0253	83	10	13	0.0	0.2	0.2	0	0	0	95	INDX	FOOT	3	0	0	0	20	00	00	00
16 0253	83	10	14	0.0	0.3	0.3	0	2	2	95	SUPP	FOOT	3	0	0	0	20	33	00	40
16 0253	83	10	19	0.0	0.2	0.2	0	0	0	95	INDX	FOOT	3	0	0	0	20	00	00	00
16 0253	83	10	26	0.0	0.2	0.2	0	0	0	95	INDX	FOOT	3	0	0	0	20	00	00	00

Summer 1984

Reach - **River mile 0.0-0.4**
Estimate = 5
Method - Oct. 15 live + dead count
Quality rating - Poor
Comments - No documented survey activity for September. Some spawning activity may have been missed.

Table 9: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	84	10	15	0.0	0.3	0.3	5	0	5	99	INDX	FOOT	0	0	0	0	20	00	00	00
16 0253	84	10	22	0.0	0.3	0.3	0	1	1	99	INDX	FOOT	0	0	0	0	20	00	00	00
16 0253	84	10	29	0.0	0.3	0.3	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1985

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1986

Reach - **River mile 0.0-0.5**
Estimate = 0
Method - Live + dead on Sept. 16, 22, Oct. 15, 21 surveys.
Quality rating - Good
Comments - None.

Table 10: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	86	9	16	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	86	9	22	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
16 0253	86	10	15	0.0	0.2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0253	86	10	21	0.0	0.2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1987

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to attempt an escapement estimate. The one survey on Sept. 3 is extremely early in typical summer chum fish entry period for this stream.

Table 11: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	87	9	3	0.0	0.2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	60	00	00	00

Notes:
Sept. 3 survey card noted stream was too low for fish entry.

Summer 1988

Reach - **River mile 0.0-1.6**
Estimate = 12
Method - Sept. 27 live + dead count
Quality rating - Good
Comments - Assumed live fish observed on Oct. 26 survey were fall chum, due to indication of a strong early entrance of fall chum to stream, as suggested by the large increase in live chum abundance on the Nov. 4 survey.

Table 12: 1988 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	***88***	***9***	***27***	***0.0***	***0.8***	***0.8***	***12***	***0***	***12***	***90***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***00***	***60***	***00***	***00***
16 0253	88	10	13	0.0	0.8	0.8	0	8	8	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0253	88	10	13	0.8	1.6	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0253	88	10	26	0.0	0.8	0.8	1	2	3	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0253	88	10	26	0.8	1.6	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
16 0253	88	11	4	0.0	0.8	0.8	15	0	15	80	INDX	FOOT	4	0	0	0	26	61	34	00
16 0253	88	11	4	0.8	1.6	0.8	38	0	38	80	INDX	FOOT	4	0	0	0	26	61	34	00

Notes:
Sept. 27 survey card notes reported all fish were in lower end of surveyed reach.

Summer 1989

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - Insufficient survey data to attempt an escapement estimate. The one survey on Sept. 1 is extramely early in typical summer chum fish entry period for this stream.

Table 13: 1989 chum survey data through Oct. . 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	88	9	1	1.6	0.0	-1.6	0	0	0	0	SPOT	FOOT	0	0	0	0	20	00	00	00

Summer 1990

Reach - **River mile 0.0-1.6**
Estimate = 0
Method - Live + dead Oct. 9, 17, 25 surveys.
Quality rating - Fair
Comments - No recorded spawning survey data collected in September time period. Some spawning activity may have been missed.

Table 14: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	90	10	9	0.0	0.4	0.4	0	0	0	95	INDX	FOOT	0	0	0	0	00	60	20	00
16 0253	90	10	17	0.0	1.6	1.6	0	0	0	95	INDX	FOOT	4	0	0	0	20	00	00	00
16 0253	90	10	25	0.0	1.6	1.6	0	0	0	70	INDX	FOOT	4	0	0	0	25	00	00	00
16 0253	90	10	31	0.0	1.6	1.6	0	0	0	85	INDX	FOOT	4	0	0	0	23	00	00	00

Notes:
Oct. 9 survey card noted there were some potential migration barriers at the current stream flow level.

Summer 1991

Reach - **River mile 0.0-1.0**
Estimate = 2 (updated 02/10/2000 – previous estimate was 0, which is value used in Summer Chum Conservation Initiative Document, year 2000 edition)
Method - Live + dead for Oct. 3, 10, 17 surveys.
Quality rating - Fair
Comments - No recorded spawning survey data collected in September time period. Some spawning activity may have been missed.

Table 15: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	91	10	3	0.0	1.0	1.0	0	1	1	90	INDX	FOOT	3	0	0	0	20	00	00	00
16 0253	91	10	10	0.0	1.0	1.0	1	0	1	90	INDX	FOOT	3	0	0	0	20	00	00	00
16 0253	91	10	17	0.0	1.0	1.0	0	1	1	90	INDX	FOOT	3	0	0	0	60	20	00	00

Summer 1992

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - Live + dead Oct. 15 survey.
Quality rating - Poor
Comments - There is no recorded survey data for Sept. - early Oct. time period. Live fish observed on Oct. 22 survey were assumed to be fall chum, due to 1) no dead fish to indicate spawning activity was occurring, and 2) indication of a strong early entrance of fall chum to stream by the large increase in live chum abundance observed on the next survey on Oct. 30.

Table 16: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	92	10	15	0.0	0.8	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	60	20	00	00
16 0253	92	10	22	0.0	1.8	1.8	17	0	17	90	INDX	FOOT	0	0	0	0	61	23	00	00
16 0253	92	10	30	0.0	0.8	0.8	135	6	141	70	INDX	FOOT	0	0	0	0	28	61	00	00
16 0253	92	10	30	0.8	1.8	1.0	94	0	94	70	INDX	FOOT	0	0	0	0	28	61	00	00

Summer 1993

Reach - **River mile 0.0-1.0**
Estimate = 0
Method - Live + dead Oct. 18 survey.
Quality rating - Poor
Comments - There is no recorded survey data for Sept. - early Oct. time period.

Table 17: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	*93*	*10*	*18*	*1.6*	*0.0*	*-1.6*	*0*	*0*	*0*	*99*	*SPOT*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*60*	*65*	*00*
16 0253	93	10	27	0.0	0.8	0.8	0	0	0	95	INDX	FOOT	0	0	0	4	20	00	60	00

Notes:
Oct. 18 survey card noted stream flow was very low.

Summer 1994

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1995

Reach - **River mile 0.0-1.0**
Estimate = 1
Method - Oct. 10 live + dead count
Quality rating - Poor
Comments - There is no recorded survey data for Sept. - early Oct. time period. Some spawning activity may have been missed.

Table 18: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	*95*	*10*	*10*	*0.0*	*1.0*	*1.0*	*1*	*0*	*1*	*80*	*INDX*	*FOOT*	*3*	*0*	*0*	*0*	*00*	*23*	*60*	*00*

Notes:
Oct. 10 survey card noted chum was located near mouth of stream.

Summer 1996

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Summer 1997

Reach - **River mile 0.0-1.6**
Estimate = 49
Method - Live + dead (Sept. 19 + Oct. 7 surveys) + (dead on Oct. 23 survey)
Quality rating - Poor
Comments - There is excessive uncertainty in the data created by the 19 day gap between the Sept. 19 and

Oct. 7 surveys to use the AUC approach. The lack of dead observed on both these surveys suggests each group of fish entered discretely, and had recently entered before date of each observation. Live fish observed on Oct. 23 were assumed to be fall chum, given consistently high October stream flows that probably encouraged rapid entry of fall chum - coho and chinook were observed in Sept. and Oct., which usually don't enter this small stream early in fall.

Table 19: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0253	97	9	19	0.0	0.8	0.8	25	0	25	85	INDX	FOOT	3	0	0	0	24	60	61	00
16 0253	97	9	19	0.8	1.6	0.8	0	0	0	85	INDX	FOOT	3	0	0	0	24	60	61	00
16 0253	97	10	7	0.0	0.8	0.8	23	1	24	95	INDX	FOOT	3	4	0	0	23	60	61	00
16 0253	97	10	7	0.8	1.6	0.8	0	0	0	95	INDX	FOOT	3	4	0	0	23	60	61	00
16 0253	97	10	16	0.0	1.6	1.6	0	0	0	90	INDX	FOOT	4	0	0	0	23	61	00	00
16 0253	97	10	23	0.0	0.8	0.8	3	1	4	95	INDX	FOOT	3	4	0	0	20	61	00	00
16 0253	97	10	23	0.8	1.6	0.8	0	0	0	95	INDX	FOOT	3	4	0	0	20	61	00	00
16 0253	97	11	10	0.0	0.8	0.8	460	43	493	80	INDX	FOOT	4	0	0	0	24	61	00	00
16 0253	97	11	10	0.8	1.6	0.8	3	1	4	80	INDX	FOOT	4	0	0	0	24	61	00	00

Notes:
Sept. 19 survey card noted majority of fish were below "the stone quarry", with 19 chum below quarry, and 6 above.

Summer 1998

Reach - **River mile 0.0-1.6**
Estimate = 0
Method - N/A
Quality rating - Good
Comments - No formal surveys conducted. LLK Weir was present at mouth of stream (no summer chum were caught). Also, flows were quite low.

Appendix 8 - Duckabush R. (WRIA 16.0351) summer chum natural spawning escapement summary

Introduction

This is one of the largest summer chum streams in Hood Canal, and has a tendency to experience increased flows and turbidity during rain events, and is tinted by snowmelt in higher snowpack years during warmer weather periods. Poor water visibility is therefore a persistent problem in some years.

Dead : live count ratios in this stream can be an unreliable indicator of the progression of the season's spawning activity because as with the neighboring Hamma Hamma and Dosewallips Rivers, the large size and "flashy" hydrologic character of these streams rapidly flushes carcasses out of the drainage. High pink densities in odd-return years often makes accurate census of summer chums in September difficult (counts are typically conservative in these situations).

Survey data was periodically summarized into two reaches, river mile 0.0 - 1.1 (powerline crossing), and RM 1.1 - 2.3 on the field data summary cards. This information was typically combined to a single reach when reported in WDFW spawning ground database. To provide more information on distribution of spawning fish, data reported in accompanying tables displays fish counts stratified by reach where possible.

There is a short section of chum spawning habitat stream upstream of the index reach. There was only two historical surveys conducted during the summer chum spawning period upstream of river mile 2.3 (that were reported as chum surveys); 1969 and 1976. Some fish were observed in this reach during these surveys, but the limited nature of the data made prevented any quantitative estimates. The Sept. 21, 1976 live + dead count in this reach was 646 fish, or 12 % of the total escapement estimate in the lower stream reach. Given the limited data, it was decided that derivation of an expansion factor to account for annual spawning in this reach would be problematic at this time, and no expansion values were used in the final estimates.

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **River mile 0.0-2.3**
Estimate = 4,693
Method - Single survey expansion by a timing model - 1996 AUC data
Quality rating - Poor
Comments - Used 1996 AUC timing data because it was one of the only good quality AUC curves for this stream that had clearly peaked prior to the Sept. 30, 1968 survey date. Sept. 30 survey appears to be post-peak, given the dead : live ratio > 1.

Original estimate : Index (RM 0.0 - 2.3) = 8,520 (AUC), Supplemental (RM 2.3 +) = 448 (Index * 0.053). Total = 8,968.

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	*68*	*9*	*30*	*0.1*	*2.3*	*2.2*	*1,869*	*1,940*	*3,809*	*0*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*23*	*13*	*00*	*00*

Summer 1969

Reach - **River mile 0.0-2.3**
Estimate = 3,802
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Poor (60 %)

visibility on peak survey. Peak was assumed to occur after Sept. 26 survey, due to almost no dead observed on this survey. 2) Peak period of curve not well defined in amplitude or timing. Overall derivation of curve was highly subjective, but assumed to be reasonably conservative.

Original estimate : Index (RM 0.0 - 2.3) = 4,220 (AUC), Supplemental (RM 2.3 +) = 222 (Index * 0.053). Total = 4,442

Table 2: 1969 chum survey data through Oct. 31 for river mile 0.0-2.3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	69	9	26	0.1	2.3	2.2	1,347	10	1,357	60	INDX	FOOT	3	0	0	0	23	13	00	00
16 0351	69	10	12	0.1	2.3	2.2	345	307	652	70	INDX	FOOT	1	3	0	0	20	13	00	00

Reach - **River mile 2.3-2.8**
Estimate = 69
Method - Sept. 26 live + dead count.
Quality rating - Poor
Comments - Minimal estimate.

Table 3: 1969 chum survey data through Oct. 31 for river mile 2.3-3.8

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	69	9	26	2.3	2.8	0.5	69	0	69	60	SUPP	FOOT	3	0	0	0	23	13	00	00

Summer 1970

Reach - **River mile 0.0-2.3**
Estimate = 2,301
Method - Single survey expansion by a timing model (based on 1988 AUC data).
Quality rating - Poor
Comments - Used 1988 AUC timing data because it was representative of a typical early Oct. peak spawning run with mid – September and mid - October starting and ending dates.

Original estimate : Index (RM 0.0 - 2.3) = 2,440 (AUC), Supplemental (RM 2.3 +) = 128 (Index * 0.053). Total = 2,568.

Table 4: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	70	9	28	0.1	2.3	2.2	1,051	70	1,121	80	INDX	FOOT	1	4	0	0	20	13	00	00

Summer 1971

Reach - **River mile 0.0-2.3**
Estimate = 3,904
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak and post – peak portions of curve not defined by data. Peak was assumed to be after Sept. 14, due to lack of dead observed on this survey. Timing of peak portion of curve was subjectively rendered to be in the typical early October period. 2) Post peak section of curve undefined. A typical end point of around ~ Oct. 20 was assumed. Overall, the curve is very subjective.

Original estimate : Index (RM 0.0 - 2.3) = 3,320 (AUC), Supplemental (RM 2.3 +) = 175 (Index * 0.053). Total = 3,495.

Table 5: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	71	9	14	0.1	2.3	2.2	271	0	271	70	INDX	FOOT	1	3	0	0	23	13	00	00
16 0351	71	9	28	0.1	2.3	2.2	1,306	26	1,332	70	INDX	FOOT	1	3	0	0	24	34	13	00

Summer 1972

Reach - **River mile 0.0-2.3**
Estimate = 13,546
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak and post – peak portions of curve not defined by data. Peak was assumed to be around Oct. 8, since this is a typical peak spawning period, and low dead count on Oct. 6 suggested spawning had peaked yet. 2) Post peak section of curve undefined. A typical end point of around ~ Oct. 25 was assumed. Overall, the curve is very subjective.

Original estimate : Index (RM 0.0 - 2.3) = 12,070 (AUC), Supplemental (RM 2.3 +) = 635 (Index * 0.053). Total = 12,705.

Table 6: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	72	9	26	0.5	2.3	1.8	2,020	5	2,025	60	INDX	FOOT	1	0	0	0	00	34	13	00
16 0351	72	10	6	0.1	2.3	2.2	5,438	896	6,334	85	INDX	FOOT	1	0	0	0	20	13	00	00

Summer 1973

Reach - **River mile 0.0-2.3**
Estimate = 5,761
Method - Single survey expansion by a timing model (based on 1988 AUC data)
Quality rating - Poor
Comments - Used 1988 AUC timing data because it was representative of a typical early Oct. peak spawning run with mid – September and mid - October starting and ending dates. Oct. 9 survey dead : live ratio was ~ 1:1, suggesting survey was post-peak, so peak period should have been early October, similar to the model used.

Original estimate : Index (RM 0.0 - 2.3) = 7,120 (AUC), Supplemental (RM 2.3 +) = 375 (Index * 0.053). Total = 7,495.

Table 7: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	73	10	9	0.1	2.3	2.2	1,982	1,897	3,879	90	INDX	FOOT	1	3	0	0	00	00	00	00

Summer 1974

Reach - **River mile 0.0-2.3**
Estimate = 3,581
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak period not defined well by survey data, because of poor visibility (60 %) on peak survey. 2) 14 day space in surveys between Oct. 2 and Oct. 16 surveys.

Original estimate : Index (RM 0.0 - 2.3) = 3,895 (AUC), Supplemental (RM 2.3 +) = 205 (Index * 0.053). Total = 4,100.

Table 8: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	74	9	18	0.1	2.2	2.1	173	1	174	60	INDX	FOOT	1	0	0	0	20	60	00	00
16 0351	74	10	2	0.3	1.2	0.9	727	23	750	60	INDX	FOOT	0	0	0	0	60	00	00	00
16 0351	74	10	2	1.2	2.3	1.1	544	5	549	60	INDX	FOOT	0	0	0	0	60	00	00	00
16 0351	74	10	16	0.1	2.2	2.1	676	452	1,128	80	INDX	FOOT	1	0	0	0	20	00	00	00
16 0351	74	10	28	0.1	2.2	2.1	223	657	880	90	INDX	FOOT	0	0	0	0	20	30	00	00

Notes:
River mile 1.2 is noted as location of "Pedwell's Farm" on Nov. 30, 1976 chum survey card.

Summer 1975

Reach - **River mile 0.0-2.3**
Estimate = 2,245
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak period not defined well by survey data, because of poor visibility (60 %) on peak survey. 2) 15 day space in surveys between Sept. 23 and Oct. 8 surveys.

Original estimate : Index (RM 0.0 - 2.3) = 2,220 (AUC), Supplemental (RM 2.3 +) = 117 (Index * 0.053). Total = 2,337.

Table 9: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	75	9	8	0.1	1.1	1.0	13	0	13	90	SUPP	FOOT	0	0	0	0	00	00	00	00
16 0351	75	9	23	0.1	2.3	2.2	690	6	696	65	INDX	FOOT	3	0	0	0	23	00	00	00
16 0351	75	10	8	0.1	2.3	2.2	494	191	685	65	INDX	FOOT	3	4	0	0	00	00	00	00
16 0351	75	10	24	0.1	1.2	1.1	8	10	18	70	INDX	FOOT	3	0	0	0	24	60	61	00
16 0351	75	10	24	1.2	2.3	1.1	7	4	11	70	INDX	FOOT	3	0	0	0	24	60	61	00

Summer 1976

Reach - **River mile 0.0-2.3**
Estimate = 5,449
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: Amplitude and timing of peak period not defined well by survey data due to gaps in survey coverage, and only fair visibility on peak survey (70 %). Spawning was assumed to peak soon after Sept. 21 survey, because of low live count on Oct. 5. Oct. 5 survey did highlight the early end to summer chum spawning activity that was common in many Hood Canal streams this year.

Original estimate : Index (RM 0.0 - 2.3) = 4,995 (AUC), Supplemental (RM 2.3 +) = 263 (Index * 0.053). Total = 5,258.

Table 10: 1976 chum survey data through Oct. 31 for river mile 0.0-2.3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	76	9	21	0.3	2.3	2.0	2,565	230	2,795	70	INDX	FOOT	0	0	0	0	00	00	00	00
16 0351	76	10	5	0.3	2.3	2.0	410	2,803	3,213	80	INDX	BOAT	1	0	0	0	00	00	00	00

Reach - **River mile 2.3-2.8**
Estimate = 646
Method - Sept. 21 live + dead count
Quality rating - Poor
Comments - Minimal estimate.

Table 11: 1976 chum survey data through Oct. 31 for river mile 2.3-2.8

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	76	9	21	2.3	2.8	0.5	596	50	646	70	SUPP	FOOT	0	0	0	0	60	00	00	00

Summer 1977

Reach - **River mile 0.0-2.3**
Estimate = 2,453
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: Amplitude and timing of peak open to considerable interpretation, due to poor visibility (50 %) on peak survey, and length of time between Sept. 22 and Oct. 10 surveys. Start and endpoints of spawning period not clearly defined by survey data. Curve is very subjective overall.

Original estimate : Index (RM 0.0 - 2.3) = 2,750 (AUC), Supplemental (RM 2.3 +) = 145 (Index * 0.053). Total = 2,895.

Table 12: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen.	Type survey	Method	Other species				Comments			Agency
16 0351	77	9	12	0.1	2.3	2.2	187	3	190	75	INDX	FOOT	0	0	0	0	00	00	00	00
16 0351	77	9	22	0.1	2.3	2.2	671	0	671	50	INDX	FOOT	3	0	0	0	00	00	00	00
16 0351	77	10	10	0.0	2.3	2.3	402	521	923	80	INDX	FOOT	3	0	0	0	21	00	00	00

Summer 1978

Reach - **River mile 0.0-2.3**
Estimate = 1,898
Method - Single survey expansion by a timing model (used 1979 AUC data).
Quality rating - Poor
Comments - Used 1979 AUC timing data because it was representative of a year with late Sept. peak of spawning. This is suggested in 1978 by the dead : live ratio transition from <1:1 to > 1:1 between the Sept. 22 and Oct. 10 surveys.

Original estimate : Index (RM 0.0 - 2.3) = 2,445 (AUC), Supplemental (RM 2.3 +) = 129 (Index * 0.053). Total = 2,574.

Table 13: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	78	9	22	0.0	2.3	2.3	1,021	47	1,068	60	INDX	BOAT	1	4	0	0	00	00	00	00
16 0351	78	10	11	0.1	2.3	2.2	19	343	362	85	INDX	FOOT	0	0	0	0	00	00	00	00
16 0351	78	10	18	0.1	2.3	2.2	14	375	389	85	INDX	FOOT	6	0	0	0	60	00	00	00
16 0351	78	10	25	0.1	2.3	2.2	9	261	270	80	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-2.3**
Estimate = 1,190
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Amplitude of peak not strongly defined, but there isn't a lot of room for manipulation of timing or amplitude of the peak period (within reason).

Original estimate : Index (RM 0.0 - 2.3) = 1,165 (AUC), Supplemental (RM 2.3 +) = 61 (Index * 0.053). Total = 1,226.

Table 14: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	79	9	12	0.1	2.3	2.2	79	0	79	85	INDX	BOAT	3	0	0	0	00	00	00	00
16 0351	79	9	24	0.2	2.3	2.1	718	96	814	85	INDX	BOAT	3	4	0	0	20	00	00	00
16 0351	79	10	5	0.1	2.3	2.2	87	60	147	80	INDX	FOOT	3	0	0	0	20	33	53	00
16 0351	79	10	17	0.1	2.3	2.2	31	135	166	85	INDX	FOOT	3	4	0	0	20	31	60	00
16 0351	79	10	24	0.1	2.3	2.2	0	0	0	30	INDX	FOOT	3	0	0	0	00	00	00	00

Summer 1980

Reach - **River mile 0.0-2.3**
Estimate = 827
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Some ambiguity to amplitude and timing of peak section of curve due to wide spacing of survey effort. A pretty normalized looking curve seems to fit the data if you assume a typical early Oct. peak spawning period, and no anomalies in fish abundance occurred in ascending or descending portions of curve that are not described by the survey data.

Original estimate : Index (RM 0.0 - 2.3) = 1,050 (AUC), Supplemental (RM 2.3 +) = 55 (Index * 0.053). Total = 1,105.

Table 15: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	80	9	5	0.3	1.2	0.9	5	0	5	60	SUPP	FOOT	0	0	0	0	00	00	00	00
16 0351	80	9	30	0.3	2.3	2.0	333	11	344	90	INDX	BOAT	1	4	0	0	20	00	00	00
16 0351	80	10	17	0.3	2.3	2.0	134	132	266	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-2.3**
Estimate = 557
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Both PNPTC and WDF conducted spawning surveys. PNPTC survey data was used for AUC estimate, due to more substantial number of surveys, and stream length coverage in PNPTC data. Amplitude and timing of peak region of AUC curve open to considerable interpretation, due to large gap in survey effort between Sept. 23 and Oct. 15.

There is an interesting discrepancy between the WDF Oct. 16 survey (0 live, 12 dead), and the PNPTC Oct. 15 survey (47 live, 37 dead). The PNPTC survey did extend further downstream, and was conducted with a boat, which may explain discrepancy.

Original estimate : Index (RM 0.0 - 2.3) = 383 (AUC), Supplemental (RM 2.3 +) = 20 (Index * 0.053). Total = 403.

Table 16: 1981 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	81	9	9	0.0	0.5	0.5	1	0	1	99	INDX	FOOT	3	0	0	0	20	51	00	40
16 0351	81	9	16	4.5	5.0	0.5	0	0	0	99	SUPP	FOOT	0	0	0	0	57	20	00	40
16 0351	81	9	23	0.1	2.3	2.2	207	5	212	90	INDX	FOOT	3	4	0	0	23	00	00	40
16 0351	81	9	29	0.2	0.0	-0.2	0	0	0	0	SPOT		0	0	0	0	28	39	00	00
16 0351	81	10	15	0.0	2.3	2.3	47	37	84	85	INDX	BOAT	1	3	4	0	00	00	00	40
16 0351	81	10	16	0.2	2.3	2.1	0	12	12	70	INDX	FOOT	0	3	0	4	00	00	00	00
16 0351	81	11	2	0.0	2.3	2.3	0	0	0	30	INDX	BOAT	4	0	0	0	00	00	00	40
16 0351	81	11	5	0.0	2.3	2.3	2	0	2	65	INDX	FOOT	4	0	0	0	26	31	00	40

Summer 1982

Reach - **River mile 0.0-2.3**
Estimate = 690
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak open to considerable interpretation, due to gap in survey data between Sept. 24 and Oct. 15. 2) Endpoint of AUC curve not clearly defined by data. Endpoint was projected by extension of slope of descending section of curve past last data point to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 785 (AUC), Supplemental (RM 2.3 +) = 41 (Index * 0.053). Total = 826.

Table 17: 1982 chum survey data through Nov. 2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	82	9	14	0.0	2.3	2.3	16	0	16	80	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	82	9	24	0.0	2.3	2.3	253	2	255	85	INDX	BOAT	0	0	0	0	20	00	00	00
16 0351	82	10	15	0.0	2.3	2.3	101	69	170	85	INDX	FOOT	0	0	0	0	33	31	23	00
16 0351	82	11	2	0.0	0.0	0.0	0	0	0	0	INDX	FOOT	0	0	0	0	60	39	00	00

Summer 1983

Reach - **River mile 0.0-2.3**
Estimate = 80
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Both WDF and PNPTC collected survey data. PNPTC surveys were used for AUC estimate, due to number of observations and consistency of stream reach surveyed. WDF observations are somewhat consistent with PNPTC data, but WDF data set is missing a survey during the apparent peak spawning period in late Sept.

Original estimate : Index (RM 0.0 - 2.3) = 200 (Educated guess), Supplemental (RM 2.3 +) = 11 (Index * 0.053). Total = 211.

Table 18: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0351	83	9	8	1.2	2.0	0.8	3	0	3	95	SUPP	FOOT	3	0	0	0	20	00	00	22
16 0351	83	9	16	0.0	2.3	2.3	22	0	22	85	INDX	FOOT	3	0	0	0	20	00	00	00
16 0351	83	9	16	0.3	1.0	0.7	2	0	2	90	INDX	FOOT	3	0	0	0	20	33	00	22
16 0351	83	9	16	1.2	2.0	0.8	22	0	22	90	SUPP	FOOT	1	3	0	0	20	33	00	22

16 0351	83	9	16	2.0	2.5	0.5	3	0	3	90	SUPP	FOOT	3	0	0	0	20	33	00	22
16 0351	83	9	23	0.1	0.3	0.2	5	0	5	70	INDX	FOOT	4	3	0	0	00	20	60	40
16 0351	83	9	23	0.3	1.0	0.7	4	1	5	60	INDX	FOOT	3	0	0	0	00	20	60	40
16 0351	83	9	23	1.0	1.2	0.2	7	1	8	80	INDX	FOOT	3	0	0	0	20	31	60	40
16 0351	83	9	23	1.2	2.0	0.8	46	1	47	85	INDX	FOOT	1	3	4	0	20	31	60	40
16 0351	83	9	29	0.0	2.3	2.3	5	4	9	85	INDX	FOOT	3	0	0	0	20	33	60	00
16 0351	83	9	29	0.3	1.0	0.7	0	4	4	60	INDX	FOOT	1	3	0	0	31	60	00	40
16 0351	83	9	29	1.0	1.2	0.2	0	4	4	90	INDX	FOOT	1	3	0	0	20	31	60	40
16 0351	83	10	5	0.3	1.0	0.7	0	2	2	75	INDX	FOOT	3	0	0	0	20	33	60	40
16 0351	83	10	5	1.0	1.2	0.2	0	2	2	90	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	6	0.1	2.3	2.2	2	2	4	95	INDX	FOOT	3	4	0	0	20	00	00	00
16 0351	83	10	12	0.1	0.3	0.2	0	1	1	70	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	12	1.0	1.2	0.2	0	2	2	90	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	12	1.2	2.0	0.8	3	5	8	90	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	13	0.1	2.3	2.2	0	9	9	90	INDX	FOOT	3	4	0	0	20	00	00	00
16 0351	83	10	19	0.1	2.3	2.2	0	10	10	85	INDX	FOOT	3	4	0	0	20	00	00	00
16 0351	83	10	20	0.3	1.0	0.7	0	3	3	75	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	20	1.0	1.2	0.2	0	4	4	85	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	20	1.2	2.0	0.8	1	12	13	85	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	20	2.0	2.5	0.5	2	7	9	85	INDX	FOOT	3	4	0	0	20	60	00	40
16 0351	83	10	26	0.1	2.3	2.2	0	2	2	90	INDX	FOOT	3	4	0	0	20	00	00	00
16 0351	83	10	27	0.3	1.0	0.7	0	7	7	80	INDX	FOOT	3	4	0	0	20	60	00	40
16 0351	83	10	27	1.0	1.2	0.2	0	4	4	80	INDX	FOOT	3	0	0	0	20	60	00	40
16 0351	83	10	27	1.2	2.0	0.8	0	8	8	80	INDX	FOOT	1	3	4	0	20	60	00	40

Summer 1984

Reach - **River mile 0.0-2.3**
Estimate = 299
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Some ambiguity in timing and amplitude of peak of curve, but the range of potential solutions within the constraints of the surrounding survey data would result in only a small percentage change in the total escapement estimate. No clear endpoint to AUC curve, because Oct. 22 and Oct. 29 surveys both have similar numbers of live fish - live fish observed on Oct. 29 survey are assumed to be fall chum due to time period of survey. Endpoint was projected by extension of slope of descending section of curve past Oct. 22 survey data point to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 300 (AUC), Supplemental (RM 2.3 +) = 16 (Index * 0.053). Total = 316.

Table 19: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	84	9	7	0.5	0.0	-0.5	0	0	0	80	SPOT	FOOT	0	0	0	0	20	00	00	00
16 0351	84	9	25	0.1	2.3	2.2	72	0	72	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0351	84	10	1	0.1	2.3	2.2	163	9	172	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	84	10	15	0.1	2.3	2.2	17	1	18	40	INDX	FOOT	0	0	0	0	26	00	00	00
16 0351	84	10	22	0.1	2.3	2.2	15	12	27	75	INDX	FOOT	4	0	0	0	23	31	00	00
16 0351	84	10	29	0.1	2.3	2.2	17	8	25	85	INDX	FOOT	0	0	0	0	23	00	00	00

Summer 1985

Reach - **River mile 0.0-2.3**
Estimate = 30
Method - (Sept. 30 + Oct. 16) live + dead
Quality rating - Poor

Comments - Survey data suggests a bi – modal run, with insufficient survey data to adequately describe an AUC function that could effectively model it.

Original estimate : Index (RM 0.0 - 2.3) = 32 (AUC), Supplemental (RM 2.3 +) = 2 (Index * 0.053). Total = 34.

Table 20: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	85	9	30	0.0	1.5	1.5	19	8	27	80	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	85	10	8	0.1	2.3	2.2	1	17	18	90	SUPP	FOOT	3	0	0	0	20	00	00	00
16 0351	85	10	16	0.0	2.3	2.3	3	6	9	80	INDX	FOOT	3	0	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-2.3**
Estimate = 177
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimate : Index (RM 0.0 - 2.3) = 188 (AUC), Supplemental (RM 2.3 +) = 10 (Index * 0.053). Total = 198.

Table 21: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	86	9	16	0.0	2.3	2.3	20	0	20	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0351	86	9	22	0.1	2.3	2.2	35	0	35	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0351	86	10	1	0.0	2.3	2.3	96	6	102	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	86	10	7	0.2	2.3	2.1	65	20	85	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	86	10	15	0.0	2.3	2.3	16	53	69	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0351	86	10	21	0.2	1.5	1.3	8	38	46	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-2.3**
Estimate = 12
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start and endpoints of AUC curve not solidly defined by survey data. However, even if a hypothetical extension of start and endpoints to extreme ends of summer chum spawning period (Sept. 1 and Oct. 31, respectively) is experimentally done, the AUC estimate only increases 17 % over the AUC estimate generated from used of the start and endpoints (Sept. 6 and Oct. 19, respectively) derived from extension of slope of ascending and descending sections of curve from first and last surveys to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 12 (AUC), Supplemental (RM 2.3 +) = 1 (Index * 0.053). Total = 13.

Table 22: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	87	9	15	0.1	2.3	2.2	2	0	2	90	INDX	FOOT	3	0	0	0	20	00	00	00
16 0351	87	9	28	0.0	2.3	2.3	5	0	5	80	INDX	FOOT	3	0	0	0	20	00	00	00
16 0351	87	10	8	0.1	2.3	2.2	3	2	5	90	INDX	FOOT	1	3	4	0	00	00	00	00

Summer 1988

Reach - **River mile 0.0-2.3**
Estimate = 497
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Peak of curve was placed before Oct. 4 survey, even though dead : live ratio was considerably less than 1 on this survey, because a good number of dead may have been flushed out in a water spike that came down the river around the Sept. 27 survey (a comment on Sept. 27 survey card was "river now high enough to float", and visibility rating was only 70 %, which suggested flow had recently increased). Endpoint was somewhat ambiguous, due to lack of a low live count on late Oct. to mark end of summer spawning period. All live chum observed on Oct. 26 were assumed to be fall chum, due to time period of survey. Endpoint was projected by extension of slope of descending section of curve past Oct. 13 survey data point to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 560 (AUC), Supplemental (RM 2.3 +) = 29 (Index * 0.053). Total = 589.

Table 23: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	88	9	16	0.0	2.3	2.3	27	0	27	95	INDX	FOOT	4	0	0	0	20	00	00	00
16 0351	88	9	27	0.0	1.1	1.1	71	1	72	70	INDX	FOOT	1	0	0	0	60	61	00	00
16 0351	88	9	27	1.1	2.3	1.2	96	0	96	70	INDX	FOOT	1	0	0	0	60	61	00	00
16 0351	88	10	4	0.0	2.3	2.3	259	19	278	90	INDX	RAFT	1	4	0	0	20	00	00	00
16 0351	88	10	13	0.0	1.1	1.1	28	80	108	80	INDX	FOOT	1	4	6	0	20	61	00	00
16 0351	88	10	13	1.1	2.3	1.2	44	63	107	80	INDX	FOOT	1	4	6	0	20	61	00	00
16 0351	88	10	26	0.0	2.3	2.3	41	29	70	90	INDX	RAFT	1	4	0	0	20	60	00	00

Summer 1989

Reach - **River mile 0.0-2.3**
Estimate = 60
Method - Live + dead Sept. 29 and Oct. 20 surveys.
Quality rating - Good
Comments - Survey data suggests a bi - modal run. AUC function derived from data (42 fish) is less than live + dead counts added together from Sept. 19 and Oct. 20 surveys. These are probably two separate batches of fish, due to the very low live + dead count on Oct. 9 in - between these two surveys. Oct. 20 fish were considered summer chum due to zero live count on Nov. 2.

Original estimate : Index (RM 0.0 - 2.3) = 49 (AUC), Supplemental (RM 2.3 +) = 3 (Index * 0.053). Total = 52.

Table 24: 1989 chum survey data through Nov. 2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	89	9	8	0.0	2.3	2.3	0	0	0	75	INDX	FOOT	3	0	0	0	20	00	00	00
16 0351	89	9	18	0.0	2.3	2.3	0	0	0	80	INDX	FOOT	3	4	0	0	00	00	00	00
16 0351	89	9	29	0.1	2.3	2.2	22	1	23	80	INDX	FOOT	1	3	0	0	00	00	00	00
16 0351	89	10	9	0.2	2.3	2.1	1	5	6	85	INDX	FOOT	1	3	4	0	20	00	00	00
16 0351	89	10	20	0.1	2.3	2.2	16	11	27	85	INDX	FOOT	3	4	0	0	20	00	00	00
16 0351	89	11	2	0.0	2.3	2.3	0	0	0	80	INDX	FOOT	3	0	0	0	00	23	00	00

Summer 1990

Reach - **River mile 0.0-2.3**
Estimate = 42
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Start point not defined by data. 2) Strange curve shape, probably an artifact of low fish abundance. 3) visibility was poor on Oct. 15 (peak) survey (55 %), 3) Endpoint of curve not defined by survey data.

Original estimate : Index (RM 0.0 - 2.3) = 55 (AUC), Supplemental (RM 2.3 +) = 3 (Index * 0.053). Total = 58.

Table 25: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	90	9	20	0.0	1.1	1.1	8	0	8	85	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	90	9	20	1.1	2.3	1.2	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	90	10	2	0.0	1.1	1.1	3	0	3	80	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	90	10	2	1.1	2.3	1.2	0	0	1	85	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	90	10	15	0.0	1.1	1.1	18	0	18	45	INDX	FOOT	1	0	0	0	25	60	61	00
16 0351	90	10	15	1.1	2.3	1.2	0	0	0	65	INDX	FOOT	1	0	0	0	25	60	61	00
16 0351	90	10	25	0.3	0.0	-0.3	NC	NC		40	SPOT	FOOT	0	0	0	0	00	24	00	00
16 0351	90	10	31	0.0	2.3	2.3	31	0	31	70	INDX	RAFT	4	0	0	0	24	00	00	00

Summer 1991

Reach - **River mile 0.0-2.3**
Estimate = 102
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - AUC curve has very irregular shape. This is probably a minimal estimate, because sum of live + dead for Sept. 23 and Oct. 10 is 110 fish, which is similar to the AUC estimate (although some of dead on Oct. 10 may be from Sept. 23 survey period). Endpoint of curve is not defined by survey data. All live chum observed on Oct. 24 survey were assumed to be fall chum, due to time period of survey observation. Endpoint of AUC curve was projected by extension of slope of descending section of curve past Oct. 17 survey data point to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 109 (AUC), Supplemental (RM 2.3 +) = 6 (Index * 0.053). Total = 115.

Table 26: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	91	9	5	0.0	2.3	2.3	0	0	0	65	INDX	FOOT	0	0	0	3	60	00	00	00
16 0351	91	9	23	0.0	2.3	2.3	47	11	58	80	INDX	RAFT	3	5	0	0	00	00	00	00
16 0351	91	10	3	0.0	2.3	2.3	13	12	25	85	INDX	RAFT	1	3	4	5	20	00	00	00
16 0351	91	10	10	0.0	2.3	2.3	39	13	52	85	INDX	RAFT	1	3	4	5	20	00	00	00
16 0351	91	10	17	0.0	2.3	2.3	5	12	17	85	INDX	RAFT	3	4	0	0	00	00	00	00
16 0351	91	10	24	0.0	2.3	2.3	7	3	10	85	INDX	RAFT	1	3	4	0	00	00	00	00

Summer 1992

Reach - **River mile 0.0-2.3**
Estimate = 617
Method - AUC - 10 DAY STREAM LIFE

Quality rating - Very good
Comments - None.

Original estimate : Index (RM 0.0 - 2.3) = 594 (AUC), Supplemental (RM 2.3 +) = 31 (Index * 0.053). Total = 625.

Table 27: 1992 chum survey data through Nov. 6

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	92	9	10	0.0	1.1	1.1	19	1	20	85	INDX	FOOT	0	0	0	4	20	60	61	00
16 0351	92	9	10	1.1	2.3	1.2	15	0	15	85	INDX	FOOT	0	0	0	4	20	60	61	00
16 0351	92	9	23	0.0	1.1	1.1	96	9	60	80	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	92	9	23	1.1	2.3	1.2	69	0	69	80	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	92	9	29	0.0	1.1	1.1	215	29	244	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0351	92	9	29	1.1	2.3	1.2	51	2	53	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0351	92	10	7	0.0	1.1	1.1	147	74	221	75	INDX	FOOT	1	0	0	0	20	61	00	00
16 0351	92	10	7	1.1	2.3	1.2	36	17	53	75	INDX	FOOT	1	0	0	0	20	61	00	00
16 0351	92	10	15	0.0	1.1	1.1	32	111	143	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0351	92	10	15	1.1	2.3	1.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0351	92	10	22	0.0	1.1	1.1	12	31	43	60	INDX	FOOT	0	0	0	0	31	61	24	00
16 0351	92	10	22	1.1	2.3	1.2	0	0	0	60	INDX	FOOT	0	0	0	0	31	61	24	00
16 0351	92	11	4	0.0	1.1	1.1	103	11	114	75	INDX	RAFT	0	0	0	0	20	61	00	00
16 0351	92	11	4	1.1	2.3	1.2	236	3	239	75	INDX	RAFT	0	0	0	0	20	61	00	00
16 0351	92	11	6	0.2	2.3	2.1	482	43	525	50	SUPP	FOOT	4	0	0	0	00	00	00	FW

Notes:
Sept. 23 survey card commented river had recently risen and decline about 1 foot.

Summer 1993

Reach - River mile 0.0-2.3
Estimate = 105
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Endpoint of AUC curve not defined by survey data. Endpoint was projected by extension of slope of descending section of curve past Oct. 22 survey data point to intersection with x-axis.

Original estimate : Index (RM 0.0 - 2.3) = 207 (AUC), Supplemental (RM 2.3 +) = 11 (Index * 0.053). Total = 218.

Table 28: 1993 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	93	9	8	0.0	2.3	2.3	0	0	0	95	INDX	FOOT	0	0	0	3	20	00	00	00
16 0351	93	9	22	0.0	1.1	1.1	4	0	4	90	INDX	FOOT	0	0	0	3	20	31	61	00
16 0351	93	9	22	1.1	2.3	1.2	2	0	0	90	INDX	FOOT	0	0	0	3	20	31	61	00
16 0351	93	9	30	0.0	1.1	1.1	28	3	31	85	INDX	FOOT	0	0	1	3	20	60	61	00
16 0351	93	9	30	1.1	2.3	1.2	15	0	15	85	INDX	FOOT	0	0	1	3	20	60	61	00
16 0351	93	10	7	0.0	1.1	1.1	49	4	53	95	INDX	FOOT	0	1	3	4	20	33	61	00
16 0351	93	10	7	1.1	2.3	1.2	4	0	4	95	INDX	FOOT	0	1	3	4	20	33	61	00
16 0351	93	10	18	0.0	1.1	1.1	9	1	10	85	INDX	FOOT	0	1	3	4	20	60	61	00
16 0351	93	10	18	1.1	2.3	1.2	9	0	9	85	INDX	FOOT	0	1	3	4	20	60	61	00
16 0351	93	10	27	0.0	1.1	1.1	73	0	73	90	INDX	FOOT	0	0	3	4	20	33	61	00
16 0351	93	10	27	1.1	2.3	1.2	8	1	9	90	INDX	FOOT	0	0	3	4	20	33	61	00
16 0351	93	11	4	0.0	1.1	1.1	16	2	18	80	INDX	FOOT	0	0	3	4	21	31	61	00
16 0351	93	11	4	1.1	2.3	1.2	8	1	9	80	INDX	FOOT	0	0	3	4	21	31	61	00

Summer 1994

Reach - **River mile 0.0-2.3**
Estimate = 263
Method - AUC
Quality rating - Good
Comments - The endpoint of the curve is not defined by the survey data, given the last survey (Oct. 17) is also the peak survey. However, the range of possible endpoints between this date and the end of October does not have a large effect on the total AUC estimate. Curve was subjectively terminated on ~ Oct. 27, on the assumption the last of the live fish observed Oct. 17 survey would die within 10 days.

Original estimate : Index (RM 0.0 - 2.3) = 366 (AUC), Supplemental (RM 2.3 +) = 19 (Index * 0.053). Total = 385.

Table 29: 1994 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	94	9	12	0.0	1.1	1.1	1	0	1	90	INDX	FOOT	0	0	0	0	20	60	61	00
16 0351	94	9	12	1.1	2.3	1.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	61	00
16 0351	94	9	19	0.0	1.1	1.1	0	1	67	90	INDX	FOOT	0	0	0	4	20	60	61	00
16 0351	94	9	19	1.1	2.3	1.2	66	0	66	90	INDX	FOOT	0	0	0	4	20	60	61	00
16 0351	94	9	28	0.0	1.1	1.1	38	0	38	90	INDX	FOOT	0	0	0	4	20	33	61	00
16 0351	94	9	28	1.1	2.3	1.2	9	1	10	90	INDX	FOOT	0	0	0	4	20	33	61	00
16 0351	94	10	7	0.0	1.1	1.1	35	8	43	N/A	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	94	10	7	1.1	2.3	1.2	32	3	35	N/A	INDX	FOOT	0	0	0	0	20	00	00	00
16 0351	94	10	17	0.0	1.1	1.1	86	14	100	90	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	94	10	17	1.1	2.3	1.2	1	1	1	90	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	94	11	4	0.0	1.1	1.1	19	1	20	85	INDX	FOOT	0	0	1	4	23	60	61	00
16 0351	94	11	4	1.1	2.3	1.2	28	0	28	85	INDX	FOOT	0	0	1	4	23	60	61	00

Notes:
Sept. 19 survey card noted 12 active, 5 completed/inactive redds in upper reach, no redds in lower reach.
Sept. 28 survey card noted 3 active, 2 completed/inactive redds in upper reach, 2 active, 12 completed/inactive in lower reach.
Oct. 17 survey card reported almost all live chum observed were pooled. (only two active redds).

Summer 1995

Reach - **River mile 0.0-2.3**
Estimate = 825
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak region of curve open to interpretation. Peak spawning period was assumed to be just after mid - September, primarily determined by attempt to retain a normalized shape to curve. The dead : live ratios on the Sept. 15 and Sept. 27 surveys are both considerably less than 1:1, and somewhat non - instructive as to the peak spawning period. Endpoint of AUC curve is not defined by the survey data. An Oct. 23 survey observed 113 live and 8 dead, followed by a Nov. 2 count of 384 live and 11 dead. All live fish observed on Oct. 23 were subjectively assumed to be fall chum, and curve was subjectively terminated on ~ Oct. 10.

Original estimate : Index (RM 0.0 - 2.3) = 862 (AUC), Supplemental (RM 2.3 +) = 45 (Index * 0.053). Total = 907.

Table 30: 1995 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	95	7	28	0.0	0.4	0.4	0	0	0	90	INDX	FOOT	3	6	0	0	00	24	60	00
16 0351	95	8	7	0.1	0.0	-0.1	0	0	0	20	SPOT	FOOT	0	0	0	0	27	60	65	00
16 0351	95	8	15	0.0	2.3	2.3	0	0	0	80	INDX	FOOT	3	0	0	0	23	60	00	00

16	0351	95	8	29	0.0	2.3	2.3	0	0	0	90	INDX	FOOT	3	4	0	0	23	60	00	00
16	0351	95	9	6	0.0	1.1	1.1	17	0	17	90	INDX	FOOT	3	4	0	0	20	60	61	00
16	0351	95	9	6	1.1	2.3	1.2	7	0	7	90	INDX	FOOT	3	4	0	0	20	60	61	00
16	0351	95	9	15	0.0	1.1	1.1	383	1	384	85	INDX	FOOT	1	3	4	0	20	60	61	00
16	0351	95	9	15	1.1	2.3	1.2	72	1	73	85	INDX	FOOT	1	3	4	0	20	60	61	00
16	0351	95	9	27	0.0	1.1	1.1	110	55	165	80	INDX	FOOT	3	4	0	0	61	60	00	00
16	0351	95	9	27	1.1	2.3	1.2	67	21	88	80	INDX	FOOT	3	4	0	0	61	60	00	00
16	0351	95	10	23	0.1	2.3	2.2	113	8	121	90	INDX	RAFT	3	4	0	0	23	60	61	00
16	0351	95	11	3	0.0	2.3	2.3	384	11	395	90	INDX	RAFT	4	0	0	0	23	60	00	00

Notes:
Sept. 27 survey card noted most of chum were on redds.
Nov. 3 survey notes commented all fish in upper section were "old", and there were many fresh pooled fish in lower stream reach.

Summer 1996

Reach - **River mile 0.0-2.3**
Estimate = 2,650
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Amplitude and timing of peak region of curve open to interpretation. Peak spawning period was assumed to be late September, primarily determined by projection if a normalized shape to curve is assumed. 2) Endpoint of AUC curve is ambiguous. There were probably a large number of fall chum in the river in late October, given the large Nov. 5 survey count of 4,350 live and 108 dead. All fish observed on Oct. 21 were subjectively assumed to be fall chum, and curve was subjectively terminated on ~ Oct. 15.

Original estimate : Index (RM 0.0 - 2.3) = 2,667 (AUC), Supplemental (RM 2.3 +) = 140 (Index * 0.053). Total = 2,807.

Table 31: 1996 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	96	9	5	0.0	1.1	1.1	27	0	27	95	INDX	FOOT	4	0	0	0	20	33	61	00
16 0351	96	9	5	1.1	2.3	1.2	6	0	6	95	INDX	FOOT	4	0	0	0	20	33	61	00
16 0351	96	9	18	0.0	1.1	1.1	474	6	480	90	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	96	9	18	1.1	2.3	1.2	356	6	362	90	INDX	FOOT	4	0	0	0	20	60	61	00
16 0351	96	9	30	0.0	1.1	1.1	723	62	785	95	INDX	FOOT	1	4	0	0	20	61	00	00
16 0351	96	9	30	1.1	2.3	1.2	542	62	604	95	INDX	FOOT	1	4	0	0	20	61	00	00
16 0351	96	10	7	0.0	1.1	1.1	269	423	691	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0351	96	10	7	1.1	2.3	1.2	88	63	149	90	INDX	FOOT	4	0	0	0	20	00	00	00
16 0351	96	10	21	0.0	1.1	1.1	258	115	373	75	INDX	FOOT	0	0	0	0	24	60	61	00
16 0351	96	10	21	1.1	2.3	1.2	8	21	29	75	INDX	FOOT	0	0	0	0	24	60	61	00
16 0351	96	11	5	0.0	1.1	1.1	3,400	84	3,484	85	INDX	RAFT	4	0	0	0	33	61	23	00
16 0351	96	11	5	1.1	2.3	1.2	950	24	974	85	INDX	RAFT	4	0	0	0	33	61	23	00

Comments:
Oct. 21 survey card noted there fresh chum pooled in lower river.

Summer 1997

Reach - **River mile 0.0-2.3**
Estimate = 475
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Peak period open to some interpretation of amplitude and timing, due to a 22 day gap between an apparent pre-peak survey on Sept. 24, and the next survey on Oct. 16. Peak was assumed to occur around Sept. 24 survey to be conservative in estimate.

Table 32: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0351	97	9	3	0.0	1.1	1.1	21	0	21	90	INDX	FOOT	1	3	0	0	20	60	00	00
16 0351	97	9	3	1.1	2.3	1.2	0	0	0	90	INDX	FOOT	1	3	0	0	20	60	00	00
16 0351	97	9	10	0.0	1.1	1.1	68	0	68	90	INDX	FOOT	1	3	0	0	20	60	61	00
16 0351	97	9	10	1.1	2.3	1.2	6	0	6	90	INDX	FOOT	1	3	0	0	20	60	61	00
16 0351	97	9	24	0.1	2.3	2.2	163	3	166	85	INDX	RAFT	1	3	5	0	21	00	00	00
16 0351	97	10	16	0.0	1.1	1.1	16	0	16	65	INDX	RAFT	3	0	0	0	27	60	61	00
16 0351	97	10	16	1.1	2.3	1.2	9	0	9	85	INDX	RAFT	3	0	0	0	27	60	61	00

Notes:
Sept. 3 survey card noted large number of pinks prevented accurate chum count.
Sept. 10 survey card noted 6 chum redds in lower reach (3 of which were active), and 2 redds in upper reach (1 of which was active).

Summer 1998

Reach - **River mile 0.0-2.3**
Estimate = 226
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Ascending section and peak of curve well defined by survey data. Severe ambiguity in post-peak period of AUC curve due to overlap of summer and fall run.

Table 33: 1998 chum survey data through Nov. 4

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
16 0351	08/12/98	0.0	2.3	2.3	0	0	0	90	INDX	FOOT					20			
16 0351	08/24/98	0.0	2.3	2.3	0	0	0	95	INDX	FOOT					20			
16 0351	09/02/98	0.0	1.1	1.1	1	0	1	95	INDX	FOOT	4	0	0	0	20	61		
16 0351	09/02/98	1.1	2.3	1.2	0	0	0	95	INDX	FOOT	4	0	0	0	20	61		
16 0351	09/11/98	0.0	1.1	1.1	9	0	9	95	INDX	FOOT	4	0	0	0	20	60	61	
16 0351	09/11/98	1.1	2.3	1.2	11	0	11	95	INDX	FOOT	4	0	0	0	20	60	61	
16 0351	09/21/98	0.0	1.1	1.1	59	1	60	95	INDX	FOOT	5	4	1	0	20	60	61	
16 0351	09/21/98	1.1	2.3	1.2	9	0	9	95	INDX	FOOT	5	4	1	0	20	60	61	
16 0351	10/01/98	0.0	1.1	1.1	62	7	69	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0351	10/01/98	1.1	2.3	1.2	1	1	2	95	INDX	FOOT	4	1	0	0	20	60	61	
16 0351	10/09/98	0.0	1.1	1.1	48	12	60	75	INDX	FOOT	4	1	0	0	24	60	61	
16 0351	10/09/98	1.1	2.3	1.2	0	0	0	75	INDX	FOOT	4	1	0	0	24	60	61	
16 0351	10/19/98	0.0	1.1	1.1	19	3	21	75	INDX	FOOT	4	0	0	0	23	60	61	
16 0351	10/19/98	1.1	2.3	1.2	9	0	9	75	INDX	FOOT	4	0	0	0	23	60	61	
16 0351	10/27/98	0.0	1.1	1.1	37	1	38	95	INDX	FOOT					60	20		
16 0351	10/27/98	1.1	2.3	1.2	5	0	5	95	INDX	FOOT					60	20		
16 0351	11/04/98	0.0	2.3	2.3	524	4	528	90	INDX	RAFT	4	0	0	0	20	60		

Notes:
09/11/98 – 7 active redds in RM 0.0-1.1 reach. Four active redds in RM 1.1-2.3 reach.
09/21/98 – 17 active chum redds in RM 0.0-1.1 reach. Three active redds in RM 1.1-2.3 reach.
10/01/98 – Heavy predation noted.
10/09/98 - 6 active chum redds in RM 0.0-1.1 reach.
10/19/98 - Carcass washout has occurred.

Appendix 9 - Dosewallips R. (WRIA 16.0442) summer chum natural spawning escapement summary

Introduction

Survey data for this population is somewhat lower in consistency and quality than for most of the other Hood Canal summer chum populations. Water visibility is often limited by glacial run-off. This is one of the largest summer chum streams in Hood Canal, and has a tendency to experience increased flows and turbidity during rain events.

Dead : live count ratios from spawning survey data can be an unreliable indicator of the progression of the season's spawning activity in this streams, because as with the neighboring Hamma Hamma and Duckabush Rivers, the large size and "flashy" hydrologic character of this stream rapidly flushes carcasses out of the drainage. High pink densities in odd-return years often makes accurate census of summer chums in September difficult (counts are typically conservative in these situations).

The majority of summer chum spawning occurs in river mile 0.0-2.3 reach Surveys are also frequently conducted from river mile 2.3-6.7 during odd (pink) return years to account for the significant numbers of spawning pinks that can be present in this reach. Data from these up-river surveys indicates only a small portion of the summer chum run utilizes the river above river mile 2.3. Both gradient and substrate coarseness increase considerably above this point.

Rockybrook Cr. is a left bank tributary at river mile 3.6 that has sporadic observations of summer chum spawning activity (Table 1). Fish entry is frequently limited by low flows during the summer chum spawning period. A large alluvial deposit at the stream mouth makes fish entry difficult at lower stream flows. There is fair quality spawning habitat in ~ the lower 0.2 miles of the stream reach, above which point the gradient and substrate size increases (Ron Eagan, WDFW, personal communication). These fish observations are not included in the total escapement estimate for the Dosewallips River drainage, due to the low number of fish observed, and the erratic consistency of surveys over the years.

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Table 1: WRIA 16.0449 (Rockybrook Cr.) historical chum survey observations through Oct. 31, through return year 1999.

WRIA		Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16	0449	45	9	28	0	0.2	0.2	10	2	12	0	INDX	FOOT	3	0	0	0	00	00	00	00
16	0449	67	10	17	0	0.2	0.2	0	1	1	0	INDX	FOOT	1	3	0	0	20	00	00	00
16	0449	69	9	26	0	0.2	0.2	5	0	5	90	INDX	FOOT	1	3	0	0	20	00	00	00
16	0449	69	10	6	0	0.2	0.2	20	8	28	99	INDX	FOOT	1	3	0	0	20	00	00	00
16	0449	74	9	18	0	0.3	0.3	0	0	0	99	INDX	FOOT	0	0	0	0	57	11	00	00
16	0449	79	10	17	0	0.2	0.2	0	0	0	99	INDX	FOOT	3	0	0	0	00	00	00	00
16	0449	81	10	2	0	0.2	0.2	14	0	14	85	INDX	FOOT	1	3	0	0	00	00	00	00
16	0449	81	10	7	0	0.3	0.3	2	0	2	15	INDX	FOOT	3	0	0	0	28	38	00	40
16	0449	81	10	14	0	0.3	0.3	8	3	11	99	INDX	FOOT	1	3	4	0	00	00	00	40
16	0449	81	10	20	0	0.3	0.3	1	6	7	80	INDX	FOOT	1	3	0	0	21	00	00	40
16	0449	81	10	27	0	0.3	0.3	0	0	0	50	INDX	FOOT	0	0	0	0	38	71	00	40
16	0449	83	10	6	0	0.3	0.3	0	0	0	95	INDX	FOOT	3	0	0	0	20	00	00	00
16	0449	83	10	12	0	0.3	0.3	0	1	1	95	INDX	FOOT	3	0	0	0	20	00	00	00
16	0449	83	10	20	0	0.3	0.3	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
16	0449	83	10	26	0	0.3	0.3	0	0	0	95	INDX	FOOT	3	0	0	0	20	00	00	00
16	0449	86	9	16	0	0.3	0.3	0	0	0	95	INDX	FOOT	0	0	0	0	00	00	00	00
16	0449	86	9	22	0	0.3	0.3	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
16	0449	86	10	14	0	0.3	0.3	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
16	0449	91	9	20	0	0.2	0.2	1	0	1	99	INDX	FOOT	1	3	0	0	20	00	00	00
16	0449	91	10	22	0.2	0.3	0.1	0	0	0	85	SUPP	FOOT	0	0	0	0	20	00	00	00
16	0449	93	9	8	0	0.2	0.2	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
16	0449	93	9	21	0	0.2	0.2	0	0	0	99	INDX	FOOT	0	0	0	3	20	00	00	00
16	0449	93	9	30	0	0.2	0.2	0	0	0	95	INDX	FOOT	0	0	0	3	20	60	00	00
16	0449	93	10	7	0	0.2	0.2	0	0	0	95	INDX	FOOT	0	0	3	4	20	60	00	00

16 0449	93	10	27	0	0.2	0.2	0	0	0	95	INDX	FOOT	0	0	0	3	20	00	00	00
16 0449	95	10	10	0	0.2	0.2	0	0	0	85	INDX	FOOT	4	0	0	0	23	60	00	00
16 0449	95	10	10	0.2	0.3	0.1	1	0	1	85	SUPP	FOOT	4	0	0	0	23	60	00	00
16 0449	95	10	23	0	0.2	0.2	1	0	1	95	INDX	FOOT	4	0	0	0	20	61	00	00
16 0449	95	10	23	0.2	0.3	0.1	0	0	0	95	SUPP	FOOT	4	0	0	0	20	00	00	00
16 0449	97	9	22	0	0.2	0.2	0	0	0	90	INDX	FOOT	3	0	0	0	20	60	00	00
16 0449	97	9	22	0.2	0.3	0.1	0	0	0	90	SUPP	FOOT	0	0	0	0	20	00	00	00
16 0449	99	9	3	0.0	0.2	0.2	0	0	0	95	SPOT	FOOT	0	0	0	0	28	00	00	00

Summer 1968

Reach - **N/A**
Estimate = N/A
Method - N/A
Quality rating - N/A
Comments - Insufficient spawning survey data to attempt an escapement estimate.

Original estimate - Index (RM 0.0-2.3 (?)) = 2,283 [(sum Dosewallips 1969,71-77)/(sum Duckabush 1969,71-77) * Duck escape. for year *X*]. Supplemental (RM 2.3+) = 254 (Index * 0.111). Total = 2,537.

Table 2: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	68	9	7	3.6	5.7	2.1	3	0	3	0	SUPP	FOOT	1	0	0	0	23	13	00	00

Summer 1969

Reach - **N/A**
Estimate = N/A
Method - N/A
Quality rating - N/A
Comments - No attempt was made to derive an escapement estimate with the Oct. 6 survey data, because the spawning activity is often almost complete in this stream by this date.

Original estimate - Index (RM 0.0-3.2 (?)) = 308 (AUC). Supplemental (RM 3.2+) = 34 (Index * 0.111). Total = 342.

Table 3: 1969 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	69	10	6	0.0	3.2	3.2	52	17	69	99	SUPP	FOOT	0	0	0	0	20	13	00	00
16 0442	69	10	6	3.6	3.7	0.1	0	0	0	99	SUPP	FOOT	0	0	0	0	20	13	00	00

Summer 1970

Reach - **N/A**
Estimate = N/A
Method - N/A
Quality rating - N/A
Comments - No recorded spawning survey data available. No estimate attempted.

Original estimate - Index (RM 0.0-2.3 (?)) = 653 [(sum Dosewallips 1969,71-77)/(sum Duckabush 1969,71-77) * Duck escape. for year *X*]. Supplemental (RM 2.3+) = 73 (Index * 0.111). Total = 726.

Summer 1971

Reach - **N/A**
Estimate = N/A
Method - N/A
Quality rating - N/A
Comments - No attempt was made to derive an escapement estimate with the Oct. 9 survey data, because the spawning activity is often almost complete in this stream by this date.

Original estimate - Index (RM 0.0-3.2 (?)) = 208 (AUC). Supplemental (RM 3.2+) = 31 (Index * 0.111). Total = 311.

Table 4: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	71	10	9	1.2	3.2	2.0	21	33	54	70	SUPP	FOOT	1	3	0	0	21	13	00	00
16 0442	71	10	9	3.6	5.7	2.1	2	2	4	70	SUPP	FOOT	1	3	0	0	21	13	00	00

Summer 1972

Reach - **River mile 0.0-2.0**
Estimate = 1,733
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Sept. 14 survey only extended from river mile 0.0-0.5, so some chum present in stream may have not been enumerated 2) Amplitude and peak of spawning period open to interpretation. 3) Descending section of curve not defined by survey data. Peak region and descending section of curve all derived subjectively, by using typical start and end dates.

Original estimate - Index (RM 0.0-2.0 (?)) = 1,422 (AUC). Supplemental (RM 2.0+) = 158 (Index * 0.111). Total = 1,580.

Table 5: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	*72*	*9*	*14*	*0.0*	*0.5*	*0.5*	*59*	*0*	*59*	*80*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*13*	*00*	*00*
16 0442	*72*	*10*	*6*	*0.0*	*2.0*	*2.0*	*665*	*137*	*802*	*80*	*SUPP*	*FOOT*	*1*	*4*	*0*	*0*	*20*	*13*	*00*	*00*

Summer 1973

Reach - **River mile 0.0-3.2**
Estimate = 623
Method - Oct. 3 live + dead count
Quality rating - Poor
Comments - Minimal estimate. No expansion attempted with Oct. 3 survey data because this is very late in spawning period for this stream in many years.

Original estimate - Index (RM 0.0-3.2 (?)) = 777 (AUC). Supplemental (RM 3.2+) = 86 (Index * 0.111). Total = 863.

Table 6: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	*73*	*10*	*3*	*0.0*	*3.2*	*3.2*	*353*	*270*	*623*	*70*	*SUPP*	*FOOT*	*1*	*3*	*0*	*0*	*00*	*00*	*00*	*00*

Oct. 3 survey card noted all chum were observed below river mile 2.5 (Lazy C Ranch).

Summer 1974

Reach - **River mile 0.0-10.0**
Estimate = 3,593
Method - Regression with Duckabush R., 1980-94. "16.0442" = -6.412 + 1.005 * "16.0351 escapement"
Quality rating - Poor
Comments - No expansion attempted with survey data due to lateness of surveys in season.

Original estimate - Index (RM 0.0-10.0 (?)) = 370 (AUC). Supplemental (RM 10.0+) = 41 (Index * 0.111). Total = 411.

Table 7: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	74	10	3	0.3	10.0	9.7	111	6	117	70	SUPP	BOAT	1	0	0	0	60	00	00	00
16 0442	74	10	21	0.0	6.7	6.7	4	21	25	80	SUPP	BOAT	1	6	0	0	60	20	00	00

Notes:
Oct. 3, 21 survey cards noted all chum were observed below river mile 2.5 (Lazy C Ranch).

Summer 1975

Reach - **River mile 0.0-6.7**
Estimate = 2,250
Method - Regression with Duckabush R., 1980-94. "16.0442" = -6.412 + 1.005 * "16.0351 escapement"
Quality rating - Poor
Comments - No expansion attempted with Sept. 29 survey data because this is very late in spawning period for this stream in many years.

Original estimate - Index (RM 0.0-6.7 (?)) = 740 (AUC). Supplemental (RM 6.7+) = 82 (Index * 0.111). Total = 822.

Table 8: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	75	9	29	0.1	6.7	6.6	267	1	268	75	SUPP	BOAT	3	4	1	0	00	00	00	00

Summer 1976

Reach - **River mile 0.0-3.2**
Estimate = 3,271
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Assumed peak was in between first two surveys due to transition in live : dead ratio. Basic curve shape is reasonably defined by the survey data. However, uncertainty in curve is increased by poor visibility on peak survey (60 %), and that all three surveys used in AUC curve had ≤ 70 % visibility.

Original estimate - Index (RM 0.0-1.4 (?)) = 5.005 (AUC). Supplemental (RM 1.4+) = 556 (Index * 0.111). Total = 5,561.

Table 9: 1976 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	76	9	10	0.0	1.4	1.4	620	29	649	65	INDX	FOOT	0	0	0	0	20	32	00	00
16 0442	76	9	22	0.0	0.4	1.4	334	78	412	60	SUPP	FOOT	0	0	0	0	60	00	00	00
16 0442	76	9	22	0.4	2.5	2.1	784	341	1,125	60	SUPP	FOOT	0	0	0	0	60	00	00	00
16 0442	76	9	22	2.5	3.2	0.8	212	10	122	60	SUPP	FOOT	0	0	0	0	60	00	00	00
16 0442	76	10	4	0.0	6.7	6.7	192	889	1,081	70	SUPP	BOAT	1	0	0	0	00	00	00	00

Notes:
Information for Oct. 22, river mile 2.5-3.5 was not entered into WDF spawning survey database at time of report.

Summer 1977

Reach - **River mile 0.0-6.7**
Estimate = 3,215
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Starting point of curve undefined by data - staring point was derived from extension of shape of ascending section of curve at Sept. 12 survey data point to intersection with x-axis. 2) Timing and amplitude of peak region of curve open to interpretation, due to only fair visibility on the peak survey. Oct. 11 survey excluded from AUC estimate due to limited reach of stream covered in survey.

Original estimate - Index (RM 0.0-6.7 (?)) = 2,525 (AUC). Supplemental (RM 6.7+) = 281 (Index * 0.111). Total = 2,806.

Table 10: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	77	9	12	0.1	2.3	2.2	357	2	359	70	SUPP	FOOT	3	0	0	0	00	00	00	00
16 0442	77	9	29	0.1	6.7	6.6	981	115	1,096	70	SUPP	BOAT	1	3	0	0	60	00	00	00
16 0442	77	10	11	0.1	0.7	0.6	64	53	117	70	SUPP	BOAT	1	3	4	0	00	00	00	00

Comments:
Sept. 29 survey card noted all chum were observed below river mile 3.5 (mouth of Rockybrook Cr.). A short canyon runs from river mile 3.2-3.5.

Summer 1978

Reach - **RM 0.0-10.0**
Estimate = 1,901
Method - Regression with Duckabush R., 1980-94. "16.0442" = -6.412 + 1.005 * "16.0351 escapement"
Quality rating - Poor
Comments - No estimate attempted with Oct. 11 survey data because this is very late in summer chum spawning period for this stream in many years.

Original estimate - Index (RM 0.0-2.3 (?)) = 682 [(10 yr. Avg. Dosewallips)/(10 yr. Avg. Duckabush) * Duck escape. for year *X*]. Supplemental (RM 2.3+) = 76 (Index * 0.111). Total = 758.

Table 11: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	78	10	11	0.1	2.3	2.2	9	32	41	65	INDX	FOOT	1	0	0	0	38	00	00	00

Summer 1979

Reach - **RM 0.0-10.0**
Estimate = 1,190
Method - Regression with Duckabush R., 1980-94. "16.0442" = -6.412 + 1.005 * "16.0351 escapement"
Quality rating - Poor
Comments - No recorded spawning survey data available.

Original estimate - Index (RM 0.0-2.3 (?)) = 323 [(10 yr. Avg. Dosewallips)/(10 yr. Avg. Duckabush) * Duck escape. for year X']. Supplemental (RM 2.3+) = 36 (Index * 0.111). Total = 359.

Summer 1980

Reach - **River mile 0.0-1.3**
Estimate = 1,216
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of curve not defined by data (and poor visibility on Oct. 7 survey). Ascending section of curve was derived by mirroring descending section of curve. It was assumed first survey, which only went from river mile 1.4 to the mouth probably accounted for most of chum present in stream on that date, because field notes for that survey commented most of the fish were pooled. Since the majority of holding pools are downstream of river mile 1.4, the survey should have accounted for most of the fish present on that day. 2) Bad visibility (55 %) on second survey. I assumed peak was soon after the Sept. 25 survey, given very low dead count on first survey, and a late Sept. peak is typical for this stream.

Original estimate - Index (RM 0.0-1.3 (?)) = 1,462 (AUC). Supplemental (RM 1.3+) = 162 (Index * 0.111). Total = 1,624.

Table 12: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	80	9	25	0.1	1.3	1.2	618	11	629	80	SUPP	BOAT	4	6	0	0	21	60	00	00
16 0442	80	10	7	0.1	2.3	2.2	194	55	249	55	INDX	BOAT	1	4	0	0	38	00	00	00

Summer 1981

Reach - **River mile 0.0-2.0**
Estimate = 63
Method - Live + dead count (Sept. 24 + Oct. 22) surveys
Quality rating - Poor
Comments - Both WDF and PNPTC conduced spawning surveys. Used PNPTC surveys for an attempt at an AUC based derivation, due to larger number of observations. Bi – modal fish entry pattern is suggested by survey data. An AUC curve derived from this data gave he same results as summing the two peak live + dead counts, and was highly subjective to derive.

Original estimate - Index (RM 0.0-2.0 (?)) = 54 (AUC). Supplemental (RM 2.0+) = 6 (Index * 0.111). Total = 60.

Table 13: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	81	9	8	0.0	0.2	0.2	0	0	0	0	INDX	FOOT	3	0	0	0	00	00	00	40
16 0442	81	9	16	3.5	4.5	1.0	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	40
16 0442	***81***	***9***	***24***	***0.0***	***2.0***	***2.0***	***25***	***11***	***36***	***68***	***INDX***	***FOOT***	***3***	***4***	***0***	***0***	***13***	***25***	***00***	***40***
16 0442	81	9	29	0.0	2.6	2.6	0	1	1	7	INDX	FOOT	3	0	0	0	06	29	38	40
16 0442	81	9	29	0.3	0.0	-0.3	0	0	0	0	SPOT	0000	0	0	0	0	28	39	00	00
16 0442	81	10	14	0.0	3.6	3.6	9	2	11	70	INDX	BOAT	3	4	0	0	00	00	00	40
16 0442	81	10	16	0.2	3.7	3.5	16	0	16	70	SUPP	BOAT	1	3	4	0	24	00	00	00
16 0442	***81***	***10***	***22***	***0.0***	***3.6***	***3.6***	***13***	***14***	***27***	***70***	***INDX***	***BOAT***	***3***	***4***	***0***	***0***	***23***	***00***	***00***	***40***
16 0442	81	11	10	0.2	2.3	2.1	0	0	0	80	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1982

Reach - **River mile 0.0-3.6**
Estimate = 507
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Amplitude and timing of peak region of AUC curve are not well defined, due to size of gap between Sept. 24 and Oct. 13 surveys. A late Sept. peak was assumed, which is typical for this stream.

Original estimate - Index (RM 0.0-3.6 (?)) = 720 (AUC). Supplemental (RM 3.6+) = 80 (Index * 0.111). Total = 800.

Table 14: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	***82***	***9***	***14***	***0.0***	***3.2***	***3.2***	***101***	***0***	***101***	***90***	***INDX***	***BOAT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
16 0442	***82***	***9***	***24***	***0.0***	***3.6***	***3.6***	***190***	***5***	***195***	***75***	***INDX***	***BOAT***	***1***	***0***	***0***	***0***	***00***	***00***	***00***	***00***
16 0442	***82***	***10***	***13***	***0.1***	***2.3***	***2.2***	***31***	***17***	***48***	***90***	***INDX***	***RAFT***	***0***	***0***	***0***	***1***	***60***	***20***	***33***	***00***

Summer 1983

Reach - **River mile 0.0-1.8**
Estimate = 64
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Both WDF and PNPTC conducted spawning surveys. Used PNPTC data because it was more complete in number of observations and length of surveys. General curve shape well defined by data, but poor visibility on two of the three peak surveys (40-50 %). Bi - modal fish entry pattern is suggested in both tribal and non-tribal data survey sets, which is assumed partially an artifact of a small runsize, plus possible counting errors due to pinks.

Original estimate - Index (RM 0.0-1.8 (?)) = 66 (AUC). Supplemental (RM 1.8+) = 7 (Index * 0.111). Total = 73.

Table 15: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	***83***	***9***	***13***	***1.0***	***1.3***	***0.3***	***4***	***0***	***4***	***50***	***SUPP***	***FOOT***	***3***	***0***	***0***	***0***	***22***	***38***	***00***	***22***
16 0442	83	9	23	0.1	2.3	2.2	14	0	14	75	INDX	BOAT	3	0	0	0	20	31	00	00
16 0442	***83***	***9***	***26***	***0.8***	***1.0***	***0.2***	***4***	***1***	***5***	***50***	***INDX***	***FOOT***	***3***	***4***	***0***	***0***	***20***	***31***	***60***	***40***
16 0442	***83***	***9***	***26***	***1.0***	***1.8***	***0.8***	***13***	***0***	***13***	***50***	***INDX***	***FOOT***	***3***	***0***	***0***	***0***	***20***	***31***	***60***	***40***
16 0442	***83***	***10***	***3***	***0.0***	***0.8***	***0.8***	***4***	***0***	***4***	***40***	***INDX***	***FOOT***	***1***	***3***	***0***	***0***	***21***	***33***	***00***	***40***
16 0442	***83***	***10***	***3***	***0.8***	***1.0***	***0.2***	***2***	***1***	***3***	***40***	***INDX***	***FOOT***	***1***	***3***	***4***	***0***	***21***	***33***	***60***	***40***
16 0442	***83***	***10***	***3***	***1.0***	***1.3***	***0.3***	***4***	***0***	***4***	***40***	***INDX***	***FOOT***	***3***	***0***	***0***	***0***	***00***	***00***	***00***	***40***

16	0442	83	10	10	0.0	0.8	0.8	0	2	2	70	INDX	FOOT	3	0	0	0	20	33	60	40
16	0442	83	10	10	0.8	1.0	0.2	19	2	21	80	INDX	FOOT	3	0	0	0	21	33	60	40
16	0442	83	10	10	1.3	1.8	0.5	1	3	4	80	INDX	FOOT	3	0	0	0	21	33	60	40
16	0442	83	10	13	0.1	2.3	2.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
16	0442	83	10	17	0.8	1.0	0.2	4	5	9	90	INDX	FOOT	1	3	4	0	20	60	00	40
16	0442	83	10	17	1.3	1.8	0.5	0	1	1	85	INDX	FOOT	3	0	0	0	20	60	00	40
16	0442	83	10	20	0.1	2.3	2.2	6	1	7	85	INDX	FOOT	3	4	0	0	20	00	00	00
16	0442	83	10	24	0.0	0.8	0.8	1	0	1	55	INDX	FOOT	3	0	0	0	21	60	00	40
16	0442	83	10	24	0.8	1.0	0.2	2	1	3	55	INDX	FOOT	3	0	0	0	21	60	00	40
16	0442	83	10	24	1.3	1.8	0.5	0	1	1	55	INDX	FOOT	3	0	0	0	21	60	00	40
16	0442	83	10	26	0.1	2.3	2.2	0	2	2	80	INDX	FOOT	3	0	0	0	21	00	00	00

Summer 1984

Reach - **River mile 0.0-2.3**
Estimate = 212
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - Five surveys were conducted, but only one during period of significant spawning activity. Pre-peak and peak portions of curve not well defined by survey data. The AUC curve was derived with the assumption Oct. 2 survey was the peak spawning period, due to low dead : live ratio on this date (i.e. peak could have been later than this date by this criteria). However, spawning in this stream is frequently concluding on this date, and since the dead counts are not usually a reliable indicator of the degree of completion for summer chum there is a great deal of uncertainty about any AUC function derived from this data.

Original estimate - Index (RM 0.0-2.3 (?)) = 162 (AUC). Supplemental (RM 2.3+) = 18 (Index * 0.111). Total = 180.

Table 16: 1984 chum survey data through Oct. 31

WRIA		Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16	0442	84	9	7	0.2	0.0	-0.2	0	0	0	30	SPOT	FOOT	0	0	0	0	20	00	00	00
16	0442	84	10	2	0.1	2.3	2.2	128	20	148	80	INDX	FOOT	1	0	0	0	20	00	00	00
16	0442	84	10	15	0.1	2.3	2.2	2	11	13	40	INDX	FOOT	4	0	0	0	27	00	00	00
16	0442	84	10	22	0.1	2.3	2.2	1	1	2	70	INDX	FOOT	0	0	0	0	23	00	00	00
16	0442	84	10	29	0.1	2.3	2.2	0	0	0	85	INDX	FOOT	0	0	0	0	23	00	00	00

Summer 1985

Reach - **River mile 0.0-3.2**
Estimate = 236
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Poor
Comments - The following uncertainties were present in the AUC curve derivation process: 1) Ascending section of curve mostly undefined by data. 2) Amplitude and timing of peak portion of curve open to some interpretation. A conservative start date of ~ Sept. 7 was assumed. Live fish count pattern suggested mid-September peak of spawning.

Original estimate - Index (RM 0.0-3.2 (?)) = 73 (AUC). Supplemental (RM 3.2+) = 8 (Index * 0.111). Total = 81.

Table 17: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	85	9	16	0.0	3.2	3.2	137	0	137	70	INDX	BOAT	3	0	0	0	00	00	00	00
16 0442	85	9	27	0.0	6.0	6.0	23	22	45	70	SUPP	FOOT	0	0	0	0	20	00	00	00
16 0442	85	10	17	0.0	6.7	6.7	9	3	12	85	SUPP	BOAT	3	4	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-2.3**
Estimate = 57
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point of AUC function was subjectively initiated at ~ Sept. 5. The remainder of AUC function is well defined by survey data.

Original estimate - Index (RM 0.0-2.2 (?)) = 62 (AUC). Supplemental (RM 2.2+) = 7 (Index * 0.111). Total = 69.

Table 18: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	86	9	16	0.0	2.3	2.3	23	1	24	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0442	86	9	22	0.1	2.3	2.2	18	0	18	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0442	86	10	1	0.1	2.3	2.2	6	4	10	90	INDX	FOOT	0	0	0	0	00	00	00	00
16 0442	86	10	7	0.1	2.3	2.2	11	2	13	90	INDX	FOOT	1	0	0	0	20	00	00	00
16 0442	86	10	14	0.2	2.1	1.9	14	3	17	90	INDX	FOOT	0	0	0	0	20	00	00	00
16 0442	86	10	21	0.1	2.3	2.2	3	1	4	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-6.7**
Estimate = 9
Method - Live + dead Sept. 17 + Sept. 30 surveys.
Quality rating - Fair
Comments - Small counts make use of AUC method impractical.

Original estimate - Index (RM 0.0-6.7 (?)) = 14 (AUC). Supplemental (RM 6.7+) = 2 (Index * 0.111). Total = 16.

Table 19: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	87	9	17	0.0	6.7	6.7	5	0	5	75	INDX	RAFT	1	3	0	0	21	00	00	00
16 0442	87	9	30	0.0	6.7	6.7	4	0	4	70	INDX	FOOT	1	3	0	0	21	00	00	00
16 0442	87	10	21	0.0	6.7	6.7	0	3	3	60	INDX	FOOT	1	3	4	0	20	60	00	00

Summer 1988

Reach - **River mile 0.0-2.3**
Estimate = 661
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Large number of days between Sept. 13 and Oct. 4 surveys creates moderate uncertainty in peak region of AUC function. Mediocre visibility on all surveys.

Original estimate - Index (RM 0.0-2.3 (?)) = 642 (AUC). Supplemental (RM 2.3+) = 71 (Index * 0.111). Total = 713.

Table 20: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	88	9	13	0.0	0.4	0.4	31	1	32	70	INDX	FOOT	0	0	0	0	21	61	00	00
16 0442	88	9	13	0.4	1.3	0.9	117	0	117	70	INDX	FOOT	0	0	0	0	21	61	00	00
16 0442	88	9	13	1.3	2.3	1.0	0	0	0	70	INDX	FOOT	0	0	0	0	21	61	00	00
16 0442	88	10	4	0.0	2.3	2.3	163	28	191	65	INDX	RAFT	0	0	0	0	24	00	00	00
16 0442	88	10	13	0.0	1.3	1.3	16	122	138	60	INDX	FOOT	0	0	0	0	21	61	00	00
16 0442	88	10	13	1.3	2.3	1.0	4	22	26	60	INDX	FOOT	0	0	0	0	21	61	00	00
16 0442	88	10	26	0.0	2.3	2.3	7	11	18	70	INDX	RAFT	1	4	0	0	21	60	00	00

Summer 1989

Reach - **River mile 0.0-2.3**
Estimate = 16
Method - Sum of live + dead Sept. 8, 28, Oct. 20 surveys
Quality rating - Fair
Comments - Small counts made use of AUC method impractical.

Original estimate - Index (RM 0.0-2.3 (?)) = 27 (AUC). Supplemental (RM 2.3+) = 3 (Index * 0.111). Total = 30.

Table 21: 1989 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	89	9	8	0.3	6.7	6.4	2	0	2	60	INDX	FOOT	1	3	6	0	24	00	00	00
16 0442	89	9	28	0.0	2.3	2.3	10	3	13	60	INDX	FOOT	1	3	0	0	00	00	00	00
16 0442	89	10	9	0.0	6.7	6.7	0	0	0	70	INDX	FOOT	3	4	0	0	00	00	00	00
16 0442	89	10	20	0.0	6.0	6.0	1	0	1	60	INDX	FOOT	1	3	4	0	24	00	00	00
16 0442	89	11	3	0.0	2.3	2.3	0	0	0	60	INDX	FOOT	3	0	0	0	23	00	00	00

Summer 1990

Reach - **River mile 0.0-2.3**
Estimate = 8
Method - Live + dead Oct. 17 survey
Quality rating - Fair
Comments - Quality of survey observations is only fair, since two of the 4 surveys were spot checks.

Original estimate - Index (RM 0.0-2.3 (?)) = 15 (AUC). Supplemental (RM 2.3+) = 2 (Index * 0.111). Total = 17.

Table 22: 1990 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
16 0442	90	9	20	0.0	2.3	2.3	0	0	0	65	INDX	FOOT	0	0	0	0	22	60	00	00
16 0442	90	10	2	0.4	0.0	-0.4	0	0	0	35	SPOT	FOOT	0	0	0	0	00	00	00	00
16 0442	90	10	15	0.4	0.0	-0.4	0	0	0	25	SPOT	FOOT	0	0	0	0	00	25	60	00
16 0442	90	10	17	0.0	1.3	1.3	7	0	7	40	INDX	FOOT	0	0	0	0	25	60	61	00
16 0442	90	10	17	1.3	2.3	1.0	1	0	1	60	INDX	FOOT	0	0	0	0	25	60	61	00
16 0442	90	10	25	0.4	0.0	-0.4	NC	NC		30	SPOT	FOOT	0	0	0	0	00	28	00	00

Summer 1991

Reach - **River mile 0.0-6.7**
Estimate = 250
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - The following uncertainties were present in the AUC curve derivation process 1) Ascending section of curve undefined by data. A typical early Sept. start time was assumed. 2) Amplitude and timing of peak portion of curve open to interpretation, in part due to bad visibility on peak survey, and lack of surveys to define shape of peak region of curve.

Original estimate - Index (RM 0.0-6.7 (?)) = 257 (AUC). Supplemental (RM 6.7+) = 29 (Index * 0.111). Total = 286.

Table 23: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	91	9	20	0.0	2.3	2.3	97	7	104	60	INDX	RAFT	3	0	0	0	24	60	00	00
16 0442	91	9	30	0.1	3.6	3.6	54	12	66	75	INDX	RAFT	1	3	0	0	60	00	00	00
16 0442	91	9	30	3.6	6.7	3.1	0	0	0	75	INDX	RAFT	1	3	0	0	60	00	00	00
16 0442	91	10	8	0.0	2.3	2.3	33	28	61	80	INDX	RAFT	1	3	4	0	20	60	00	00
16 0442	91	10	22	0.1	3.6	3.6	2	9	11	65	INDX	RAFT	1	3	4	0	60	21	00	00
16 0442	91	10	22	3.6	6.7	3.1	0	0	0	65	INDX	RAFT	1	3	4	0	60	21	00	00

Notes:
Sept. 30 survey card did not indicate where split point was for fish counts on back of card, but Ron Eagan was of the opinion it was probably the mouth of Rockybrook Cr. (RM 3.6).
Oct. 8 survey card noted spawning was primarily in lower 0.5 miles of stream.

Summer 1992

Reach - **River mile 0.0-2.3**
Estimate = 655
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair / Good
Comments - Amplitude of curve open to some interpretation, due to only fair visibility on most surveys. General shape of curve well defined by data. Start point not defined by survey data. Start point derived by extension of slope of line through survey data points down to intersection with x-axis.

Original estimate - Index (RM 0.0-2.3 (?)) = 600 (AUC). Supplemental (RM 2.3+) = 67 (Index * 0.111). Total =667.

Table 24: 1992 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	92	9	10	0.0	1.3	1.3	104	2	106	80	INDX	FOOT	0	0	0	1	20	60	61	00
16 0442	92	9	10	1.3	2.3	1.0	13	1	14	80	INDX	FOOT	0	0	0	1	20	60	61	00
16 0442	92	9	21	0.0	1.3	1.3	169	16	185	70	INDX	FOOT	1	0	0	0	21	60	61	00
16 0442	92	9	21	1.3	2.2	0.9	1	2	3	70	INDX	FOOT	1	0	0	0	21	60	61	00
16 0442	92	9	29	0.0	1.3	1.3	234	29	263	70	INDX	FOOT	0	0	0	1	21	60	61	00
16 0442	92	9	29	1.3	2.3	1.0	0	0	0	70	INDX	FOOT	0	0	0	1	21	60	61	00
16 0442	92	10	7	0.0	1.3	1.3	37	101	138	75	INDX	FOOT	0	0	0	0	20	61	00	00
16 0442	92	10	7	1.3	2.3	1.0	0	0	0	75	INDX	FOOT	0	0	0	0	20	61	00	00
16 0442	92	10	15	0.0	1.3	1.3	2	44	46	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0442	92	10	15	1.3	2.3	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	61	00	00
16 0442	92	10	22	0.0	1.3	1.3	9	8	17	60	INDX	FOOT	0	0	0	0	31	61	24	00
16 0442	92	10	22	1.3	2.3	1.0	0	0	0	60	INDX	FOOT	0	0	0	0	31	61	24	00
16 0442	92	11	4	0.0	1.3	1.3	35	1	36	80	INDX	RAFT	0	0	0	0	20	61	60	00
16 0442	92	11	4	1.3	2.3	1.0	3	0	3	80	INDX	RAFT	0	0	0	0	20	61	60	00

Notes:

Sept. 10 survey card noted over 20 completed redds were visible.

Summer 1993

Reach - **River mile 0.0-6.1**
Estimate = 105
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Most of curve defined OK by survey data. Amplitude of peak region of curve open to some interpretation. Endpoint of AUC curve is not defined by data, due to lack of a low live count to indicate end of summer spawning period. All live fish observed on Oct. 27 survey were assumed to be fall chum due to time period of observation .

Original estimate - Index (RM 0.0-6.1 (?)) = 179 (AUC). Supplemental (RM 6.1+) = 20 (Index * 0.111). Total = 199.

Table 25: 1993 chum survey data through Nov. 4

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	93	9	8	0.0	2.3	2.3	0	0	0	55	INDX	FOOT	0	0	0	3	24	38	60	00
16 0442	93	9	21	0.0	1.3	1.3	8	0	8	85	INDX	FOOT	0	0	1	3	20	60	61	00
16 0442	93	9	21	1.3	2.3	1.0	0	0	0	85	INDX	FOOT	0	0	1	3	20	60	61	00
16 0442	93	9	30	0.0	1.3	1.3	55	3	58	90	INDX	FOOT	0	0	1	3	20	61	00	00
16 0442	93	9	30	1.3	2.3	1.0	2	0	2	90	INDX	FOOT	0	0	1	3	20	61	00	00
16 0442	93	9	30	2.5	6.1	3.6	2	0	2	90	SUPP	FOOT	0	0	1	3	20	60	00	00
16 0442	93	10	7	0.0	2.3	2.3	21	7	28	80	INDX	FOOT	0	1	3	4	20	60	61	00
16 0442	93	10	7	2.5	6.1	3.6	12	0	12	80	SUPP	FOOT	0	1	3	4	20	60	00	00
16 0442	93	10	18	0.0	1.3	1.3	15	3	18	95	INDX	FOOT	0	1	3	4	20	60	61	00
16 0442	93	10	18	1.3	2.3	1.0	12	0	12	95	INDX	FOOT	0	1	3	4	20	60	61	00
16 0442	93	10	27	0.0	1.3	1.3	24	2	26	70	INDX	FOOT	0	1	3	4	21	31	60	00
16 0442	93	10	27	1.3	2.3	1.0	3	0	3	70	INDX	FOOT	0	1	3	4	21	31	60	00
16 0442	93	11	4	0.0	1.3	1.3	20	2	22	80	INDX	FOOT	0	0	3	4	21	31	61	00
16 0442	93	11	4	1.3	2.3	1.0	2	0	2	80	INDX	FOOT	0	0	3	4	21	31	61	00

Summer 1994

Reach - **River mile 0.0-2.3**
Estimate = 225
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-2.3 (?)) = 235 (AUC). Supplemental (RM 2.3+) = 26 (Index * 0.111). Total = 261.

Table 26: 1994 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	94	9	12	0.0	1.3	1.3	4	0	4	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0442	94	9	12	1.3	2.3	1.0	2	0	2	95	INDX	FOOT	0	0	0	0	20	60	61	00
16 0442	94	9	19	0.0	1.3	1.3	76	0	76	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0442	94	9	19	1.3	2.3	1.0	6	0	6	90	INDX	FOOT	0	0	1	4	20	60	61	00
16 0442	94	9	28	0.0	1.3	1.3	67	3	70	90	INDX	FOOT	0	0	1	4	20	61	00	00
16 0442	94	9	28	1.3	2.3	1.0	4	1	5	90	INDX	FOOT	0	0	1	4	20	61	00	00
16 0442	94	10	7	0.0	1.3	1.3	69	25	94	90	INDX	FOOT	1	4	0	0	20	00	00	00
16 0442	94	10	7	1.3	2.3	1.0	3	6	9	90	INDX	FOOT	1	4	0	0	20	00	00	00
16 0442	94	10	17	0.0	1.3	1.3	18	19	37	95	INDX	FOOT	1	4	0	0	20	61	00	00
16 0442	94	10	17	1.3	2.3	1.0	0	0	0	95	INDX	FOOT	1	4	0	0	20	61	00	00

16	0442	94	11	3	0.0	1.3	1.3	3	0	3	85	INDX	FOOT	0	0	1	4	20	60	61	00
16	0442	94	11	3	1.3	2.3	1.0	22	0	25	85	INDX	FOOT	0	0	1	4	20	60	61	00

Notes:
Sept. 12 survey card noted 4 completed redds in upper reach, 5 completed redds in lower reach, and 1 active redd.

Summer 1995

Reach - **River mile 0.0-3.2**
Estimate = 2,771
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Most of curve well defined by survey data. Amplitude of peak, endpoint a little ambiguous. Different index start used in 1995 - bottom of Rockybrook Cr. Canyon (river mile 3.2).

Original estimate - Index (RM 0.0-3.2 (?)) = 3,449 (AUC). Supplemental (RM 3.2+) = 383 (Index * 0.111). Total = 3,832.

Table 27: 1995 chum survey data through Nov. 3 for river mile 0.0-2.3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	95	7	28	0.0	0.1	0.1	0	0	0	40	INDX	FOOT	0	0	0	0	27	60	65	00
16 0442	95	8	7	0.1	0.0	-0.1	0	0	0	20	SPOT	FOOT	0	0	0	0	27	60	65	00
16 0442	***95***	***8***	***28***	***0.0***	***3.2***	***3.2***	***39***	***0***	***39***	***85***	***SUPP***	***RAFT***	***1***	***3***	***0***	***0***	***23***	***60***	***61***	***00***
16 0442	***95***	***9***	***6***	***0.0***	***3.2***	***3.2***	***261***	***1***	***262***	***90***	***INDX***	***RAFT***	***1***	***3***	***4***	***0***	***00***	***20***	***60***	***00***
16 0442	***95***	***9***	***19***	***0.0***	***1.3***	***1.3***	***1,229***	***58***	***1,287***	***90***	***INDX***	***FOOT***	***1***	***3***	***4***	***0***	***20***	***60***	***61***	***00***
16 0442	***95***	***9***	***19***	***1.3***	***2.3***	***1.0***	***34***	***3***	***37***	***90***	***INDX***	***FOOT***	***1***	***3***	***4***	***0***	***20***	***60***	***61***	***00***
16 0442	***95***	***10***	***2***	***0.0***	***1.3***	***1.3***	***348***	***123***	***469***	***80***	***INDX***	***FOOT***	***1***	***3***	***4***	***0***	***21***	***60***	***61***	***00***
16 0442	***95***	***10***	***2***	***1.3***	***2.3***	***1.0***	***2***	***1***	***3***	***80***	***INDX***	***FOOT***	***1***	***3***	***4***	***0***	***21***	***60***	***61***	***00***
16 0442	95	10	23	0.0	2.3	2.3	6	3	9	80	INDX	RAFT	1	3	4	0	23	60	61	00
16 0442	95	11	3	0.0	3.2	3.2	6	0	6	90	INDX	RAFT	4	0	0	0	23	60	61	00

Notes:
Aug. 28 survey card noted there was one active chum redd.

Reach - **River mile 3.2-6.7**
Estimate = 16
Method - Live + dead (Sept . 19 + Oct. 2 + Oct. 23) surveys
Quality rating - Poor
Comments - Minimal estimate

Table 28: 1995 chum survey data through Oct. 31 for river mile 2.3-6.7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	95	8	28	3.2	6.7	3.5	0	0	0	85	SUPP	RAFT	1	3	0	0	23	60	61	00
16 0442	***95***	***9***	***19***	***3.6***	***6.7***	***3.1***	***8***	***0***	***8***	***90***	***SUPP***	***FOOT***	***1***	***3***	***4***	***0***	***20***	***60***	***61***	***00***
16 0442	***95***	***10***	***2***	***3.6***	***6.7***	***3.1***	***6***	***0***	***6***	***80***	***SUPP***	***FOOT***	***1***	***3***	***0***	***0***	***21***	***60***	***61***	***00***
16 0442	***95***	***10***	***23***	***2.3***	***.3.1***	***0.8***	***2***	***0***	***2***	***80***	***SUPP***	***RAFT***	***1***	***3***	***4***	***0***	***23***	***60***	***00***	***00***

Summer 1996

Reach - **River mile 0.0-2.3**
Estimate = 6,976
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Amplitude of peak a little ambiguous, but not enough to allow for more a small change in total estimate with range of possible interpretations.

Original estimate - Index (RM 0.0-2.3 (?)) = 7,163 (AUC). Supplemental (RM 2.3+) = 796 (Index * 0.111). Total = 7,959.

Table 29: 1996 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	96	9	5	0.0	1.3	1.3	283	0	305	95	INDX	FOOT	4	0	0	0	20	33	61	00
16 0442	96	9	5	1.3	2.3	1.0	22	0	22	95	INDX	FOOT	4	0	0	0	20	33	61	00
16 0442	96	9	18	0.0	1.3	1.3	2,936	69	3,005	80	INDX	FOOT	4	0	0	0	20	60	61	00
16 0442	96	9	18	1.3	2.3	1.0	105	0	105	80	INDX	FOOT	4	0	0	0	20	60	61	00
16 0442	96	9	30	0.0	1.3	1.3	1,900	937	2,837	95	INDX	FOOT	4	0	0	0	20	60	61	00
16 0442	96	9	30	1.3	2.3	1.0	76	13	89	95	INDX	FOOT	4	0	0	0	20	60	61	00
16 0442	96	10	7	0.0	1.3	1.3	238	787	1,025	85	INDX	FOOT	4	0	0	0	21	00	00	00
16 0442	96	10	7	1.3	2.3	1.0	2	2	4	85	INDX	FOOT	4	0	0	0	21	00	00	00
16 0442	96	10	21	0.0	1.3	1.3	16	231	247	90	INDX	FOOT	0	0	0	0	23	60	61	00
16 0442	96	10	21	1.3	2.3	1.0	3	0	3	90	INDX	FOOT	0	0	0	0	23	60	61	00
16 0442	96	11	5	0.0	1.3	1.3	300	43	343	80	INDX	RAFT	4	0	0	0	32	23	61	00
16 0442	96	11	5	1.3	2.3	1.0	30	0	30	80	INDX	RAFT	4	0	0	0	32	23	61	00

Notes:
Sept. 5 survey card noted 5 redds in upper reach (4 of which were active).
Oct. 21 survey card noted most of live chum were fresh pooled fish.

Summer 1997

Reach - **River mile 0.0-2.3**
Estimate = 47
Method - Live + dead Sept. 10, Sept. 23 surveys.
Quality rating - Poor
Comments - Minimal estimate. Data insufficient to draw an AUC estimate.

Table 30: 1997 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
16 0442	97	8	22	6.7	0.0	-6.7	0	0	0	95	SPOT	FOOT	0	0	0	0	20	00	00	00
16 0442	97	9	4	0.0	2.3	2.3	0	0	0	75	INDX	FOOT	3	0	0	0	21	60	00	00
16 0442	97	9	10	0.0	1.3	1.3	15	0	15	90	INDX	FOOT	3	0	0	0	20	60	61	00
16 0442	97	9	10	1.3	2.3	1.0	5	0	5	90	INDX	FOOT	3	0	0	0	20	60	61	00
16 0442	97	9	23	0.0	2.3	2.3	17	2	19	85	INDX	RAFT	3	5	0	0	24	33	00	00
16 0442	97	9	23	2.3	6.7	4.4	0	0	0	85	SUPP	RAFT	3	5	0	0	24	33	00	00

Summer 1998

Reach - **River mile 0.0-2.3**
Estimate = 336
Method - AUC
Quality rating - Very good
Comments - All points of curve well defined by survey data.

Table 31: 1998 chum survey data through Nov. 4

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
16 0442	08/12/98	0.0	2.3	2.3	0	0	0	90	INDX	FOOT					20	60		
16 0442	08/24/98	0.0	2.3	2.3	0	0	0	95	INDX	FOOT					20			
16 0442	09/02/98	0.0	1.3	1.3	7	0	7	95	INDX	FOOT					20	60	61	
16 0442	09/02/98	1.3	2.3	2.3	0	0	0	95	INDX	FOOT					20	60	61	
16 0442	09/11/98	0.0	1.3	1.3	86	1	87	95	INDX	FOOT	1	0	0	0	20	60	61	
16 0442	09/11/98	1.3	2.3	2.3	6	0	6	95	INDX	FOOT	1	0	0	0	20	60	61	
16 0442	09/21/98	0.0	1.3	1.3	126	3	129	90	INDX	FOOT	4	0	0	0	20	60		
16 0442	09/21/98	1.3	2.3	2.3	18	0	18	90	INDX	FOOT	4	0	0	0	20	60		
16 0442	10/01/98	0.0	1.3	1.3	73	75	148	95	INDX	FOOT	1	4	0	0	20	60	61	
16 0442	10/01/98	1.3	2.3	2.3	1	0	1	95	INDX	FOOT	1	4	0	0	20	60	61	
16 0442	10/09/98	0.0	1.3	1.3	14	56	70	70	INDX	FOOT	4	1	0	0	24	60	61	

16 0442	*10/09/98*	*1.3*	*2.3*	*2.3*	*0*	*0*	*0*	*70*	*INDX*	*FOOT*	*4*	*1*	*0*	*0*	*24*	*60*	*61*	
16 0442	10/19/98	0.0	1.3	1.3	1	0	1	85	INDX	FOOT	4	1	0	0	23	60	61	
16 0442	10/19/98	1.3	2.3	2.3	0	0	0	85	INDX	FOOT	4	1	0	0	23	60	61	
16 0442	10/27/98	0.0	2.3	2.3	4	0	4	95	INDX	FOOT	1	4	0	0	60	20	61	
16 0442	11/04/98	0.0	2.3	2.3	30	0	30	85	INDX	RAFT	4	0	0	0	60	20		

Comments:
09/02/98 – Two redds observed in RM 0.0-1.3 reach, 1 redd in RM 0.0-1.3 reach,
09/11/98 – 25 active redds in RM 0.0-1.3 reach, 1 active redd in RM 1.3-2.3 reach.
09/21/98 – All chum in RM 1.3-2.3 reach were in one hole ~0.3 mi. below Numamacher's place. Fresh coho and chum observed entering lower river.

Appendix 10 - Big Quilcene R. (WRIA 17.0012) summer chum natural spawning escapement summary

Introduction

The stream reach available for summer chum spawning extends from river mile 0.0-2.7. A weir at a USFWS hatchery blocks further upstream passage at river mile 2.7. The highest quality spawning habitat, and spawning densities are observed downstream of ~ river mile 2.0. Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Summer 1968

Reach - **River mile 0.0-2.0**
Estimate = 5,797
Method - Single survey expansion by a timing model (used 1992 AUC timing data)
Quality rating - Poor
Comments - Used 1992 run timing data because the Sept. 25, 1992 survey dead/live ratio data follows the general historical pattern of summer chum counts in this stream being close to a 1:1 ratio a few days after the peak of spawning (unlike many other summer chum streams in the region where dead fish do not accumulate). The Sept. 26, 1968 survey observation has a 1:1 dead/live ratio.

Original estimate - Index (RM 0.0-2.0) = 4,074 (AUC)

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	***68***	***9***	***26***	***0.0***	***0.6***	***0.6***	***672***	***422***	***1,094***	***0***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***13***	***00***	***00***
17 0012	***68***	***9***	***26***	***0.6***	***2.6***	***2.0***	***1,002***	***1,138***	***2,140***	***0***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***20***	***13***	***00***	***00***

Summer 1969

Reach - **River mile 0.0-2.6**
Estimate = 1,307
Method - Single survey expansion by a timing model (used 1993 AUC timing data)
Quality rating - Poor
Comments - Used 1993 run timing data because the dead : live ratio was very low on the Sept. 28, 1969 survey, similar to the same period in 1993.

Original estimate - Index (RM 0.0-2.6) = 1,508 (AUC)

Table 2: 1969 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	***69***	***9***	***28***	***0.0***	***2.6***	***2.6***	***537***	***28***	***565***	***80***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***12***	***00***	***00***

Summer 1970

Reach - **River mile 0.0-2.6**
Estimate = 655
Method - Single survey expansion by a timing model (used 1994 AUC timing data).
Quality rating - Poor
Comments - Used 1994 run timing data because the dead : live ratio was low on the Sept. 25, 1970 survey, similar to the same period in 1994.

Original estimate - Index (RM 0.0-2.6) = 1,152 (AUC)

Table 3: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	70	9	25	0.0	0.7	0.7	243	31	274	80	INDX	FOOT	1	0	0	0	20	13	00	00
17 0012	70	9	25	0.7	2.6	1.9	72	17	89	80	INDX	FOOT	1	0	0	0	20	13	00	00

Summer 1971

Reach - **River mile 0.0-2.6**
Estimate = 1,798
Method - Single survey expansion by a timing model (used 1993 AUC timing data).
Quality rating - Poor
Comments - Used 1993 run timing data because the dead : live ratio was very low on the Sept. 29, 1971 survey, similar to the same period in 1993.

Original estimate - Index (RM 0.0-2.6) = 1,822 (AUC)

Table 4: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	71	9	29	0.0	2.6	2.6	739	27	766	90	INDX	FOOT	1	4	0	0	20	13	00	00

Notes:
Sept. 29 survey card noted all visible chums were spawning.

Summer 1972

Reach - **River mile 0.0-2.6**
Estimate = 2,067
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start and endpoints of curve not defined by data – they were derived from extension of the line slope though the survey data points to the respective intersections with the x-axis. The range of possible solutions for these regions of curve will have little effect on final estimate.

Original estimate - Index (RM 0.0-2.6) = 2,047 (AUC)

Table 5: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	72	9	25	0.0	2.6	2.6	586	21	607	70	INDX	FOOT	1	4	0	0	20	13	00	00
17 0012	72	10	4	0.0	2.6	2.6	1,122	156	1,278	85	INDX	FOOT	1	0	0	0	20	13	00	00
17 0012	72	10	13	0.0	2.6	2.6	208	891	1,099	80	INDX	FOOT	1	4	0	0	20	13	00	00

Summer 1973

Reach - **River mile 0.0-2.6**
Estimate = 3,107
Method - Single survey expansion by a timing model (used 1980 AUC timing data).
Quality rating - Poor
Comments - Used 1980 run timing data because the dead : live ratio was about 1:1 Oct. 4. 1973 survey, similar to the same period in 1980.

Original estimate - Index (RM 0.0-2.6) = 2,148 (AUC)

Table 6: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	73	10	4	0.0	2.6	2.6	770	803	1,573	90	INDX	FOOT	1	0	0	0	00	00	00	00

Summer 1974

Reach - **River mile 0.0-2.6**
Estimate = 795
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - There is considerable room for interpretation in the shape of the spawning curve between Sept. 30 and Oct. 18. The low dead count on Sept. 30 does not in of itself suggest this survey is near the peak of spawning, even though spawning usually peaks near this point. However, given the peak spawning period is usually around Oct. 1, the peak of the curve was placed around Oct. 1, with an assumed peak abundance similar to that observed on the Sept. 30 survey.

Original estimate - Index (RM 0.0-2.6) = 924 (AUC)

Table 7: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	74	9	18	0.0	0.9	0.9	40	0	40	80	SUPP	FOOT	0	0	0	0	20	61	00	00
17 0012	74	9	18	0.9	2.6	1.7	25	1	26	80	SUPP	FOOT	0	0	0	0	20	61	00	00
17 0012	74	9	30	0.0	2.6	2.6	402	84	486	80	SUPP	FOOT	1	4	0	0	00	00	00	00
17 0012	74	10	18	0.0	2.6	2.6	24	350	374	90	SUPP	FOOT	1	3	0	0	00	00	00	00

Summer 1975

Reach - **River mile 0.0-2.6**
Estimate = 1,405
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - None.

Original estimate - Index (RM 0.0-2.6) = 1,599 (AUC)

Table 8: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	75	9	8	0.0	2.6	2.6	29	1	30	80	SUPP	FOOT	3	0	0	0	60	00	00	00
17 0012	75	9	18	0.0	2.6	2.6	201	5	206	75	SUPP	FOOT	4	0	0	0	00	00	00	00
17 0012	75	9	22	0.0	2.6	2.6	692	32	724	0	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0012	75	9	24	0.0	2.6	2.6	752	32	784	80	INDX	FOOT	1	3	4	0	00	00	00	00
17 0012	75	9	30	0.0	2.6	2.6	858	353	1,211	0	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0012	75	10	6	0.0	2.6	2.6	172	204	376	50	SUPP	FOOT	1	4	0	0	60	00	00	00
17 0012	75	10	15	0.0	0.7	0.7	10	2	12	50	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0012	75	10	15	0.7	2.8	2.1	0	2	2	50	SUPP	FOOT	1	4	0	0	24	74	00	00

Summer 1976

Reach - **River mile 0.0-2.6**
Estimate = 2,445
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Survey timing is good for the three surveys, but poor visibility (70 %) on Sept. 21 (peak) survey

leaves a fair amount of latitude in the possible height of the peak. There is a USFWS survey (Nov. 1) one month after the last WDFW survey (Sept. 29) that had a 2,000 fish dead count. Given that the Sept. 29 count was 34 live + 2,375 dead, this suggests that more fish had spawned and died between Sept. 29 and Nov. 1. However, spawning did end early in many Hood Canal streams in 1996 (around the first week of October), so AUC curve was terminated in early October.

Original estimate - Index (RM 0.0-0.6) =3,114 (AUC)

Table 9: 1976 chum survey data through Nov. 1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	76	9	10	0.0	2.0	2.0	469	27	496	70	INDX	FOOT	0	0	0	0	20	33	00	00
17 0012	76	9	21	0.0	2.6	2.6	1,233	1,490	2,723	70	INDX	FOOT	0	0	0	0	60	00	00	00
17 0012	76	9	30	0.0	2.6	2.6	34	2,375	2,409	80	INDX	FOOT	1	0	0	0	00	00	00	00
17 0012	76	11	1	0.0	0.6	0.6	2	1,000	1,002	0	SUPP	FOOT	4	0	0	0	60	00	00	FW
17 0012	76	11	1	0.6	2.6	2.0	0	1,000	1,000	0	SUPP	FOOT	1	4	0	0	60	00	00	FW

Summer 1977

Reach - **River mile 0.0-2.6**
Estimate = 821
Method - Single survey expansion by a timing model (used 1983 AUC data).
Quality rating - Poor
Comments - Used 1983 AUC run timing data because peak of spawning for 1983 was later than average. Oct. 13, 1977 survey dead : live ratio suggests spawning is still pre-peak, because the ratio is still considerably less than 1:1.

Original estimate - Index (RM 0.0-2.6) = 1,662 (AUC)

Table 10: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	77	9	13	0.0	2.6	2.6	56	2	58	80	INDX	FOOT	4	0	0	0	60	00	00	00
17 0012	77	10	13	0.0	0.9	0.9	311	212	523	70	INDX	FOOT	1	4	0	0	21	31	60	00
17 0012	77	10	13	0.9	2.6	1.7	162	56	212	70	INDX	FOOT	1	4	0	0	21	31	60	00

Notes:
Sept. 13 survey card noted USFWS had installed a trap below "second bridge" (river mile 0.9?) to take chums for Walcott Slough.
Oct. 13 - Count break not defined on card, assumed it was river mile 0.9, as was noted on previous years.

Summer 1978

Reach - **River mile 0.0-2.6**
Estimate = 2,978
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Survey timing is OK for the four surveys that define the curve, but poor visibility (60 %) on Sept. 21 (peak) survey leaves a fair amount of latitude in the possible height of the peak.

Original estimate - Index (RM 0.0-2.6) = 3,037 (AUC)

Table 11: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	78	9	7	0.2	1.7	1.5	275	2	277	85	INDX	FOOT	1	4	0	0	00	00	00	00
17 0012	78	9	21	0.0	2.6	2.6	1,329	77	1,406	60	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	78	10	5	0.0	2.6	2.6	43	444	487	80	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	78	10	12	0.0	2.6	2.6	9	368	377	80	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	78	10	26	0.0	2.6	2.6	0	275	275	85	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-2.6**
Estimate = 345
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Survey time density is OK for the three surveys that define the peak and post-peak portions of the spawning period, but portion of curve prior to Sept. 17 survey is undefined by data, and amplitude of peak of spawning is also not clearly defined. A typical Sept. 1 survey start was assumed.

Original estimate - Index (RM 0.0-2.6) = 690 (AUC). Please note that survey data used for this AUC curve does not match survey data currently in WDFW survey database files.

Table 12: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	79	9	17	0.0	0.7	0.7	148	8	156	85	INDX	FOOT	3	4	0	0	21	31	51	00
17 0012	79	9	27	0.0	2.6	2.6	131	158	289	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0012	79	10	10	0.0	2.7	2.7	10	20	30	80	INDX	FOOT	1	4	0	0	20	31	60	00
17 0012	79	10	22	0.0	2.6	2.6	0	1	1	80	INDX	FOOT	4	0	0	0	28	00	00	00

Notes:
Sept. 27 survey card noted most of chums were in lower 0.5 miles of river.

Summer 1980

Reach - **River mile 0.0-2.6**
Estimate = 375
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair/Good
Comments - Similar situation to data for 1979, but starting point of spawning a little more defined by a zero count on Sept. 5.

Original estimate - Index (RM 0.0-2.6) = 567 (AUC)

Table 13: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	80	9	5	0.0	0.5	0.5	0	0	0	75	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0012	80	9	22	0.0	2.6	2.6	178	17	195	90	INDX	FOOT	0	0	0	0	24	00	00	00
17 0012	80	10	1	0.0	2.6	2.6	127	108	235	80	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	80	10	15	0.0	2.6	2.6	15	166	181	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-2.6**
Estimate = 138
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - Both PNPTC and WDF collected spawning survey data. Used PNPTC data, due to larger number of surveys. Poor visibility on the Sept. 28 survey (65 %), but it had little influence on the shape of the curve.

Original estimate - Index (RM 0.0-2.6) = 139 (AUC)

Table 14: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	81	9	10	0.0	0.8	0.8	13	0	13	90	INDX	FOOT	0	0	0	0	20	51	33	40
17 0012	81	9	17	1.0	2.5	1.5	8	0	8	75	INDX	FOOT	4	0	0	0	00	11	72	40
17 0012	81	9	18	0.0	1.0	1.0	43	9	52	90	INDX	FOOT	4	0	0	0	00	20	00	40
17 0012	81	9	23	0.0	2.6	2.6	62	36	98	95	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	81	9	25	0.0	2.6	2.6	78	34	112	89	INDX	FOOT	4	0	0	0	13	23	51	40
17 0012	81	9	28	0.0	2.6	2.6	48	17	65	65	INDX	FOOT	4	0	0	0	16	27	70	40
17 0012	81	10	1	0.0	2.6	2.6	37	14	51	75	INDX	FOOT	0	0	0	0	27	00	00	00
17 0012	81	10	13	0.0	2.6	2.6	0	18	18	89	INDX	FOOT	1	4	0	0	00	00	00	40
17 0012	81	10	19	0.0	2.6	2.6	1	17	18	88	INDX	FOOT	1	3	4	0	00	00	00	40
17 0012	81	10	21	0.5	2.7	2.2	1	1	2	75	SUPP	FOOT	1	4	0	0	00	00	00	FW

Summer 1982

Reach - **River mile 0.0-2.6**
Estimate = 156
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Poor visibility on peak survey (60 % on Sept. 25), and pre-peak type dead : live ratio made derivation of timing and amplitude of peak period of AUC curve subjective.

Original estimate - Index (RM 0.0-2.6) = 163 (AUC)

Table 15: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	82	9	9	0.0	0.7	0.7	7	0	7	75	SUPP	FOOT	0	0	0	4	20	00	00	00
17 0012	82	9	15	0.0	0.6	0.6	18	1	19	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	82	9	25	0.0	2.6	2.6	92	18	110	60	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	82	10	6	0.0	2.6	2.6	6	70	76	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	82	10	13	1.0	2.6	1.6	0	2	2	90	INDX	FOOT	1	4	0	0	23	33	38	00

Summer 1983

Reach - **River mile 0.0-2.6**
Estimate = 64
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Both PNPTC and WDF collected spawning survey data. Used mostly WDF data, due to better consistency of WDF survey observations in relationship to each other. Sept. 2 and Sept. 6 PNPTC surveys were included in curve, due to lack of WDF surveys in early Sept. There is an irregular shape to curve, which is probably an artifact of the small runsize, that is probably not fully defined by the available number of surveys.

Original estimate - Index (RM 0.0-2.6) = 107 (AUC).

Table 16: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	83	9	2	0.0	0.6	0.6	5	0	5	85	INDX	FOOT	4	0	0	0	00	00	00	40
17 0012	83	9	6	0.0	0.6	0.6	36	0	36	85	INDX	FOOT	4	0	0	0	00	00	00	40
17 0012	83	9	21	0.0	2.6	2.6	16	9	25	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0012	83	10	3	0.0	2.7	2.7	11	15	26	80	INDX	FOOT	4	0	0	0	00	00	00	40
17 0012	83	10	6	0.0	2.6	2.6	10	17	27	95	INDX	FOOT	3	0	0	0	20	00	00	00
17 0012	83	10	10	0.0	2.7	2.7	4	13	17	90	INDX	FOOT	4	0	0	0	00	00	00	40

17	0012	83	10	13	0.0	2.6	2.6	37	13	50	95	INDX	FOOT	0	0	0	0	20	00	00	00
17	0012	83	10	17	0.0	2.7	2.7	2	4	6	90	INDX	FOOT	4	0	0	0	00	00	00	40
17	0012	83	10	20	0.0	2.6	2.6	0	5	5	90	INDX	FOOT	0	0	0	0	20	31	00	00
17	0012	83	10	26	0.0	2.6	2.6	0	2	2	85	INDX	FOOT	0	0	0	0	20	31	00	00

Summer 1984

Reach - **River mile 0.0-2.6**
Estimate = 60
Method - (Live + dead Sept. 24 survey) + (live count on Oct. 15 survey)
Quality rating - Fair
Comments - Insufficient data to draw an AUC estimate. Data suggests peak live abundance was Sept. 6, with erratic fish entry pattern that is not really amenable to an AUC estimate.

Original estimate - Index (RM 0.0-2.6) = 61 (AUC).

Table 17: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	84	9	6	0.0	0.7	0.7	35	0	35	95	INDX	FOOT	4	0	0	0	20	33	00	40
17 0012	84	9	6	0.7	0.9	0.2	4	0	4	95	INDX	FOOT	0	0	0	0	20	33	00	40
17 0012	84	9	12	0.3	0.7	0.4	4	4	8	94	INDX	FOOT	4	0	0	0	20	00	00	40
17 0012	84	9	12	0.7	0.9	0.2	2	1	3	90	INDX	FOOT	4	0	0	0	20	00	00	40
17 0012	84	9	24	0.0	2.6	2.6	12	43	55	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	84	10	8	0.0	2.6	2.6	2	29	31	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	84	10	15	0.0	2.6	2.6	5	18	23	85	INDX	FOOT	0	0	0	0	21	00	00	00
17 0012	84	10	22	0.0	2.6	2.6	2	6	8	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	84	10	29	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1985

Reach - **River mile 0.0-2.6**
Estimate = 44
Method - Live + dead Sept. 25 survey
Quality rating - Poor
Comments - Insufficient data to draw an AUC estimate.

Original estimate - Index (RM 0.0-2.6) = 45 (AUC).

Table 18: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	85	9	25	0.0	2.6	2.6	24	20	44	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	85	10	3	0.0	2.6	2.6	0	24	24	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0012	85	10	31	0.0	2.6	2.6	0	0	0	50	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1986

Reach - **River mile 0.0-2.6**
Estimate = 15
Method - Oct. 14 live + dead count
Quality rating - Fair
Comments - AUC curve is difficult to derive from the small numbers of fish observed and erratic abundance pattern of live counts.

Original estimate - Index (RM 0.0-2.6) = 15 (AUC).

Table 19: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	86	9	17	0.0	2.6	2.6	0	0	0	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	86	9	23	0.0	2.6	2.6	1	1	2	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	86	10	1	0.0	2.0	2.0	4	11	15	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0012	***86***	***10***	***14***	***0.0***	***2.0***	***2.0***	***8***	***7***	***15***	***90***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0012	86	10	20	0.0	2.0	2.0	1	8	9	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0012	86	10	27	0.0	1.0	1.0	0	4	4	80	INDX	FOOT	4	0	0	0	24	38	00	00

Summer 1987

Reach - **River mile 0.0-0.7**
Estimate = 8
Method - Sept. 28 live + dead count
Quality rating - Poor
Comments - Insufficient data and apparent very small runsize prevented use of an AUC estimate.

Original estimate - Index (RM 0.0-0.7) = 15 (No documentation)

Table 20: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	***87***	***9***	***28***	***0.0***	***0.7***	***0.7***	***1***	***7***	***8***	***90***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0012	87	10	8	0.0	0.5	0.5	0	7	7	90	INDX	FOOT	0	0	0	0	20	60	00	00

Notes:
Oct. 8 survey card noted all chum were in lower river (This is a drought year, which is apparently why surveys only extended up to river mile 0.7).

Summer 1988

Reach - **River mile 0.0-2.7**
Estimate = 120
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Ascending portion of curve undefined by survey data. Assumed a typical start point to curve of ~ Sept. 1. Amplitude and timing of peak spawning period slightly ambiguous.

Original estimate - Index (RM 0.0-2.7) = 129 (AUC).

Table 20: 1988 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	***88***	***9***	***16***	***0.0***	***2.7***	***2.7***	***45***	***13***	***58***	***95***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0012	***88***	***9***	***26***	***0.0***	***1.8***	***1.8***	***23***	***31***	***54***	***80***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***61***	***00***	***00***	***00***
17 0012	***88***	***9***	***26***	***1.8***	***2.7***	***0.9***	***11***	***0***	***11***	***80***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***61***	***00***	***00***	***00***
17 0012	***88***	***10***	***5***	***0.0***	***1.8***	***1.8***	***20***	***39***	***59***	***85***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***61***	***00***	***00***
17 0012	***88***	***10***	***5***	***1.8***	***2.7***	***0.9***	***6***	***4***	***10***	***85***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***61***	***00***	***00***
17 0012	***88***	***10***	***17***	***0.0***	***2.7***	***2.7***	***1***	***59***	***60***	***90***	***INDX***	***FOOT***	***1***	***4***	***0***	***0***	***20***	***61***	***00***	***00***
17 0012	88	10	27	0.0	1.8	1.8	0	32	32	90	INDX	FOOT	1	4	0	0	20	61	00	00
17 0012	88	10	27	1.8	2.7	0.9	0	11	11	90	INDX	FOOT	1	4	0	0	20	61	00	00

Summer 1989

Reach - **River mile 0.0-2.7**
Estimate = 1
Method - Sept. 13 survey dead count
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-2.7) = 5 (Educated guess).

Table 21: 1989 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	***89***	***9***	***13***	***0.0***	***0.4***	***0.4***	***0***	***1***	***1***	***90***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***60***	***00***	***00***
17 0012	89	9	22	0.0	0.4	0.4	0	1	1	80	INDX	FOOT	4	0	0	0	20	00	00	00
17 0012	89	10	4	0.0	1.0	1.0	0	1	1	90	INDX	FOOT	3	4	0	0	20	60	00	00
17 0012	89	10	13	0.0	2.7	2.7	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0012	89	10	26	0.0	0.0	0.0	NC	NC		0	SPOT	FOOT	0	0	0	0	27	00	00	00
17 0012	89	11	3	0.0	2.7	2.7	1	0	1	75	INDX	FOOT	4	0	0	0	21	00	00	00

Summer 1990

Reach - **River mile 0.0-2.7**
Estimate = 6
Method - Oct. 9 live + dead count
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-2.7) = 11 (AUC).

Table 22: 1990 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	90	9	27	0.0	2.7	2.7	0	0	0	85	INDX	FOOT	4	0	0	0	20	60	00	00
17 0012	***90***	***10***	***9***	***0.0***	***1.8***	***1.8***	***5***	***1***	***6***	***90***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***61***	***00***	***00***
17 0012	***90***	***10***	***9***	***1.8***	***2.7***	***0.9***	***0***	***0***	***0***	***90***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***61***	***00***	***00***
17 0012	90	10	17	0.0	1.8	1.8	2	1	3	90	INDX	FOOT	4	0	0	0	20	60	61	00
17 0012	90	10	17	1.8	2.7	0.9	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	61	00
17 0012	90	10	26	0.0	1.8	1.8	3	0	3	60	INDX	FOOT	4	0	0	0	23	61	60	00
17 0012	90	10	26	1.8	2.7	0.9	0	0	0	60	INDX	FOOT	4	0	0	0	23	61	60	00

Summer 1991

Reach - **River mile 0.0-2.7**
Estimate = 49
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Ascending portion of curve undefined by survey data. Assumed a typical start date ~ Sept. 1. Amplitude and timing of peak spawning period slightly ambiguous. Apparent good separation between summer and fall spawning populations in data, given there was a 0 live, 0 dead count on Nov. 7.

Original estimate - Index (RM 0.0-2.7) = 58 (AUC).

Table 23: 1991 chum survey data through Nov. 7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	91	9	10	0.0	1.8	1.8	11	1	13	90	INDX	FOOT	1	4	0	0	60	20	00	00
17 0012	91	9	10	1.8	2.7	0.9	0	1	1	80	INDX	FOOT	1	4	0	0	60	20	00	00
17 0012	91	9	25	0.0	2.7	2.7	12	12	24	90	INDX	FOOT	1	3	4	0	20	00	00	00
17 0012	91	10	16	0.0	1.8	1.8	4	15	19	50	INDX	FOOT	4	0	0	0	25	60	00	00
17 0012	91	10	16	1.8	2.7	0.9	0	0	0	50	INDX	FOOT	4	0	0	0	25	60	00	00
17 0012	91	10	29	0.0	1.8	1.8	1	15	16	90	INDX	FOOT	1	4	0	0	20	61	00	00
17 0012	91	10	29	1.8	2.7	0.9	0	0	0	90	INDX	FOOT	1	4	0	0	20	61	00	00
17 0012	91	11	7	0.0	2.7	2.7	0	0	0	80	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1992

Reach - **River mile 0.0-2.7**
Estimate = 320
Method - AUC - 10 DAY STREAM LIFE, with broodstock collection adjustment.
Quality rating - Good.
Comments - Slight ambiguity in amplitude of peak of curve, due to 80 % visibility on peak survey.

Broodstock adjusted wild spawning estimate = (Total AUC fish*days - (inriver broodstock collection * assumed 5 day stream life before capture))/10 day stream life for wild chum = (3,840 - (129 * 5)) / 10. An additional 232 were retained in the bay seine fishery, and 53 in the setnet fishery.

Used a 5 day stream life for broodstock collected from the river because 38 % of the 129 fish were already spawned at time of capture, and this residence time was used by Jim Uehara in the original estimate as the expected stream life of the broodstock fish. In-river broodstock collection was 65 males, 62 females. There was an additional 2 males killed during capture.

Original estimate - Index (RM 0.0-2.7) = 395 (AUC, with hatchery adjustment).

Table 24: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	92	8	27	0.0	1.8	1.8	3	0	4	99	INDX	FOOT	4	0	0	0	20	60	59	00
17 0012	92	8	27	1.8	2.7	0.9	1	0	0	99	INDX	FOOT	4	0	0	0	20	60	59	00
17 0012	92	9	9	0.0	1.8	1.8	40	1	41	80	INDX	FOOT	0	0	0	4	20	60	00	00
17 0012	92	9	9	1.8	2.7	0.9	7	0	7	80	INDX	FOOT	0	0	0	4	20	60	00	00
17 0012	92	9	18	0.0	1.8	1.8	226	60	286	80	INDX	FOOT	0	0	0	4	20	60	61	00
17 0012	92	9	18	1.8	2.7	0.9	1	0	0	80	INDX	FOOT	0	0	0	4	20	60	61	00
17 0012	92	9	25	0.0	1.8	1.8	121	104	225	90	INDX	FOOT	0	0	0	4	20	60	61	00
17 0012	92	9	25	1.8	2.7	0.9	0	1	1	90	INDX	FOOT	0	0	0	4	20	60	61	00
17 0012	92	10	6	0.0	1.8	1.8	15	98	113	85	INDX	FOOT	0	0	0	4	20	61	00	00
17 0012	92	10	6	1.8	2.7	0.9	0	0	0	85	INDX	FOOT	0	0	0	4	20	61	00	00
17 0012	92	10	12	0.0	1.8	1.8	7	156	163	90	INDX	FOOT	4	0	0	0	20	61	00	00
17 0012	92	10	12	1.8	2.7	0.9	0	1	1	90	INDX	FOOT	4	0	0	0	20	61	00	00

Notes:
Sept. 9 survey card noted some active chum redds (all in lower reach).

Summer 1993

Reach - **River mile 0.0-2.7**
Estimate = 98
Method - AUC - 10 DAY STREAM LIFE, with broodstock collection adjustment.
Quality rating - Very good
Comments - None.

Hatchery fish adjusted wild spawning estimate = (Total AUC fish*days - (inriver broodstock collection * assumed 2 day stream life before capture))/10 day stream life for wild chum = (1020 - (22 * 2)) / 10.

There were 10 males, 12 females captured in **in-river** broodstock program, and 4 males entered hatchery rack. An additional 25 fish were retained in bay fishery (11 of which were mortalities). It was assumed **rack** capture fish moved rapidly enough through river to avoid being censused in spawner surveys.

Original estimate - Index (RM 0.0-2.7) = 89 (AUC, with hatchery adjustment).

Table 25: 1993 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	93	8	24	0.0	1.8	1.8	5	0	5	85	INDX	FOOT	0	1	3	4	23	60	61	00
17 0012	93	8	24	1.8	2.7	0.9	4	0	4	85	INDX	FOOT	0	1	3	4	23	60	61	00
17 0012	93	9	2	0.0	1.8	1.8	4	0	4	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	9	2	1.8	2.7	0.9	3	0	3	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	9	9	0.0	1.8	1.8	1	0	1	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	9	9	1.8	2.7	0.9	2	0	2	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	9	16	0.0	2.7	2.7	13	0	13	85	INDX	FOOT	0	1	3	4	31	13	60	00
17 0012	93	9	22	0.0	1.8	1.8	21	3	24	90	INDX	FOOT	1	4	3	0	20	31	60	00
17 0012	93	9	22	1.8	2.7	0.9	7	0	7	90	INDX	FOOT	1	4	3	0	20	31	60	00
17 0012	93	9	29	0.0	1.8	1.8	33	3	36	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	9	29	1.8	2.7	0.9	7	1	8	90	INDX	FOOT	0	1	3	4	20	61	00	00
17 0012	93	10	6	0.0	2.7	2.7	21	18	39	95	INDX	FOOT	0	1	3	4	20	60	61	00
17 0012	93	10	14	0.0	1.8	1.8	6	11	17	95	INDX	FOOT	0	0	1	4	20	60	61	00
17 0012	93	10	14	1.8	2.7	0.9	0	0	0	95	INDX	FOOT	0	0	1	4	20	60	61	00
17 0012	93	10	19	0.0	1.8	1.8	5	11	16	90	INDX	FOOT	0	0	1	4	20	61	60	00
17 0012	93	10	19	1.8	2.7	0.9	0	0	0	90	INDX	FOOT	0	0	1	4	20	61	60	00
17 0012	93	10	29	0.0	1.8	1.8	2	2	4	90	INDX	FOOT	0	0	0	4	20	31	60	00
17 0012	93	10	29	1.8	2.7	0.9	2	0	2	90	INDX	FOOT	0	0	0	4	20	31	60	00
17 0012	93	11	5	0.0	2.7	2.7	13	3	16	90	INDX	FOOT	0	0	0	4	20	60	61	00

Summer 1994

Reach - **River mile 0.0-2.7**
Estimate = 349
Method - AUC - 10 DAY STREAM LIFE, with broodstock collection adjustment.
Quality rating - Good
Comments - Some ambiguity about amplitude of peak of curve. Last survey used in AUC curve (Oct. 26) may include some fall chum.

Hatchery fish adjusted wild spawning estimate = (Total AUC fish*days - (inriver broodstock collection * assumed 2 day stream life before capture))/10 day stream life for wild chum = (3,530 - (18) * 2)) / 10.

There were 10 males, 8 females captured in in-river broodstock collection, and 18 males, 7 females entered rack. It was assumed **rack** capture fish moved rapidly enough through river to avoid being censused in spawner surveys. A total of 369 fish were retained in bay beach seine (20 of which were mortalities).

Original estimate - Index (RM 0.0-2.7) = 317 (AUC, with hatchery rack return passage and broodstock capture adjustment).).

Table 26: 1994 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	94	9	8	0.0	1.8	1.8	25	0	25	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0012	94	9	8	1.8	2.7	0.9	0	0	0	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0012	94	9	16	0.0	1.8	1.8	44	0	44	95	INDX	FOOT	4	0	0	0	20	61	60	00
17 0012	94	9	16	1.8	2.7	0.9	22	1	23	95	INDX	FOOT	4	0	0	0	20	61	60	00
17 0012	94	9	23	0.0	1.8	1.8	97	10	107	95	INDX	FOOT	4	0	0	0	20	60	61	00
17 0012	94	9	23	1.8	2.7	0.9	56	2	58	95	INDX	FOOT	4	0	0	0	20	60	61	00
17 0012	94	9	30	0.0	1.8	1.8	105	23	128	95	INDX	FOOT	4	1	0	0	20	60	00	00
17 0012	94	9	30	1.8	2.7	0.9	7	13	20	95	INDX	FOOT	4	1	0	0	20	60	00	00
17 0012	94	10	7	0.0	1.8	1.8	40	83	123	95	INDX	FOOT	0	0	0	1	20	60	61	00
17 0012	94	10	7	1.8	2.7	0.9	0	9	9	95	INDX	FOOT	0	0	0	1	20	60	61	00
17 0012	94	10	17	0.0	1.8	1.8	25	77	102	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0012	94	10	17	1.8	2.7	0.9	0	6	6	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0012	94	10	26	0.0	1.8	1.8	31	8	39	85	INDX	FOOT	4	0	0	0	60	20	61	00
17 0012	94	10	26	1.8	2.7	0.9	0	0	0	85	INDX	FOOT	4	0	0	0	60	20	61	00
17 0012	94	11	3	0.0	1.8	1.8	71	0	71	90	INDX	FOOT	0	0	0	4	20	60	61	00
17 0012	94	11	3	1.8	2.7	0.9	4	0	4	90	INDX	FOOT	0	0	0	4	20	60	61	00

Summer 1995

Reach - **River mile 0.0-2.8**
Estimate = 4,029
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Some ambiguity about amplitude of peak of curve. Detailed record of spawner distribution available in Table 1A. This information was collected to provide detailed information on distribution of spawners in Big Quilcene R.

Rack return was 22 fish. It was assumed rack capture fish moved rapidly enough through river to avoid being censused in spawner surveys. A total of 476 were retained in bay beach seine fishery (7 of which were mortalities).

Original estimate - Index (RM 0.0-2.8) = 4,056 (AUC, with hatchery rack return passage adjustment).

Table 27: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	95	7	27	0.0	2.8	2.8	0	0	0	70	INDX	FOOT	0	0	0	0	23	60	00	00
17 0012	95	8	4	0.0	2.8	2.8	0	0	0	90	INDX	FOOT	4	0	0	0	23	60	00	00
17 0012	95	8	14	0.0	2.8	2.8	0	0	0	95	INDX	FOOT	4	5	0	0	23	60	00	00
17 0012	95	8	21	0.0	2.8	2.8	13	1	14	95	INDX	FOOT	1	3	4	5	23	60	00	00
17 0012	95	8	31	0.0	2.8	2.8	77	1	78	90	INDX	FOOT	1	3	4	0	23	60	61	00
17 0012	95	9	7	0.0	2.8	2.8	828	10	838	95	INDX	FOOT	1	3	4	5	20	60	61	00
17 0012	95	9	15	0.0	2.8	2.8	1,425	267	1,692	95	INDX	FOOT	1	3	4	0	20	60	61	00
17 0012	95	9	25	0.0	2.8	2.8	1,168	966	2,134	90	INDX	FOOT	1	3	4	0	20	60	61	00
17 0012	95	10	6	0.0	2.8	2.8	453	1,039	1,492	90	INDX	FOOT	1	3	4	0	20	60	61	00
17 0012	95	10	19	0.0	2.8	2.8	52	51	103	90	INDX	FOOT	1	3	4	0	23	60	61	00

Summer 1996

Reach - **River mile 0.0-2.8**
Estimate = 8,479
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Very good
Comments - Detailed record of spawner distribution available in Table 2A. This information was collected to

provide detailed information on distribution of spawners in Big Quilcene R.

Rack return was 243 males, 61 females (12 males and 1 female of which were not initially accounted for in preliminary return summaries). It was assumed rack capture fish moved rapidly enough through river to avoid being censused in spawner surveys. A total of 526 fish were retained in bay fishery (59 of which were mortalities).

Original estimate - Index (RM 0.0-2.8) = 8,889 (AUC, with hatchery rack return passage adjustment).

Table 28: 1996 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	96	8	26	0.0	2.8	2.8	6	0	6	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0012	96	9	4	0.0	2.8	2.8	1,190	13	1,203	90	INDX	FOOT	1	4	5	0	20	60	61	00
17 0012	96	9	12	0.0	2.8	2.8	4,420	358	4,778	90	INDX	FOOT	1	4	0	0	20	60	61	00
17 0012	96	9	19	0.0	2.8	2.8	2,977	1,908	4,885	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0012	96	9	27	0.0	2.8	2.8	1,465	3,503	4,968	90	INDX	FOOT	4	0	0	0	20	60	61	00
17 0012	96	10	11	0.0	2.8	2.8	181	4,414	4,595	90	INDX	FOOT	4	0	0	0	20	60	00	00
17 0012	96	11	5	0.0	2.8	2.8	74	109	183	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1997

Reach - **River mile 0.0-2.6**
Estimate = 7,339
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Fair
Comments - Amplitude and timing of peak and post-peak periods of curve ambiguous. Detailed record of spawner distribution available in Table 3A. This information was collected to provide detailed information on distribution of spawners in Big Quilcene R.

Rack return = 249 fish. It was assumed rack capture fish moved rapidly enough through river to avoid being censused in spawner surveys. A total of 408 fish were retained in bay fishery (100 fish of which were mortalities).

Table 29: 1997 chum survey data through Nov. 6

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0012	97	8	21	0.0	0.6	0.6	2	0	2	99	INDX	FOOT	3	5	0	0	20	60	00	00
17 0012	97	8	27	0.0	2.8	2.8	18	0	18	95	INDX	FOOT	3	4	5	0	20	60	61	00
17 0012	97	9	4	0.0	2.8	2.8	214	1	215	90	INDX	FOOT	0	0	0	0	20	61	00	00
17 0012	97	9	22	0.0	2.8	2.8	2,653	216	2,869	85	INDX	FOOT	1	3	4	5	24	60	61	00
17 0012	97	10	23	0.0	2.8	2.8	72	28	100	90	INDX	FOOT	1	0	0	0	24	60	61	00
17 0012	97	11	6	0.0	2.8	2.8	92	1	93	65	INDX	FOOT	0	0	0	0	24	60	61	00

Summer 1998

Reach - **River mile 0.0-2.6**
Estimate = 2,244
Method - AUC - 10 DAY STREAM LIFE
Quality rating - Good
Comments - Start point, amplitude and timing of peak and post-peak periods of curve somewhat ambiguous.

USFWS caught 268 broodstock in bay setnets/seines (of these 4 died during capture), and 280 entered hatch. rack. It was assumed rack capture fish moved rapidly enough through river to avoid being censused in spawner surveys.

Table 29: 1998 chum survey data through Nov. 3

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
17 0012	09/01/98	0.0	1.8	1.8	260	9	269	95	INDX	FOOT					20	60	61	
17 0012	09/01/98	1.8	2.8	1.0	21	0	21	95	INDX	FOOT					20	60	61	
17 0012	09/10/98	0.0	2.8	2.8	939	102	1,041	95	INDX	FOOT					20	60		
17 0012	09/21/98	0.0	1.8	1.8	575	587	1,162	95	INDX	FOOT	1	4	0	0	20	60		
17 0012	09/21/98	1.8	2.8	1.0	87	43	130	95	INDX	FOOT	1	4	0	0	20	60		
17 0012	10/01/98	0.0	2.8	2.8	206	830	1,036	95	INDX	FOOT	4	0	0	0	20	60		
17 0012	10/09/98	0.0	2.8	2.8	84	218	302	95	INDX	FOOT	4	0	0	0	20	60		
17 0012	10/23/98	0.0	1.8	1.8	11	27	38	95	INDX	FOOT	4	0	0	0	20	61		
17 0012	10/23/98	1.8	2.8	1.0	0	7	7	95	INDX	FOOT	4	0	0	0	20	61		
17 0012	11/03/98	0.0	1.8	1.8	94	17	111	90	INDX	FOOT	4	1	0	0	23	60	61	
17 0012	11/03/98	1.8	2.8	1.0	0	0	0	90	INDX	FOOT	4	1	0	0	23	60	61	

Comments:
09/10/98 – 128 redds in RM 0.0-1.7 reach, 38 redds in RM 1.7-2.8 reach.

Introduction

The distribution of spawners in this stream appears to be somewhat variable. In some years the majority of spawning is confined to the lower 0.3-0.4 miles of stream, and in others a significant portion of the total spawning activity is observed upstream of river mile 0.8. This is assumed to be influenced by stream flow, density of spawners, and other factors. Unfortunately chum survey effort was frequently inconsistent in the stream reach above river mile 0.8 in the early 1970's, making estimates of spawning activity for the upper reach difficult during this period. When surveys were conducted for the entire river mile 0.0-1.8 reach, they were frequently not stratified, so estimates of the relative spawning activity in each reach section could not usually be determined. In 1976 the data was stratified, and it was estimated that 66 % of the spawning had occurred in the river mile 0.0-0.8 reach, and 34 % in the river mile 0.8-1.8 reach that year.

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables.

Escapement estimates

Summer 1968

Reach - **River mile 0.0-1.8**
Estimate = 897
Method - AUC
Quality rating - Fair
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 653 (AUC). Supplemental (RM 0.8-1.8) = 821 (see attached notes for method). Total = 1,474. It is unknown why the RM 0.0-0.8 data was not used to derive an AUC curve instead of using an alternative expansion method.

Table 1: 1968 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	***68***	***9***	***26***	***0.2***	***0.8***	***0.6***	***258***	***91***	***349***	***0***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***44***	***13***	***00***
17 0076	***68***	***9***	***26***	***0.8***	***1.8***	***1.0***	***315***	***38***	***353***	***0***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***44***	***14***	***00***
17 0076	***68***	***10***	***9***	***0.2***	***0.8***	***0.6***	***8***	***408***	***416***	***0***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***13***	***00***	***00***
17 0076	***68***	***10***	***9***	***0.8***	***1.8***	***1.0***	***36***	***350***	***386***	***0***	***INDX***	***FOOT***	***1***	***0***	***0***	***0***	***20***	***14***	***00***	***00***

Notes:
Survey cards noted lower river had been extensively channelized, and would probably cause high scouring mortality of redds.

Summer 1969

Reach - **N/A**
Estimate = No survey data available. No estimate attempted.
Method - N/A
Quality rating - N/A
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 363 [(Sum Big Quil. Escape. 1968,70-77 / Sum Little Quil. 1968, 1970-77) * 1969 Big Quil escape.]. Supplemental (RM 0.8-1.8) = 237 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 600.

Summer 1970

Reach - **River mile 0.0-0.8**
Estimate = 12
Method - Single survey expansion by a timing model (used 1975 timing data).
Quality rating - Poor
Comments - Used 1975 AUC timing data. No expansion was added for upper reach, because Sept. 25 survey card noted most spawning was in lower end of river mile 0.0-0.8 survey reach.

Original estimate - Index (RM 0.0-0.8) = 104 (AUC), Supplemental (RM 0.8-1.8) = 68 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year X_i]. Total = 172.

Table 2: 1970 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	70	9	25	0.2	0.8	0.6	7	2	9	90	INDX	FOOT	0	0	0	0	20	13	00	00

Reach - **River mile 0.8-1.8**
Estimate = None - see comments above
Method - N/A
Quality rating - N/A
Comments - N/A.

Summer 1971

Reach - **River mile 0.0-0.8**
Estimate = 71
Method - Single survey expansion by a timing model (used 1975 AUC timing data).
Quality rating - Poor
Comments - Used 1975 AUC timing data. No expansion was added for upper reach, because most of fish were noted spawning downstream of power line crossing @ river mile 0.4 on Sept. 29 survey card.

Original estimate - Index (RM 0.0-0.8) = 148 (AUC), Supplemental (RM 0.8-1.8) = 97 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year X_i]. Total = 245.

Table 3: 1971 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	71	9	29	0.2	0.8	0.6	47	2	49	90	INDX	FOOT	0	0	0	0	20	13	00	00

Reach - **River mile 0.8-1.8**
Estimate = None - see comments above
Method - N/A
Quality rating - N/A
Comments - N/A

Summer 1972

Reach - **River mile 0.0-0.8**
Estimate = 198
Method - AUC
Quality rating - Fair
Comments - Unusually late summer chum spawning activity period is suggested by the survey data. There is a lack of surveys both at the beginning and ending points spawning period to provide good quantitative support for the shape of the AUC curve on the starting and ending points, so beginning and ending sections of curve are largely subjective. The start and endpoints were determined by the slope of the AUC line at the first and last survey points derived out to the x axis.

Original estimate - Index (RM 0.0-0.8) = 194 (AUC), Supplemental (RM 0.8-1.8) = 127 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 321.

Table 4: 1972 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	72	9	26	0.2	0.8	0.6	44	2	46	95	INDX	FOOT	0	0	0	0	20	13	00	00
17 0076	72	10	4	0.2	0.8	0.6	80	12	92	90	INDX	FOOT	0	0	0	0	20	13	00	00
17 0076	72	10	13	0.2	0.8	0.6	67	104	171	90	INDX	FOOT	1	0	0	0	20	13	00	00

Reach - **River mile 0.8-1.8**
Estimate = 102
Method - Method - (RM 0.0-0.8 escapement estimate for year *x* / 1976 proportion RM 0.0-0.8 escapement of total escapement) - RM 0.0-0.8 escapement estimate for year *X*

Estimate = (198/0.66)-198 = 102

Quality rating - Poor
Comments - None

Summer 1973

Reach - **River mile 0.0-0.8**
Estimate = 157
Method - Single survey expansion by a timing model (used 1975 AUC data)
Quality rating - Poor
Comments - Expansion of Oct. 4 live count by 1975 AUC timing data produced a similar result to Oct. 4 live + dead count, so this is a minimal estimate of escapement. Some of the dead probably drifted down from spawning areas above upper end of survey reach, so the dead count for this reach may be somewhat inflated.

Original estimate - Index (RM 0.0-0.8) = 179 (AUC), Supplemental (RM 0.8-1.8) = 117 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 296.

Table 5: 1973 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	73	10	4	0.2	0.8	0.6	60	98	158	90	INDX	FOOT	1	0	0	0	13	00	00	00

Reach - **River mile 0.8-1.8**
Estimate = 81
Method - Method - (RM 0.0-0.8 escapement estimate for year *x* / 1976 proportion RM 0.0-0.8 escapement of total escapement) - RM 0.0-0.8 escapement estimate for year *x*,

Estimate = (157/0.66)-157 = 81

Quality rating - Poor
Comments - None

Summer 1974

Reach - **RM 0.0-0.8**
Estimate = 44
Method - Oct. 18 live + dead count
Quality rating - Poor
Comments - Minimal estimate. No AUC estimate attempted, due to very small live counts on the three surveys, and the large dead count on Oct. 18 (relative to the previous live counts). Some of the dead fish may have been spawners from upstream of RM 0.8.

Original estimate - Index (RM 0.0-0.8) = 156 (AUC), Supplemental (RM 0.8-1.8) = 102 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 258.

Table 6: 1974 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	74	9	18	0.0	0.8	0.8	2	0	2	80	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0076	74	9	30	0.0	0.8	0.8	4	6	10	95	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0076	***74***	***10***	***18***	***0.0***	***0.8***	***0.8***	***4***	***40***	***44***	***90***	***SUPP***	***FOOT***	***0***	***0***	***0***	***0***	***00***	***00***	***00***	***00***

Reach - **RM 0.8-1.8**
Estimate = N/A
Method - N/A
Quality rating - N/A
Comments - N/A

Summer 1975

Reach - **River mile 0.0-0.8**
Estimate = 573
Method - AUC
Quality rating - Fair
Comments - Ascending section and peak of run defined well by curve. Some ambiguity about shape of curve peak. Descending section of curve not as well defined by data. Total estimate is less than Sept. 30 survey live + dead total (352 live + 224 dead = 576 total), but dead from upstream are probably inflating the dead count. This is probably a minimal estimate at any rate.

Original estimate - Index (RM 0.0-0.8) = 859 (AUC), Supplemental (RM 0.8-1.8) = 562 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 1,421.

Table 7: 1975 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	75	9	8	0.0	0.8	0.8	1	0	1	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	75	9	18	0.0	0.8	0.8	75	3	78	80	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	75	9	22	0.0	0.8	0.8	210	31	241	0	INDX	FOOT	0	0	0	0	60	00	00	00
17 0076	75	9	24	0.0	0.8	0.8	277	29	306	90	INDX	FOOT	0	0	0	0	60	20	00	00
17 0076	75	9	30	0.0	0.8	0.8	352	224	576	0	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0076	75	10	15	0.0	0.8	0.8	2	61	63	50	INDX	FOOT	4	0	0	0	60	21	30	00

Reach - **River mile 0.8-1.8**
Estimate = 295
Method - Method : (RM 0.0-0.8 escapement estimate for year *x* / 1976 proportion RM 0.0-0.8 escapement of total escapement) - RM 0.0-0.8 escapement estimate for year *x*,

Estimate = (573/0.66)-573 = 295

Quality rating - Poor
Comments - None

Summer 1976

Reach - **River mile 0.0-1.8**
Estimate = 1,088
Method - AUC
Quality rating - Fair
Comments - Data suggests unusually early end to summer chum spawning. This situation was also observed in other Hood Canal streams in 1976. Amplitude and timing of peak period of spawning is ambiguous. Separate AUC estimates were also derived for the river mile 0.0-0.8 and 0.8-1.8 stream reaches, in order to estimate the proportion of spawning activity in each reach for expansion. River mile 0.0-0.8 = 691. River mile 0.8-1.8 = 365.

Original estimate - Index (RM 0.0-0.8) = 793 (AUC), Supplemental (RM 0.8-1.8) = 549 (see attached notes for method). Total = 1,342.

Table 8: 1976 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
17 0076	76	9	10	0.0	0.8	0.8	95	7	102	90	INDX	FOOT	0	0	0	0	00	20	33	00
17 0076	76	9	10	0.8	1.8	1.0	30	0	30	90	INDX	FOOT	0	0	0	0	00	20	33	00
17 0076	76	9	22	0.0	0.8	0.8	505	510	1,015	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	76	9	22	0.8	1.8	1.0	270	81	351	85	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0076	76	9	30	0.0	0.8	0.8	6	705	711	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	76	9	30	0.8	1.8	1.0	2	119	121	90	SUPP	FOOT	0	0	0	0	00	00	00	00

Summer 1977

Reach - **River mile 0.0-1.8**
Estimate = 773
Method - AUC
Quality rating - Fair
Comments - Amplitude and timing of peak period of spawning is ambiguous. This section of curve was subjectively derived, by use of a relatively flattened peak to be conservative. Descending portion and endpoint of curve are undefined by data. A late October endpoint was assumed, due the significant number of live fish still present on Oct. 13 survey.

Original estimate - Index (RM 0.0-0.8) = 732 (AUC), Supplemental (RM 0.8-1.8) = 479 [(Sum

1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 1,211. It seems index AUC curve should technically be considered to have accounted for all of spawning, since most of surveys extended up to river mile 1.8.

Table 9: 1977 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type Survey	Method	Other species				Comments			Agency
17 0076	77	9	13	0.0	1.8	1.8	4	2	6	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	77	9	22	0.0	1.8	1.8	164	5	169	85	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	77	10	13	0.0	0.8	0.8	161	108	269	70	INDX	FOOT	1	4	0	0	20	33	60	00
17 0076	77	10	13	0.8	1.8	1.0	18	1	19	70	INDX	FOOT	1	4	0	0	20	33	60	00

Notes:
Sept. 13 survey card noted water flow was very low, and would prevent fish passage upstream of river mile 0.8.

Summer 1978

Reach - **River mile 0.0-1.8**
Estimate = 1,816
Method - AUC
Quality rating - Good
Comments - Relatively early end to spawning, also observed in other Hood Canal streams. Some ambiguity regarding amplitude peak spawning due to mediocre visibility on peak survey (70 %).

Original estimate - Index (RM 0.0-0.8) = 1,626 (AUC), Supplemental (RM 0.8-1.8) = 1,063 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year *X*]. Total = 2,689. It seems index AUC curve should technically be considered to have accounted for all of spawning, since most of surveys extended up to river mile 1.8.

Table 10: 1978 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	78	9	7	0.0	1.8	1.8	188	3	191	75	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	78	9	21	0.0	1.8	1.8	804	53	857	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	78	10	5	0.0	1.8	1.8	27	467	494	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	78	10	12	0.0	1.8	1.8	1	220	221	85	INDX	FOOT	1	4	0	0	00	00	00	00
17 0076	78	10	26	0.0	1.8	1.8	4	95	99	85	INDX	FOOT	1	4	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-1.8**
Estimate = 110
Method - AUC
Quality rating - Fair
Comments - Starting portion and ascending section of AUC curve not defined by data. I subjectively assumed an early Sept. start point. The presence of some dead on Sept. 17 survey indicates some chum must have entered stream over 10 days ago (assuming an average 10 day residence time).

Original estimate - Index (RM 0.0-1.8) = 174 (AUC).

Table 11: 1979 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	79	9	17	0.0	1.8	1.8	65	9	74	90	INDX	FOOT	0	0	0	0	42	60	00	00
17 0076	79	9	27	0.0	1.8	1.8	22	80	102	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	79	10	10	0.0	0.8	0.8	1	4	5	99	INDX	FOOT	3	0	0	0	20	60	00	00
17 0076	79	10	10	0.8	1.8	1.0	0	0	0	99	INDX	FOOT	3	0	0	0	20	60	00	00

Notes:
Sept. 27 survey card noted impassable beaver dam at ~ river mile 0.6.

Summer 1980

Reach - **River mile 0.0-1.8**
Estimate = 154
Method - AUC
Quality rating - Fair
Comments - Starting portion of curve not defined by data. Used a mid-Sept. start point 1) to be conservative, and 2) given there were few dead observed on Sept. 22 survey.

Original estimate - Index (RM 0.0-1.8) = 210 (AUC).

Table 12: 1980 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	80	9	22	0.0	1.8	1.8	86	3	91	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	80	10	1	0.0	1.8	1.8	27	34	61	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	80	10	15	0.0	1.8	1.8	28	45	73	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1981

Reach - **River mile 0.0-1.8**
Estimate = 84
Method - AUC
Quality rating - Fair
Comments - Both PNPTC and WDF conducted spawning surveys. Used WDF data for estimate. There was inconsistencies in the PNPTC data regarding the stream reach covered from survey to survey.

Original estimate - Index (RM 0.0-1.8) = 104 (AUC), Supplemental (RM 0.8-1.8) = 68 [(Sum 1968 and 76 Supplemental escape. / Sum 1968 and 76 Index escape.) * Index escape for year X]. Total = 172. There is no specific documentation in regards to the expansion, but it is the same value that would result if you use the canned method used for many of the previous years. It appears that original AUC curve used a mix of WDFW and PNPTC data. Given that the reported upper survey point for the WDF data is usually 1.8 or better, I am unsure why the AUC estimate was expanded.

Table 13: 1981 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	81	9	10	0.0	0.8	0.8	5	2	7	80	INDX	FOOT	0	0	0	0	00	00	00	40
17 0076	81	9	21	0.0	1.0	1.0	43	5	48	85	INDX	FOOT	0	0	0	0	21	57	00	40
17 0076	81	9	23	0.0	1.8	1.8	19	0	19	95	INDX	FOOT	0	0	0	0	60	00	00	00
17 0076	81	9	25	0.0	2.0	2.0	53	4	57	85	INDX	FOOT	4	0	0	0	23	48	80	40
17 0076	81	9	29	0.0	1.0	1.0	54	7	61	85	INDX	FOOT	4	0	0	0	00	16	47	40
17 0076	81	10	1	0.0	1.8	1.8	55	2	57	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	81	10	30	3.0	4.3	1.3	25	0	25	70	SUPP	FOOT	4	0	0	0	23	31	60	00

Notes:
Sept. 23 survey card noted small, impassable beaver dam in lower stream reach.

Summer 1982

Reach - **River mile 0.0-0.8**
Estimate = 125
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 140 (AUC). Supplemental (RM 0.8-1.8) = No expansion.

Table 14: 1982 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	82	9	15	0.0	0.8	0.8	24	0	24	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	82	9	25	0.0	0.8	0.8	67	22	89	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	82	10	6	0.0	0.8	0.8	17	79	96	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	82	10	13	0.0	1.8	1.8	0	77	77	90	INDX	FOOT	4	0	0	0	21	32	31	00
17 0076	82	10	29	3.0	4.3	1.3	3	0	3	80	SUPP	FOOT	4	0	0	0	23	00	00	00

Reach - **River mile 0.8-1.8**
Estimate = 0
Method - No expansion was applied, due to fact that individual(s) who did original escapement estimate were uncompelled to assume any additional escapement upstream of the index reach.

If a expansion was attempted, a possible result is:
Method - (RM 0.0-0.8 escapement estimate for year *x* / 1976 proportion RM 0.0-0.8 escapement of total escapement) - RM 0.0-0.8 escapement estimate for year *x*,

Estimate = (125/0.66)-125 = 64 (**not** used).

Quality rating - Poor
Comments - None.

Summer 1983

Reach - **River mile 0.0-1.8**
Estimate = 176
Method - AUC
Quality rating - Fair
Comments - Both PNPTC and WDF conducted spawning surveys. Used WDF data for estimate. PNPTC data was more limited in time period surveyed, and number of surveys. Ascending section of curve undefined by survey data. Irregular double peak in live count data (similar to Big Quilcene).

Original estimate - Index (RM 0.0-1.8) = 251 (AUC).

Table 15: 1983 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	83	9	21	0.0	1.8	1.8	58	2	60	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	83	9	26	0.0	0.8	0.8	83	10	93	80	INDX	FOOT	0	0	0	0	00	00	00	40
17 0076	83	9	26	0.8	1.8	1.0	0	0	0	85	INDX	FOOT	0	0	0	0	00	00	00	40
17 0076	83	10	3	0.0	1.8	1.8	8	9	17	70	INDX	FOOT	0	0	0	0	00	00	00	40
17 0076	83	10	6	0.0	1.8	1.8	41	17	58	95	INDX	FOOT	1	4	0	0	20	00	00	00
17 0076	83	10	10	0.0	1.8	1.8	0	1	1	80	INDX	FOOT	0	0	0	0	00	00	00	40
17 0076	83	10	13	0.0	1.8	1.8	58	10	68	95	INDX	FOOT	1	4	0	0	20	00	00	00
17 0076	83	10	20	0.0	1.8	1.8	6	3	9	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	83	10	26	0.0	1.8	1.8	2	13	15	95	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1984

Reach - **River mile 0.0-1.8**
Estimate = 83
Method - AUC
Quality rating - Fair
Comments - Both PNPTC and WDF conducted spawning surveys. Used WDF data for estimate, but

included Sept. 7 PNPTC survey due to lack of WDF survey observations in this time period. Ascending section of curve undefined by data. Secondary period of spawning activity occurred in October, also observed in Big Quilcene.

Original estimate - Index (RM 0.0-1.8) = 117 (AUC).

Table 16: 1984 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	***84***	***9***	***7***	***0.2***	***0.8***	***0.6***	***6***	***0***	***6***	***95***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***33***	***60***	***40***
17 0076	84	9	18	0.0	0.8	0.8	53	7	60	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0076	***84***	***9***	***24***	***0.0***	***1.8***	***1.8***	***47***	***20***	***67***	***99***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	84	9	25	0.0	0.8	0.8	67	23	90	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0076	84	9	25	0.8	1.0	0.2	3	3	6	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0076	***84***	***10***	***2***	***0.0***	***1.8***	***1.8***	***9***	***62***	***71***	***99***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	***84***	***10***	***3***	***0.0***	***0.6***	***0.6***	***13***	***61***	***74***	***80***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***60***	***00***	***00***	***00***
17 0076	84	10	3	0.6	1.8	1.2	0	10	10	80	INDX	FOOT	4	0	0	0	60	00	00	00
17 0076	***84***	***10***	***8***	***0.0***	***1.8***	***1.8***	***18***	***69***	***87***	***99***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	84	10	11	0.0	0.8	0.8	3	52	55	85	INDX	FOOT	0	0	0	0	20	60	00	40
17 0076	84	10	11	0.8	1.8	1.0	2	0	2	85	INDX	FOOT	1	4	0	0	20	31	60	40
17 0076	***84***	***10***	***15***	***0.0***	***1.8***	***1.8***	***1***	***49***	***50***	***0***	***INDX***	***FOOT***	***4***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	84	10	17	0.0	0.8	0.8	13	41	54	90	INDX	FOOT	4	0	0	0	20	60	00	40
17 0076	84	10	22	0.0	1.8	1.8	0	46	46	98	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	84	10	25	0.0	0.8	0.8	11	35	46	90	INDX	FOOT	4	0	0	0	20	60	00	40
17 0076	84	10	29	0.0	1.8	1.8	0	14	14	99	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	84	11	1	0.0	0.8	0.8	6	28	34	90	INDX	FOOT	4	0	0	0	20	00	00	40

Notes:
Sept. 7, Sept. 25 survey card noted a beaver dam at ~ river mile 0.4
Oct. 3 survey conducted by WDF habitat biologist. Card noted a beaver dam at river mile 0.6 had been removed.

Summer 1985

Reach - **River mile 0.0-1.8**
Estimate = 1
Method - Sept. 25 + Oct. 3 survey live+dead count
Quality rating - Fair
Comments - None.

Original estimate - Index (RM 0.0-1.8) = 50 (No documentation).

Table 17: 1985 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	***85***	***9***	***25***	***0.0***	***1.8***	***1.8***	***0***	***1***	***1***	***99***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	***85***	***10***	***3***	***0.0***	***1.8***	***1.8***	***0***	***0***	***0***	***99***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0076	85	10	31	0.0	0.8	0.8	0	0	0	85	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1986

Reach - **River mile 0.0-0.8**
Estimate = 12
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 12 (AUC).

Table 18: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	86	9	17	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	86	9	23	0.0	1.8	1.8	4	0	4	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0076	86	9	30	0.1	0.8	0.7	7	0	7	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	86	10	14	0.1	0.8	0.7	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	86	10	20	0.0	0.8	0.8	2	0	2	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	86	10	27	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	86	11	4	0.0	0.8	0.8	0	3	3	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-0.8**
Estimate = 71
Method - Single survey expansion by a timing model (used 1978 AUC data)
Quality rating - Poor
Comments - Assumed there were no fish upstream of river mile 0.8, because it was 1) a drought year, 2) Sept. 28 survey card noted most of spawning was observed in lower 0.2 miles of index, and 3) all summer chum in Big Quilcene spawned in lower 0.5 miles of river.

Original estimate - Index (RM 0.0-0.8) = 54 (AUC).

Table 19: 1987 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	87	9	28	0.0	0.8	0.8	26	11	37	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	87	10	8	0.0	0.8	0.8	0	4	4	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	87	10	26	0.0	0.7	0.7	0	1	1	90	INDX	FOOT	4	0	0	0	20	00	00	00

Notes:
Sept. 28 survey card noted most of spawning was observed in lower 0.2 miles of index.

Reach - **River mile 0.8-1.8**
Estimate = 0
Method - N/A
Quality rating - N/A
Comments - See notes above.

Summer 1988

Reach - **River mile 0.0-1.8**
Estimate = 177
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 181 (AUC).

Table 20: 1986 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	88	9	16	0.0	0.8	0.8	9	3	12	90	INDX	FOOT	0	0	0	0	20	61	00	00
17 0076	88	9	16	0.8	1.8	1.0	5	0	5	90	INDX	FOOT	0	0	0	0	20	61	00	00
17 0076	88	9	26	0.0	0.8	0.8	120	11	131	90	INDX	FOOT	4	0	0	0	61	00	00	00
17 0076	88	9	26	0.8	1.8	1.0	3	1	4	90	INDX	FOOT	4	0	0	0	61	00	00	00
17 0076	88	10	5	0.0	0.8	0.8	32	83	115	90	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	88	10	5	0.8	1.8	1.0	1	0	1	90	INDX	FOOT	4	0	0	0	20	61	00	00

17	0076	88	10	17	0.0	0.8	0.8	3	54	59	90	INDX	FOOT	0	0	0	0	61	20	00	00
17	0076	88	10	17	0.8	1.8	1.0	0	2	2	90	INDX	FOOT	0	0	0	0	61	20	00	00
17	0076	88	10	27	0.0	0.8	0.8	0	28	28	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0076	88	10	27	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00

Summer 1989

Reach - **River mile 0.0-1.8**
Estimate = 1
Method - (Sept. 13 + Sept. 22 + Oct. 4 + Oct. 13 + Oct. 26) live + dead counts
Quality rating - Good
Comments - Surveys were conducted in the proper period to note the presence of any significant spawning activity this year.

Original estimate - Index (RM 0.0-0.8) = 5 (Educated guess).

Table 21: 1989 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	89	9	13	0.0	0.9	0.9	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	89	9	22	0.0	0.8	0.8	0	1	1	85	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	89	10	4	0.0	0.9	0.9	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	89	10	13	0.0	1.0	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	89	10	26	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	89	11	3	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1990

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - (Sept. 27 + Oct. 9 + Oct. 17 + Oct 26) live + dead counts
Quality rating - Good
Comments - Surveys were conducted in the proper period to note the presence of any significant spawning activity this year.

Original estimate - Index (RM 0.0-0.8) = 0.

Table 22: 1990 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	90	9	27	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	90	10	9	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	90	10	17	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	90	10	26	0.0	1.8	1.8	0	0	0	85	INDX	FOOT	4	0	0	0	23	00	00	00

Summer 1991

Reach - **River mile 0.0-1.8**
Estimate = 1
Method - (Sept. 10 + Sept. 25 + Oct. 16 + Oct 29) live + dead counts
Quality rating - Good
Comments - Surveys were conducted in the proper period to note the presence of any significant spawning activity this year.

Original estimate - Index (RM 0.0-0.8) = 5 (Educated guess).

Table 23: 1991 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	91	9	10	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	91	9	25	0.0	0.8	0.8	1	0	1	90	INDX	FOOT	0	0	0	0	60	20	00	00
17 0076	91	9	25	0.8	1.8	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	60	20	00	00
17 0076	91	10	16	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	47	48	00
17 0076	91	10	29	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	61	00

Notes:
Oct. 16, Oct. 29 survey card noted one beaver dam in river mile 0.8-1.8 reach, and river mile 0.0-0.8 reach had three beaver dams, one of which was considered probably impassible.

Summer 1992

Reach - **River mile 0.0-0.8**
Estimate = 9
Method - AUC
Quality rating - Good
Comments - Ascending section of curve undefined by data, but range of possible variation in start date does not change estimate significantly. Start date was subjectively assumed to be about Sept. 1, end date around Sept. 28 (natural progression of descending AUC line to interception with x-axis).

Original estimate - Index (RM 0.0-0.8) = 10 (AUC).

Table 24: 1992 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	92	9	9	0.0	0.8	0.8	6	1	7	98	INDX	FOOT	0	0	0	0	60	61	00	00
17 0076	92	9	9	0.8	1.8	1.0	0	0	0	98	INDX	FOOT	0	0	0	0	60	61	00	00
17 0076	92	9	18	0.0	0.8	0.8	3	2	5	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	92	9	18	0.8	1.8	1.0	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	92	9	25	0.0	0.8	0.8	0	2	3	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	92	9	25	0.8	1.8	1.0	0	1	1	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	92	10	6	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00

Notes:
Sept. 9 survey card noted beaver dam activity in lower river. A dam was removed on Sept. 4.
Sept. 25, Oct. 6 survey cards noted new beaver dam construction, with an apparently impassable dam at – river mile 0.2.

Summer 1993

Reach - **River mile 0.0-1.8**
Estimate = 12
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 12 (AUC).

Table 25: 1993 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	93	8	24	0.0	1.8	1.8	0	0	0	60	INDX	FOOT	0	0	0	0	24	38	60	00
17 0076	93	9	2	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0076	93	9	9	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0076	93	9	16	0.0	0.8	0.8	4	2	6	90	INDX	FOOT	0	0	0	4	20	31	60	00
17 0076	93	9	16	0.8	1.8	1.0	1	0	1	90	INDX	FOOT	0	0	0	4	20	31	60	00
17 0076	93	9	22	0.0	0.8	0.8	5	2	7	95	INDX	FOOT	0	0	0	4	60	31	20	00
17 0076	93	9	22	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	0	0	0	4	60	31	20	00
17 0076	93	9	29	0.0	0.8	0.8	3	2	5	95	INDX	FOOT	0	0	3	4	20	60	61	00

17 0076	93	9	29	0.8	1.8	1.0	1	2	3	95	INDX	FOOT	0	0	3	4	20	60	61	00
17 0076	93	10	6	0.0	0.8	0.8	2	3	5	95	INDX	FOOT	0	0	0	4	20	60	61	00
17 0076	93	10	6	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	0	0	0	4	20	60	61	00
17 0076	93	10	14	0.0	0.8	0.8	1	1	2	95	INDX	FOOT	0	0	0	4	20	61	00	00
17 0076	93	10	14	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	0	0	0	4	20	61	00	00
17 0076	93	10	19	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	00	00
17 0076	93	10	29	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	4	20	31	48	00
17 0076	93	11	5	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	4	20	48	61	00

Notes:
Sept. 22 survey card noted new beaver dam construction in lower stream reach.
Sept. 29 survey card noted an impassable beaver dam in lower stream reach, barrier was partially breached by surveyor.
Oct. 6 survey card noted beaver dam was passable.
Oct. 19, Oct. 29 , Nov. 5 survey cards noted there was an impassable beaver dam at river mile 0.2.
Dec. 28 survey card noted tremendous bedload movement after a flood, most of redds constructed earlier in season were probably destroyed.

Summer 1994

Reach - **River mile 0.0-1.8**
Estimate = 0
Method - (Sept. 8 + Oct. 7) live + dead
Quality rating - Fair
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 0.

Table 26: 1994 chum survey data through Nov. 3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	94	9	8	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00
17 0076	94	10	7	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	48	60	00
17 0076	94	11	3	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00

Notes:
Sept. 8, Oct. 7, Nov. 3 survey cards noted impassable beaver dams in lower 0.3 miles of river.

Summer 1995

Reach - **River mile 0.0-1.8**
Estimate = 54
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 54.

Table 27: 1995 chum survey data through Oct. 31

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	95	9	7	0.0	0.8	0.8	9	0	9	95	INDX	FOOT	0	0	0	0	00	20	60	00
17 0076	95	9	15	0.0	0.8	0.8	16	2	18	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	95	9	15	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0076	95	9	25	0.0	0.8	0.8	26	4	30	95	INDX	FOOT	4	0	0	0	20	60	61	00
17 0076	95	9	25	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	60	61	00
17 0076	95	10	6	0.0	0.8	0.8	1	2	3	95	INDX	FOOT	3	0	0	0	20	61	00	00
17 0076	95	10	6	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	3	0	0	0	20	61	00	00
17 0076	95	10	19	0.0	1.8	1.8	0	0	0	90	INDX	FOOT	0	0	0	0	23	60	00	00

Notes:
Sept. 7 survey card noted all fish were below power lines @ river mile 0.4.

Summer 1996

Reach - **River mile 0.0-1.8**
Estimate = 265
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-0.8) = 274.

Table 28: 1996 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	96	9	4	0.0	0.8	0.8	4	0	4	95	PART	FOOT	0	0	0	0	20	60	00	00
17 0076	96	9	12	0.0	0.8	0.8	103	1	104	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	9	12	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	9	19	0.0	0.8	0.8	102	26	129	95	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	96	9	19	0.8	1.8	1.0	1	0	1	95	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	96	9	27	0.0	0.8	0.8	88	77	165	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	9	27	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	10	11	0.0	0.8	0.8	5	100	105	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	10	11	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	96	11	5	0.0	0.8	0.8	0	12	12	95	INDX	FOOT	4	0	0	0	20	00	00	00
17 0076	96	11	5	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	00	00	00

Notes
Sept. 4 survey card noted all chums were in lower 0.2 miles of river.

Summer 1997

Rea[illegible] - **River mile 0.0-1.8**
Est[illegible]e = 29
M[illegible] -
Qua[illegible] rating - Fair
Comments - There is a 26 day gap between Sept. 22 and Oct. 17 surveys, which requires excessive assumptions to render the shape of an AUC curve between these two points. Also, low escapements frequently have irregular fish entry patterns that cannot be identified from two surveys.

Table 29: 1997 chum survey data through Nov. 5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0076	97	9	4	0.0	1.8	1.8	0	0	0	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0076	97	9	22	0.0	0.8	0.8	12	0	12	90	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	97	9	22	0.8	1.8	1.0	0	0	0	90	INDX	FOOT	4	0	0	0	20	61	00	00
17 0076	97	10	17	0.0	1.8	1.8	3	0	3	90	INDX	FOOT	0	0	0	0	23	00	00	00
17 0076	97	11	6	0.0	1.8	1.8	0	0	0	80	INDX	FOOT	4	0	0	0	24	60	61	00

Summer 1998

Reach - **River mile 0.0-1.8**
Estimate = 265
Method - AUC
Quality rating - Good
Comments - None. Amplitude and timing of peak spawning period a little ambiguous.

Editor note 02-10-99: The 1998 AUC curve dated 10/31/98 was run with faulty survey data. The Oct. 23 survey reported in AUC printout does not exist, while two actual surveys (Oct. 13, Oct. 20) were excluded. However, this omission has no effect on AUC result, so estimate has not been changed to date.

Table 30: 1998 chum survey data through Nov. 3

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
17 0076	09/01/98	0.0	0.8	0.8	3	1	4	95	INDX	FOOT	4	0	0	0	20	60	61	
17 0076	09/01/98	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	60	61	
17 0076	09/10/98	0.0	0.8	0.8	16	0	16	95	INDX	FOOT	4	0	0	0	20	60	61	
17 0076	09/10/98	0.8	1.8	1.0	0	0	0	95	INDX	FOOT	4	0	0	0	20	60	61	
17 0076	09/19/98	0.0	0.8	0.8	176	12	188	95	INDX	FOOT	0	0	0	4	20	60		
17 0076	09/19/98	0.8	1.8	1.0	10	1	11	95	INDX	FOOT	0	0	0	4	20	60		
17 0076	09/29/98	0.0	0.8	0.8	61	116	177	95	INDX	FOOT	4	0	0	0	20	60		
17 0076	09/29/98	0.8	1.8	1.0	1	0	1	95	INDX	FOOT	4	0	0	0	20	60		
17 0076	10/08/98	0.0	0.8	0.8	16	69	85	95	INDX	FOOT	4	0	0	0	20	60		
17 0076	10/08/98	0.8	1.8	1.0	0	1	1	95	INDX	FOOT	4	0	0	0	20	60		
17 0076	10/13/98	0.0	0.8	0.8	4	28	32	80	INDX	FOOT	4	0	0	0	20			
17 0076	10/13/98	0.8	1.8	1.0	0	0	0	80	INDX	FOOT	4	0	0	0	20			
17 0076	10/20/98	0.0	0.8	0.8	0	18	18	80	INDX	FOOT	4	0	0	0	20			
17 0076	11/03/98	0.0	1.8	1.8	0	1	1	95	INDX	FOOT	4	1	0	0	23	60	61	

Comments:

09/01/98 – Two chum redds observed at beginning of new channel along RB lower field dike wall, just up from high tide line. Pooled chum were just upstream of redds.

09/10/98 – 8 redds in RM 0.0-0.8 reach.

09/19/98 – 61 redds in RM 0.0-0.8 reach, 5 redds in RM 0.8-1.8 reach.

Introduction

As with the other Discovery/Sequim Bay summer chum streams, this stream contains no fall chum run. WDFW has operated an upstream / downstream migrant weir at river mile 0.8 for many years. Weir operation has usually been aimed at coho and winter steelhead upstream/downstream migrant investigations, and typically has not been operated during the summer chum adult return period – it is open to allow upstream fish passage without enumeration of upstream passing fish until mid - October. However, in some years the trap was operated during the summer chum run to enumerate upstream migrating adults.

When the weir was operated during the summer chum run, and/or the spawning survey data was stratified by reach it was possible to generate separate estimates of spawning activity for the stream reaches upstream and downstream of the WDFW weir in some years. These values are summarized in Table 1. Although only limited data is available, spawning activity upstream of river mile 1.5 appears minimal, even though fish can continue upstream unobstructed by barriers for a considerable distance.

Redd counts were used to estimate escapement on this stream in some years of low escapements in the 1990's. Comparisons of redd counts and live chum counts on low escapement years in Snow Cr. indicates it is common to miss a significant portion of the fish present with live fish counts. This could be due to a number of factors 1) a significant portion of the few fish that are present are going to be hiding, and 2) small census errors (i.e. the observer missing a couple of fish during the survey by accident) become much more significant in a small population count.

The river mile points that correspond with significant geographic landmarks on this stream are river mile (RM) 0.8 (WDFW weir), river mile 1.1 (BPA power line crossing) and river mile 1.5 (Uncas Rd. crossing).

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables. In addition Table 46 (Appendix 13-Salmon Cr.) contains a summary table of the daily rack return data for Snow and Salmon Cr. for the 1978-80 time period.

Table 1: Estimates of total summer chum spawning activity in Snow Cr., stratified by reach

	Year						
Stream Reach	1976	1977	1978[1]	1983	1984	1988	1996
RM 0.0-0.8 escapement	N/A	N/A	342	125	223	667	76
% of total	-	-	55.0%	78.6%	58.1%	94.7%	48.7%
RM 0.8 + escapement	N/A	N/A	280	34	161	37	80
% of total	-	-	45.0%	21.4%	41.9%	5.3%	51.3%
RM 0.0-1.5 escapement	570	529	N/A	N/A	N/A	N/A	N/A
% of total	93.8%	98.4%	-	-	-	-	-
RM 1.5 + escapement	38	8.5	N/A	N/A	N/A	N/A	N/A
% of total	6.3%	1.6%	-	-	-	-	-
Total of individual AUC estimates	608	537.5	622	159	384	704	156

Comments:
1: 1978 RM 0.0-0.8 estimate is derived from the formula [(AUC estimate for RM 0.0 to 2.2) - season total rack count @ RM 0.8].

Summer 1968-71

Comments - Limited survey data was collected on summer chum spawning during this time period. There is insufficient data to develop a escapement estimates based on survey data for these years.

Original estimates - Index (RM ?) = 659 (Derivation method unknown), Supplemental = 11 [(1977 supp * 1977 Index) * Index escapement for year *X*)], Total = 670.

Summer 1972

Reach - **River mile 0.0-0.8**
Estimate = 436
Method - AUC+expansion
Quality rating - Poor
Comments - Both surveys are apparently pre - peak, given the low dead : live ratios. Peak and post - peak sections of AUC curve were subjectively derived. The Oct. 4 survey was assumed to be close to the peak of spawning, because the Oct. 4 survey is still pre-peak as indicated by the dead : live ratio, but spawning usually peaks around this time, and rarely peaks much later. Estimate was doubled for total escapement estimate, based on cursory examination of data in Table 1 for 1978, 84, and 96 that suggested this would be an appropriate expansion factor for spawning upstream of river mile 0.8.

Original estimates - Index (?) = 659 (Derivation method unknown), Supplemental = 11 [(1977 supp * 1977 Index) * Index escapement for year *X*)]. Total = 670.

Table 1: 1972 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	*72*	*9*	*25*	*0.1*	*0.5*	*0.4*	*50*	*6*	*56*	*95*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*00*
17 0219	*72*	*10*	*4*	*0.0*	*0.5*	*0.5*	*127*	*30*	*157*	*90*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*00*

Notes:
Sept. 25 survey card noted chums were present above surveyed reach.

Summer 1973

Reach - **N/A**
Estimate = No estimate
Method - N/A
Quality rating - N/A
Comments - Insufficient data to generate an estimate based on spawning survey data. Lack of any fish on Sept. 30 survey suggests a small run though.

Original estimates - Index (?) = 659 (Derivation method unknown), Supplemental = 11 [(1977 supp * 1977 Index) * Index escapement for year *X*)]. Total = 670.

Table 2: 1973 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	73	9	30	0.1	1.5	1.4	0	0	0	95	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0219	73	12	19				3	0	3	30	SPOT	FOOT	4	0	0	0	25	00	00	00

Summer 1974

Reach - **River mile 0.0-1.6**
Estimate = 818
Method - AUC
Quality rating - Fair
Comments - Peak is ambiguous – the peak/post peak surveys have low dead/live ratios.

Original estimates - Index (RM 0.0-1.6) = 852 (AUC), Supplemental = 14 [(1977 supp * 1977 Index) * Index escapement for year *X*)]. Total = 866.

Table 3: 1974 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	74	9	23	0.0	1.6	1.6	49	2	51	90	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0219	74	10	7	0.0	1.6	1.6	554	41	595	95	SUPP	FOOT	1	0	0	0	00	60	00	00
17 0219	74	10	18	0.0	1.6	1.6	5	90	95	80	SUPP	FOOT	0	1	0	0	00	00	00	00
17 0219	74	12	03	1.4	4.2	2.8	0	0	0	60	SUPP	FOOT	3	0	0	0	30	00	00	00
17 0219	74	12	06				0	0	0	80	SPOT	FOOT	4	0	0	0	65	00	00	00
17 0219	74	12	11	1.0	1.5	0.5	0	0	0	80	SUPP	FOOT	4	0	0	0	70	00	00	00
17 0219	74	12	11	3.0	3.5	0.5	0	0	0	90	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0219	74	12	11	3.5	4.1	0.6	0	0	0	90	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0219	74	12	12	0.0	0.5	0.5	0	0	0	80	SUPP	FOOT	0	0	0	0	34	00	00	00
17 0219	74	12	12	0.6	1.0	0.4	0	0	0	80	SUPP	FOOT	0	0	0	0	34	20	00	00
17 0219	74	12	17	0.0	0.3	0.3	0	0	0	90	SUPP	FOOT	4	0	0	0	00	00	00	00
17 0219	74	12	31	0.0	0.3	0.3	0	0	0	75	SUPP	FOOT	4	0	0	0	20	00	00	00

Notes:
Sept. 25, Oct. 7 survey cards noted no chums were observed above power lines @ river mile 1.1

Summer 1975

Reach - **River mile 0.0-1.4**
Estimate = 327
Method - Oct. 3 live + dead
Quality rating - Poor
Comments - Used live+dead count because it is impossible to draw a (realistic) AUC curve that equals the live + dead count of 327 (67 live, 260 dead) on Oct. 3.

Original estimates - Index (RM 0.0-1.4) = 413 (AUC), Supplemental = 7 [(1977 supp * 1977 Index) * Index escapement for year X)]. Total = 420.

Table 4: 1975 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	75	9	8	0.0	0.0	0.0	5	0	5	90	SPOT	FOOT	0	0	0	0	00	00	00	00
17 0219	75	9	18	0.0	1.0	1.0	55	0	55	75	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0219	75	10	3	0.0	1.4	1.4	67	260	327	85	SUPP	FOOT	0	0	0	0	60	61	00	00
17 0219	75	10	3	1.4	1.8	0.4	3	10	13	60	SUPP	FOOT	0	0	0	0	20	31	38	00
17 0219	75	10	15	0.0	0.6	0.6	0	16	16	50	SUPP	FOOT	0	0	0	0	00	00	00	00

Summer 1976

Reach - **River mile 0.0-1.5**
Estimate = 570
Method - AUC
Quality rating - Good
Comments - Assumed Sept. 14 survey was close to peak abundance, given rapid decline in spawner abundance by Sept. 26 survey, and Sept. 26 live + dead count was similar to Sept. 14 live +dead count.

Original estimates - Index (RM 0.0-1.5) = 747 (AUC), Supplemental (RM 1.5 +) = 12 [(1977 supp. * 1977 Index) * Index escapement for year X)]. Total = 759.

Table 5: 1976 chum survey data for river mile 0.0-1.5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	76	9	10	0.0	1.5	1.5	110	1	111	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	76	9	14	0.0	1.5	1.5	363	11	374	95	INDX	FOOT	0	0	0	0	21	00	00	DG
17 0219	76	9	14	1.0	1.3	0.3	13	0	13	80	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0219	76	9	28	0.0	1.5	1.5	62	272	334	90	INDX	FOOT	0	0	0	0	20	00	00	DG

17 0219	76	10	5	0.0	1.5	1.5	17	97	114	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	10	13	0.0	1.5	1.5	9	45	54	99	INDX	FOOT	4	0	0	0	20	00	00	DG
17 0219	76	10	20	0.0	1.5	1.5	1	39	40	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	10	27	0.0	1.5	1.5	0	8	8	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	11	17	0.0	1.0	1.0	0	2	2	99	INDX	FOOT	0	0	0	0	20	34	70	DG

Reach - **River mile 1.5 +**
Estimate = 38
Method - AUC
Quality rating - Good
Comments - None

Table 6: 1976 chum survey data for river mile 1.5+

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	76	9	14	1.5	4.2	2.7	13	0	13	99	SUPP	FOOT	0	0	0	0	21	00	00	DG
17 0219	76	9	21	1.5	1.8	0.3	34	1	35	90	SUPP	FOOT	0	0	0	0	21	00	00	DG
17 0219	76	9	28	1.5	1.7	0.2	2	6	8	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	10	5	1.5	4.0	2.5	0	2	2	99	SUPP	FOOT	4	0	0	0	20	00	00	DG
17 0219	76	10	13	1.5	4.2	2.7	0	0	0	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	10	20	1.5	1.7	0.2	0	0	0	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0219	76	10	27	1.5	1.7	0.2	0	0	0	99	SUPP	FOOT	0	0	0	0	20	00	00	DG

Summer 1977

Reach - **River mile 0.0-1.5**
Estimate = 529
Method - AUC
Quality rating - Fair
Comments - A good number of surveys (8), but both of the peak surveys had poor visibility (50 %).

Original estimates - Index (RM 0.0-1.5) = 622 (AUC), Supplemental (RM 1.5 +) = 10 (assumed to be based on live + dead counts). Total = 632.

Table 7: 1977 chum survey data for river mile 0.0-1.5

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	77	9	14	0.0	1.5	1.5	11	2	13	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	9	21	0.0	1.5	1.5	86	6	92	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	9	22	0.0	1.4	1.4	71	2	73	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0219	77	9	28	0.0	1.5	1.5	184	14	198	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	10	5	0.0	1.5	1.5	161	49	210	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	10	13	0.0	1.5	1.5	73	56	129	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	10	19	0.0	1.5	1.5	36	67	103	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	10	26	0.0	1.5	1.5	11	28	39	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	11	2	0.0	1.5	1.5	0	3	3	15	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	11	9	0.0	1.5	1.5	0	10	10	15	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	77	11	16	0.0	1.5	1.5	0	1	1	10	INDX	FOOT	0	0	0	0	00	00	00	00

Reach - **River mile 1.5-2.2**
Estimate = 9
Method - AUC
Quality rating - Good
Comments - None

Table 7: 1977 chum survey data for river mile 1.5-2.2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	77	9	14	1.5	2.2	0.7	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0219	77	9	21	1.5	2.2	0.7	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	77	9	28	1.5	2.2	0.7	3	0	3	95	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	77	10	5	1.5	2.2	0.7	7	0	7	75	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	77	10	13	1.5	2.2	0.7	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	77	10	19	1.5	2.0	0.5	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0219	77	10	26	1.5	2.0	0.5	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	00

Summer 1978

Reach - **River mile 0.0-2.1**
Estimate = 629
Method - AUC
Quality rating - Good
Comments - Rack count @ RM 0.8 was 280 fish, so **theoretical** spawning distribution was 629 - 280 = 349 fish below weir, 280 above weir.

Original estimate - Index (RM 0.0-2.1) = 683 (AUC).

Table 8: 1978 chum survey data for river mile 0.0-2.1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	78	9	6	0.0	0.8	0.8	36	0	36	90	INDX	FOOT	0	0	0	0	60	00	00	DG
17 0219	78	9	6	0.8	2.1	1.3	0	0	0	90	INDX	FOOT	0	0	0	0	60	00	00	DG
17 0219	78	9	13	0.0	2.1	2.1	194	2	196	80	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0219	78	9	19	0.0	0.8	0.8	218	4	222	90	INDX	FOOT	6	0	0	0	00	00	00	00
17 0219	78	9	19	0.8	2.1	1.3	105	2	107	90	INDX	FOOT	6	0	0	0	00	00	00	00
17 0219	78	9	20	0.0	2.1	2.1	323	17	340	80	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0219	78	9	27	0.0	2.1	2.1	207	101	308	80	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0219	78	10	4	0.0	2.1	2.1	32	62	94	80	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0219	78	10	11	0.0	2.1	2.1	32	68	100	80	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0219	78	10	26	0.0	2.1	2.1	2	10	12	90	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0 - 0.8**
Estimate = 74
Method - Estimate based on formula: (1978 escape. below weir / 1978 escape. above weir) * 1979 escape. above weir = (349/280) * 59.

Original estimate - RM 0.0-1.5+ = 130 (Rack count + estimate of escapement below weir). The estimate of escapement below weir was derived by the same formula as above. However, different rack counts and 1978 escapement value numbers were used, so results were different from current estimate.
Quality rating - Poor
Comments - None

Reach - **River mile 0.8 +**
Estimate = 59 (40 males, 19 females).
Method - Rack count
Quality rating - Very good
Comments - None

Table 9: 1979 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	79	9	17	1.5	0.0	-1.5	0	0	0	0	SPOT	FOOT	0	0	0	0	20	57	00	0
17 0219	79	9	17	0.2	0.2		62					WEIR								

Notes:
Weir was operated from Sept. 13 to Oct. 25. Peak was noted as Sept. 28.

Summer 1980

Reach - **River mile 0.0 - 0.8**
Estimate = 502
Method - Live + dead (see comments).
Quality rating - Poor
Comments - Oct. 10, 1980 survey by WDG staff observed 78 live, 424 dead in stream reach from river mile 0.0-0.8. This was used as a minimal estimate of escapement. Please note this survey is not in WDFW survey database, and was obtained from Thom Johnson (WDFW, Snow Cr. Research Station, Port Townsend, WA).

Original estimate - RM 0.0-1.5+ = 710 (Rack count + estimate of escapement below weir). The estimate of escapement below weir was derived by the same formula as above. However, different rack counts and 1978 escapement value numbers were used, so results were different from current estimate.

Reach - **River mile 0.8 +**
Estimate = 207 (142 males, 65 females).
Method - Rack count
Quality rating - Very good
Comments - None

Summer 1981

Reach - **River mile 0.0-1.0**
Estimate = 242
Method - Single survey expansion by a timing model (used 1978 AUC data)
Quality rating - Poor
Comments - Used 1978 AUC timing data because 1981 data suggested a peak spawning period just after mid-September, given the dead fish were starting to accumulate to a fairly substantial portion of the point count total (~32 % of the live fish count) on Sept. 26 survey, which usually indicates spawning activity is approaching the peak period of activity for the season.

Original estimate - Index (RM 0.0-1.0) = 300 (AUC).

Table 10: 1981 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	*81*	*9*	*16*	*0.0*	*1.0*	*1.0*	*116*	*37*	*153*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*00*	*00*	*00*	*00*

Summer 1982

Reach - **River mile 0.0-1.8**
Estimate = 766
Method - AUC
Quality rating - Good

Comments - Start and endpoints of curve not defined by survey data. These sections of the AUC curve were derived by extending the line slope described at the first and last survey data points outward past the earliest and latest survey dates to intersection with the x-axis. The range of (practical) potential derivations in these sections of the curve would result in only limited variation in the total AUC estimate.

Original estimate - Index (RM 0.0-1.8) = 780 (AUC).

Table 11: 1982 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	82	9	14	0.0	1.8	1.8	159	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	82	9	21	0.0	1.8	1.8	267	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	82	9	28	0.0	1.8	1.8	224	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	82	10	11	0.0	1.8	1.8	126	NC		85	SUPP	FOOT	0	0	0	0	00	00	00	DG

Summer 1983

Reach - **River mile 0.0-1.8**
Estimate = 154
Method - AUC
Quality rating - Fair
Comments - Ascending section of curve undefined by data. Very low dead count on first survey suggests entry of majority of chums had occurred within 10 days, so curve was started 10 days before survey observation (~ Sept. 18). The remainder of curve is reasonably well defined. The Oct. 4 survey only extends from river mile 0.0-0.5 (there are no notes regarding why this survey was shorter in length than the other ones). The assumption made for the purposes of this AUC estimate is that the survey accounted for most of the fish in the stream on this date.

Original estimate - Index (RM 0.0-1.8) = 195 (AUC).

Table 12: 1983 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	83	9	28	0.0	0.8	0.8	62	3	65	90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	83	9	28	0.8	1.8	1.0	23	0	23	85	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	83	10	4	0.0	0.5	0.5	51	25	76	75	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0219	83	10	11	0.0	0.8	0.8	30	24	54	85	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	83	10	11	0.8	1.8	1.0	2	4	6	80	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	83	10	21	0.0	0.8	0.8	14	36	50	0	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0219	83	10	21	0.8	1.7	0.9	0	0	0	90	SUPP	FOOT	0	0	0	0	00	00	00	DG

Summer 1984

Reach - **River mile 0.0-1.5**
Estimate = 384
Method - AUC
Quality rating - Fair
Comments - Both WDF and PNPTC conducted spawning surveys. The PNPTC data was the most complete in number of surveys and length of reach surveyed, so it was used for AUC estimate. There was a very good number of surveys (8), but poor visibility (50 %) on two of the peak surveys, which results in a high level of uncertainty in the overall estimate.

Original estimate - Index (RM 0.0-1.5) = 353 (AUC).

Table 13: 1984 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	84	9	17	0.1	1.5	1.4	11	0	11	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	9	18	0.0	0.5	0.5	19	1	20	99	INDX	FOOT	0	0	0	0	20	00	00	0
17 0219	84	9	24	0.0	0.8	0.8	47	0	47	70	INDX	FOOT	0	0	0	0	21	31	60	40
17 0219	84	9	25	0.1	0.8	0.9	33	2	35	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	84	9	25	0.8	1.0	0.2	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	84	10	2	0.0	0.8	0.8	72	16	88	60	INDX	FOOT	0	0	0	0	20	60	00	40
17 0219	84	10	2	0.8	1.5	0.7	33	2	35	65	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	10	8	0.1	1.0	0.9	76	14	90	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	84	10	10	0.2	0.8	0.6	42	15	57	60	INDX	FOOT	0	0	0	0	21	60	00	40
17 0219	84	10	10	0.8	1.5	0.7	56	20	76	60	INDX	FOOT	0	0	0	0	21	60	00	40
17 0219	84	10	18	0.0	0.8	0.8	49	26	75	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	10	18	0.8	1.5	0.7	56	42	98	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0219	84	10	24	0.0	0.8	0.8	19	36	55	85	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	10	24	0.8	1.5	0.7	38	46	84	85	INDX	FOOT	0	0	0	0	20	60	00	40
17 0219	84	10	31	0.2	0.8	0.6	4	11	15	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	10	31	0.8	1.5	0.7	7	57	64	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0219	84	11	7	0.2	0.8	0.6	0	4	4	55	INDX	FOOT	4	0	0	0	24	60	00	40
17 0219	84	11	7	0.8	1.5	0.7	0	13	13	55	INDX	FOOT	4	0	0	0	24	60	00	40
17 0219	84	11	14	0.0	0.8	0.8	0	6	6	20	INDX	FOOT	4	0	0	0	28	60	00	40
17 0219	84	11	14	0.8	1.5	0.7	0	6	6	20	INDX	FOOT	4	0	0	0	28	60	00	40

Summer 1985

Reach - **River mile 0.0-1.5**
Estimate = 20
Method - Oct. 4 survey live + dead count
Quality rating - Poor
Comments - Insufficient survey data to derive an AUC estimate. Very low number of fish observed on th two available surveys prevents use of any expansion methods, due to erratic fish entry patterns that tend to occur with very small runsizes.

Original estimate - Index (RM 0.0-1.5) = 26 (AUC).

Table 14: 1985 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	85	10	4	0.0	1.5	1.5	16	5	21	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	85	10	10	0.0	0.5	0.5	2	15	17	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-1.5**
Estimate = 213
Method - AUC
Quality rating - Very good
Comments - None.

Original estimate - Index (RM 0.0-1.5) = 212 (AUC).

Table 15: 1986 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	86	9	17	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
17 0219	86	9	23	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	
17 0219	86	9	30	0.0	0.7	0.7	38	7	45	90	INDX	FOOT	0	0	0	0	20	00	00	00

17	0219	86	10	8	0.0	1.5	1.5	61	24	85	95	INDX	FOOT	0	0	0	0	20	00	00	00
17	0219	86	10	20	0.0	1.5	1.5	71	50	121	90	INDX	FOOT	0	0	0	0	20	00	00	00
17	0219	86	10	27	0.0	1.0	1.0	45	34	79	90	INDX	FOOT	4	0	0	0	20	00	00	00
17	0219	86	11	4	0.1	1.5	1.4	8	33	41	90	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-1.5**
Estimate = 465
Method - AUC
Quality rating - Good
Comments - Slight ambiguity about timing and amplitude of peak portion of survey. Most of surveys only went up to river mile 1.0, but they probably accounted for most of fish - Sept. 15 and 25, Oct. 26 survey cards noted all fish were observed below a BPA sub-station @ river mile 1.1.

Original estimate - Index (RM 0.0-1.5) = 459 (AUC).

Table 16: 1987 chum survey data

WRIA		Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17	0219	87	9	15	0.0	0.8	0.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
17	0219	87	9	25	0.0	0.8	0.8	92	8	100	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	87	9	25	0.8	1.5	0.7	7	1	8	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	87	10	7	0.0	0.8	0.8	189	109	298	90	INDX	FOOT	4	0	0	0	20	60	00	00
17	0219	87	10	7	0.8	1.0	0.2	0	0	0	90	INDX	FOOT	4	0	0	0	20	60	00	00
17	0219	87	10	16	0.0	1.0	1.0	88	153	241	80	INDX	FOOT	0	0	0	0	20	00	00	00
17	0219	87	10	26	0.0	1.0	1.0	23	38	61	95	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1988

Reach - **River mile 0.0-1.5**
Estimate = 723
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-1.5) = 719 (AUC).

Table 17: 1988 chum survey data

WRIA		Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17	0219	88	9	15	0.0	0.8	0.8	59	2	61	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	9	15	0.8	1.5	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	9	26	0.0	0.8	0.8	312	59	371	90	INDX	FOOT	0	0	0	0	60	00	00	00
17	0219	88	9	26	0.8	1.5	0.7	10	2	12	90	INDX	FOOT	0	0	0	0	60	00	00	00
17	0219	88	10	5	0.0	0.8	0.8	227	239	466	90	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	10	5	0.8	1.5	0.7	23	8	31	90	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	10	17	0.0	0.8	0.8	46	330	376	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	10	17	0.8	1.5	0.7	0	18	18	95	INDX	FOOT	0	0	0	0	20	61	00	00
17	0219	88	10	27	0.0	0.8	0.8	0	231	231	95	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1989

Reach - **River mile 0.0-1.3**
Estimate = 21
Method - Oct. 4 live + dead count
Quality rating - Good
Comments - Very low number of fish observed on the two available surveys prevents use of any expansion methods, due to erratic fish entry patterns that tend to occur with very small runsizes.

Original estimate - Index (RM 0.0-1.3) = 21 (AUC).

Table 18: 1989 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	89	9	13	0.0	0.7	0.7	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	89	9	22	0.0	0.8	0.8	4	3	7	80	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	89	10	4	0.0	1.3	1.3	10	11	21	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	89	10	13	0.0	0.8	0.8	0	7	7	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	89	10	13	0.8	1.0	0.2	0	2	2	90	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1990

Reach - **River mile 0.0-1.3**
Estimate = 33
Method - AUC
Quality rating - Good
Comments - Endpoint not defined by survey data. Endpoint was derived by extending curve outward from last survey data point to intersection with x -axis, using slope of line described at last data point. No fish were observed above RM 0.8.

Original estimate - Index (RM 0.0-1.5) = 33 (AUC).

Table 19: 1990 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	90	9	5	0.0	1.5	1.5	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	90	9	19	0.0	0.8	0.8	3	0	3	85	INDX	FOOT	4	0	0	0	60	61	00	00
17 0219	90	9	19	0.8	1.5	0.7	0	0	0	85	INDX	FOOT	4	0	0	0	60	61	00	00
17 0219	90	10	1	0.0	0.8	0.8	5	6	11	85	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	90	10	1	0.8	1.5	0.7	0	0	0	85	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	90	10	10	0.0	0.8	0.8	13	3	16	85	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	90	10	10	0.8	1.5	0.7	0	0	0	85	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	90	10	18	0.0	0.8	0.8	11	12	23	80	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	90	10	18	0.8	1.5	0.7	0	0	0	80	INDX	FOOT	0	0	0	0	20	60	61	00

Notes:
Oct. 18 survey card noted weir was closed to open upstream passage about Oct. 12.

Summer 1991

Reach - **River mile 0.0-1.3**
Estimate = 12
Method - 6 redds * 2 fish per redd (one female, one male)
Quality rating - Fair
Comments - Redd counts were used - a comparison of redd counts and live fish counts for this stream indicates a significant portion of the live fish can go unobserved in small runsize years (see 1996, 1997 notes for examples of this phenomena). The four surveys are sufficiently spac that they should have observed the majority of spawning activity. However, significan

departure of sex ratio from assumed 1:1 ratio would compromise precision of estimate (see Salmon Cr. 1995-97 escapement data, some Snow Cr. rack counts for situations where this was noted).

Original estimate - Index (RM 0.0-1.5) = 15 (Educated guess).

Table 20: 1991 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	91	9	16	0.0	0.7	0.7	1	0	1	98	INDX	FOOT	0	0	0	0	00	20	60	00
17 0219	91	9	27	0.0	0.7	0.7	0	7	7	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	91	10	9	0.0	0.3	0.3	0	4	4	75	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	91	10	16	0.0	0.2	0.2	0	0	0	75	INDX	FOOT	0	0	0	0	20	00	00	00

Notes:
Sept. 16 survey card noted flow was very low.
Oct. 9 survey card noted 6 redds visible in stream on this date. Card commented dead fish on Oct. 9 survey were probably fresh.

Summer 1992

Reach - **River mile 0.0-1.5**
Estimate = 21
Method - (Sept. 3 + Sept. 15 + Oct. 6) live + dead count
Quality rating - Good
Comments - The three surveys used are sufficiently spaced that they should have observed the majority of spawning activity. Very low number of fish observed on the surveys prevents use of any expansion methods, due to erratic fish entry patterns that tend to occur with very small runsizes. No fish were observed upstream of RM 0.8.

Original estimate - Index (RM 0.0-1.5) = 17 (Educated guess).

Table 21: 1992 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	92	9	3	0.0	1.5	1.5	0	1	1	95	INDX	FOOT	0	0	0	0	60	00	00	00
17 0219	92	9	15	0.0	0.8	0.8	3	0	3	80	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	92	9	15	0.8	1.5	0.7	0	0	0	80	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	92	9	24	0.0	1.5	1.5	0	1	1	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	92	10	6	0.0	0.8	0.8	6	11	17	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	92	10	6	0.8	1.5	0.7	0	0	0	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0219	92	10	12	0.0	0.8	0.8	3	1	4	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	92	10	12	0.8	1.5	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0219	92	10	21	0.0	1.5	1.5	0	0	0	95	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1993

Reach - **River mile 0.0-1.5**
Estimate = 11
Method - Sept. 20 live + dead count
Quality rating - Good
Comments - The five surveys are sufficiently spaced that they should have observed the majority of spawning activity. Very low number of fish observed on the surveys prevents use of any expansion methods, due to erratic fish entry patterns that tend to occur with very small runsizes.

Original estimate - Index (RM 0.0-0.6) = 15 (AUC).

Table 22: 1993 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	93	8	31	0.1	1.5	1.4	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	***93***	***9***	***20***	***0.0***	***0.6***	***0.6***	***7***	***4***	***11***	***75***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***60***	***00***	***00***
17 0219	93	9	27	0.0	0.5	0.5	0	5	5	70	INDX	FOOT	0	0	0	0	20	00	00	0
17 0219	93	10	4	0.0	0.5	0.5	0	0	0	75	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	93	10	11	0.0	0.3	0.3	0	0	0	75	INDX	FOOT	0	0	0	0	20	00	00	00

Notes:
Sept. 20 survey card noted all chum were below HW 101 (~ river mile 0.2).

Summer 1994

Reach - **River mile 0.0-0.3**
Estimate = 2
Method - Sept. 27 live + dead count
Quality rating - Good
Comments - The five surveys are sufficiently spaced that they should have observed the majority of spawning activity. Very low number of fish observed on the surveys prevents use of any expansion methods, due to erratic fish entry patterns that tend to occur with very small runsizes.

Original estimate - Index (RM 0.0-0.3) = 2 (No documentation).

Table 23: 1994 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	94	9	19	0.0	0.3	0.3	0	0	0	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	***94***	***9***	***27***	***0.0***	***0.3***	***0.3***	***0***	***2***	***2***	***80***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***60***	***00***	***00***
17 0219	94	10	5	0.0	0.3	0.3	0	0	0	80	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1995

Reach - **River mile 0.0-0.3**
Estimate = 25
Method - AUC
Quality rating - Good
Comments - The five surveys are sufficiently spaced that they should have observed the majority of spawning activity.

Original estimate - Index (RM 0.0-0.5) = 26 (AUC).

Table 24: 1995 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	***95***	***9***	***14***	***0.0***	***0.3***	***0.3***	***5***	***0***	***5***	***85***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0219	***95***	***9***	***24***	***0.0***	***0.4***	***0.4***	***4***	***0***	***4***	***80***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***60***	***00***	***00***
17 0219	***95***	***10***	***2***	***0.0***	***0.5***	***0.5***	***15***	***2***	***17***	***75***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***21***	***00***	***00***	***00***
17 0219	***95***	***10***	***9***	***0.0***	***0.4***	***0.4***	***5***	***3***	***8***	***75***	***INDX***	***FOOT***	***0***	***0***	***0***	***0***	***20***	***00***	***00***	***00***
17 0219	95	10	18	0.0	0.3	0.3	0	1	1	80	INDX	FOOT	4	0	0	0	20	00	00	00

Notes:
Sept. 24 survey card noted 7 or 8 redds, all inactive.

Summer 1996

Reach - **River mile 0.0-1.5**
Estimate = 160
Method - Redd counts below weir + weir passage count
Quality rating - Fair/Good (Fair for redd estimate, good for rack count)
Comments - Redds were expanded to an estimate of total fish that spawned in RM reach 0.0-0.8 by sex ratio observed at Salmon Cr. rack in 1996. [33 redds + 33*((457 M at salmon Cr rack)/(319 females at Salmon Cr.))]. Redd counts wera used because comparison of redd counts and live fish counts for this stream indicates a significant portion of the live fish can go unobserved in small runsize years. Weir passed 45 males and 35 females.

AUC estimate for RM 0.0-0.8 = 33 fish.

Original estimate - Index (RM 0.0-0.5) = 146 (Same method as above - sex ratio was refined in newer estimate, however).

Table 25: 1996 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	96	8	29	0.0	0.2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	96	9	15	0.0	0.8	0.8	3	0	3	80	INDX	FOOT	0	0	0	0	20	31	00	00
17 0219	96	9	19	0.0	0.8	0.8	7	0	7	80	INDX	FOOT	0	0	0	0	20	31	00	00
17 0219	96	9	20	0.8	0.0	-0.8	12	0	12	80	INDX	FOOT	0	0	0	0	20	31	00	00
17 0219	96	9	23	0.0	0.8	0.8	8	1	9	80	INDX	FOOT	0	0	0	0	20	31	00	00
17 0219	96	9	25	0.0	0.8	0.8	11	0	11	80	INDX	FOOT	0	0	0	0	20	31	60	00
17 0219	96	9	30	0.0	0.8	0.8	18	0	18	80	INDX	FOOT	0	0	0	0	20	31	00	00
17 0219	96	10	7	0.0	0.8	0.8	7	6	13	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	96	10	14	0.0	0.8	0.8	4	11	15	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	96	10	22	0.0	0.8	0.8	0	0	0	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	96	10	22	0.8	0.0	-0.8	80	0	80	99	TOTL	WEIR	0	0	0	0	62	60	00	00
17 0219	96	10	22	0.8	0.8	0.0	80	0	80	99	TOTL	WEIR	0	0	0	0	62	60	00	00

Notes:
Sept. 25 survey card noted a snorkel count had been conducted after foot count, and 79 % of fish present were seen on foot survey.

Summer 1997

Reach - **River mile 0.0-1.5**
Estimate = 67
Method - Redd counts below weir + weir passage count (no fish went thru weir)
Quality rating - Fair
Comments - Redds were expanded to an estimate of total fish that spawned in stream reach by sex ratio observed at Salmon Cr. rack in 1997. [23 redds + 23*((484 males at Salmon Cr. trap)/(254 females at Salmon Cr. trap))]. Redd counts were used because comparison of redd counts and live fish counts for this stream indicates a significant portion of the live fish can go unobserved in small runsize years. AUC estimate for RM 0.0-0.8= 27 fish.

Table 26: 1997 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0219	97	9	8	0.0	0.8	0.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	97	9	15	0.0	0.8	0.8	1	1	2	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0219	97	9	22	0.0	0.8	0.8	10	0	10	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	97	9	29	0.0	0.8	0.8	3	5	8	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	97	10	5	0.0	0.8	0.8	6	0	6	80	INDX	FOOT	0	0	0	0	20	31	60	00
17 0219	97	10	13	0.0	0.8	0.8	8	0	8	80	INDX	FOOT	0	0	0	0	23	31	60	00
17 0219	97	10	21	0.0	0.8	0.8	4	1	5	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0219	97	10	29	0.0	0.8	0.8	2	4	6	80	INDX	FOOT	0	0	0	0	23	60	00	00
17 0219	97	11	5	0.0	0.8	0.8	0	0	0	80	INDX	FOOT	0	0	0	0	23	60	00	00

Summer 1998

Reach - **River mile 0.0-1.5**
Estimate = 27
Method - Redd counts below weir + weir passage count (no fish went thru weir)
Quality rating - Fair
Comments - Redds were expanded to an estimate of total fish that spawned in stream reach by sex ratio observed at Salmon Cr. rack in 1998 [13 redds + 13* ((505 males thru trap thru Oct. 16)/453 females thru trap thru Oct. 16))]. Redd counts were used because comparison of redd counts and live fish counts for this stream indicates a significant portion of the live fish can go unobserved in small runsize years. AUC estimate not possible due to minimal fish observed. Stream flows were reported to be extremely low for most of spawning season.

Table 27: 1998 chum survey data

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
17 0219	08/22/98	0.0	0.8	0.8	0	0	0	95	INDX	FOOT					20			
17 0219	09/02/98	0.0	0.8	0.8	0	0	0	95	INDX	FOOT					20			
17 0219	09/14/98	0.0	0.8	0.8	0	0	0	95	INDX	FOOT					20			
17 0219	09/19/98	0.0	0.8	0.8	0	1	1	95	INDX	FOOT					20			
17 0219	09/27/98	0.0	0.8	0.8	1	0	1	95	INDX	FOOT					20			
17 0219	10/05/98	0.0	0.8	0.8	0	1	1	95	INDX	FOOT					20			
17 0219	10/17/98	0.0	0.8	0.8	0	0	0	90	INDX	FOOT					20			
17 0219	10/26/98	0.0	0.8	0.8	2	8	10	90	INDX	FOOT					20	60		
17 0219	10/29/98	0.0	0.8	0.8	0	10	10	90	INDX	FOOT					20	60		

Comments:
10/17/98 – 8 new redds, 12 visible redds

Appendix 13 - Salmon Cr. (WRIA 17.0245) summer chum natural spawning escapement summary

Introduction

As with the other Discovery/Sequim Bay summer chum streams, this stream contains no fall chum run. The first dedicated summer chum spawning surveys conducted on this stream occurred in the early 1970s. The surveyed reach usually extended from river mile 0.0 to 1.0-1.5, or RM 0.0-0.7 (Uncas Rd. crossing). In the years survey data was collected upstream of RM 0.7 the live and dead fish counts were commonly summarized into the two separate reaches – however, the data was usually entered into the WDFW spawning ground database as a single observation for the entire survey reach. The survey data is stratified into the separate reaches in the data summary tables in this document, where it was recorded in this manner in the field summary records.

The AUC based estimates reported here were generated with the data for the two reaches combined, unless the survey observations for each reach were conducted on different days (which occurred in some years). Because the survey data was frequently stratified into two separate reaches, it was also possible to generate separate estimates of spawning activity for the two stream reaches with the AUC technique[1] for many of the years (Table 1). This allowed examination of the changes in spawning distribution within the stream from year to year, and to provide an expansion factor for the years few or no surveys were conducted upstream of RM 0.7.

Table 1: Estimates of total summer chum spawning activity in Salmon Cr., stratified by reach

	Year										
Stream reach	1976	1977	1983	1984	1987	1988	1991	1993	1994	1995	1996
RM 0.0-0.7 estimate	232	401	487	261	539	917	136	391	117	263	491
% RM 0.0-0.7 of total escapement	39.4%	57.0%	65.7%	40.2%	52.4%	49.1%	80.5%	91.1%	83.6%	85.9%	79.6%
RM 0.7+ escapement estimate	357	303	254	389	490	950	33	38	23	43	126
% RM 0.7-upper limit of total escape.	60.6%	43.0%	34.3%	59.8%	47.6%	50.9%	19.5%	8.9%	16.4%	14.1%	20.4%
Total of individual AUC estimates[1]	589	704	741	650	1029	1867	169	429	140	306	617
AUC estimate for entire stream reach[3]	521	701	731	828	1063	1914	171	426	137	-	635
% difference[4]	13.1%	0.4%	1.4%	-21.5%	-3.2%	-2.5%	-1.2%	0.7%	2.2%	N/A[2]	-2.8%

Comments:
1: Sum of the two individual AUC estimates.
2: No single total AUC estimate is available for 1995 (surveys for upper and lower reaches were not conducted on same days).
3: This is an AUC estimate generated with survey data collected each day for all of the individual stream reaches pooled together. Stream reaches are normally pooled for AUC estimates (see footnote #1).
4: Difference between individual AUC estimates and combined AUC est.

Weir counts were used to documented total escapement upstraam of river mile 0.2 in 1978-1980 and 1995-97. Redd counts were used to estimate escapement downstream of river mile 0.2 in 1995-97 (the method used to estimate chum spawning downstream of the weir in 1979 is undocumented). Spawning surveys were still conducted above the weir in 1978, and 1995-98 period, which allowed a comparison of spawning estimates with this technique and the weir count, and to document spawning distribution. The differences between the weir counts and AUC estimate are summarized below in Table 2.

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables. Please note that estimate of river mileage at the Uncas Rd. crossing has varied between 0.7 and 0.8 over the

[1] Stratifying the survey data for a stream into two or more separate stream reach units to generate separate AUC estimates of spawning activity violates the basic assumption that each single survey is an instantaneous count of the all the live fish in the stream at the time of each survey, since some of the fish counted in the lower stream reach may be -recounted in the upper stream reach the next week. However, we have found that in most situations for chum salmon in South Puget Sound and Hood Canal streams the sum of AUC estimates generated for each stream reach are usually similar to a single AUC estimate using the survey data for the separate reaches combined together (Table 1). A possible explanation for this is given the short reach of stream spawned by chums in this region (usually a maximum of three miles of stream), the majority of chums being enumerated in each survey are at or near their preferred spawning area when they are counted, and the stream life of each fish is sufficiently short that individual fish are not "double counted" (once in the lower section of a stratified stream reach, and again in the next section upstream on the following survey date).

years – in all cases either of these two river mile points reported in the survey data corresponds to the road crossing. At the end of this section are summary tables of the daily rack returns to Salmon Cr. for 1992-98 (Tables 40-45), and rack return summaries for Salmon and Snow Creeks for the 1978-1980 time period (Table 46).

Table 2: Comparison of rack counts and AUC estimates for Salmon Cr. chum escapement upstream of RM 0.2 weir for the period 1995-1998

	Year				
Method	1978	1995	1996	1997	1998
Rack passage count	1,639[1]	435	669	628	915
AUC estimate	1,183	340	706	581	525

Notes
1: Includes an estimate of spawning for reach downstream of weir based on method outlined in 1979 estimate notes, since survey counts used in AUC estimate extended from mouth upstream.

Interestingly, the proportion of fish spawning in the river mile 0.7 + reach has been consistently much lower in the 1989-96 period (average of 16 %), vs. an average of 49 % for the six years separate estimates are available in the 1976-1987 period (Table 1). The reasons for this are unknown. Possible effects are lower average stream flows in this time period (J. Ames, WDFW Olympia WA, pers. comm.), influence on the upstream migration pattern from the broodstock weir at river mile 0.2, changes in the spawning habitat in the upper stream reach, or the development of a migratory impediment in the channel that discourages upstream movement.

The AUC estimates were reasonably close to the rack count (Table 2) for 4 of the 5 years studied (within 70 %). A larger difference of 59 % was observed in 1998. AUC estimates lower than the rack counts may be a result of actual stream life values being shorter than those used in the AUC estimate derivation, consistent under-counting by surveyors, or other factors. Salmon Cr. is a very small stream, and it is very difficult to count fish without them running for cover - some under-counting is likely to occur during live fish count surveys (J. Haymes, WDFW Olympia, pers. comm.). Stream life upstream of the rack may have be lower than the 10 day values used the AUC based estimates, especially given possible delays in migration caused by the rack.

Summer 1968-70

Comments - Limited chum survey data was collected during this period (one survey each in 1968 and 1970, none in 1969). There is insufficient data to develop escapement estimates.

Original estimates - Index (RM 0.0-0.7(?)) = 385. Supplemental (RM 0.7+(?)) = 303 [(1977 supp. / 1977 index) * index escape. for year *X*] . Total = 688. Origin of these estimates is undocumented.

Table 3: 1968 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	68	11	19	0.0	0.7	0.7	0	0	0	0	SUPP	FOOT	0	0	0	0	20	00	00	00

Table 4: 1970 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	70	12	1	0.0	0.7	0.7	0	12	12		SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1971

Reach - **River mile 0.0-0.7**
Estimate = 142
Method - Oct. 15 live + dead
Quality rating - Poor
Comments - Oct. 15 is usually at or near the end of the spawning activity period - this is therefore a minimal estimate of escapement.

Original estimate - Index (RM 0.0-0.7) = 362 (AUC). Supplemental (RM 0.7+) = 284 [(1977 supp. / 1977 index) * index escape. for year *X*]. Total = 646.

Table 5: 1971 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	71	10	15	0.0	0.7	0.7	16	126	142	99	SUPP	FOOT	3	0	0	0	20	00	00	00

Reach - **River mile 0.7+**
Estimate = 107
Method - (1977 RM 0.7+ escape. / 1977 RM 0.0-0.7 escape.) * 1971 RM 0.0-0.7 escape. = 303 / 401 * 142.
Quality rating - Poor
Comments - None.

Summer 1972

Reach - **River mile 0.0-0.7**
Estimate = 474
Method - AUC
Quality rating - Fair
Comments - Ascending limb of the curve was reasonably defined by survey data. The two available surveys appear to be pre-peak spawning observations, given the low dead : live ratio. Start point, amplitude and timing of peak period, and descending limb of AUC curve not defined by the data. I assumed the Oct. 4 survey occurred right at the peak spawning period because of the moderately high proportion of dead in the fish count. The curve was ended at Oct. 25 because this is the typical end of spawning period.

Original estimate - Index (RM 0.0-0.7) = 503 (AUC). Supplemental (RM 0.7+) = 395, based on formula [(1977 supp. / 1977 index) * index escape. for year X]. Total = 898.

Table 6: 1972 chum survey data for river mile 0.0-0.7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	72	9	25	0.0	0.7	0.7	113	23	136	95	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	72	10	4	0.0	0.7	0.7	223	84	307	0	SUPP	FOOT	0	0	0	0	20	00	00	00

Reach - **River mile 0.7-1.2**
Estimate = 60
Method - Single survey expansion by a timing model (Used 1972 river mile 0.0-0.7 AUC timing data)
Quality rating - Poor
Comments - The Sept. 25 survey observation of 14 live fish and 0 dead in the RM 0.7-1.5 reach does not suggest that there was a large number of spawners present this year in this stream each, so the estimate of 60 fish for the season is probably reasonable.

Table 7: 1972 chum survey data for river mile 0.7-1.2

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	72	9	25	0.7	1.2	0.5	14	0	14	95	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1973

Reach - **River mile 0.0-0.5**
Estimate = 362
Method - Sept. 30 live + dead count.
Quality rating - Poor

Comments - Minimal estimate. Dead : live ratio on Sept. 30 survey suggests spawning had peaked in mid-September. No expansion methods were attempted, since this observation is apparently well past the peak of spawning.

Original estimate - Index (RM 0.0-0.7) = 320 (AUC). Supplemental (RM 0.7+) = 251 [(1977 supp. / 1977 index) * index escape. for year X]. Total = 571. The AUC value in the original escapement estimation notes was 747 fish, and the peak live + dead as 320 fish.

Table 8: 1973 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	*73*	*9*	*30*	*0.0*	*0.5*	*0.5*	*78*	*284*	*362*	*95*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*00*	*00*	*00*	*00*

Reach - **River mile 0.7+**
Estimate = 274
Method - (1977 RM 0.7+ escape. / 1977 RM 0.0-0.7 escape.) * 1973 RM 0.0-0.7 escape. = 303 / 401 * 362.
Quality rating - Poor
Comments - None.

Summer 1974

Reach - **River mile 0.0-0.7**
Estimate = 247
Method - AUC
Quality rating - Fair/Poor
Comments - There was ambiguity to the peak region of the curve. Also, the estimate seems somewhat low, given Oct. 18 live + dead count of 249 fish. However, the dead summer chums accumulate very well in the Discovery/Sequim Bay streams. It is possible that the carcasses of the majority of fish that had spawned in the stream were still present on Oct. 18, and that the AUC function produced a valid result.

Original estimate - Index (RM 0.0-0.7) = 279 (AUC). Supplemental (RM 0.7+) = 219 [(1977 supp. / 1977 index) * index escape. for year X]. Total = 498.

Table 9: 1974 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	74	9	10	0.5	0.0	-0.5	0	0	0	95	SPOT	FOOT	0	0	0	0	13	20	00	00
17 0245	*74*	*9*	*23*	*0.0*	*0.7*	*0.7*	*75*	*5*	*80*	*90*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*00*	*00*	*00*
17 0245	*74*	*10*	*7*	*0.0*	*0.7*	*0.7*	*88*	*116*	*204*	*80*	*SUPP*	*FOOT*	*1*	*0*	*0*	*0*	*00*	*00*	*00*	*00*
17 0245	*74*	*10*	*18*	*0.0*	*0.7*	*0.7*	*19*	*230*	*249*	*80*	*SUPP*	*FOOT*	*1*	*0*	*0*	*0*	*00*	*00*	*00*	*00*
17 0245	74	12	03	0.0	0.6	0.6	0	0	0	50	SUPP	FOOT	4	0	0	0	00	00	00	00
17 0245	74	12	03	0.6	1.3	0.7	0	0	0	50	SUPP	FOOT	4	0	0	0	00	00	00	00
17 0245	74	12	03	4.0	4.5	0.5	0	0	0	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	74	12	12	0.0	0.6	0.6	0	0	0	80	SUPP	FOOT	4	0	0	0	34	00	00	00
17 0245	74	12	31	0.0	0.9	0.9	0	0	0	75	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0245	75	01	07	0.0	1.0	1.0	0	0	0		SUPP	FOOT	0	0	0	0	24	31	37	00

Reach - **River mile 0.7-upper limit of spawning activity**
Estimate = 265
Method - Method - [RM 0.0-0.7 estimate / average proportion of RM 0.0-0.7 spawning in total escapement (1976-77 average)] - RM 0.0-0.7 estimate.

Estimate = [247/0.482] – 247 = 265

Quality rating - Poor
Comments - High potential for error if assumed average distribution did not occur.

Summer 1975

Reach - River mile 0.0-0.7
Estimate = 364
Method - AUC
Quality rating - Fair
Comments - Peak region of curve not well defined by survey data. At Oct. 11 the AUC curve line for the river mile 0.0-0.7 reach intersects a point about 50 % below actual live fish count, because the Oct. 11 survey data was not stratified by reach - since approximately the same number of live fish were observed in the upper and lower survey reaches on Oct. 3, this ratio was assumed for Oct. 11.

Original estimate - Index (RM 0.0-0.7) = 544 (AUC). Supplemental (RM 0.7+) = 427 [(1977 supp. / 1977 index) * index escape. for year *X*]. Total = 971.

Table 10: 1975 chum survey data for river mile 0.0-0.7[1]

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	*75*	*9*	*8*	*0.0*	*0.0*	*0.0*	*7*	*0*	*7*	*90*	*SPOT*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*00*	*00*	*00*
17 0245	*75*	*9*	*18*	*0.0*	*0.7*	*0.7*	*160*	*5*	*165*	*80*	*SUPP*	*FOOT*	*1*	*0*	*0*	*0*	*00*	*00*	*00*	*00*
17 0245	*75*	*10*	*3*	*0.0*	*0.7*	*0.7*	*55*	*246*	*301*	*90*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*60*	*61*	*00*	*00*
17 0245	75	10	11	0.0	1.4	1.4	53	212	265	90	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0245	*75*	*10*	*15*	*0.0*	*1.0*	*1.0*	*2*	*65*	*67*	*50*	*SUPP*	*FOOT*	*1*	*0*	*0*	*0*	*60*	*00*	*00*	*00*

Notes:
1: Oct. 11 survey data was not stratified by reach.

Reach - River mile 0.7-upper limit of spawning
Estimate = 391
Method - See comments.
Quality rating - Poor
Comments - Method - [RM 0.0-0.7 estimate / average proportion of RM 0.0-0.7 spawning in total escapement (1976-77 average)] - RM 0.0-0.7. This seems too high, given the maximum live + dead count for the entire stream = 301 fish.

Table 11. 1975 chum survey data for river mile 0.7-1.1

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	75	10	3	0.7	1.1	0.4	59	143	202	90	SUPP	FOOT	0	0	0	0	60	61	00	00

Summer 1976

Reach - River mile 0.0-1.3
Estimate = 521
Method - AUC
Quality rating - Very good
Comments - None.

Original estimate - Index (RM 0.0-0.7) = 643 (AUC). Supplemental (RM 0.7+) = 505 [(1977 supp. / 1977 index) * index escape. for year *X*]. Total = 1,148. The supplemental estimate was actually derived from a separate AUC estimate in original escapement estimate notes, and = 340 (but wasn't used, apparently).

Table 12: 1976 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	76	9	10	0.0	0.7	0.7	100	2	102	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	76	9	14	0.0	0.7	0.7	165	30	195	95	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	9	14	0.7	1.7	0.9	117	30	147	95	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	9	21	0.0	0.7	0.7	47	266	313	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	9	21	0.7	1.1	0.3	220	116	336	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	9	28	0.0	0.7	0.7	25	110	135	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	9	28	0.7	1.3	0.5	99	286	385	99	SUPP	FOOT	4	0	0	0	20	00	00	DG
17 0245	76	10	5	0.0	0.7	0.7	7	73	80	99	INDX	FOOT	1	0	0	0	20	00	00	DG
17 0245	76	10	5	0.7	1.3	0.5	23	92	115	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	13	0.0	0.7	0.7	10	33	43	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	13	0.7	1.3	0.5	3	28	31	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	20	0.0	0.7	0.7	3	33	36	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	20	0.7	1.3	0.5	0	5	5	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	27	0.0	0.7	0.7	1	32	33	99	INDX	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	10	27	0.7	1.3	0.5	0	8	8	99	SUPP	FOOT	0	0	0	0	20	00	00	DG
17 0245	76	11	10	0.0	0.7	0.7	0	0	0	99	INDX	FOOT	0	0	0	0	20	70	00	DG
17 0245	76	11	10	0.7	1.1	0.3	0	4	4	99	SUPP	FOOT	0	0	0	0	20	70	00	DG
17 0245	76	11	24	0.7	1.3	0.5	0	1	1		SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	76	12	01	0.0	0.8	0.8	0	0	0		SUPP	FOOT	0	0	0	0	00	00	00	DG

Summer 1977

Reach - **River mile 0.0-1.4**
Estimate = 701
Method - AUC
Quality rating - Good
Comments - There is a strange survey on Sept. 22 conducted by a WDF surveyor, the day after a WDG survey on Sept. 21 (all of the surveys except the Sept. 22 survey were conducted by Dept. of Game staff) that doesn't fit in with the data. The Sept. 22 survey was not used.

Original estimate - Index (RM 0.0-0.7) = 374 (AUC). Supplemental (RM 0.7+) = 294 [(1977 supp. / 1977 index) * index escape. for year X]. Total = 668. The supplemental estimate was actually derived from a separate AUC estimate in original escapement estimate notes, and = 288.

Table 13: 1977 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	77	9	14	0.0	0.7	0.7	5	10	15	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	9	21	0.0	0.7	0.7	145	6	151	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	9	21	0.7	1.1	0.3	129	6	135	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	9	22	0.0	1.3	1.3	141	11	152	85	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	77	9	28	0.0	0.7	0.7	179	44	223	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	9	28	0.7	1.4	0.6	131	25	156	70	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	5	0.0	0.7	0.7	123	119	242	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	5	0.7	1.4	0.6	78	44	122	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	13	0.0	0.7	0.7	32	143	175	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	13	0.7	1.4	0.6	21	47	68	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	19	0.0	0.7	0.7	10	90	100	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	19	0.7	1.4	0.6	2	16	18	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	26	0.0	0.7	0.7	1	25	26	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	10	26	0.7	2.4	1.6	0	2	2	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	11	2	0.0	0.7	0.7	2	17	19	50	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	11	2	0.7	1.4	0.6	0	2	2	50	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	11	9	0.0	0.7	0.7	3	6	9	90	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	77	11	9	0.7	2.0	1.2	0	0	0	0	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	77	11	16	0.0	0.7	0.7	0	4	4	0	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1978

Reach - **River mile 0.0-1.4**
Estimate = 1,664
Method - Method - Weir count + expansion factor.
Quality rating - Good/Fair
Comments - Method - Weir count + expansion factor. Expansion factor is derived from 1980 RM 0.0-0.2 escape / 1980 rack passage count. [Weir count + (Weir count* 1980 RM 0.0-0.2 escape / RM 0.2+ escape)] = 1,261+(1,261*744/2,330) = 1,664.

Original estimate - Index (RM 0.0-0.7) = 1,149 (AUC). It is unknown why rack count was not used in original estimate

Table 14: 1978 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	78	9	6	0.0	1.4	1.4	52	5	57	90	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0245	78	9	13	0.0	1.4	1.4	513	29	542	90	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0245	78	9	19	0.0	1.4	1.4	511	69	580	95	INDX	FOOT	1	0	0	0	00	00	00	00
17 0245	78	9	27	0.0	1.4	1.4	329	393	722	90	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0245	78	10	4	0.0	1.4	1.4	121	224	345	85	INDX	FOOT	1	4	0	0	00	00	00	00
17 0245	78	10	11	0.0	1.4	1.4	53	212	265	90	INDX	FOOT	0	0	0	0	00	00	00	DG
17 0245	78	10	26	0.0	1.4	1.4	7	65	72	85	INDX	FOOT	1	0	0	0	00	00	00	00

Summer 1979

Reach - **River mile 0.0-1.4**
Estimate = 458
Method - Method - Weir count + expansion factor. Expansion factor is derived from 1980 RM 0.0-0.2 escape / 1980 rack passage count. [Weir count + (Weir count* 1980 RM 0.0-0.2 escape / RM 0.2+ escape)] = 347+(347*744/2,330) = 458.
Quality rating - Good
Comments - The weak point in the estimate is the expansion for spawning below the weir. Average flow in Sept 1979 was 4 cfs, vs. the 6 cfs long term average, so a good number of the fish should have been compelled to spawn low in the drainage, which means the 32 % expansion factor should be conservative. This approximate distribution of spawners was also observed in 1995.

Original estimate - Index (RM 0.0-1.4) = 451 (Same method as above).

Table 15: 1979 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	79	9	17	0.7	0.7	0.1	0	0	0	0	INDX	FOOT	0	0	0	0	00	57	00	00
17 0245	79	10	27	0.2	0.0	-0.2	347		347	0	TOTL	WEIR	0	0	0	0	60	00	00	DG

Notes:
Weir count summary card noted rack was in operation from Aug. 20, 1979 to Oct. 27, 1979, with the run peaking Oct. 2.

Summer 1980

Reach - **River mile 0.0-0.2**
Estimate = 744
Method - Live + dead. Oct. 10, 1980 WDG survey. Please note this data is not in WDFW survey database, and was obtained from Thom Johnson (WDFW, Snow Cr. Research Station, Port Townsend WA).
Quality rating - Good/Fair
Comments - None.

Original estimate - Index (RM 0.0-1.4) = 3,074 (Assumed same method as above).

Reach - **River mile 0.2-1.3**
Estimate = 2,330
Method - Rack count
Quality rating - Good/Fair
Comments - None.

Original estimate - Index (RM 0.0-1.4) = 3,074 (Assumed same method as above).

Summer 1981

Reach - **River mile 0.0-1.3**
Estimate = 439
Method - Single survey expansion by a timing model (used 1976 AUC data)
Quality rating - Poor
Comments - None

Original estimate - Index (RM 0.0-1.4) = 480 (AUC).

Table 16: 1981 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	81	9	16	0.0	1.3	1.3	269	45	314	90	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1982

Reach - **River mile 0.0-0.7**
Estimate = 810
Method - AUC
Quality rating - Good
Comments - Start and endpoints of spawning not clearly defined by survey data. AUC line in these sections of curve was derived by continuing the slope of the line described at the first and last survey data points outward to intersection with the x-axis. However, most of intensive spawning period was reasonably defined by the four surveys.

Original estimate - Index (RM 0.0-1.3) = 900 (AUC).

Table 17: 1982 chum survey data for river mile 0.0-0.7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	82	9	14	0.0	0.7	0.7	287	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	82	9	21	0.0	0.7	0.7	317	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	82	9	28	0.0	0.7	0.7	167	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	82	10	11	0.0	0.7	0.7	82	NC		90	SUPP	FOOT	0	0	0	0	00	00	00	DG

Reach - **River mile 0.7-1.3**
Estimate = 576
Method - Oct. 11 live + dead
Quality rating - Poor
Comments - None.

Table 18: 1982 chum survey data for river mile 0.7-1.3

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	82	10	11	0.7	1.3	0.5	74	502	576	90	SUPP	FOOT	0	0	0	0	00	00	00	DG

Summer 1983

Reach - **River mile 0.0-1.3**
Estimate = 731
Method - AUC
Quality rating - Fair
Comments - Start and end points of spawning activity not clearly defined by data. Amplitude and timing of peak region of AUC curve required considerable subjective rendering.

Original estimate - Index (RM 0.0-1.5) = 1,020 (AUC).

Table 19: 1983 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	83	9	28	0.0	0.7	0.7	129	23	152	90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	83	9	28	0.7	1.2	0.4	105	14	119	85	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	83	10	11	0.0	0.6	0.6	142	151	293	90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	83	10	11	0.6	1.5	0.9	58	56	114	90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	83	10	21	0.0	0.7	0.7	109	237	346	90	SUPP	FOOT	0	0	0	0	00	00	00	DG
17 0245	83	10	21	0.7	1.2	0.4	32	57	89	90	SUPP	FOOT	0	0	0	0	00	00	00	DG

Summer 1984

Reach - **River mile 0.0-1.5**
Estimate = 828
Method - AUC
Quality rating - Good
Comments - Both PNPTC and WDF conducted spawning surveys. PNPTC data was used, due to more extensive number of surveys.

Original estimate - Index (RM 0.0-1.5) = 858 (AUC).

Table 20: 1984 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	84	9	17	0.1	1.5	1.4	73	6	79	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	9	18	0.0	1.4	1.4	176	18	194	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	84	9	24	0.1	1.5	1.4	294	43	337	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	10	2	0.0	0.7	0.7	110	108	218	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	10	2	0.7	1.5	0.7	167	106	273	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	10	8	0.1	1.2	1.1	215	368	583	90	INDX	FOOT	1	0	0	0	20	00	00	00
17 0245	84	10	10	0.0	0.7	0.7	55	213	268	75	INDX	FOOT	0	0	0	0	20	60	00	40
17 0245	84	10	10	0.7	1.5	0.7	79	162	241	75	INDX	FOOT	0	0	0	0	20	60	00	40
17 0245	84	10	18	0.0	0.7	0.7	44	222	266	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0245	84	10	18	0.7	1.5	0.7	69	183	252	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	10	24	0.0	0.7	0.7	53	248	301	90	INDX	FOOT	0	0	0	0	20	60	00	40
17 0245	84	10	24	0.7	1.5	0.7	61	164	225	90	INDX	FOOT	0	0	0	0	20	60	00	40
17 0245	84	10	31	0.1	0.7	0.6	29	257	286	90	INDX	FOOT	4	0	0	0	20	00	00	40
17 0245	84	10	31	0.7	1.5	0.7	14	211	225	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0245	84	11	7	0.0	0.7	0.7	0	35	35	60	INDX	FOOT	0	0	0	0	24	60	00	40
17 0245	84	11	14	0.0	0.7	0.7	0	7	7	75	INDX	FOOT	0	0	0	0	24	60	00	40
17 0245	84	11	14	0.7	1.5	0.7	1	4	5	75	INDX	FOOT	0	0	0	0	60	00	00	40

Summer 1985

Reach - **River mile 0.0-1.3**
Estimate = 151
Method - Single survey expansion by a timing model (1976 AUC data)
Quality rating - Poor
Comments - 1976 timing data was selected, because 1976 run ended fairly early in October, which the high dead / live ratio data in these early to mid - October surveys suggested occurred in 1985.

Original estimate - Index (RM 0.0-1.3) = 19 (AUC).

Table 21: 1985 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	85	10	4	0.0	1.3	1.3	11	40	51	99	INDX	FOOT	0	0	0	4	20	00	00	00
17 0245	85	10	10	0.0	0.7	0.7	1	48	49	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-1.7**
Estimate = 582
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-1.7) = 611 (AUC).

Table 22: 1986 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	86	9	17	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	86	9	23	0.0	0.5	0.5	0	0	0	99	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	86	9	30	0.0	0.7	0.7	95	7	102	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0245	86	10	8	0.0	1.7	1.7	223	74	297	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0245	86	10	20	0.0	1.8	1.8	163	129	292	90	INDX	FOOT	1	4	0	0	20	00	00	00
17 0245	86	10	27	0.1	1.2	1.1	112	158	270	90	INDX	FOOT	0	0	0	0	21	38	00	00
17 0245	86	11	4	0.0	0.7	0.7	4	128	132	95	INDX	FOOT	4	0	0	0	20	00	00	00

Summer 1987

Reach - **River mile 0.0-1.7**
Estimate = 1,062
Method - AUC
Quality rating - Good
Comments - None.

Original estimate - Index (RM 0.0-1.7) = 1,081 (AUC).

Table 23: 1987 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	87	9	15	0.0	0.7	0.7	7	3	10	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	87	9	25	0.0	0.7	0.7	81	18	99	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0245	87	9	25	0.7	1.2	0.4	160	13	173	90	SUPP	FOOT	0	0	0	0	20	60	00	00
17 0245	87	10	7	0.0	0.7	0.7	235	160	395	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	87	10	7	0.7	1.3	0.5	209	167	376	95	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	87	10	16	0.0	0.7	0.7	105	275	380	95	INDX	FOOT	0	0	0	0	20	00	00	00

17 0245	87	10	16	0.7	1.5	0.7	47	206	253	95	SUPP	FOOT	0	0	0	0	20	60	00	00
17 0245	87	10	26	0.0	0.7	0.7	88	151	239	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	87	10	26	0.7	1.3	0.5	34	59	93	95	SUPP	FOOT	0	0	0	0	20	00	00	00

Notes:
Sept. 15 survey noted all live fish were in intertidal zone.

Summer 1988

Reach - **River mile 0.0-1.1**
Estimate = 1,915
Method - AUC
Quality rating - Good
Comments - The original AUC estimate did not use the data collected upstream of river mile 0.7, for some unknown reason.

Original estimate - Index (RM 0.0-0.7) = 956 (AUC).

Table 24: 1988 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	88	9	15	0.0	0.7	0.7	77	14	91	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	88	9	15	0.7	1.1	0.3	138	10	148	95	SUPP	FOOT	0	0	0	0	20	60	00	00
17 0245	88	9	26	0.0	0.7	0.7	369	75	444	90	INDX	FOOT	0	0	0	0	60	00	00	00
17 0245	88	9	26	0.7	1.0	0.2	418	103	521	90	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0245	88	10	5	0.0	0.7	0.7	328	313	641	90	INDX	FOOT	0	0	0	0	61	00	00	00
17 0245	88	10	5	0.7	1.1	0.3	267	476	743	90	SUPP	FOOT	0	0	0	0	20	60	00	00
17 0245	88	10	17	0.0	0.7	0.7	96	545	641	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	88	10	17	0.7	1.8	1.0	58	563	621	95	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	88	10	27	0.0	0.7	0.7	10	522	532	95	INDX	FOOT	0	0	0	0	20	61	00	00

Summer 1989

Reach - **River mile 0.0-1.3**
Estimate = 194
Method - AUC
Quality rating - Fair
Comments - The AUC curve was assumed to account for all the spawning activity in the RM 0.0-1.3 reach, even though the Sept. 22 survey covered only some of the upper reach (RM 0.7-0.9), and the Oct. 4 survey covered the entire chum spawning reach up to RM 1.3. The estimate therefore based on the assumption that the Sept. 22 survey was conducted upstream to point were fish faded out (RM 0.9). If there were significant numbers of fish upstream of this point at this date, then the AUC curve will be an underestimate.

Original estimate - Index (RM 0.0-0.7) = 205 (AUC).

The original AUC estimate did not use the data collected upstream of river mile 0.7, for some unknown reason.

Table 25: 1989 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	89	9	13	0.0	0.7	0.7	1	0	1	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	89	9	22	0.0	0.9	0.9	51	15	66	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	89	10	4	0.0	0.7	0.7	32	82	114	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	89	10	4	0.7	1.3	0.5	47	53	100	90	SUPP	FOOT	0	0	0	0	20	60	00	00
17 0245	89	10	13	0.0	0.7	0.7	34	154	188	90	INDX	FOOT	3	0	0	0	20	00	00	00

Summer 1990

Reach - **River mile 0.0-1.3**
Estimate = 245
Method - AUC
Quality rating - Fair
Comments - Good number of surveys, but survey data in stream reach above river mile 0.7 is spotty (i.e., a significant number of fish may have been missed, depending on distribution of spawners.

Original estimate - Index (RM 0.0-0.7) = 260 (AUC).

Table 26: 1990 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	90	9	5	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	90	9	19	0.0	0.7	0.7	27	11	38	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0245	90	9	19	0.7	0.9	0.1	2	0	2	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	90	10	1	0.0	0.7	0.7	99	67	166	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0245	90	10	10	0.0	0.7	0.7	35	65	100	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0245	90	10	10	0.7	1.5	0.8	56	43	99	95	INDX	FOOT	4	0	0	0	20	61	00	00
17 0245	90	10	18	0.0	0.7	0.7	33	170	203	95	INDX	FOOT	0	0	0	0	20	60	61	00

Notes:
Sept. 5 survey card noted 2 redds (no fish observed).
Oct. 1 survey card noted some fish present up to river mile 1.0 (no quantitative value given - ed.).

Summer 1991

Reach - **River mile 0.0-1.3**
Estimate = 172
Method - AUC
Quality rating - Fair
Comments - Peak portion of AUC curve required a fair amount of subjective interpretation. I assumed Sept. 27 survey was close to the peak live abundance, since the proportion of dead in the count was fairly significant, and this is close to the typical peak spawning period. Survey data for stream reach above river mile 0.7 is spotty.

Original estimate - Index (RM 0.0-0.7) = 159 (AUC).

Table 27: 1991 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	91	9	16	0.0	0.7	0.7	9	0	9	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	91	9	27	0.0	0.7	0.7	75	25	100	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	91	9	27	0.7	1.1	0.4	25	2	27	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	91	10	9	0.0	0.7	0.7	21	58	79	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	91	10	9	0.7	1.1	0.4	1	11	12	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	91	10	16	0.0	1.0	1.0	13	29	42	95	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1992

Reach - **River mile 0.0-0.7**
Estimate = 311
Method - AUC + adjustment for broodstock collection
Quality rating - Fair
Comments - Peak portion of AUC curve required a fair amount of subjective interpretation.

62 fish were taken out of stream for broodstock. Assuming a five day stream life before capture, the wild escapement estimate after correction for broodstock removals is:

AUC fish days - (62 fish * 5 days) = 3,416 - 310 = 3,106 fish*days = 311 fish.

Original estimate - Index (RM 0.0-0.7) = 271 (Same method as above).

Table 28: 1992 chum survey data for river mile 0.0-0.7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	92	9	3	0.0	0.7	0.7	0	0	0	95	INDX	FOOT	0	0	0	0	60	00	00	00
17 0245	92	9	15	0.0	0.7	0.7	21	17	38	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0245	92	9	24	0.0	0.7	0.7	186	74	260	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0245	92	10	6	0.0	0.7	0.7	41	134	175	85	INDX	FOOT	0	0	0	0	20	60	61	00
17 0245	92	10	12	0.0	0.7	0.7	37	175	212	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0245	92	10	21	0.0	0.7	0.7	31	118	149	95	INDX	FOOT	0	0	0	0	61	20	00	00

Reach - **River mile 0.7-1.0**
Estimate = 60
Method - See comments below.
Quality rating - Poor
Comments - [RM 0.0-0.7 estimate / average proportion of RM 0.0-0.7 spawning in total escapement (average 1993-1996 data)] - RM 0.0-0.7. Daily rack return summary is in Table 40 (end of this appendix section).

(311/0.851) - 311 = 54

Table 29. 1992 chum survey data for river mile 0.0-0.7

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	92	9	24	0.7	1.0	0.3	13	20	33	95	SUPP	FOOT	0	0	0	0	20	60	00	00

Summer 1993

Reach - **River mile 0.0-1.3**
Estimate = 400
Method - AUC
Quality rating - Good
Comments - Survey data from Oct. 26 river mile 0.7-1.1 reach was combined with Oct. 25 RM 0.0-0.7 reach data for purposes of drawing curve.

52 fish were taken out of stream for broodstock. Assuming a five day stream life before capture, the wild escapement estimate would be:

AUC fish days - (52 fish * 5 days) = 4,257 - 260 = 3,997 fish*days = 400 fish.

Original estimate - Index (RM 0.0-1.3) = 408 (Same method as above).

Table 30: 1993 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	93	8	31	0.0	0.8	0.8	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	93	9	20	0.0	0.8	0.8	17	6	23	80	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	93	9	20	0.8	1.0	0.2	0	0	0	80	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	93	9	27	0.0	0.8	0.8	104	12	116	85	INDX	FOOT	1	0	0	0	20	60	00	00
17 0245	93	9	27	0.8	1.0	0.2	0	0	0	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	93	10	4	0.0	0.8	0.8	106	73	179	80	INDX	FOOT	1	0	0	0	20	60	00	00

17	0245	93	10	4	0.8	1.0	0.2	0	0	0	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17	0245	93	10	11	0.0	0.8	0.8	102	69	171	85	INDX	FOOT	0	0	0	0	20	60	00	00
17	0245	93	10	11	0.8	1.0	0.2	1	1	2	90	SUPP	FOOT	0	0	0	0	20	60	00	00
17	0245	93	10	18	0.0	0.8	0.8	82	66	148	85	INDX	FOOT	0	0	0	0	20	60	00	00
17	0245	93	10	18	0.8	1.3	0.5	26	4	30	80	SUPP	FOOT	0	0	0	0	20	00	00	00
17	0245	93	10	25	0.0	0.8	0.8	53	38	91	85	INDX	FOOT	4	0	0	0	20	60	00	00
17	0245	93	10	26	0.8	1.1	0.3	18	8	26	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17	0245	93	11	4	0.0	0.8	0.8	25	46	71	85	INDX	FOOT	0	0	0	0	20	60	00	00
17	0245	93	11	4	0.8	1.2	0.4	2	8	10	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Notes:
Sept. 27 survey card noted 78 live, 5 dead above rack, and 39 redds. Below rack was 26 live, 7 dead, and 22 redds.

Summer 1994

Reach - **River mile 0.0-1.3**
Estimate = 137 (An additional 24 fish were retained at weir for broodstock program).
Method - AUC
Quality rating - Good
Comments - None. Daily rack return summary is in Table 41 (end of this appendix section).

Original estimate - Index (RM 0.0-1.3) = 137 (AUC).

Table 31: 1994 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	94	9	9	0.0	0.8	0.8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	94	9	16	0.0	0.8	0.8	3	5	8	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	94	9	23	0.0	0.8	0.8	49	12	61	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	94	9	29	0.0	0.8	0.8	70	31	101	85	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	94	9	29	0.8	1.1	0.3	8	1	9	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	6	0.0	0.8	0.8	32	58	90	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	6	0.8	1.1	0.3	18	11	29	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	13	0.0	0.8	0.8	10	51	61	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	13	0.8	1.1	0.3	2	21	23	90	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	19	0.0	0.8	0.8	2	44	46	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	94	10	19	0.8	1.1	0.3	0	20	20	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1995

Reach - **River mile 0.0-1.3**
Estimate = 538 (an additional 53 fish were retained at weir for a broodstock collection program).
Method - Rack count + redd counts below weir
Quality rating - Good
Comments - See attached summary for detailed description of estimate (Table 36). AUC estimate for reach upstream of weir = 340. Two curves had to be derived for the total AUC estimate, one for the river mile 0.0-0.7 reach, and another for the river mile 0.7-1.3 reach, due to differing dates of surveys in each reach. A 9 day stream life was assumed for estimate, to account for an assumed average 1 day migration delay of fish at rack. Daily rack return summary is in Table 42 (end of this appendix section).

Original estimate - Index (RM 0.0-1.3) = 538 (Rack + expansion).

Table 32: 1995 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	95	9	7	0.0	0.8	0.8	3	1	4	90	INDX	FOOT	4	0	0	0	20	60	00	00
17 0245	95	9	14	0.0	0.8	0.8	50	21	71	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	95	9	22	0.0	0.8	0.8	81	37	118	80	INDX	FOOT	0	0	0	0	20	61	60	00
17 0245	95	9	29	0.0	0.8	0.8	85	61	146	85	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	95	10	2	0.8	1.1	0.3	30	2	32	75	SUPP	FOOT	0	0	0	0	21	00	00	00
17 0245	95	10	6	0.0	0.8	0.8	74	74	148	85	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	95	10	9	0.8	1.1	0.3	5	10	15	85	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0245	95	10	12	0.0	0.8	0.8	39	60	99	75	INDX	FOOT	0	0	0	0	20	60	00	00
17 0245	95	10	18	0.0	0.8	0.8	6	51	57	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	95	10	18	0.8	1.0	0.2	0	5	5	85	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1996

Reach - **River mile 0.0-1.3**
Estimate = 785 (an additional 109 fish were captured at weir for a broodstock collection program).
Method - Rack count + redd counts below weir
Quality rating - Good
Comments - See attached summary for detailed description of estimate (Table 37). AUC estimate for reach upstream of weir = 706. A 9 day stream life was assumed for estimate, to account for an assumed average 1 day migration delay of fish at rack. Daily rack return summary is in Table 43 (end of this appendix section).

Original estimate - Index (RM 0.0-1.3) = 785 (Rack + expansion).

Table 33: 1996 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	96	8	29	0.0	0.2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0245	96	9	19	0.0	0.7	0.7	124	21	145	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	96	9	19	0.7	1.3	0.6	58	7	65	80	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	96	9	26	0.0	0.7	0.7	225	42	267	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	96	9	26	0.7	1.3	0.6	51	25	76	80	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	96	10	3	0.0	0.7	0.7	157	149	306	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	96	10	3	0.7	1.3	0.6	35	46	81	80	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	96	10	10	0.0	0.7	0.7	56	257	313	70	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	96	10	10	0.7	1.3	0.6	2	79	81	80	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0245	96	10	17	0.0	0.7	0.7	11	364	375	70	INDX	FOOT	0	0	0	0	00	00	00	00

Summer 1997

Reach - **River mile 0.0-1.3**
Estimate = 724 (an additional 110 fish were captured at weir for a broodstock collection program).
Method - Rack count + redd counts below weir
Quality rating - Good
Comments - See attached summary for detailed description of estimate (Table 38). AUC estimate for reach upstream of weir = 581. A 9 day stream life was assumed for estimate, to account for an assumed average 1 day migration delay of fish at rack. Daily rack return summary is in Table 44 (end of this appendix section).

Table 34: 1997 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0245	97	9	18	0.0	0.7	0.7	146	13	159	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	9	18	0.7	1.0	0.3	0	0	0	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	9	29	0.0	0.7	0.7	108	138	246	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	9	29	0.7	1.0	0.3	0	1	1	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	10	14	0.0	0.7	0.7	107	58	165	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	10	14	0.7	1.0	0.3	4	1	5	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	10	21	0.0	0.7	0.7	58	135	193	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0245	97	10	28	0.0	0.7	0.7	56	110	166	0	INDX	FOOT	0	0	0	0	00	00	00	00
17 0270	75	11	19	0.0	0.8	0.8	0	0	0	90	SUPP	FOOT	0	0	0	0	60	00	00	00

Summer 1998

Reach - **River mile 0.0-1.3**

Estimate = 1,013 (an additional 121 fish were captured at weir for a broodstock collection program).

Method - Rack count + redd counts below weir

Quality rating - Good

Comments - See attached summary for derivation of estimate (Table 39). Ten of fish in natural escapement estimate were pre-spawn seal kills observed below weir. AUC estimate for reach upstream of weir = 525. A 9 day stream life was assumed for AUC estimate, to account for an assumed average 1 day migration delay of fish at rack. The majority of fish were downstream of river mile 0.8. Stream flows were reported to be extremely low for most of spawning season.

Daily rack return summary is in Table 45 (end of this appendix section).

Table 35: 1998 chum survey data

WRIA	Date	Lower RM	Upper RM	Length	Live	Dead	Live + dead	Vis	Type survey	Method	Other species				Comments			Agency
17 0245	08/11/98	0.0	0.3	0.3	0	0	0	95	SUPP	FOOT					20			
17 0245	08/21/98	0.0	0.3	0.3	0	0	0	95	SUPP	FOOT					20			
17 0245	09/10/98	0.0	0.3	0.3	0	0	0		SUPP	FOOT								
17 0245	09/10/98	0.3	0.8	0.5	11	0	11		SUPP	FOOT								
17 0245	09/13/98	0.0	0.3	0.3	4	10	14		SUPP	FOOT								
17 0245	09/13/98	0.3	0.8	0.5	30	1	31		SUPP	FOOT								
17 0245	09/17/98	0.0	0.3	0.3	12	16	28		SUPP	FOOT								
17 0245	09/17/98	0.3	0.8	0.5	53	10	63		SUPP	FOOT								
17 0245	09/24/98	0.0	0.3	0.3	19	16	35		INDX	FOOT								
17 0245	09/24/98	0.3	0.8	0.5	188	43	231		INDX	FOOT								
17 0245	09/24/98	0.8	1.1	0.3	0	0	0		SUPP	FOOT								
17 0245	09/28/98	0.3	0.8	0.5	235	93	328		INDX	FOOT								
17 0245	10/01/98	0.8	1.1	0.3	0	0	0		SUPP	FOOT								
17 0245	10/05/98	0.0	0.3	0.3	6	18	24		INDX	FOOT								
17 0245	10/05/98	0.3	0.8	0.5	121	250	371		INDX	FOOT								
17 0245	10/05/98	0.8	1.1	0.3	8	0	8		SUPP	FOOT								
17 0245	10/08/98	0.0	0.3	0.3	8	29	37		INDX	FOOT								
17 0245	10/08/98	0.3	0.8	0.5	117	277	394		INDX	FOOT								
17 0245	10/08/98	0.8	1.1	0.3	5	0	5		SUPP	FOOT								
17 0245	10/12/98	0.0	0.3	0.3	8	29	37		INDX	FOOT								
17 0245	10/12/98	0.3	0.8	0.5	74	400	474		INDX	FOOT								
17 0245	10/12/98	0.8	1.1	0.3	2	0	2		SUPP	FOOT								
17 0245	10/15/98	0.0	0.3	0.3	4	21	25		INDX	FOOT								
17 0245	10/15/98	0.3	0.8	0.5	78	353	431		INDX	FOOT								
17 0245	10/15/98	0.8	1.1	0.3	0	0	0		SUPP	FOOT								

Table 36. 1995 Salmon Cr. (17.0245) escapement: Data from Salmon Cr. WOS report May 30, 1996. Cheri Scalf (WOS) author

Part I: Escapement upstream of trap

289 Number of unspawned males passed upstream at trap *plus*
115 Number of unspawned females passed upstream at trap *equals*
404 Total unspawned males passed upstream + total unspawned females passed upstream

14 Number of naturally spawned out males passed upstream at trap plus
17 Number of naturally spawned out females passed upstream at trap *equals*
31 Total spawned out females passed upstream + total spawned out males passed upstream

435 Total escapement upstream of trap (naturally spawned out fish passed thru rack + unspawned fish passed through rack)

Part II: Escapement downstream of trap

39 Redds observed downstream of trap.

289 Number of unspawned males passed upstream *plus*
35 Number males spawned at trap *equals*
324 Total males in run (**not** including males that spawned downstream of trap, which is not yet known)

115 Number of unspawned females passed upstream *plus*
18 Number females spawned at trap *equals*
133 Total females in run (**not** including females that spawned downstream of trap)

2.4 Male/female ratio (289+35)/(115+18) of unspawned fish passed through trap + fish spawned at trap (note: ratio was 1.9:1 in scale samples). Spawned out fish passing trap and fish spawning below rack were excluded from this ratio since they are part of population estimated. *This value multiplied by*
39 Number of Redds (1 redd = 1 female) observed below trap, *equals*
95 Total males spawning downstream of trap, *plus*
39 Number of females (=redd count downstream of trap), *equals*
134 Total male + female spawning activity downstream of trap

Part III: Total escapement =

404 Total fish that spawned above trap (total fish passed through trap minus spawned out fish passed through trap. The spawned out fish are accounted for in "total spawners below rack"). *This is added to*
134 Total fish that spawned below rack
538 Total natural spawning, *plus*
53 Number of fish artificially spawned at trap *equals*
591 Total return to Salmon Cr.

Table 37. 1996 Salmon Cr. (17.0245) escapement estimate: Data from Salmon Cr. WOS report July 24, 1997. Cheri Scalf (WOS) author

Part I: Escapement upstream of trap

389	Number of unspawned males passed upstream at trap *plus*
268	Number of unspawned females passed upstream at trap *equals*
657	Total unspawned males passed upstream + total unspawned females passed upstream
4	Number of naturally spawned out males passed upstream at trap plus
8	Number of naturally spawned out females passed upstream at trap *equals*
12	Total spawned out females passed upstream + total spawned out males passed upstream
669	**Total escapement upstream of trap (naturally spawned out fish passed thru rack + unspawned fish passed through rack)**

Part II: Escapement downstream of trap

53	Redds observed downstream of trap.
389	Number of unspawned males passed upstream *plus*
59	Number males spawned at trap *equals*
448	Total males in run (**not** including males that spawned downstream of trap, which is not yet known)
268	Number of unspawned females passed upstream *plus*
50	Number females spawned at trap *equals*
318	Total females in run (**not** including females that spawned downstream of trap)
1.4	Male/female ratio (289+35)/(115+18) of unspawned fish passed through trap + fish spawned at trap (note: ratio was 1.9:1 in scale samples). Spawned out fish passing trap and fish spawning below rack were excluded from this ratio since they are part of population estimated. *This value multiplied by*
53	Number of Redds (1 redd = 1 female) observed below trap, *equals*
75	Total males spawning downstream of trap, *plus*
53	Number of females (=redd count downstream of trap), *equals*
128	**Total male + female spawning activity downstream of trap**

Part III: Total escapement =

657	Total fish that spawned above trap (total fish passed through trap minus spawned out fish passed through trap. The spawned out fish are accounted for in "total spawners below rack"). *This is added to*
128	Total fish that spawned below rack
785	**Total natural spawning, *plus***
109	Number of fish artificially spawned at trap *equals*
894	**Total return to Salmon Cr.**

Table 38. 1997 Salmon Cr. (17.0245) escapement estimate. Data from a Thom H. Johnson (WDFW) memo dated Jan. 12, 1998.

Part I: Escapement upstream of trap

424	Number of unspawned males passed upstream at trap *plus*
204	Number of unspawned females passed upstream at trap *equals*
628	Total unspawned males passed upstream + total unspawned females passed upstream
0	Number of naturally spawned out males passed upstream at trap plus
0	Number of naturally spawned out females passed upstream at trap *equals*
0	Total spawned out females passed upstream + total spawned out males passed upstream
628	**Total escapement upstream of trap (naturally spawned out fish passed thru rack + unspawned fish passed through rack)**

Part II: Escapement downstream of trap

33	Redds observed downstream of trap.
424	Number of unspawned males passed upstream *plus*
60	Number males spawned at trap *equals*
484	Total males in run (**not** including males that spawned downstream of trap, which is not yet known)
204	Number of unspawned females passed upstream *plus*
50	Number females spawned at trap *equals*
254	Total females in run (**not** including females that spawned downstream of trap)
1.9	Male/female ratio (289+35)/(115+18) of unspawned fish passed through trap + fish spawned at trap (note: ratio was 1.9:1 in scale samples). Spawned out fish passing trap and fish spawning below rack were excluded from this ratio since they are part of population estimated. *This value multiplied by*
33	Number of Redds (1 redd = 1 female) observed below trap, *equals*
63	Total males spawning downstream of trap, *plus*
33	Number of females (=redd count downstream of trap), *equals*
96	**Total male + female spawning activity downstream of trap**

Part III: Total escapement =

628	Total fish that spawned above trap (total fish passed through trap minus spawned out fish passed through trap. The spawned out fish are accounted for in "total spawners below rack"). *This is added to*
96	Total fish that spawned below rack
724	**Total natural spawning, *plus***
110	Number of fish artificially spawned at trap *equals*
834	**Total return to Salmon Cr.**

Table 39. 1998 Salmon Ck. (17.0245) escapement estimate: Data from a Thom Johnson (WDFW) fax dated Oct. 30, 1998.

Part I: Escapement upstream of trap

486	Number of unspawned males passed upstream at trap *plus*
429	Number of unspawned females passed upstream at trap *equals*
915	Total unspawned males passed upstream + total unspawned females passed upstream
0	Number of naturally spawned out males passed upstream at trap plus
0	Number of naturally spawned out females passed upstream at trap *equals*
0	Total spawned out females passed upstream + total spawned out males passed upstream
915	**Total escapement upstream of trap (naturally spawned out fish passed thru rack + unspawned fish passed through rack)**

Part II: Escapement downstream of trap

41	Redds observed downstream of trap.
486	Number of unspawned males passed upstream *plus*
65	Number males spawned at trap *equals*
551	Total males in run (**not** including males that spawned downstream of trap, which is not yet known)
429	Number of unspawned females passed upstream *plus*
56	Number females spawned at trap *equals*
485	Total females in run (**not** including females that spawned downstream of trap)
1.1	Male/female ratio (289+35)/(115+18) of unspawned fish passed through trap + fish spawned at trap (note: ratio was 1.9:1 in scale samples). Spawned out fish passing trap and fish spawning below rack were excluded from this ratio since they are part of population estimated. *This value multiplied by*
41	Number of Redds (1 redd = 1 female) observed below trap, *equals*
47	Total males spawning downstream of trap, *plus*
41	Number of females (=redd count downstream of trap), *equals*
88	**Total male + female spawning activity downstream of trap**

Part III: Total escapement =

915	Total fish that spawned above trap (total fish passed through trap minus spawned out fish passed through trap. The spawned out fish are accounted for in "total spawners below rack"). *This is added to*
88	Total fish that spawned below rack
1003	**Total natural spawning, *plus***
121	Number of fish artificially spawned at trap *equals*
10	Otter kills observed below trap (assumed to be unspawned fish) equals
1134	**Total return to Salmon Cr.**

Appendix 14 – JimmyComeLately Cr. (WRIA 17.0285) summer chum natural spawning escapement summary

Introduction

As with the other Discovery/Sequim Bay summer chum streams, this stream contains no fall chum run The first regular summer chum spawning surveys for this stream were conducted in 1983 The surveyed reach was usually from river mile 0 0-0 8, and periodically was extended up to river mile 1 5 The majority of spawning activity has been observed in the river mile 0 0-0 8 reach A partial chum migration blockage has been periodically noted in recent years around river mile 0 2, caused by the formation of a small cascade in the channel which was apparently only passable to chum at higher flows (Brad Sele, Jamestown S'Kallam Tribe, Sequim WA , pers comm)

Redd counts were used to estimate escapement on this stream in some years of low escapements in the 1990's Comparisons of redd counts and live fish counts on low escapement tears indicate it is common to miss a significant portion of the fish present with live fish counts This could be due to a number of factors 1) a significant portion of the few fish that are present are going to be hiding, and 2) small census errors (i e the observer missing a couple of fish during the survey by accident) become much more significant in a small population count

Survey data directly used in estimation process is highlighted in ***bold italic*** in the annual survey summary tables

Summer 1968 - 1981

Comments - No escapement estimates attempted for this time period due to insufficient survey data collected during these years The **previous** estimates were based on the formula

> (1983 Jimmy-Come-Lately escapement estimate / 1983 Salmon escapement estimate) * Salmon Cr escapement for year *X* = Jimmy - Come - Lately escapement estimate for year *X*

Table 1. Original and new 1968-1981 WRIA 16.0285 escapement estimates

Year	1968	1968	1970	1971	1972	1973	1974
Original estimate	247	247	247	232	322	205	170
New estimate	N/A	N/A	N/A	N/A	N/A	N/A	438

Year	1975	1976	1977	1978	1979	1980	1981
Original estimate	348	412	240	412	162	1,102	172
New estimate	348	365	405	787	170	1,326	203

Given that the Salmon Cr escapement estimates were of poor quality through the mid 1970's, the quality of any estimates generated by this technique were very questionable In order to derive escapement values for 1974 to 1981 for run reconstruction purposes, the escapement values for Jimmy-Come-Lately were regressed against the Snow + Salmon escapements for 1982 - 1988 (data after this point was excluded due to apparent loss of production in Snow Cr relative to the other two streams from 1989 to present) This produced an equation "17 0285" = -44 210 + 0 362 * "0219+0245" The results are summarized in Table 1, along with the original estimates The survey data for the period 1968-81 is summarized below (No chum survey data was collected in 1969-71 time period)

Table 2: 1968 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	68	11	19	0 0	0 2	0 2	0	2	2		SUPP	FOOT	0	0	0	0	20	00	00	00

Notes:
Nov 19 survey card noted fish passage was blocked at HW 101 culvert by low flow

Table 3. 1972 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	72	10	25	0 0	0 2	0 2	0	136	136		SUPP	FOOT	0	0	0	0	20	00	00	00

Table 4. 1973 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	73	9	30	0 0	0 2	0 2	34	92	126	95	SUPP	FOOT	0	0	0	0	00	00	00	00

Table 5. 1974 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	74	9	23	0 0	0 2	0 2	0	0	0	90	SUPP	FOOT	0	0	0	0	60	00	00	00
17 0285	74	10	7	0 0	0 2	0 2	0	2	2	90	SUPP	FOOT	0	0	0	0	00	00	00	00
17 0285	74	12	12	0 0	0 3	0 3	0	0	0	70	SUPP	FOOT	4	0	0	0	00	00	00	00
17 0285	74	12	31	0 0	0 8	0 8	0	0	0	80	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0285	75	01	07	0 0	0 6	0 6	0	0	0	70	SUPP	FOOT	0	0	0	0	24	31	34	00

Table 6. 1975 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	75	10	3	0 4	0 7	0 3	1	64	65	60	SUPP	FOOT	0	0	0	0	38	00	00	00
17 0285	75	11	19	0 0	1 9	1 9	0	0	0	60	SUPP	FOOT	0	0	0	0	24	40	60	00

Table 7. 1976 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	76	12	10	0 0	1 4	1 4	0	0	0	90	SUPP	FOOT	4	0	0	0	20	60	00	00

Table 8. 1979 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	79	12	27	0 0	1 5	1 5	0	0	0	85	SUPP	FOOT	4	0	0	0	24	00	00	00

Table 9. 1980 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	80	11	18	0 0	1 5	1 5	0	2	2	90	INDX	FOOT	0	0	0	0	20	31	60	00

Table 10. 1981 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	81	10	30	0 0	1 5	1 5	1	101	102	90	SUPP	FOOT	4	0	0	0	20	31	60	00
17 0285	81	11	6	0 0	1 5	1 5	0	128	128	90	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0285	81	11	13	0 0	1 5	1 5	0	45	45	75	INDX	FOOT	4	0	0	0	24	31	00	00

Notes
Oct 30 survey card noted most of fish were in "lower half of index" (upper end of fish distribution not explicitly defined - ed)

Summer 1982

Reach - **River mile 0.0-0.8**
Estimate = 599
Method - Sept 29 live + dead count
Quality rating - Fair
Comments - The first survey on Sept 29 is obviously well past the peak of spawning, as indicated by the very high dead live ratio

Original estimate - Index (Entire spawned reach) = 323 (See introduction for description of method)

Table 11. 1982 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	*82*	*9*	*29*	*0 0*	*0 8*	*0 8*	*45*	*554*	*599*	*75*	*SUPP*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*45*	*60*	*00*
17 0285	82	10	29	0 0	1 5	1 5	0	140	140	90	SUPP	FOOT	4	0	0	0	20	31	00	00
17 0285	82	11	12	0 0	1 5	1 5	0	107	107	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0285	82	11	30	0 0	1 5	1 5	1	0	1	90	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0285	82	12	07	0 0	1.5	1 5	3	0	0	70	SUPP	FOOT	4	0	0	0	24	31	33	00

Notes
Sept 29 survey card noted chum run looked like it had peaked in Mid-Sept , because all the carcasses were covered in fungus

Summer 1983

Reach - **River mile 0.0-1.5**
Estimate = 254
Method - AUC
Quality rating - Fair
Comments - There is no pre-peak period survey data, but the low dead live ratio on the first survey suggests the initiation of fish entry was probably within 10 days of the first survey, so the curve was subjectively started ~ Sept 15 There are some inconsistencies in length of stream reach surveyed (the surveys varied between 0 7 and 1 5 miles in length) It is assumed the surveys were conducted with the intent to account for the majority of spawning activity, and that the length of surveys were adjusted accordingly One data anomaly is the fish counts changing from 0 live and 20 dead on Nov 1, to 0 live and 79 dead on Nov 8 The visibility was rated as good on both surveys, so visibility does not seem to account for this discrepancy

Original estimate - Index (Entire spawned reach) = 366 (AUC)

Table 12. 1983 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	*83*	*9*	*26*	*0 0*	*0 7*	*0 7*	*165*	*23*	*188*	*95*	*INDX*	*FOOT*	*4*	*0*	*0*	*0*	*13*	*20*	*00*	*40*
17 0285	*83*	*9*	*27*	*0.0*	*1 0*	*1.0*	*148*	*47*	*195*	*95*	*INDX*	*FOOT*	*3*	*0*	*0*	*0*	*60*	*00*	*00*	*00*
17 0285	*83*	*10*	*3*	*0 0*	*1.5*	*1.5*	*59*	*64*	*123*	*95*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*33*	*00*	*40*
17 0285	*83*	*10*	*11*	*0.0*	*0 7*	*0 7*	*35*	*193*	*228*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*40*
17 0285	*83*	*10*	*18*	*0 0*	*0 7*	*0 7*	*21*	*207*	*228*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*40*
17 0285	*83*	*10*	*25*	*0 0*	*1 5*	*1.5*	*20*	*199*	*219*	*95*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*40*
17 0285	*83*	*11*	*1*	*0 0*	*0 7*	*0 7*	*3*	*78*	*81*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*40*
17 0285	*83*	*11*	*1*	*0 7*	*1.5*	*0.8*	*0*	*20*	*20*	*90*	*INDX*	*FOOT*	*0*	*0*	*0*	*0*	*20*	*00*	*00*	*40*
17 0285	83	11	8	0 0	0 7	0 7	0	79	79	95	INDX	FOOT	4	0	0	0	20	60	00	40
17 0285	83	11	8	0 7	1 5	0 8	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0285	83	11	21	0 0	0 7	0 7	1	0	1	60	INDX	FOOT	4	0	0	0	27	31	00	00

Summer 1984

Reach - **River mile 0.0-1.5**
Estimate = 367
Method - AUC
Quality rating - Good
Comments - Spawning surveys were conducted by both WDFW and the PNPTC I used the PNPTC data for the estimate because it had the most surveys (10), as opposed to three WDF surveys by the chum survey crew, and three by the coho crew The PNPTC data was reasonably consistent with the WDF surveys There are some inconsistencies in length of stream reach surveyed (the surveys varied between 0 7 and 1 3 miles in length) I am assuming the surveys were conducted with the intent to account for the majority of spawning activity, and that the length of surveys were adjusted accordingly

Original estimate - Index (Entire spawned reach) = 343 (AUC)

Table 13. 1984 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	84	9	10	0 0	0 7	0 7	33	1	34	95	INDX	FOOT	0	0	0	0	20	33	00	40
17 0285	84	9	17	0.0	0 7	0 7	112	16	128	95	INDX	FOOT	0	0	0	0	20	00	00	40
17 0285	84	9	18	0 0	1 2	1 2	114	26	140	90	INDX	FOOT	0	0	0	0	61	00	00	00
17 0285	84	9	18	0 0	1 3	1 3	84	18	102	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	84	9	24	0.0	0 7	0 7	80	98	178	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0285	84	9	25	0 0	1 0	1 0	47	105	152	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0285	84	9	25	0 0	1 0	1 0	65	123	188	90	INDX	FOOT	0	0	0	0	60	00	00	00
17 0285	84	10	2	0 0	0 7	0 7	77	236	313	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0285	84	10	8	0 0	1 0	1 0	40	176	216	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	84	10	10	0 0	0 7	0 7	59	264	323	75	INDX	FOOT	0	0	0	0	20	60	00	40
17 0285	84	10	18	0 0	0 7	0 7	40	351	391	95	INDX	FOOT	0	0	0	0	20	60	00	40
17 0285	84	10	24	0 0	0 7	0.7	43	298	341	90	INDX	FOOT	0	0	0	0	20	60	00	40
17 0285	84	10	31	0 0	0 7	0 7	32	365	397	90	INDX	FOOT	0	0	0	0	20	00	00	40
17 0285	84	11	7	0 0	0 7	0 7	2	49	51	50	INDX	FOOT	0	0	0	0	24	60	00	40
17 0285	84	11	8	0 0	0 8	0 8	0	6	6	25	INDX	FOOT	4	0	0	0	27	30	31	00
17 0285	84	11	14	0 0	0 7	0 7	0	12	12	75	INDX	FOOT	0	0	0	0	24	60	00	40

Notes:
Sept 18 survey card detailed the chum distribution - 19 live, 12 dead from river mile 0 0-0 2, and 95 live, and 14 dead from river mile 0 2-1 2
Sept 25 survey card detailed the chum distribution - 11 live, 37 dead from river mile 0 0-0 2, and 54 live, and 86 dead from river mile 0 2-1 2

Summer 1985

Reach - **River mile 0.0-1.5**
Estimate = 61
Method - Oct 10 survey live + dead
Quality rating - Poor
Comments - AUC result (~53 fish) is less than this method The Oct 10 live + dead count is probably a reasonably good estimate of spawning, given the dead seem to accumulate well in this small stream in many years

Original estimate - Index (Entire spawned reach) = 64 (AUC)

Table 14: 1985 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	85	9	25	0 0	0 7	0 7	24	16	40	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	85	10	4	0 0	0 7	0 7	14	37	51	99	INDX	FOOT	0	0	0	1	20	00	00	00
17 0285	85	10	10	0 0	0.5	0 5	9	52	61	90	SUPP	FOOT	0	0	0	0	20	00	00	00

Summer 1986

Reach - **River mile 0.0-1.5**
Estimate = 292
Method - AUC
Quality rating - Good
Comments - None

Original estimate - Index (Entire spawned reach) = 299 (AUC)

Table 15: 1986 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	86	9	17	0 0	0 8	0 8	74	5	79	95	INDX	FOOT	0	0	0	0	00	00	00	00
17 0285	86	9	23	0 0	0 8	0.8	143	19	162	95	INDX	FOOT	0	0	0	0	00	00	00	00
17 0285	86	9	30	0 0	0 7	0 7	69	118	187	90	INDX	FOOT	0	0	0	0	20	00	00	00

17 0285	86	10	8	0 0	1 1	1 1	75	121	196	99	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	86	10	20	0 0	1 0	1 0	13	162	175	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	86	10	27	0 0	0 8	0 8	9	57	66	90	INDX	FOOT	4	0	0	0	20	00	00	00
17 0285	86	11	4	0 0	1 5	1 5	0	NC		95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0285	86	11	28	0 0	1 5	1 5	0	0	0	80	INDX	FOOT	0	0	0	0	21	00	00	00
17 0285	86	12	10	0 0	1 5	1 5	0	0	0	95	INDX	FOOT	6	4	0	0	20	00	00	00
17 0285	86	01	02	0 0	1 5	1 5	0	0	0	85	INDX	FOOT	4	0	0	0	24	00	00	00

Summer 1987

Reach - **River mile 0.0-1.5**
Estimate = 464
Method - AUC
Quality rating - Fair
Comments - This AUC curve has an unusual shape Derivation of the period between Sept 25 and Oct 7 was difficult The period between the Sept 25 and Oct 7 surveys continued to have significant spawning activity, since the dead count on Oct 7 rose to 363 fish, after a Sept 25 live + dead count of 199 live + 99 dead = 287 total fish I extended the curve on a fairly level line from the Sept 25 data point for a while before dropping the slope to meet the Oct 7 live fish data point, in an attempt to account for the additional post-Sept 25 fish entry suggested by the difference between the Sept 25 live + dead count and the Oct 7 dead count

A data inconsistency is the difference between the Oct 26 survey count (4 live, 28 dead), and the Nov 3 survey count (0 live, 196 dead) The surveyed reach was longer for the Nov 3 survey (river mile 0 0-1 5), vs river mile 0 0-0 8 for the Oct 26 survey However, the Sept 25 (peak) survey observed no fish above river mile 0 8, so it seems unlikely a significant portion of fish were all above river mile 0 8 and therefore missed by the Oct 26 survey (there is no information on Nov 3 survey card regarding distribution of the fish observed)

Original estimate - Index (Entire spawned reach) = 423 (AUC)

Table 16. 1987 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	87	9	4	0 0	0 3	0 3	0	0	0	99	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	87	9	15	0.0	0 7	0 7	142	4	146	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	87	9	25	0.0	0 8	0 8	188	99	287	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	87	9	25	0 8	1.5	0 7	0	0	0	95	SUPP	FOOT	0	0	0	0	20	00	00	00
17 0285	87	10	7	0 0	1 0	1 0	27	363	390	95	INDX	FOOT	4	0	0	0	20	60	00	00
17 0285	87	10	16	0 0	0 8	0 8	20	145	165	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	87	10	26	0 0	0 8	0 8	4	28	32	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	87	11	3	0 0	1 5	1 5	0	196	196	95	INDX	FOOT	4	0	0	0	20	00	00	00
17 0285	87	11	12	0 0	1 5	1 5	0	133	133	95	SUPP	FOOT	4	0	0	0	20	00	00	00
17 0285	87	11	19	0 0	1 5	1 5	0	132	132	95	SUPP	FOOT	4	0	0	0	20	00	00	00

Summer 1988

Reach - **River mile 0.0-1.5**
Estimate = 1,052
Method - AUC
Quality rating - Good
Comments - None

Original estimate - Index (Entire spawned reach) = 1,127 (AUC)

Table 17. 1988 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	88	9	15	0 0	1.5	1 5	206	50	256	95	INDX	FOOT	1	0	0	0	00	00	00	00
17 0285	88	9	26	0 0	1 5	1 5	488	319	807	90	INDX	FOOT	0	0	0	0	60	00	00	00
17 0285	88	10	5	0 0	0.6	0.6	266	822	1,088	90	INDX	FOOT	0	0	0	0	61	00	00	00
17 0285	88	10	5	0 6	1 5	0 9	7	24	31	90	INDX	FOOT	0	0	0	0	61	00	00	00
17 0285	88	10	17	0 0	0 6	0 6	22	880	902	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	88	10	17	0.6	1 5	0 9	0	16	16	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	88	10	27	0 0	0 6	0 6	0	637	637	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	88	10	27	0 6	1 5	0 9	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	88	11	2	0 0	1 5	1 5	0	305	305	80	SUPP	FOOT	0	0	0	0	20	34	00	00

Summer 1989

Reach - **River mile 0.0-1.5**
Estimate = 173
Method - AUC
Quality rating - Good
Comments - Survey data doesn't clearly define timing and amplitude of peak period Dead count on Oct 4 survey roughly equaled live + dead count on Sept 22 survey, indicating spawning activity must not have increased much after Sept 22 So, peak amplitude of curve was assumed to be close to the Sept 22 live count

Original estimate - Index (Entire spawned reach) = 185 (AUC)

Table 18: 1989 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	89	9	13	0.0	0.5	0 5	21	9	30	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	89	9	22	0.0	1 5	1 5	111	35	146	80	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	89	10	4	0.0	0.6	0.6	11	101	112	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	89	10	4	0 6	1.5	0 9	1	36	37	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	89	10	13	0 0	0 6	0 6	0	104	104	90	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	89	10	13	0 6	1 5	0 9	0	17	17	90	INDX	FOOT	0	0	0	0	20	60	00	00

Summer 1990

Reach - **River mile 0.0-1.5**
Estimate = 63
Method - AUC
Quality rating - Good
Comments - Survey data doesn't clearly define timing and amplitude of peak period Dead count on Oct 1 survey roughly equaled live + dead count on Sept 19 survey, indicating spawning activity must not have increased much after Sept 19 So, peak amplitude of curve was assumed to be close to the Sept 19 live count

Original estimate - Index (Entire spawned reach) = 63 (AUC)

Table 19. 1990 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	90	9	5	0.0	1.5	1 5	2	1	3	95	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	90	9	19	0 0	0 6	0.6	26	8	34	85	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	90	9	19	0.6	1 5	0 9	0	0	0	99	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	90	10	1	0.0	0 6	0 6	10	28	38	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	90	10	1	0 6	1 5	0 9	0	1	1	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	90	10	10	0 0	0 6	0.6	10	14	24	95	INDX	FOOT	0	0	0	0	20	60	61	00

17 0285	90	10	10	0 6	1 5	0 9	0	0	0	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	90	10	18	0 0	0 6	0 6	4	12	16	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	90	10	18	0.6	1 5	0 9	0	0	0	95	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	90	11	5	0.0	1.5	1.5	1	0	1	85	INDX	FOOT	0	0	0	0	20	00	00	00

Notes
Sept 5 survey card noted the 3 observed fish were on a redd in the lower 0 1 mile of stream

Summer 1991

Reach - **River mile 0.0-0.8**
Estimate = 125
Method - AUC
Quality rating - Good
Comments - Survey coverage extended only to RM 0 8, but I assumed survey reach length was adjusted accordingly to account for majority of spawning in stream

Original estimate - Index (Entire spawned reach) = 121 (AUC)

Table 20. 1991 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	91	9	16	0 0	0 8	0 8	4	4	8	99	INDX	FOOT	0	0	0	0	20	00	60	00
17 0285	91	9	27	0 0	0 8	0 8	60	7	67	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	91	10	9	0.0	0.7	0 7	33	53	86	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	91	10	16	0 0	0.7	0 7	16	20	36	95	INDX	FOOT	0	0	0	0	20	00	00	00

Notes
Sept 16 survey card noted chum were all observed below river mile 0 2 Flow was described as so low that upstream passage past extreme lower end of stream was unlikely

Summer 1992

Reach - **River mile 0.0-1.5**
Estimate = 616
Method - AUC
Quality rating - Good
Comments - None

Original estimate - Index (Entire spawned reach) = 614 (AUC)

Table 21. 1992 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	92	9	3	0 0	0 2	0 2	27	0	27	90	INDX	FOOT	0	0	0	0	60	61	00	00
17 0285	92	9	3	0 2	1 0	0 8	20	0	20	90	INDX	FOOT	0	0	0	0	60	61	00	00
17 0285	92	9	3	1 0	1 5	0 5	0	0	0	90	INDX	FOOT	0	0	0	0	60	61	00	00
17 0285	92	9	15	0 0	0 0	0 0	150	73	223	95	INDX	FOOT	0	0	0	0	00	10	60	37
17 0285	92	9	15	0 0	0 6	1 6	179	78	257	80	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	92	9	15	0.6	1.5	0 9	37	5	42	80	INDX	FOOT	0	0	0	0	20	61	00	00
17 0285	92	9	24	0 0	0 6	1 6	173	192	365	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	92	9	24	0.6	1 5	0.9	46	38	84	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	92	10	6	0 0	1 5	1 5	39	277	316	90	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	92	10	12	0 0	0 6	1 6	32	207	239	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	92	10	12	0 6	1 5	0 9	6	62	68	95	INDX	FOOT	0	0	0	0	20	60	61	00
17 0285	92	10	21	0.0	0.6	1 6	5	50	55	95	INDX	FOOT	0	0	0	4	20	61	00	00
17 0285	92	10	21	0 6	1.5	0 9	1	35	36	95	INDX	FOOT	0	0	0	4	20	61	00	00

Notes
Sept 3 survey card noted low flow and log jams would make fish passage difficult past river mile 1 0
Sept 24 survey card noted all fish were below river mile 0 6

Summer 1993

Reach - **River mile 0.0-1.0**
Estimate = 110
Method - AUC
Quality rating - Good
Comments - Survey coverage extended only to RM 1 0, but I assumed survey reach length was adjusted accordingly to account for majority of spawning in stream

Original estimate - Index (Entire spawned reach) = 108 (AUC)

Table 22. 1993 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	93	8	31	0 0	1 5	1 5	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	93	9	16	0.0	1 0	1 0	20	1	21	99	SUPP	FOOT	0	0	0	0	10	20	60	37
17 0285	93	9	20	0 0	1 0	1.0	53	8	61	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	93	9	27	0 0	1 0	1 0	50	32	82	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	93	10	4	0 0	1 0	1 0	26	76	102	85	INDX	FOOT	3	0	0	0	20	00	00	00
17 0285	93	10	11	0.0	1 0	1.0	10	44	54	85	INDX	FOOT	3	0	0	0	20	00	00	00
17 0285	93	10	18	0 0	0 3	0 3	4	17	21	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	93	10	27	0 0	0.8	0.8	1	20	21	80	INDX	FOOT	4	0	0	0	20	00	00	00

Notes
Sept 16 survey card noted all fish below 101 Some spawning activity starting Water temp = 51 degrees

Summer 1994

Reach - **River mile 0.0-1.5**
Estimate = 15
Method - AUC
Quality rating - Good
Comments - Survey coverage this year only (usually) extended up to river mile 0 3 or 0 4 This may be due to passage impediments in the lower stream that discouraged upstream movement past this point I assumed survey coverage was conducted accordingly to account for majority of spawning Sept 23 survey was considered an outlier and not used in AUC curve

Original estimate - Index (Entire spawned reach) = 16 (AUC)

Table 23: 1994 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	94	9	8	0 0	0 3	0 3	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	94	9	15	0 0	0 4	0 4	7	0	7	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	94	9	22	0 0	0.8	0 8	9	2	11	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	94	9	23	0 0	1 0	1 0	4	2	6	99	SUPP	FOOT	0	0	0	0	10	20	60	37
17 0285	94	9	30	0.0	0 3	0 3	4	4	8	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	94	10	7	0 0	0 3	0 3	0	2	2	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	94	10	7	0 0	0 5	0 5	0	4	4	99	SUPP	FOOT	0	0	0	0	14	16	20	37

Summer 1995

Reach - **River mile 0.0-1.5**
Estimate = 223
Method - AUC
Quality rating - Very good
Comments - AUC estimate was derived from pooled WDFW and Jamestown S'Klallam Tribe spawning surveys

Original estimate - Index (Entire spawned reach) = 206 (AUC)

Table 24 1995 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	95	8	22	0 0	0 2	0 2	1	0	1	99	SUPP	FOOT	0	0	0	0	13	20	48	37
17 0285	95	8	31	0 0	0 2	0 2	2	0	2	99	SUPP	FOOT	0	0	0	0	13	20	48	37
17 0285	95	9	8	0 0	0 2	0 2	79	0	79	95	SUPP	FOOT	0	0	0	0	10	20	47	37
17 0285	95	9	11	0.0	0 5	0 5	71	4	75	80	INDX	FOOT	0	0	0	0	20	33	00	00
17 0285	95	9	15	0 0	0 2	0.2	48	39	87	95	SUPP	FOOT	0	0	0	0	15	20	48	00
17 0285	95	9	20	0 0	1 0	1 0	86	51	137	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	95	9	22	0 0	0 2	0.2	42	74	116	95	SUPP	FOOT	0	0	0	0	15	20	48	00
17 0285	95	9	27	0 0	1 0	1 0	61	91	152	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	95	9	28	0 0	0 2	0 2	45	87	132	95	SUPP	FOOT	0	0	0	0	15	20	48	37
17 0285	95	10	04	0 0	1 0	1 0	6	89	95	90	INDX	FOOT	0	0	0	0	20	00	00	37

Summer 1996

Reach - **River mile 0.0-1.5**
Estimate = 30
Method - AUC
Quality rating - Good
Comments - Both WDFW and Jamestown S'Klallam Tribe conducted spawning surveys Tribal data was inconsistent with WDFW data, so I did not use tribal data in AUC estimate

Original estimate - Index (Entire spawned reach) = 34 (AUC)

Table 25. 1996 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	96	8	29	0 0	0 2	0 2	0	0	0	95	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	96	9	10	0 0	0 2	0.2	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	96	9	13	0 0	1 5	1 5	0	1	1	95	SUPP	FOOT	0	0	0	0	15	20	00	37
17 0285	96	9	18	0 0	0 5	0 5	13	3	16	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	96	9	19	0 0	1 5	1 5	7	1	8	95	SUPP	FOOT	0	0	0	0	15	20	00	37
17 0285	96	9	26	0 0	1 5	1 5	4	1	5	95	SUPP	FOOT	0	0	0	0	15	20	00	37
17 0285	96	9	28	0 0	0 8	0 8	12	4	16	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	96	10	4	0.0	0 6	0 6	11	6	17	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	96	10	7	0 0	1 5	1 5	7	8	15	95	SUPP	FOOT	0	0	0	0	15	20	00	37
17 0285	96	10	11	0.0	0 5	0 5	3	7	10	85	INDX	FOOT	0	0	0	0	20	00	00	00

Summer 1997

Reach - **River mile 0.0-1.5**
Estimate = 61
Method - AUC
Quality rating - Good
Comments - AUC estimate was derived from pooled WDFW and Jamestown S'Klallam Tribe spawning surveys Endpoint of AUC curve not defined directly by survey data I assumed spawning ended on ~Oct 26, ~ 10 days after last survey on Oct 16

Table 26: 1997 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	97	9	10	0	1 5	1 5	7	2	9	90	SUPP	FOOT	0	0	0	0	11	20	40	37
17 0285	97	9	24	0	1 5	1.5	11	2	13	90	SUPP	FOOT	0	0	0	0	13	20	00	37
17 0285	97	10	2	0	1 5	1 5	23	4	27	80	SUPP	FOOT	0	0	0	0	10	24	00	37
17 0285	97	10	8	0	1 5	1 5	11	4	15	90	SUPP	FOOT	0	0	0	0	12	23	00	37
17 0285	97	10	16	0	1 5	1 5	14	3	17	90	SUPP	FOOT	0	0	0	0	12	23	00	37

Summer 1998

Reach - **River mile 0.0-1.5**
Estimate = 98
Method - AUC
Quality rating - Very good
Comments - Most of curve well defined by survey data points Very low stream flow during most of spawning period

Table 27. 1998 chum survey data

WRIA	Year	Month	Day	Lower RM	Upper RM	Length	Live	Dead	Live + dead	% seen	Type survey	Method	Other species				Comments			Agency
17 0285	98	8	25	0	0.1	0 1	0	0	0	90			0	0	0	0	20	00	00	00
17 0285	98	9	1	0	0.1	0.1	0	0	0	90	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	98	9	11	0	0 3	0 3	12	0	12	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	98	9	16	0	0.4	0 4	47	1	48	80	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	98	9	24	0	0 5	0.5	52	14	66	85	INDX	FOOT	0	0	0	0	20	60	00	00
17 0285	98	9	30	0	0.5	0 5	25	18	43	85	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	98	10	7	0	0 5	0 5	9	20	29	80	INDX	FOOT	0	0	0	0	20	00	00	00
17 0285	98	10	14	0	0 2	0.2	1	4	5	80	INDX	FOOT	0	0	0	0	20	00	00	00

Appendix 15 – Dungeness R. (WRIA 18.0018) summer chum natural spawning escapement summary

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Introduction

Summer chum have been regularly observed in the Dungeness R during spawner surveys (Table 4, Appendix 16) Prior to 1981 spawning ground counts in the mainstem Dungeness R were conducted primarily for pink salmon (odd years only) below the Woodcock Road bridge (RM 3 3), with occasional surveys up to the HW 101 bridge (RM 6 4) During this time period directed chinook surveys were sporadic, and were mainly conducted on even-numbered years, when no pink salmon surveys were conducted and/or manpower was available, and pink and chinook salmon passing upstream of RM 10 5 were counted at the WDFW Salmon Hatchery weir In 1981 the permanent weir at the Salmon Hatchery was removed Spawner survey effort for chinook and summer pinks was subsequently expanded in the basin to make up for the loss of fish counts at the weir, and to provide data to conduct escapement estimates for these species in a manner consistent with those used on other river basins Since 1986 there has been a consistently high chinook-directed survey effort throughout the Dungeness R basin, as part of the WDFW Dungeness R chinook recovery program Though these surveys were directed at chinook, they also enumerate any chums or other salmon species observed

Survey conditions in the lower Dungeness River are often poor, with limited visibility in pools throughout the season due to snowmelt When stream flows are elevated by fall rains (typically mid-October to mid-November), the opportunity to conduct meaningful spawner counts ranges from extremely poor to impossible

Available population data

Table 4 (Appendix 16) summarizes the available survey observations for chum in the Dungeness watershed (WRIA 18 0018) in the annual time period Aug 1-Oct 31 As discussed earlier, because there were no historical directed chum survey effort in this river basin the majority of the chum survey observations recorded in the WDFW spawning survey database are only for those surveys where summer chum were directly observed There were many more surveys conducted in the basin for other species each year, but no chum were observed there were no records coded as chum surveys entered in the database (as opposed to those streams that dedicated chum surveys are conducted, and database entries are made even for surveys where counts of the target specie(s) were zero)

Most observations of live and/or dead chum are confined to the lower river reach (RM 0 0-6 6), with only two observations upstream of RM 6 6 (these occurred on 9/23/85 and 9/13/95) Most individual observations range from one or two up to ~30 fish The highest count was 189 live and 10 dead on 9/22/76

Appendix 16 - Table 1 - Comment codes for WDFW spawning survey database

Area surveyed

0 Partial index survey
1 Intertidal
2 Includes tributary in index
3 Holes not surveyed
4 Right bank side channel
5 Left bank side channel
6 Includes area above index
7 Includes area below index
8 Right bank survey
9 Left bank survey

Survey timing

10 Peak survey
11 Survey too early - before peak
12 Survey too late - after peak
13 Early run
14 Late run
15 Middle run
16 Redds observed - after peak

Water conditions

20 Low - clear
21 Low - medium
22 Low - muddy
23 Medium - clear
24 Medium - medium color
25 Medium - muddy
26 High - clear
27 High - medium color
28 High - muddy
29

Viewing conditions

30 Dark
31 Dark in pools
32 High glare
33 Some glare
34 Raining
35 Snowing
36 Frozen
37 Partly frozen
38 Water turbid

Stream conditions

40 Needs stream improvement work
41 Impassable log jam
42 Passable log jam
43 Man-made block
44 Damaging channel work
45 Damaging bank work
46 Damaging diversion
47 Passable beaver dam
48 Impassable beaver dam
49 Evidence of scouring

Factors affecting fish abundance

50 Heavy poaching
51 Light poaching
52 Heavy predation
53 Light predation
54 Stream dry
55 Stream frozen
56 Fish kill
57 Stream too low
58 Illegal set netting
59 Recent habitat alteration

Card information

60 See card for additional comments
61 Count breakdown available from card
62 Summary card
63 Escapement estimate survey
64 Area surveyed unknown
65 Spot observation
66 Live tagged fish observed
67 Dead tagged fish observed
68 Tag recovered

Miscellaneous

70 Most carcasses have washed out
71 Heavy siltation
72 Count in holes estimated
73 Partial count
74 Exposed redds due to low flow
75 Actual dead count higher than shown
76 carcass counts only
77 Tag recovery surveys. Sampled carcasses were marked.

Appendix 16 - Table 2 - Agency codes for WDFW spawning survey database

Null	Wash. Dept. of Fisheries / Fish and Wildlife
00	Wash. Dept. of Fisheries / Fish and Wildlife
NR	Wash. Dept. of Natural Resources
DG	Wash. Dept. of Game
DW	Wash. Dept. of Wildlife
FW	U.S. Fish and Wildlife Service
FR	Fisheries Research Institute (UW)
SM	Seattle Metro
ST	Small Tribes Org. of Western Wash.
01	Undefined
02	Chehalis
03	Chinook
04	Colville
05	Cowlitz
06	Duwamish
07	Hoh
08	Lower Elwha
09	Lumni
10	Makah
11	Muckleshoot
12	Nes Perce
13	Nisqually
14	Nooksack
15	Port Gamble
16	Puyallup
17	Quileute
18	Quinault
19	Samish
20	Sauk-Suiattle
21	Shoalwater
22	Skokomish
23	Skykomish
24	Snohomish
25	Snoqualmie
26	Squaxin
27	Steilacoom
28	Suquamish
29	Swinomish
30	Swinomish (aboriginal)
31	Tulalip
32	Umatilla
33	Upper Skagit
34	Warm Springs
35	Yakima
36	Stillguamish
37	Jamestowm S'klallam
40	Point No Point Treaty Council (PNPTC)
25	Snoqualmie
26	Squaxin
27	Steilacoom
28	Suquamish
29	Swinomish
30	Swinomish (aboriginal)
31	Tulalip
32	Umatilla
33	Upper Skagit
34	Warm Springs
35	Yakima
36	Stillguamish
37	Jamestowm S'klallam
40	Point No Point Treaty Council (PNPTC)

Appendix 16 - Table 3 - Species codes for WDFW spawning survey database

1	Chinook
2	Chum
3	Pink
4	Coho
5	Sockeye
6	Steelhead

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0377	10/13/1981	0.0	1.5	1.5	0	0	0	0	0	SUPP	FOOT								
15 0377	10/20/1981	0.0	1.5	1.5	0	0	0		0	SUPP	FOOT								
15 0377	9/22/1983	0.0	1.3	1.3	0	0	0	70	0	INDX	FOOT					11	20	60	40
15 0377	9/28/1983	0.0	1.5	1.5	0	0	0	70	0	INDX	FOOT								40
15 0377	10/7/1983	0.0	1.5	1.5	0	0	0	60	0	INDX	FOOT								40
15 0379	10/6/1981	0.1	0.3	0.2	0	0	0	5		SUPP	FOOT					28			40
15 0379	10/14/1981	0.1	1.0	1.0	0	0	0	98		SUPP	FOOT					21			40
15 0379	10/7/1983	0.0	0.2	0.2	0	0	0	50		SUPP	FOOT								40
15 0387	9/18/1981	0.0	0.5	0.5	0	0	0	98		SUPP	FOOT					20			40
15 0387	9/23/1981	0.0	0.5	0.5	0	0	0	98		SUPP	FOOT					20			40
15 0387	9/29/1983	0.0	1.0	1.0	0	0	0	80	0	SUPP	FOOT								40
15 0387	10/7/1983	0.0	0.5	0.5	0	0	0	60	0	SUPP	FOOT								40
15 0387	10/14/1983	0.0	0.5	0.5	0	0	0	60	0	SUPP	FOOT								40
15 0389	10/2/1946	0.0	0.2	0.2	69	56	125			SUPP	FOOT	4	0	0	0	20	60		
15 0389	10/25/1968	0.0	0.5	0.5	17	1	18			SUPP	FOOT					20			
15 0389	10/2/1969	0.3	1.0	0.7	17	2	19	99		SUPP	FOOT					20			
15 0389	10/22/1969	0.0	0.5	0.5	0	0	0	99	10	SUPP	FOOT					20			
15 0389	10/15/1974	6.2	6.4	0.2	0	0	0			SUPP	FOOT					11	21		
15 0389	10/7/1975	0.0	1.5	1.5	98	104	202	90		INDX	FOOT								
15 0399	10/14/1981	0.0	0.3	0.3	0	0	0	98		SUPP	FOOT								40
15 0400	10/3/1977	0.1	0.3	0.2	0	0	0	99		SUPP	FOOT					20			
15 0400	9/18/1981	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					11	20		40
15 0400	10/6/1981	0.0	0.3	0.3	0	0	0	10		INDX	FOOT					00	28		40
15 0400	10/13/1981	0.0	1.0	1.0	0	0	0		0	SUPP	FOOT								
15 0400	10/14/1981	0.0	0.5	0.5	0	0	0	98		INDX	FOOT					20			40
15 0400	10/20/1981	0.0	1.0	1.0	0	0	0	0	0	SUPP	FOOT								
15 0400	10/27/1981	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					11	20	34	40
15 0400	9/28/1983	0.0	0.7	0.7	0	0	0	90		INDX	FOOT								40
15 0400	10/6/1983	0.0	1.0	1.0	0	0	0	75		INDX	FOOT								40
15 0400	10/13/1983	0.0	1.0	1.0	0	0	0	70	0	INDX	FOOT								40
15 0400	10/26/1989	0.0	0.5	0.5	0	0	0			INDX	FOOT								
15 0400 A	9/21/1983	0.0	0.3	0.3	0	0	0			SUPP	FOOT					20	57		40
15 0400 A	10/6/1983	0.0	0.2	0.2	0	0	0	75		SUPP	FOOT					60			40
15 0400 A	10/13/1983	0.0	0.2	0.2	0	0	0	60	0	SUPP	FOOT								40
15 0401	10/6/1983	0.0	0.3	0.3	0	0	0	75		SUPP	FOOT					60			40
15 0401	10/13/1983	0.0	0.3	0.3	0	0	0	60	0	SUPP	FOOT								40
15 0404	9/18/1968	0.0	0.5	0.5	0	0	0		2	INDX	FOOT					23			
15 0404	10/18/1972	0.0	0.5	0.5	45	30	75			INDX	FOOT								
15 0404	10/3/1977	0.0	0.4	0.4	1	0	1	95		SUPP	FOOT					21			
15 0404	9/23/1981	0.0	1.0	1.0	1	0	1	98		INDX	FOOT					06	11	20	40
15 0404	10/6/1981	0.1	0.3	0.3	0	0	0	5		INDX	FOOT					00	29	30	40
15 0404	10/14/1981	0.0	0.5	0.5	0	0	0	98		INDX	FOOT					20			40
15 0404	10/20/1981	0.0	0.5	0.5	0	0	0	99		INDX	FOOT					11	20		40
15 0404	9/21/1983	0.0	1.3	1.3	2	0	2	80	0	INDX	FOOT								40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0404	9/28/1983	0.0	1.0	1.0	3	1	4	80	2	INDX	FOOT								40
15 0404	10/6/1983	0.0	1.0	1.0	1	2	3	70	0	INDX	FOOT	1	0	0	0	60			40
15 0404	10/13/1983	0.0	0.5	0.5	0	0	0	80	0	INDX	FOOT								40
15 0404	10/13/1983	0.5	1.0	0.5	0	0	0	80	0	INDX	FOOT								40
15 0404	9/7/1984	0.2	0.6	0.4	0	0	0	95		INDX	FOOT					20	33	60	40
15 0405	10/6/1983	0.0	0.3	0.3	0	0	0	70		SUPP	FOOT								40
15 0405	10/13/1983	0.0	0.3	0.3	0	0	0	80	0	SUPP	FOOT								40
15 0407	10/13/1983	0.0	0.8	0.8	0	0	0	80	0	SUPP	FOOT								40
15 0412	9/18/1968	0.0	0.8	0.8	14	0	14		35	INDX	FOOT					23	13		
15 0412	9/24/1970	0.0	0.8	0.8	21	0	21	99		INDX	FOOT	1	0	0	0	13	23		
15 0412	10/9/1970	0.0	0.8	0.8	22	2	24	90	39	INDX	FOOT					20	13		
15 0412	9/22/1971	0.0	0.8	0.8	38	2	40	95		INDX	FOOT					20	13		
15 0412	10/5/1972	0.0	0.8	0.8	93	8	101	95		INDX	FOOT					20	13		
15 0412	10/18/1973	0.0	0.2	0.2	0	63	63	95		INDX	FOOT					12	00		
15 0412	9/10/1974	0.0	1.1	1.1	0	0	0	95		SUPP	FOOT					13	20		
15 0412	9/19/1974	0.0	1.1	1.1	0	0	0	95	0	SUPP	FOOT					57			
15 0412	10/1/1974	0.1	0.0	0.0	0	0	0	99		SPOT	FOOT	4	0	0	0	60			
15 0412	10/28/1974	0.0	1.2	1.2	0	0	0	0	1	SUPP	FOOT	6	0	0	0	41	59	60	
15 0412	9/30/1975	0.0	1.1	1.1	124	23	147	85		INDX	FOOT								
15 0412	10/14/1975	0.0	1.1	1.1	7	39	46	80		INDX	FOOT								
15 0412	9/8/1976	0.0	1.0	1.0	2	0	2	90	7	INDX	FOOT					20			
15 0412	9/17/1976	0.0	1.1	1.1	41	4	45	90	27	INDX	FOOT								
15 0412	9/27/1976	0.0	1.0	1.0	96	19	115	90		INDX	FOOT								
15 0412	10/3/1977	0.4	0.5	0.1	0	0	0	90		SUPP	FOOT					21			
15 0412	9/13/1978	0.0	1.1	1.1	16	0	16	95		INDX	FOOT					60			
15 0412	10/9/1978	0.0	1.1	1.1	0	8	8	95		INDX	FOOT	1	0	0	0	20			
15 0412	9/27/1979	0.1	1.3	1.2	3	3	6	99		INDX	FOOT	3	0	0	0	20			
15 0412	9/17/1980	0.0	1.1	1.1	0	0	0	95		INDX	FOOT					60			
15 0412	9/27/1980	0.0	1.1	1.1	2	0	2	90		INDX	FOOT								
15 0412	9/9/1981	0.0	1.1	1.1	0	1	1	95	6	INDX	FOOT					20			40
15 0412	9/23/1981	0.0	1.1	1.1	0	0	0	98		INDX	FOOT					11	20		40
15 0412	10/6/1981	0.0	0.5	0.5	0	0	0	5		INDX	FOOT					00	29	34	40
15 0412	10/14/1981	0.0	1.1	1.1	0	0	0	99		INDX	FOOT					11	20		40
15 0412	10/27/1981	0.0	1.1	1.1	0	0	0	50		INDX	FOOT					24	33	34	40
15 0412	10/18/1982	0.4	0.8	0.4	0	0	0	95		INDX	FOOT	0	0	0	0	20	33	60	
15 0412	10/26/1982	0.1	1.1	1.0	0	0	0	90		INDX	FOOT	0	0	0	0	21	33	38	
15 0412	9/22/1983	0.0	1.5	1.5	0	0	0	90	0	INDX	FOOT					42	20	60	40
15 0412	10/5/1983	0.0	2.0	2.0	0	0	0	90	0	INDX	FOOT					60			40
15 0412	10/5/1983	0.1	1.1	1.0	0	0	0	95		INDX	FOOT					20	48		
15 0412	10/12/1983	0.0	2.0	2.0	0	0	0	80	0	INDX	FOOT					60			40
15 0412	9/7/1984	0.2	1.2	1.0	0	0	0	95		INDX	FOOT					20	33	60	40
15 0412	9/18/1984	0.0	1.0	1.0	0	0	0	95	2	INDX	FOOT					13	48	60	
15 0412	9/26/1984	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					20			
15 0412	10/3/1984	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0412	10/10/1984	0.0	1.0	1.0	1	0	1	99		INDX	FOOT					20			
15 0412	10/16/1984	0.0	1.1	1.1	0	0	0	99		INDX	FOOT					20			
15 0412	10/23/1984	0.0	1.1	1.1	0	0	0	99		INDX	FOOT					20			
15 0412	10/30/1984	0.0	1.0	1.0	0	0	0	90		INDX	FOOT	4	0	0	0	60	41		
15 0412	10/30/1984	0.0	1.1	1.1	1	0	1	99		SUPP	FOOT					20			
15 0412	10/1/1985	0.0	0.8	0.8	0	0	0	99		INDX	FOOT					20			
15 0412	10/9/1985	0.0	1.1	1.1	0	0	0	99		INDX	FOOT					20			
15 0412	10/29/1985	0.0	1.1	1.1	0	0	0	90		INDX	FOOT					26			
15 0412	9/18/1986	0.1	1.1	1.0	0	0	0	99		INDX	FOOT					20	60		
15 0412	9/25/1986	0.0	1.0	1.0	0	0	0	95		INDX	FOOT								
15 0412	10/6/1986	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					20			
15 0412	10/17/1986	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			
15 0412	9/24/1987	0.0	1.0	1.0	0	0	0	90	0	INDX	FOOT					20			
15 0412	10/6/1987	0.0	1.0	1.0	0	0	0	95	1	INDX	FOOT					20			
15 0412	10/22/1987	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			
15 0412	9/9/1988	1.0			0	0	0	99		SPOT	FOOT					20	60		
15 0412	9/22/1988	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					20			
15 0412	10/3/1988	0.0	1.0	1.0	0	0	0	95		INDX	FOOT								
15 0412	10/12/1988	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20			
15 0412	10/20/1988	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20			
15 0412	10/31/1988	0.0	1.0	1.0	0	0	0	95		INDX	FOOT						61		
15 0412	10/18/1989	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					20			
15 0412	9/26/1990	0.0	1.0	1.0	0	0	0	90		INDX	FOOT	4	0	0	0	20	60		
15 0412	10/26/1990	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					21			
15 0412	10/9/1991	0.2	0.2	0.0	0	0	0	95		SPOT	FOOT					20	65		
15 0412	10/18/1991	0.2	0.2	0.0	0	0	0	95		SPOT	FOOT					60	20		
15 0412	10/28/1991	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20			
15 0412	9/2/1992	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	48	60	
15 0412	9/23/1992	0.0	0.1	0.1	0	0	0	90		SPOT	FOOT	1	0	0	0	20	60		
15 0412	10/8/1992	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20	48	60	
15 0412	9/15/1993	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					20	48	60	
15 0412	10/5/1993	0.0	1.0	1.0	0	0	0	99		INDX	FOOT	0	0	0	0	20	48	60	
15 0412	10/22/1993	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					48	60	65	
15 0412	9/14/1994	0.0	0.6	0.6	0	0	0	95		INDX	FOOT					20	60	48	
15 0412	9/26/1994	0.0	0.6	0.6	0	0	0	95		INDX	FOOT					00	48	60	
15 0412	10/14/1994	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	60		
15 0412	8/30/1995	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					00	20	60	
15 0412	9/13/1995	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					20	60		
15 0412	9/26/1995	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	60		
15 0412	10/17/1995	0.0	1.0	1.0	0	0	0	55		INDX	FOOT					25	60		
15 0412	9/6/1996	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	48	60	
15 0412	9/16/1996	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	7	0	0	0	20	48	60	
15 0412	10/15/1996	0.0	1.0	1.0	0	0	0	90		INDX	FOOT	4	0	0	0	20	48	60	
15 0412	10/30/1996	0.0	1.0	1.0	786	2	788	90		INDX	FOOT	4	0	0	0	23			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0412	10/30/1996	1.0	2.0	1.0	474	3	477	90		SUPP	FOOT	4	0	0	0	23			
15 0412	9/8/1997	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	60	48	
15 0412	9/29/1997	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	60		
15 0412	10/13/1997	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					20	60		
15 0412	10/27/1997	0.0	1.0	1.0	9	0	9	95		INDX	FOOT					20	60	61	
15 0412	9/4/1998	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	0	0	0	0	20	48	60	
15 0412	9/24/1998	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	0	0	0	0	20	60		
15 0412	10/8/1998	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	1	0	0	0	20	60		
15 0412	10/16/1998	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	0	0	0	0	20	60		
15 0412	10/26/1998	0.0	1.0	1.0	7	0	7	95		INDX	FOOT					48	20	60	
15 0413	10/14/1981	0.0	0.1	0.1	0	0	0	99		SUPP	FOOT					20			40
15 0413	10/27/1981	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					20			40
15 0413	10/5/1983	0.0	0.5	0.5	0	0	0	70		SUPP	FOOT								40
15 0413	10/12/1983	0.0	0.5	0.5	0	0	0	70	0	SUPP	FOOT								40
15 0414	9/30/1983	0.0	0.7	0.7	0	0	0	90	0	SUPP	FOOT					20	48	60	40
15 0414	10/5/1983	0.0	0.7	0.7	0	0	0	70	0	SUPP	FOOT								40
15 0414	10/12/1983	0.0	0.7	0.7	0	0	0	70	0	SUPP	FOOT								40
15 0420	10/1/1974	0.0	1.8	1.8	80	22	102	90	107	INDX	FOOT	1	0	0	0	60	07		
15 0420	10/26/1974	0.4	0.5	0.1	2	7	9	70		INDX	FOOT	0	0	0	0	65	00		
15 0420	9/15/1975	0.0	1.8	1.8	117	0	117	95	30	INDX	FOOT					20	13		
15 0420	9/30/1975	0.0	1.8	1.8	253	137	390	80		INDX	FOOT								
15 0420	10/14/1975	0.3	1.8	1.5	1	116	117	90		INDX	FOOT	1	0	0	0	12	20		
15 0420	10/7/1953	1.3	1.8	0.5			700			INDX	FOOT					60	00		
15 0420	10/30/1957	1.8	3.8	2.0	5	1	6			SUPP	FOOT	4	0	0	0	21	60		
15 0420	10/7/1959	0.3	1.8	1.5	921	1,170	2,091			INDX	FOOT	1	3	0	0	20	60		
15 0420	9/23/1960	0.3	1.8	1.5	564	16	580			INDX	FOOT					20	13		
15 0420	10/21/1960	0.3	1.8	1.5	190	633	823			INDX	FOOT					12	20	60	
15 0420	10/13/1961	0.3	1.8	1.5	103	35	138			INDX	FOOT	1	4	0	0	22			
15 0420	10/26/1961	0.3	1.8	1.5	52	32	84			INDX	FOOT	1	4	0	0	20	13		
15 0420	9/20/1962	0.3	1.8	1.5	387	4	391			INDX	FOOT	1	0	0	0	20	13		
15 0420	10/5/1962	0.3	1.8	1.5	693	446	1,139			INDX	FOOT	1	0	0	0	20	13		
15 0420	9/18/1963	0.3	1.8	1.5	102	13	115			INDX	FOOT	1	3	0	0	20	13		
15 0420	10/6/1964	0.3	1.8	1.5	703	963	1,666			INDX	FOOT	1	4	0	0	20	13		
15 0420	9/23/1965	0.3	1.8	1.5	727	142	869			INDX	FOOT	1	0	0	0	20	13		
15 0420	9/26/1966	0.3	1.8	1.5	375	30	405		25	INDX	FOOT					20	60		
15 0420	10/4/1966	0.3	1.8	1.5	202	260	462			INDX	FOOT	1	0	0	0	20	60	13	
15 0420	10/5/1967	0.3	1.8	1.5	638	697	1,335			INDX	FOOT	1	4	0	0	20	60	13	
15 0420	9/7/1968		0.0	0.0	75	0	75			SPOT	FOOT					20	13		
15 0420	9/18/1968	0.3	1.8	1.5	1,338	112	1,450			INDX	FOOT	1	0	0	0	24	13		
15 0420	9/27/1968	0.3	1.8	1.5	732	921	1,653			INDX	FOOT	1	0	0	0	23	13		
15 0420	9/25/1969	0.3	1.8	1.5	169	7	176	70		INDX	FOOT	1	0	0	0	21	13		
15 0420	9/24/1970	0.3	1.8	1.5	1,438	69	1,507	80		INDX	FOOT	1	0	0	0	22	13		
15 0420	10/9/1970	0.3	1.8	1.5	118	754	872	90		INDX	FOOT	1	0	0	0	20	13		
15 0420	9/22/1971	0.3	1.8	1.5	628	20	648	95		INDX	FOOT	1	0	0	0	23	51	13	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0420	9/30/1971	0.3	1.8	1.5	926	198	1,124	90		INDX	FOOT	1	4	0	0	20	13		
15 0420	9/27/1972	0.3	1.8	1.5	517	22	539	90		INDX	FOOT	1	4	0	0	20	13		
15 0420	10/5/1972	0.3	1.8	1.5	749	164	913	90		INDX	FOOT	1	4	0	0	20	13		
15 0420	9/27/1973	0.3	1.8	1.5	338	35	373	90		INDX	FOOT	0	0	0	0	13			
15 0420	10/18/1973	0.3	1.8	1.5	30	136	166	80		INDX	FOOT	4	0	0	0	13			
15 0420	9/10/1974	0.3	1.8	1.5	3	0	3	90		INDX	FOOT	0	0	0	0	13	20	31	
15 0420	9/19/1974	0.1	1.8	1.7	38	0	38	75	28	INDX	FOOT	0	0	0	0	40	07	60	
15 0420	9/8/1976	0.0	1.8	1.8	81	6	87	85	61	INDX	FOOT					20			
15 0420	9/17/1976	0.0	1.8	1.8	341	66	407	70	250	INDX	FOOT	4	0	0	0	60			
15 0420	9/27/1976	0.0	1.8	1.8	237	295	532	90		INDX	FOOT								
15 0420	9/27/1976	1.8	2.1	0.3	3	0	3	99	6	SUPP	FOOT								
15 0420	9/16/1977	0.0	0.9	0.9	132	2	134	90		SUPP	FOOT					60			
15 0420	10/3/1977	0.0	1.8	1.8	21	85	106	97		INDX	FOOT	1	0	0	0	11	20	60	
15 0420	10/12/1977	0.0	1.8	1.8	7	32	39	95		INDX	FOOT					20			
15 0420	9/13/1978	0.0	1.8	1.8	253	11	264	80		INDX	FOOT	1	4	0	0				
15 0420	9/27/1978	0.0	1.8	1.8	89	81	170	80		INDX	FOOT	1	4	0	0				
15 0420	10/9/1978	0.0	1.8	1.8	10	141	151	85		INDX	FOOT	1	0	0	0	20	60		
15 0420	9/27/1979	0.0	0.5	0.5	9	15	24	98		INDX	FOOT	1	0	0	0	60			
15 0420	10/18/1979	0.0	1.8	1.8	15	10	25	75		INDX	FOOT	1	4	0	0	20	31		
15 0420	9/8/1980	0.2	1.8	1.6	3	0	3	80	2	INDX	FOOT								
15 0420	9/17/1980	0.0	1.8	1.8	58	3	61	90		INDX	FOOT	4	0	0	0				
15 0420	10/3/1980	0.2	1.8	1.6	2	27	29	80		INDX	FOOT	4	0	0	0				
15 0420	10/23/1980	0.0	1.8	1.8	13	26	39	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/29/1980	0.0	1.8	1.8	0	2	2	90		INDX	FOOT	4	0	0	0	20			
15 0420	9/9/1981	0.0	1.8	1.8	10	3	13	98		INDX	FOOT					20			40
15 0420	9/15/1981	0.0	1.3	1.3	6	3	9	85	6	INDX	FOOT					20	41	40	40
15 0420	9/22/1981	0.3	1.0	0.7	11	1	12	95		INDX	FOOT	1	0	0	0	00	20		40
15 0420	9/24/1981	0.0	1.8	1.8	10	0	10	98		INDX	FOOT	1	0	0	0	20	60		
15 0420	10/2/1981	3.0	3.2	0.2	0	0	0	85		SUPP	FOOT					20			
15 0420	10/6/1981	1.0	3.2	2.0	0	0	0	40		INDX	FOOT					00	24	34	40
15 0420	10/7/1981	0.0	1.0	1.0	0	0	0	60		INDX	FOOT					00	24		40
15 0420	10/13/1981	0.3	2.8	2.5	3	0	3	80		SUPP	FOOT								40
15 0420	10/16/1981	0.0	1.8	1.8	16	6	22	75		INDX	FOOT	0	0	0	4				
15 0420	10/27/1981	0.3	3.4	3.1	1	0	1	30		INDX	FOOT	4	0	0	0	06	30	34	40
15 0420	10/28/1981	0.3	0.0	0.0	0	0	0	0		SPOT	FOOT					28	39		
15 0420	9/13/1982	0.0	0.2	0.2	0	0	0	95		SUPP	FOOT	1	0	0	0	20			
15 0420	10/4/1982	0.0	1.8	1.8	4	3	7	90		INDX	FOOT	1	4	0	0	20			
15 0420	10/14/1982	0.0	1.8	1.8	3	7	10	90		INDX	FOOT	0	0	1	4	20	31	33	
15 0420	10/19/1982	0.0	1.8	1.8	3	0	3	85		INDX	FOOT	0	0	1	4	20	33	31	
15 0420	10/26/1982	0.0	1.8	1.8	0	4	4	60		INDX	FOOT	4	0	0	0	24	31	33	
15 0420	9/20/1983	0.0	1.8	1.8	4	0	4	90		INDX	FOOT	1	0	0	0	20			
15 0420	9/28/1983	0.1	1.8	1.7	3	1	4	95		INDX	FOOT	1	0	0	0	20			
15 0420	10/3/1983	0.3	1.8	1.5	3	2	5	80	0	INDX	FOOT	1	4	0	0	20	51	60	40
15 0420	10/5/1983	0.1	1.8	1.7	7	2	9	90		INDX	FOOT	1	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souoe - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0420	10/9/1983	0.0	1.8	1.8	3	3	6	70	0	INDX	FOOT	4	0	0	0				40
15 0420	10/18/1983	0.1	1.8	1.7	3	3	6	95		INDX	FOOT	4	0	0	0	20			
15 0420	10/25/1983	0.1	1.8	1.7	0	1	1	85		INDX	FOOT	0	0	0	4	20	31	51	
15 0420	10/31/1983	0.0	3.2	3.2	5	1	6	60		INDX	FOOT	4	0	0	0				40
15 0420	9/11/1984	0.0	1.8	1.8	2	0	2	95		INDX	FOOT	1	0	0	0	20			
15 0420	9/14/1984	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					20			40
15 0420	9/20/1984	0.0	1.8	1.8	19	1	20	90		INDX	FOOT	1	0	0	0	20			
15 0420	9/26/1984	0.0	1.8	1.8	4	0	4	90		INDX	FOOT	4	0	0	0	20			
15 0420	9/26/1984	0.0	1.8	1.6	13	2	15	95		INDX	FOOT	4	0	0	0	20			40
15 0420	10/3/1984	0.0	1.8	1.8	8	10	18	90		INDX	FOOT	1	4	0	0	20			
15 0420	10/10/1984	0.0	1.8	1.8	14	0	14	40		INDX	FOOT	1	4	0	0	24			
15 0420	10/14/1984	0.0	1.8	1.8	5	2	7	85	0	INDX	FOOT	1	4	0	0	20	31	60	40
15 0420	10/16/1984	0.0	1.8	1.8	5	2	7	65		INDX	FOOT	4	0	0	0	23			
15 0420	10/22/1984	0.0	0.9	0.9	0	2	2	90	0	INDX	FOOT	4	0	0	0	20	33	60	40
15 0420	10/23/1984	0.0	1.8	1.8	1	1	2	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/29/1984	0.0	0.9	0.9	2	3	5	90		INDX	FOOT	4	0	0	0	20			40
15 0420	10/30/1984	0.0	1.8	1.8	0	1	1	70		INDX	FOOT	4	0	0	0	31			
15 0420	9/23/1985	0.0	1.8	1.8	11	1	12	90		INDX	FOOT	1	4			20			
15 0420	10/1/1985	0.0	1.8	1.8	9	1	10	90		INDX	FOOT	1	4			20			
15 0420	10/9/1985	0.0	1.8	1.8	0	2	2	90		INDX	FOOT	1	4			20			
15 0420	10/17/1985	0.0	1.8	1.8	0	0	0	90		INDX	FOOT	1	3	4		20	50		
15 0420	10/29/1985	0.0	1.8	1.8	0	0	0	65		INDX	FOOT					26	31		
15 0420	9/10/1986	0.4			0	0	0	90		SPOT	FOOT								
15 0420	9/18/1986	0.3	1.8	1.5	1	0	1	99		INDX	FOOT	4	0	0	0	20			
15 0420	9/25/1986	0.3	1.8	1.5	12	0	12	95		INDX	FOOT	4	0	0	0				
15 0420	10/8/1986	0.0	1.8	1.8	7	1	8	95		INDX	FOOT	1	4	0	0	20			
15 0420	10/17/1986	0.0	1.8	1.8	0	3	3	90		INDX	FOOT	1	4	0	0	20			
15 0420	10/28/1986	0.0	1.8	1.8	0	0	0	70		INDX	FOOT	4	0	0	0	21	31		
15 0420	9/24/1987	0.3	1.8	1.5	0	2	2	90	16	INDX	FOOT	1	4	0	0	20	60	01	
15 0420	10/6/1987	0.3	1.8	1.5	1	3	4	90		INDX	FOOT	1	4	0	0	20			
15 0420	10/22/1987	0.3	1.8	1.5	3	2	5	90		INDX	FOOT	1	4			20			
15 0420	9/9/1988	0.0	1.8	1.8	2	0	2	95		INDX	FOOT					20	60		
15 0420	9/22/1988	0.3	1.8	1.5	8	1	9	90		INDX	FOOT	1	4	0	0	20			
15 0420	10/3/1988	0.3	1.8	1.5	7	3	10	90		INDX	FOOT	1	4	0	0	61			
15 0420	10/12/1988	0.3	1.8	1.5	5	8	13	90		INDX	FOOT	1	4	0	0	20	61		
15 0420	10/20/1988	0.3	1.8	1.5	52	7	59	90		INDX	FOOT	1	4	0	0	20	61		
15 0420	10/31/1988	0.3	1.8	1.5	37	2	39	90		INDX	FOOT	4	0	0	0	20	61		
15 0420	9/15/1989	0.3	1.8	1.5	0	0	0			INDX	FOOT					20	60		
15 0420	9/25/1989	0.3	1.8	1.5	1	0	1	85		INDX	FOOT	4	0	0	0	20	60		
15 0420	10/5/1989	0.2	1.8	1.6	2	0	2	90		INDX	FOOT	1	4	0	0	20	60		
15 0420	10/18/1989	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/30/1989	0.0	2.1	2.1	8	1	9	80		INDX	FOOT	4	0	0	0	21			
15 0420	9/26/1990	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/8/1990	0.3	1.8	1.5	0	0	0	90		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0420	10/26/1990	0.0	1.8	1.8	0	0	0	70		INDX	FOOT					24			
15 0420	10/9/1991	0.3	1.8	1.5	28	3	31	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/18/1991	0.1	1.8	1.7	5	0	5	90		INDX	FOOT	4	0	0	0	20	60		
15 0420	10/25/1991	0.0	1.8	1.8	0	0	0	80		INDX	FOOT	4	0	0	0	20			
15 0420	10/28/1991	0.0	1.3	1.3	0	0	0	80		INDX	FOOT	4	0	0	0	00	20		
15 0420	10/28/1991	0.3	1.8	1.5	18	0	18	75		INDX	FOOT	4	0	0	0	20	60	61	
15 0420	9/2/1992	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20			
15 0420	9/14/1992	0.3	1.8	1.5	0	0	0	90		INDX	FOOT					20	60	61	
15 0420	9/22/1992	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20	60	61	
15 0420	10/2/1992	0.3	1.8	1.5	0	0	0	90		INDX	FOOT					20			
15 0420	10/8/1992	0.0	1.0	1.0	0	0	0	90		INDX	FOOT	0	0	1	4	20	48	60	
15 0420	10/16/1992	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	4	0	0	0	00	20	60	
15 0420	10/23/1992	0.3	1.8	1.5	21	0	21	90		INDX	FOOT	0	0	0	4	23	60	61	
15 0420	9/15/1993	0.3	1.8	1.5	0	0	0	95		INDX	FOOT					20	60		
15 0420	9/27/1993	0.3	1.8	1.5	0	0	0	95		INDX	FOOT	0	0	0	0	31	60	61	
15 0420	10/5/1993	0.0	1.8	1.8	0	0	0	95		INDX	FOOT	0	0	0	0	20	31	60	
15 0420	10/13/1993	0.3	1.8	1.5	0	1	1	95		INDX	FOOT	0	0	0	4	20	48	61	
15 0420	10/22/1993	0.3	1.0	0.7	0	0	0	95		INDX	FOOT	0	0	0	4	20	60	65	
15 0420	9/14/1994	0.3	1.8	1.5	0	0	0	90		INDX	FOOT					20	60		
15 0420	9/26/1994	0.3	1.8	1.5	0	0	0	95		INDX	FOOT					20	47	60	
15 0420	10/14/1994	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20	60		
15 0420	9/13/1995	0.3	1.8	1.5	0	0	0	90		INDX	FOOT					20	60		
15 0420	9/28/1995	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20	60		
15 0420	10/17/1995	0.3	1.8	1.5	0	0	0	60		INDX	FOOT	4	0	0	0	24	60		
15 0420	9/6/1996	0.3	1.8	1.5	0	0	0	95		INDX	FOOT	7	0	0	0	20	47	60	
15 0420	9/16/1996	0.3	1.8	1.5	0	0	0	95		INDX	FOOT	7	0	0	0	20			
15 0420	9/23/1996	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0420	10/4/1996	0.3	1.8	1.5	0	0	0	85		INDX	FOOT					20	34		
15 0420	10/15/1996	0.3	1.8	1.5	23	1	24	80		INDX	FOOT	4	0	0	0	23	60	61	
15 0420	10/30/1996	0.3	1.8	1.5	1,196	9	1,205	85		INDX	FOOT	4	0	0	0	23	31	33	
15 0420	9/8/1997	0.3	1.8	1.5	6	0	6	90		INDX	FOOT	1	4	0	0	20	60	61	
15 0420	9/29/1997	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	1	4	0	0	20	60	31	
15 0420	9/29/1997	0.6	1.8	1.2	0	1	1			SUPP	FOOT	4	6	0	0	21	31	51	
15 0420	10/13/1997	0.3	1.8	1.5	38	0	38	90		INDX	FOOT	1	3	4	0	23	60	61	
15 0420	10/20/1997	0.6	1.8	1.2	8	0	8			SUPP	FOOT	4	0	0	0	24	33		
15 0420	10/27/1997	0.3	1.8	1.5	35	0	35	90		INDX	FOOT	4	0	0	0	20	60	61	
15 0420	9/4/1998	0.3	1.8	1.5	0	0	0	95		INDX	FOOT	4	0	0	0	20			
15 0420	9/15/1998	0.3	1.8	1.3	0	0	0	95		INDX	FOOT	1	0	0	0	20			
15 0420	9/24/1998	0.3	1.8	1.5	9	0	9	95		INDX	FOOT	4	1	0	0	20	60	61	
15 0420	10/8/1998	0.3	1.8	1.5	2	1	3	90		INDX	FOOT	4	1	0	0	20	60	61	
15 0420	10/16/1998	0.3	1.8	1.5	3	1	4	90		INDX	FOOT	1	4	0	0	20	61		
15 0420	10/26/1998	0.3	1.8	1.5	40	1	41	95		INDX	FOOT	1	4	0	0	60	20		
15 0421	10/13/1981	0.0	0.3	0.3	0	0	0	99		SUPP	FOOT					20			40
15 0421	10/27/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0421	10/30/1989	0.0	0.5	0.5	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0421	10/28/1991	0.0	0.5	0.5	0	0	0	90		INDX	FOOT					20	60		
15 0421	10/30/1996	0.0	0.5	0.5	83	3	86	95		INDX	FOOT					20			
15 0421	10/27/1997	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					20			
15 0424	10/6/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT					11	23	42	40
15 0424	10/27/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	20		40
15 0424	10/30/1989	0.0	0.5	0.5	0	0	0	99		INDX	FOOT					20			
15 0424	10/27/1997	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					20			
15 0426	9/30/1981	0.0	0.2	0.2	0	0	0	95		SUPP	FOOT					11	20	41	40
15 0426	10/6/1981	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					11	20	34	40
15 0426	10/27/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT					20	57		40
15 0439	9/18/1986	0.0		0.0						SPOT	FOOT					54	60		
15 0439	10/30/1989	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					54			
15 0445	9/27/1981	0.0	0.5	0.5	0	0	0	99		INDX	FOOT					20			40
15 0445	10/5/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	20	43	40
15 0445	10/19/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	20		40
15 0445	10/28/1981	0.0	0.3	0.3	0	0	0	99		SUPP	FOOT	4	0	0	0	20	43	60	40
15 0445	10/25/1983	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			40
15 0445	10/17/1985	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					20			
15 0445	10/30/1989	0.0	0.5		0	0	0	90		INDX	FOOT					20			
15 0446	10/7/1952			0.5			24				FOOT					64	60		
15 0446	10/10/1952	2.9	3.4	0.5	75	150	225			SUPP	FOOT					13	20		
15 0446	10/7/1959	6.5	7.5	1.0	0	0	0			INDX	FOOT					20	13		
15 0446	10/5/1967	3.2	3.4	0.2	228	50	278			SUPP	FOOT	1	4	0	0	13	20	60	
15 0446	10/9/1967	3.4	7.3	3.9	400	1,055	1,455			SUPP	FOOT	1	4	0	0	13	20	60	
15 0446	10/24/1968	2.0	2.5	0.5	37	22	59			SUPP	FOOT	1	0	0	0	13			
15 0446	10/31/1968	0.0	0.2	0.2	200	16	216			INDX	FOOT					20	15	01	
15 0446	10/31/1968	6.5	7.5	1.0	6	41	47			INDX	FOOT	4	0	0	0	20			
15 0446	9/24/1970	3.0	4.0	1.0	337	26	363	90		SUPP	FOOT	1	4	0	0	23	13		
15 0446	10/9/1970	2.0	2.5	0.5	21	107	128	90		SUPP	FOOT	1	0	0	0	20	13		
15 0446	9/30/1971	3.0	4.0	1.0	360	29	389	90		SUPP	FOOT					13			
15 0446	9/27/1972	1.9	3.1	1.2	951	8	959	90		SUPP	FOOT	1	4	0	0	20	13		
15 0446	10/5/1972	0.0	1.9	1.9	1,099	116	1,215	85		SUPP	FOOT	1	4	0	0	21	13		
15 0446	9/27/1973	6.5	7.5	1.0	333	15	348	98		INDX	FOOT	1	0	0	0				
15 0446	9/10/1974	1.8	2.0	0.2	0	0	0	90	0	SUPP	FOOT	0	0	0	0	13	20	60	
15 0446	9/19/1974	0.3	2.3	2.0	46	0	46	60	30	SUPP	FOOT	0	0	0	0	31	60		
15 0446	10/1/1974	0.8	3.7	2.9	370	17	387	85	156	SUPP	FOOT	1	0	0	0	60			
15 0446	10/25/1974	0.0	0.3	0.3	0	0	0	95		INDX	HELI	0	0	0	0	14	11	01	
15 0446	10/25/1974	0.2	3.7	3.5	52	52	104	75		SUPP	FOOT	4	0	0	0	20	31	60	
15 0446	9/15/1975	0.4	3.7	3.3	127	1	128	75	21	SUPP	FOOT					13	20	46	
15 0446	9/30/1975	0.0	3.7	3.7	744	188	932	80		SUPP	FOOT								
15 0446	10/14/1975	0.3	3.7	3.4	25	207	232	60		INDX	FOOT	1	0	0	0	12	23	31	
15 0446	9/8/1976	0.0	3.7	3.7	198	0	198	85	55	INDX	FOOT					20	60		
15 0446	9/17/1976	0.4	3.7	3.3	693	60	753	70		INDX	FOOT					31			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0446	9/27/1976	0.4	3.7	3.4	832	447	1,279	75		INDX	FOOT								
15 0446	9/27/1976	3.7	7.5	3.8	52	360	412	90	178	SUPP	FOOT					20			
15 0446	10/13/1976	0.4	5.3	4.9	338	1,436	1,774	90		INDX	FOOT	1	4	0	0	20	61		
15 0446	9/16/1977	0.0	0.0	0.0	30	0	30			SPOT	FOOT								
15 0446	9/26/1977	0.0	2.3	2.3	499	6	505	80		INDX	FOOT	1	4	0	0	20	60		
15 0446	10/5/1977	0.3	3.7	3.4	147	45	192	85		INDX	FOOT	1	4	0	0				
15 0446	10/12/1977	0.0	2.3	2.3	33	25	58	80		INDX	FOOT	4	0	0	0	21	60		
15 0446	9/27/1978	0.3	3.7	3.4	138	17	155	85		INDX	FOOT	1	4	0	0	60			
15 0446	9/27/1979	1.9	0.0	0.0	6	0	6			SPOT	FOOT					60			
15 0446	10/2/1979	0.0	2.3	2.3	69	26	95	90		INDX	FOOT	1	4	0	0	60			
15 0446	10/18/1979	0.2	2.3	2.1	22	6	28	80		INDX	FOOT	4	0	0	0	21	60		
15 0446	10/3/1980	0.2	2.7	2.5	77	7	84	70		INDX	FOOT	4	0	0	0				
15 0446	10/16/1980	0.2	2.7	2.5	45	51	96	90		INDX	FOOT	4	0	0	0	20			
15 0446	10/23/1980	0.2	2.7	2.5	35	72	107	90		INDX	FOOT	4	0	0	0	20			
15 0446	10/29/1980	0.3	2.7	2.4	83	29	112	85		INDX	FOOT	4	0	0	0	20			
15 0446	9/22/1981	0.0	3.7	3.7	53	0	53	80	14	INDX	FOOT					42	20	72	40
15 0446	9/24/1981	0.0	0.0	0.0	0	0	0	99		SPOT	FOOT					20	60	65	
15 0446	9/24/1981	0.2	0.0	0.0	20	0	20	95		SPOT	FOOT	4	0	0	0	20	60	65	
15 0446	9/24/1981	1.9	0.0	0.0	1	0	1	99		SPOT	FOOT					20	60	65	
15 0446	9/24/1981	2.9	0.0	0.0	0	0	0	99		SPOT	FOOT					20	60	65	
15 0446	10/6/1981	0.0	1.7	1.7	0	0	0	10		INDX	FOOT					00	27	34	40
15 0446	10/14/1981	0.2	3.7	3.5	23	2	25	60		INDX	FOOT	4	0	0	0	00	23	31	40
15 0446	10/16/1981	0.2	2.3	2.1	77	10	87	80		INDX	FOOT	0	0	0	4				
15 0446	10/20/1981	1.5	4.5	3.0	25	4	29	80	6	INDX	FOOT	4	0	0	0	00	06	20	40
15 0446	10/26/1981	1.5	4.5	3.0	15	7	22	80	5	INDX	FOOT	4	0	0	0	00	06	20	40
15 0446	10/28/1981	0.3	0.0	0.0	0	0	0	0		SPOT	FOOT					28	39		
15 0446	9/13/1982	0.2	0.0	0.0	0	0	0	95		SPOT	FOOT					20			
15 0446	10/4/1982	0.1	2.3	2.2	52	13	65	90		INDX	FOOT	1	4	0	0	20			
15 0446	10/12/1982	0.0	2.3	2.3	12	5	17	90		INDX	FOOT	1	4	0	0	23	33	31	
15 0446	10/21/1982	0.3	3.7	3.4	9	9	18	75		INDX	FOOT	0	0	1	4	60	34	24	
15 0446	10/27/1982	0.3	2.3	2.0	2	2	4	85		INDX	FOOT	4	0	0	0	33	31	23	
15 0446	9/3/1983	0.3	0.0	0.0	0	0	0	70		SPOT	FOOT					60			
15 0446	9/20/1983	0.3	0.0	0.0	2	0	2	80		SPOT	FOOT					20			
15 0446	9/27/1983	0.0	3.7	3.7	20	3	23	60	0	INDX	FOOT	4	0	0	0	20			40
15 0446	9/28/1983	0.2	2.7	2.5	31	3	34	90		INDX	FOOT	1	0	0	0	20	31	53	
15 0446	10/4/1983	0.0	3.7	3.7	28	7	35	70	19	INDX	FOOT	4	0	0	0	21	60		40
15 0446	10/5/1983	0.2	2.7	2.5	59	4	63	85		INDX	FOOT					20			
15 0446	10/11/1983	0.0	3.7	3.7	27	4	31	80		INDX	FOOT	4	0	0	0	20			40
15 0446	10/18/1983	0.0	3.7	3.7	3	5	8	80	0	INDX	FOOT	4	0	0	0	20	60		40
15 0446	10/18/1983	0.2	2.7	2.5	0	2	2	85		INDX	FOOT	4	0	0	0	20			
15 0446	10/25/1983	0.0	3.7	3.7	2	2	4	80		INDX	FOOT	4	0	0	0	20	60		40
15 0446	10/25/1983	0.2	2.7	2.5	0	1	1	85		INDX	FOOT	4	0	0	0	20			
15 0446	9/11/1984	0.2	2.3	2.1	5	0	5	95		INDX	FOOT					20			
15 0446	9/14/1984	0.2	1.5	1.3	2	0	2	95		INDX	FOOT	4	0	0	0	20			40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0446	9/20/1984	0.0	1.0	1.0	26	0	26	90		INDX	FOOT	4	0	0	0	20			
15 0446	9/26/1984	0.0	1.0	1.0	33	1	34	90		INDX	FOOT	4	0	0	0	20			
15 0446	9/28/1984	0.3	1.5	1.2	43	2	45	80		INDX	FOOT	4	0	0	0	20	31	60	40
15 0446	9/28/1984	1.5	2.5	1.0	29	1	30	90		INDX	FOOT	1	4	0	0	20	31	60	40
15 0446	10/5/1984	0.1	2.3	2.2	81	20	101	90		INDX	FOOT	4	0	0	0	20			
15 0446	10/8/1984	0.0	3.7	3.7	40	35	75	90		INDX	FOOT	4	0	0	0	20			40
15 0446	10/10/1984	0.3	3.7	3.4	25	11	36	35		INDX	FOOT	1	4	0	0	34	60		40
15 0446	10/11/1984	0.1	2.3	2.2	33	19	52	75		INDX	FOOT	1	4	0	0	23			
15 0446	10/15/1984	0.0	3.7	3.7	10	19	29	95		INDX	FOOT	4	0	0	0	60			40
15 0446	10/16/1984	0.0	2.3	2.3	8	23	31	80		INDX	FOOT	1	4	0	0	23			
15 0446	10/22/1984	0.2	1.5	1.3	14	15	29	90		INDX	FOOT	4	0	0	0	20			40
15 0446	10/22/1984	1.5	3.7	2.2	1	3	4	90		INDX	FOOT	4	0	0	0	20	60		40
15 0446	10/23/1984	0.0	2.3	2.3	23	14	37	90		INDX	FOOT	4	0	0	0	20			
15 0446	10/29/1984	0.0	1.5	1.5	48	4	52	90		INDX	FOOT	4	0	0	0	20			40
15 0446	10/29/1984	1.5	3.7	2.2	1	3	4	90		INDX	FOOT	4	0	0	0	20			40
15 0446	9/23/1985	0.0	0.5	0.5	73	2	75	90		INDX	FOOT					20			
15 0446	10/1/1985	0.0	2.3	2.3	31	6	37	90		INDX	FOOT			1	4	20			
15 0446	10/9/1985	0.3	2.3	2.0	27	5	32	90		INDX	FOOT	1	4			20			
15 0446	10/17/1985	0.5	1.8	1.3	3	6	9	75		INDX	FOOT	1	4			23			
15 0446	9/10/1986	2.2	3.3	1.1	0	0	0	90		SUPP	FOOT					60			
15 0446	9/18/1986	0.2	2.3	2.1	5	0	5	95		INDX	FOOT					20	60		
15 0446	9/25/1986	0.2	1.8	1.6	40	1	41	90		INDX	FOOT								
15 0446	10/3/1986	0.3	2.3	2.0	50	16	66	90		INDX	FOOT	4	0	0	0	20			
15 0446	10/10/1986	0.2	2.3	2.1	38	10	48	90		INDX	FOOT	1	4	0	0	20	48	60	
15 0446	10/17/1986	0.2	2.3	2.1	8	6	14	90		INDX	FOOT	4	1	0	0	20			
15 0446	10/28/1986	0.2	2.3	2.1	11	2	13	70		INDX	FOOT	4	0	0	0	21	31		
15 0446	9/16/1987	0.2	2.3	2.1	4	2	6	90		INDX	FOOT					20	60		
15 0446	9/24/1987	0.0	2.3	2.3	40	0	40	90		INDX	FOOT	4	0	0	0	20	60	61	
15 0446	10/6/1987	0.0	2.0	2.0	34	9	43	90		INDX	FOOT	4	0	0	0	20	60		
15 0446	10/22/1987	0.0	1.5	1.5	0	5	5	95		INDX	FOOT	4				20			
15 0446	9/9/1988	0.2			0	0	0	99		SPOT	FOOT					20	60		
15 0446	9/22/1988	0.3	2.6	2.3	30	3	33	90		INDX	FOOT	4	0	0	0	20	60	61	
15 0446	10/12/1988	0.0	2.6	2.6	40	69	109	85		INDX	FOOT	1	4	0	0	20	61		
15 0446	10/20/1988	0.0	2.6	2.6	17	23	40	80		INDX	FOOT	1	4	0	0	20	61		
15 0446	10/31/1988	0.0	2.6	2.6	54	16	70	90		INDX	FOOT	4	0	0	0	20	61		
15 0446	9/15/1989	0.0	2.6	2.6	0	0	0	80		INDX	FOOT					20	60		
15 0446	9/25/1989	0.0	2.6	2.6	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0446	9/29/1989	0.0	2.6	2.6	0	0	0			INDX	FOOT	4	0	0	0	20			
15 0446	10/5/1989	0.0	2.6	2.6	4	1	5	90		INDX	FOOT	1	4	0	0	20			
15 0446	10/18/1989	0.0	2.6	2.6	4	0	4	90		INDX	FOOT	4	0	0	0	20			
15 0446	9/26/1990	0.0	2.6	2.6	1	1	2	90		INDX	FOOT					20	60		
15 0446	10/8/1990	0.0	2.6	2.6	4	0	4	90		INDX	FOOT	4	0	0	0	20	61		
15 0446	10/26/1990	0.3	2.6	2.3	0	0	0	75		INDX	FOOT					23			
15 0446	10/9/1991	0.0	2.6	2.6	5	0	5	90		INDX	FOOT	3	4	0	0	20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0446	10/18/1991	0.3	2.6	2.3	0	0	0	85		INDX	FOOT	4	0	0	0	60	20		
15 0446	10/28/1991	0.0	2.6	2.6	0	0	0	90		INDX	FOOT	4	0	0	0	20			
15 0446	9/2/1992	0.2	2.6	2.4	0	0	0	95		INDX	FOOT					20			
15 0446	9/22/1992	0.1	2.6	2.5	0	0	0	90		INDX	FOOT					20	60		
15 0446	10/2/1992	0.2	2.6	2.4	0	0	0	90		INDX	FOOT					20			
15 0446	10/8/1992	0.0	2.6	2.6	0	0	0	90		INDX	FOOT					20	48	60	
15 0446	10/16/1992	0.0	1.7	1.7	0	0	0	95		INDX	FOOT					00	20	60	
15 0446	10/23/1992	0.0	1.7	1.7	20	0	20	85		INDX	FOOT	0	0	0	4	00	23	60	
15 0446	9/15/1993	0.0	1.5	1.5	0	0	0	95		INDX	FOOT					00	20	60	
15 0446	9/27/1993	0.0	1.2	1.2	0	0	0	95		INDX	FOOT	0	0	0	0	00	60	31	
15 0446	10/5/1993	0.0	1.2	1.2	0	0	0	95		INDX	FOOT	0	0	0	0	00	20	60	
15 0446	10/13/1993	0.0	1.2	1.2	0	0	0	95		INDX	FOOT	0	0	0	0	20	31	00	
15 0446	10/22/1993	0.0	1.9	1.9	0	0	0	90		INDX	FOOT	0	0	0	4	20	60		
15 0446	9/14/1994	0.0	2.6	2.6	0	0	0	95		INDX	FOOT					20	60		
15 0446	9/26/1994	0.0	2.6	2.6	0	0	0	90		INDX	FOOT	0	0	0	4	20	47	60	
15 0446	10/14/1994	0.0	2.6	2.6	0	0	0	95		INDX	FOOT					20	60		
15 0446	8/17/1995	0.0	2.6	2.6	0	0	0	85		INDX	FOOT	4	7	0	0	20	60		
15 0446	9/14/1995	0.0	2.6	2.6	0	0	0	90		INDX	FOOT					20	60		
15 0446	9/26/1995	0.0	2.6	2.6	0	0	0	90		INDX	FOOT	7	0	0	0	20	60		
15 0446	10/17/1995	0.2	2.6	2.4	3	0	3	70		INDX	FOOT	4	0	0	0	24	60	61	
15 0446	10/25/1995	0.0	2.6	2.6	32	0	32	70		INDX	FOOT	4				24	60	61	
15 0446	9/6/1996	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					20	65		
15 0446	9/16/1996	0.0	2.6	2.6	0	0	0	95		INDX	FOOT	7	0	0	0	20	48	60	
15 0446	9/23/1996	0.0	2.6	2.6	5	0	5	90		INDX	FOOT	4	7	0	0	20			
15 0446	10/4/1996	0.0	2.6	2.6	0	0	0	80		INDX	FOOT					20	60		
15 0446	10/15/1996	0.0	2.6	2.6	11	0	11	85		INDX	FOOT	4	8	0	0	20	60	61	
15 0446	9/8/1997	0.0			0	0	0	90		INDX	FOOT					00	20	60	
15 0446	10/17/1997	0.0	2.6	2.6	4	0	4	85		INDX	FOOT	4	0	0	0	23	60	61	
15 0446	9/4/1998	0.0	2.6	2.6	0	0	0	95		INDX	FOOT	4	0	0	0	20			
15 0446	9/15/1998	0.0	2.6	2.6	0	0	0	95		INDX	FOOT	4	0	0	0	20			
15 0446	9/24/1998	0.0	2.6	2.6	0	0	0	95		INDX	FOOT	0	0	0	0	20			
15 0446	10/8/1998	0.0	2.6	2.6	0	0	0	95		INDX	FOOT	4	1	0	0	20			
15 0446	10/16/1998	0.0	2.6	2.6	1	0	1	95		INDX	FOOT	4	0	0	0	20	61		
15 0446	10/28/1998	0.3	2.6	2.3	9	0	9	95		INDX	FOOT	4	0	0	0	20	60	61	
15 0446	10/16/1996	0.0	0.6	0.6	8	0	8	95		INDX	FOOT					20	60	61	
15 0461	10/29/1985	0.0	1.2	1.2	1	0	1	90		SUPP	FOOT	4	0	0	0				
15 0478	9/28/1983	0.0	0.5	0.5	0	0	0	95	0	INDX	FOOT					20			40
15 0483	10/18/1973	0.0	0.1	0.1	2	0	2	99		INDX	FOOT								
15 0488	10/26/1961	0.0	1.1	1.1	18	0	18			INDX	FOOT					20			
15 0488	10/31/1962	0.0	1.1	1.1	33	7	40			INDX	FOOT					20			
15 0488	10/29/1964	0.0	1.1	1.1	47	0	47			INDX	FOOT					20			
15 0488	10/24/1968	0.0	1.1	1.1	79	23	102			INDX	FOOT					20	60		
15 0488	10/29/1971	0.0	1.1	1.1	16	2	18	90		INDX	FOOT					20	51	60	
15 0488	10/15/1974	0.0	1.0	1.0	0	0	0	0	0	INDX	FOOT	0	0	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0488	10/28/1974	0.0	1.0	1.0	0	0	0	95		INDX	FOOT	0	0	0	0	57			
15 0488	10/24/1978	0.0	0.6	0.6	0	0	0	90		INDX	FOOT					20	60		
15 0488	9/18/1980	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					57			
15 0488	9/21/1981	0.0	1.1	1.1	0	0	0	95		INDX	FOOT					20			40
15 0488	10/5/1981	0.0	1.1	1.1	0	0	0	95		INDX	FOOT					11	21	34	40
15 0488	10/19/1981	0.0	1.1	1.1	0	0	0	99		INDX	FOOT					11	20		40
15 0488	10/20/1981	0.0	1.0	1.0	0	0	0	90		INDX	FOOT								
15 0488	10/26/1981	0.0	1.1	1.1	3	0	3	99		INDX	FOOT					20			40
15 0488	10/28/1981	0.0	1.0	1.0	19	4	23	90		INDX	FOOT								
15 0488	10/19/1982	0.0	0.6	0.6	0	0	0	95		INDX	FOOT	0	0	0	0	20	33	60	
15 0488	10/4/1983	0.0	0.5	0.5	0	0	0	95	0	INDX	FOOT								40
15 0488	10/11/1983	0.0	0.5	0.5	0	0	0	95	0	INDX	FOOT					20			40
15 0488	10/20/1983	0.0	0.5	0.5	0	0	0	95	0	INDX	FOOT					20			40
15 0488	10/25/1983	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					20			40
15 0488	10/10/1986	0.0	0.1	0.1	0	0	0	90		INDX	FOOT					20			
15 0488	10/18/1988	0.0	0.6	0.6	4	0	4	95		INDX	FOOT					20	61		
15 0488	10/28/1988	0.0	0.6	0.6	9	2	11	95		INDX	FOOT					20			
15 0488	10/23/1989	0.0	0.6	0.6	1	0	1	90		INDX	FOOT					20			
15 0488	10/16/1996	0.0	0.6	0.6	8	0	8	95		INDX	FOOT					20	60	61	
15 0488	10/25/1996	0.0	0.6	0.6	405	11	416	95		INDX	FOOT					20			
15 0488	10/22/1997	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					20	65		
15 0488	10/27/1997	0.0	0.6	0.6	0	0	0	95		INDX	FOOT					20			
15 0488	10/21/1998	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	0	0	0	0	20	00		
15 0488	10/28/1998	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					20			
15 0493	10/24/1968	0.0	0.8	0.8	521	86	607			INDX	FOOT					20			
15 0493	10/26/1970	0.0	0.8	0.8	831	92	923	98		INDX	FOOT					20			
15 0493	10/29/1971	0.0	0.9	0.9	958	147	1,105	90		INDX	FOOT					23	06		
15 0493	10/25/1972	0.0	0.3	0.3	691	70	761	99		INDX	FOOT	1	4	0	0	20	00		
15 0493	10/26/1973	0.0	0.8	0.8	96	17	113			INDX	FOOT								
15 0493	10/15/1974	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT	0	0	0	0	60			
15 0493	10/28/1974	0.0	0.8	0.8	202	17	219	98		INDX	FOOT					20			
15 0493	10/21/1975	0.0	0.8	0.8	0	0	0	90		INDX	FOOT					57			
15 0493	10/27/1976	0.0	0.9	0.9	388	30	418	99		INDX	FOOT								
15 0493	10/24/1978	0.0	0.8	0.8	101	12	113	90		INDX	FOOT					20	60		
15 0493	10/31/1978	0.0	0.8	0.8	307	21	328	95		INDX	FOOT					20			
15 0493	10/2/1979	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
15 0493	10/26/1979	0.0	0.8	0.8	16	0	16	90		INDX	FOOT								
15 0493	10/6/1980	0.0	0.8	0.8	0	0	0	99		INDX	FOOT						20		
15 0493	10/13/1980	0.0	0.3	0.3	4	1	5	95		SUPP	FOOT								
15 0493	10/16/1980	0.0	0.8	0.8	2	0	2	95		INDX	FOOT					20	57		
15 0493	10/23/1980	0.0	0.8	0.8	105	4	109	90		INDX	FOOT					20			
15 0493	9/21/1981	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					11	20		40
15 0493	9/27/1981	0.0	1.0	1.0	0	0	0	95		INDX	FOOT					23			40
15 0493	10/5/1981	0.0	0.8	0.8	0	1	1	95		INDX	FOOT					11	20	34	40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0493	10/19/1981	0.0	0.8	0.8	16	3	19	99		INDX	FOOT					11	20		40
15 0493	10/20/1981	0.0	0.8	0.8	0	0	0	95		INDX	FOOT								
15 0493	10/26/1981	0.0	0.8	0.8	156	10	166	99	13	INDX	FOOT					20			40
15 0493	10/28/1981	0.0	0.8	0.8	303	14	317	95		INDX	FOOT								
15 0493	10/5/1982	0.0	0.8	0.8	0	0	0	99		INDX	FOOT	0	0	0	0	20	33		
15 0493	10/19/1982	0.0	0.8	0.8	17	0	17	95		INDX	FOOT	0	0	0	0	20	33	60	
15 0493	10/26/1982	0.0	0.8	0.8	110	12	122	99		INDX	FOOT	0	0	0	0	20	33		
15 0493	9/26/1983	0.0	0.8	0.8	0	0	0	98	0	INDX	FOOT					20			40
15 0493	10/3/1983	0.0	0.8	0.8	0	0	0	98	0	INDX	FOOT								40
15 0493	10/9/1983	0.0	0.8	0.8	0	0	0	98	0	INDX	FOOT					20			40
15 0493	10/17/1983	0.0	0.8	0.8	2	0	2	98	0	INDX	FOOT					20			40
15 0493	10/24/1983	0.0	0.8	0.8	2	2	4	95	0	INDX	FOOT					20			40
15 0493	9/20/1984	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			
15 0493	9/26/1984	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			
15 0493	10/3/1984	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			
15 0493	10/11/1984	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			
15 0493	10/16/1984	0.0	0.8	0.8	1	0	1	99		INDX	FOOT					20			
15 0493	10/23/1984	0.0	0.8	0.8	14	1	15	99		INDX	FOOT					20			
15 0493	10/30/1984	0.0	0.8	0.8	196	6	202	99		INDX	FOOT					20			
15 0493	10/10/1985	0.0	0.8	0.8	0	1	1	99		INDX	FOOT					20			
15 0493	10/17/1985	0.0	0.2	0.2	3	0	3	95		INDX	FOOT					20			
15 0493	10/29/1985	0.0	0.8	0.8	20	2	22	99		INDX	FOOT					20			
15 0493	10/10/1986	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			
15 0493	10/17/1986	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			
15 0493	10/28/1986	0.0	0.8	0.8	125	0	125	90		INDX	FOOT					20			
15 0493	10/29/1987	0.0	0.3	0.3	62	4	66	90		INDX	FOOT					20			
15 0493	10/18/1988	0.0	0.7	0.7	104	6	110	95		INDX	FOOT					20	61		
15 0493	10/28/1988	0.0	0.7	0.7	295	97	392	95		INDX	FOOT					20	60		
15 0493	10/23/1989	0.0	0.7	0.7	18	1	19	90		INDX	FOOT					20			
15 0493	9/27/1991	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					60	20		
15 0493	10/7/1991	0.0	0.4	0.4	0	0	0	95		INDX	FOOT					20			
15 0493	10/16/1991	0.0	0.7	0.7	1	0	1	99		INDX	FOOT					20			
15 0493	10/25/1991	0.0	0.7	0.7	47	0	47	90		INDX	FOOT	1	0	0	0	20	60		
15 0493	10/23/1992	0.0	0.2	0.2	529	51	580	95		INDX	FOOT					00	20	60	
15 0493	9/15/1993	0.0	0.1	0.1	0	0	0	99		SPOT	FOOT					20	60	65	
15 0493	9/27/1993	0.0	0.1	0.1	0	0	0	95		INDX	FOOT	0	0	0	0	31	60	61	
15 0493	10/5/1993	0.0	0.1	0.1	0	0	0	95		INDX	FOOT	0	0	0	0	00	20	60	
15 0493	10/13/1993	0.0	0.1	0.1	0	0	0	95		INDX	FOOT	0	0	0	0	00	20	60	
15 0493	10/22/1993	0.0	0.1	0.0	7	1	8	99		SPOT	FOOT					20	60		
15 0493	9/20/1994	0.3	0.0		0	0	0	98		SPOT	FOOT					00	60		
15 0493	10/4/1994	0.0	0.3	0.2	0	0	0	99		INDX	FOOT					00	20		
15 0493	10/12/1994	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			
15 0493	10/19/1994	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			
15 0493	9/13/1995	0.0	0.2	0.2	0	0	0	99		SPOT	FOOT					20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0493	10/3/1995	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20	60		
15 0493	10/13/1995	0.0	0.7	0.7	8	0	8	90		INDX	FOOT	4	0	0	0	20	60		
15 0493	10/24/1995	0.0	0.7	0.7	26	1	27	95		INDX	FOOT					20	60	61	
15 0493	9/6/1996	0.0	0.0	0.0	0	0	0	95		SPOT	FOOT					20	60	65	
15 0493	9/23/1996	0.0	0.7	0.7	0	0	0	95		INDX	FOOT	7	0	0	0	20			
15 0493	10/1/1996	0.0	0.7	0.7	2	0	2	95		INDX	FOOT					20			
15 0493	10/8/1996	0.0	0.7	0.7	5	1	6	95		INDX	FOOT					20	60	61	
15 0493	10/16/1996	0.0	0.7	0.7	255	12	267	95		INDX	FOOT					20	60	61	
15 0493	10/25/1996	0.0	0.7	0.7	1,059	142	1,201	85		INDX	FOOT					21			
15 0493	9/15/1997	0.0	0.7	0.7	0	0	0	90		INDX	FOOT	7	0	0	0	20	60		
15 0493	10/3/1997	0.0	0.9	0.9	0	0	0	90		INDX	FOOT					24			
15 0493	10/17/1997	0.0	0.7	0.7	6	3	9	95		INDX	FOOT					23	61		
15 0493	10/28/1997	0.0	0.9	0.9	51	11	62	96		INDX	FOOT					20	60	61	
15 0493	10/14/1998	0.0	0.7	0.7	5	0	5	95		INDX	FOOT	0	0	0	0	20	61		
15 0493	10/20/1998	0.0	0.7	0.7	7	1	8	95		INDX	FOOT					20	61		
15 0493	10/28/1998	0.0	0.7	0.7	112	5	117	95		INDX	FOOT					20	61		
15 0495	9/28/1952	0.1	0.3	0.2	13	0	13			INDX	FOOT					00			
15 0495	10/10/1952	0.1	0.3	0.2	25	23	48			INDX	FOOT					00	20		
15 0495	10/11/1966		0.0	0.0	0	2	2		3	SPOT	FOOT					20	60	65	
15 0495	10/16/1968	0.0	1.0	1.0	231	30	261			INDX	FOOT					20	11		
15 0495	10/24/1968	0.0	1.0	1.0	252	276	528			INDX	FOOT					20			
15 0495	10/22/1970	0.0	1.5	1.5	207	31	238			INDX	FOOT	4	0	0	0	20			
15 0495	10/29/1971	0.0	1.0	1.0	414	160	574	90		INDX	FOOT					20			
15 0495	10/25/1972	0.0	1.0	1.0	1,430	410	1,840			INDX	FOOT					20			
15 0495	10/26/1973	0.0	1.0	1.0	135	136	271			INDX	FOOT								
15 0495	9/11/1974	0.5	0.7	0.2	0	0	0			SUPP	FOOT					20	57		
15 0495	10/1/1974	0.0	0.3	0.3	1	1	2	95	12	INDX	FOOT					60	00	50	
15 0495	10/15/1974	0.0	2.1	2.1	24	14	38	95	27	INDX	FOOT	0	0	0	0	48			
15 0495	10/29/1974	0.0	2.1	2.1	108	52	158	90		INDX	FOOT					60			
15 0495	9/30/1975	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT								
15 0495	10/14/1975	0.0	1.0	1.0	6	6	12	70		INDX	FOOT	4	0	0	0	11	20		
15 0495	10/21/1975	0.0	1.5	1.5	49	4	53	80		INDX	FOOT					21	31		
15 0495	9/27/1976	0.6	0.0	0.0	8	13	21	90		SPOT	FOOT					20			
15 0495	10/1/1976	0.0	0.9	0.9	26	25	51	90	53	INDX	FOOT					50	60	00	
15 0495	10/13/1976	0.0	1.5	1.5	150	99	249	80		INDX	FOOT								
15 0495	10/27/1976	0.0	1.5	1.5	495	301	796	95		INDX	FOOT	4	0	0	0				
15 0495	9/16/1977	0.2	0.0	0.0	0	0	0			SPOT									
15 0495	9/26/1977	0.0	0.2	0.2	0	0	0	95		SUPP	FOOT					20			
15 0495	10/12/1977	0.0	0.0	0.0	0	0	0	90		SPOT						20			
15 0495	10/31/1977	0.0	1.5	1.5	158	32	190	85		INDX	FOOT	4	0	0	0				
15 0495	10/24/1978	0.0	1.6	1.6	205	137	342	85		INDX	FOOT					20	30	60	
15 0495	10/31/1978	0.0	1.6	1.6	297	218	515	95		INDX	FOOT					20	50		
15 0495	10/2/1979		0.0	0.0	0	1	1			SPOT	FOOT					60			
15 0495	10/2/1979	0.0	1.6	1.6	0	3	3	99		INDX	FOOT								

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0495	10/26/1979	0.0	1.6	1.6	52	14	66	90		INDX	FOOT								
15 0495	10/6/1980	0.0	2.1	2.1	15	46	61	95		INDX	FOOT								
15 0495	10/16/1980	0.0	2.1	2.1	17	49	66	90		INDX	FOOT					20			
15 0495	10/23/1980	0.0	2.1	2.1	247	66	313	95		INDX	FOOT					20			
15 0495	9/21/1981	0.0	1.0	1.0	13	1	14	95	2	INDX	FOOT	4	0	0	0	00	20		40
15 0495	9/27/1981	0.0	2.1	2.1	4	2	6	85		INDX	FOOT					24	41		40
15 0495	10/5/1981	0.0	2.1	2.1	7	5	12	80		INDX	FOOT					11	23	31	40
15 0495	10/13/1981	0.0	2.1	2.1	9	1	10	95		INDX	FOOT	4	0	0	0	11	20		40
15 0495	10/19/1981	0.0	2.1	2.1	43	1	44	85	8	INDX	FOOT	4	0	0	0	11	20		40
15 0495	10/20/1981	0.0	1.6	1.6	27	9	36	95		INDX	FOOT	0	0	0	4				
15 0495	10/28/1981	0.0	1.6	1.6	152	11	163	50		INDX	FOOT								
15 0495	10/28/1981	0.0	2.1	2.1	346	23	369	80	76	INDX	FOOT	4	0	0	0	20	33		40
15 0495	10/5/1982	0.0	1.6	1.6	28	22	50	95		INDX	FOOT	1	4	0	0	20	33	60	
15 0495	10/11/1982	0.0	1.6	1.6	33	35	68	90		INDX	FOOT	0	0	0	0	20	33	60	
15 0495	10/19/1982	0.0	1.6	1.6	16	40	56	95		INDX	FOOT	0	0	0	0	20	33	60	
15 0495	10/26/1982	0.0	1.5	1.5	89	36	125	95		INDX	FOOT	4	0	0	0	24	33	31	
15 0495	9/8/1983	0.1	0.0	0.0	0	0	0	80		SPOT	FOOT					60			
15 0495	9/26/1983	0.0	2.1	2.1	6	0	6	95	0	INDX	FOOT					20			40
15 0495	10/4/1983	0.0	2.1	2.1	9	3	12	85	0	INDX	FOOT	4	0	0	0				40
15 0495	10/9/1983	0.0	2.1	2.1	4	2	6	50	0	INDX	FOOT	4	0	0	0	20	60		40
15 0495	10/12/1983	0.0	1.8	1.8	7	4	11	95		INDX	FOOT					20			
15 0495	10/17/1983	0.0	2.1	2.1	13	7	20	90	0	INDX	FOOT					20			40
15 0495	10/24/1983	0.0	2.1	2.1	17	7	24	75	0	INDX	FOOT	4	0	0	0	20			40
15 0495	10/25/1983	0.0	1.8	1.8	6	20	26	95		INDX	FOOT	4	0	0	0	20			
15 0495	10/31/1983	0.0	1.8	1.8	19	5	24	90		INDX	FOOT	4	0	0	0	20			
15 0495	10/31/1983	0.0	2.1	2.1	19	8	27	80		INDX	FOOT	4	0	0	0				40
15 0495	9/26/1984	0.0	1.6	1.6	3	0	3	99		INDX	FOOT					20			
15 0495	10/1/1984	0.0	2.1	2.1	1	3	4	95		INDX	FOOT					20			40
15 0495	10/3/1984	0.0	1.6	1.6	3	0	3	99		INDX	FOOT					20			
15 0495	10/9/1984	0.0	2.1	2.1	17	2	19	90		INDX	FOOT					20	60		40
15 0495	10/11/1984	0.0	1.6	1.6	21	1	22	99		INDX	FOOT	4	0	0	0	20			
15 0495	10/16/1984	0.0	2.1	2.1	11	4	15	99		INDX	FOOT	4	0	0	0	20			
15 0495	10/16/1984	0.0	2.1	2.1	9	11	20	95		INDX	FOOT	4	0	0	0	20	60		40
15 0495	10/23/1984	0.0	2.1	2.1	68	10	78	99		INDX	FOOT	4	0	0	0	20			
15 0495	10/23/1984	0.0	1.0	1.0	74	8	82	90		INDX	FOOT	4	0	0	0	20	60		40
15 0495	10/23/1984	1.0	2.1	1.1	11	0	11	90		INDX	FOOT					20			40
15 0495	10/30/1984	0.0	1.0	1.0	180	23	203	90		INDX	FOOT	4	0	0	0	20			40
15 0495	10/30/1984	0.0	2.1	2.1	244	28	272	95		INDX	FOOT	4	0	0	0	20			
15 0495	10/30/1984	1.0	2.1	1.1	28	1	29	90		INDX	FOOT					20			40
15 0495	10/10/1985	0.0	2.1	2.1	1	5	6	99		INDX	FOOT					20			
15 0495	10/17/1985	0.0	0.5	0.5	13	4	17	95		INDX	FOOT					20			
15 0495	10/29/1985	0.0	2.1	2.1	90	12	102	99		INDX	FOOT					21			
15 0495	10/10/1986	0.0	0.5	0.5	23	10	33	90		INDX	FOOT					20			
15 0495	10/17/1986	0.0	0.4	0.4	9	13	22	90		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0495	10/29/1986	0.0	0.8	0.8	67	7	74	90		INDX	FOOT	4	0	0	0	20			
15 0495	10/15/1987	0.0	0.5	0.5	9	12	21	90		INDX	FOOT					20	60		
15 0495	10/29/1987	0.0	0.8	0.8	68	10	78	90		INDX	FOOT	4	0	0	0	20	60		
15 0495	10/3/1988	0.0	1.6	1.6	48	17	65	90		INDX	FOOT					61			
15 0495	10/12/1988	0.0	1.6	1.6	141	52	193	95		INDX	FOOT					20	61		
15 0495	10/20/1988	0.0	1.6	1.6	273	131	404	95		INDX	FOOT	4	0	0	0	20	61		
15 0495	10/31/1988	0.0	1.6	1.6	433	377	810	95		INDX	FOOT	4	0	0	0	20	61		
15 0495	9/15/1989	0.0	1.6	1.6	0	0	0	99		INDX	FOOT					20			
15 0495	9/25/1989	0.0	1.6	1.6	1	0	1	85		INDX	FOOT					20			
15 0495	10/5/1989	0.0	1.6	1.6	0	1	1	85		INDX	FOOT					20	60		
15 0495	10/23/1989	0.0	1.6	1.6	10	4	14	90		INDX	FOOT					20			
15 0495	9/18/1990	0.0	1.6	1.6	1	0	1	95		INDX	FOOT					61	20		
15 0495	9/28/1990	0.0	1.6	1.6	3	0	3	90		INDX	FOOT					20	61		
15 0495	10/8/1990	0.0	1.6	1.6	6	5	11	90		INDX	FOOT					20	61		
15 0495	10/23/1990	0.0	1.6	1.6	5	4	9	95		INDX	FOOT	4	0	0	0	23	60	61	
15 0495	9/19/1991	0.0	1.6	1.6	0	0	0	95		INDX	FOOT								
15 0495	9/27/1991	0.0	1.6	1.6	8	1	9	85		INDX	FOOT					60	20		
15 0495	10/7/1991	0.0	1.6	1.6	13	4	17	90		INDX	FOOT					60	20		
15 0495	10/16/1991	0.0	1.6	1.6	49	5	54	95		INDX	FOOT					20			
15 0495	10/25/1991	0.0	1.6	1.6	176	27	203	90		INDX	FOOT					20	60		
15 0495	9/14/1992	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					20	60	73	
15 0495	9/22/1992	0.0	1.6	1.6	2	0	2	95		INDX	FOOT					20	60	61	
15 0495	10/8/1992	0.0	1.6	1.6	84	12	96	95		INDX	FOOT					20	60	61	
15 0495	10/16/1992	0.0	1.6	1.6	258	106	364	95		INDX	FOOT	4	0	0	0	20	61		
15 0495	10/23/1992	0.0	1.6	1.6	909	230	1,139	95		INDX	FOOT					20	60	61	
15 0495	9/20/1993	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					20	00	60	
15 0495	9/27/1993	0.0	0.3	0.3	0	0	0	95		INDX	FOOT	0	0	0	0	00	60	31	
15 0495	10/5/1993	0.0	0.3	0.3	1	0	1	95		INDX	FOOT	0	0	0	0	00	20	60	
15 0495	10/13/1993	0.0	0.3	0.3	8	1	9	95		INDX	FOOT	0	0	0	0	20	00	60	
15 0495	10/22/1993	0.0	1.6	1.6	27	10	37	95		INDX	FOOT					20	60	61	
15 0495	9/20/1994	0.0	0.6	0.6	1	0	1	95		SPOT	FOOT					00	20	60	
15 0495	9/26/1994	0.0	0.9	0.9	1	0	1	95		INDX	FOOT					00	20	60	
15 0495	10/4/1994	0.0	1.6	1.6	2	4	6	95		INDX	FOOT					20	60	61	
15 0495	10/12/1994	0.0	1.6	1.6	6	2	8	95		INDX	FOOT					20	60	61	
15 0495	10/19/1994	0.0	1.6	1.6	2	1	3	95		INDX	FOOT					20	60	61	
15 0495	9/13/1995	0.0	0.3	0.3	0	0	0	95		SPOT	FOOT					20	60		
15 0495	10/3/1995	0.0	1.6	1.6	14	0	14	95		INDX	FOOT	7	0	0	0	20	60	61	
15 0495	10/13/1995	0.0	1.6	1.6	111	2	113	90		INDX	FOOT	1	4			20	60	61	
15 0495	10/24/1995	0.0	1.6	1.6	310	112	422	95		INDX	FOOT	4	0	0	0	20	60	61	
15 0495	9/6/1996	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT					20	60	65	
15 0495	9/23/1996	0.0	1.6	1.6	15	5	20	90		INDX	FOOT					20			
15 0495	10/1/1996	0.0	1.6	1.6	177	29	206	95		INDX	FOOT	8	0	0	0	20			
15 0495	10/8/1996	0.0	1.6	1.6	740	132	872	95		INDX	FOOT	8	0	0	0	20	60	61	
15 0495	10/16/1996	0.0	1.6	1.6	3,125	654	3,779	90		INDX	FOOT	4	0	0	0	20	61		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0495	10/25/1996	0.0	1.6	1.6	8,021	2,299	10,310	85		INDX	FOOT	4	0	0	0	21			
15 0495	10/30/1996	3.2	5.1	1.9	1	0	1	95		SUPP	FOOT					20	33		
15 0495	9/8/1997	0.0	1.6	1.6	0	0	0	90		INDX	FOOT					20			
15 0495	9/15/1997	0.0	1.6	1.6	0	0	0	95		INDX	FOOT	1	7	0	0	20	60		
15 0495	10/3/1997	0.0	1.6	1.6	9	0	9	90		INDX	FOOT					24	60	61	
15 0495	10/17/1997	0.0	1.6	1.6	189	21	210	90		INDX	FOOT	4	0	0	0	23	61		
15 0495	10/28/1997	0.0	1.6	1.6	337	160	497	95		INDX	FOOT	4	0	0	0	20	61		
15 0495	9/9/1998	0.0	1.6	1.6	0	0	0	95		INDX	FOOT					20	60		
15 0495	9/18/1998	0.0	1.6	1.6	0	0	0	95		INDX	FOOT	4	0	0	0	20			
15 0495	9/28/1998	0.0	1.6	1.6	2	0	2	95		INDX	FOOT	4	0	0	0	20	60		
15 0495	10/7/1998	0.0	1.6	1.6	9	1	10	95		INDX	FOOT	4	0	0	0	20	61		
15 0495	10/14/1998	0.0	1.6	1.6	52	4	58	95		INDX	FOOT	4	0	0	0	20	60	61	
15 0495	10/20/1998	0.0	1.6	1.6	128	6	134	95		INDX	FOOT	4	0	0	0	20	60	61	
15 0495	10/28/1998	0.0	1.6	1.6	698	39	637	95		INDX	FOOT	4	0	0	0	60	20		
15 0503	10/16/1947	0.3	0.6	0.3	3	1	4			INDX	FOOT					00	13		
15 0503	9/28/1952	1.1	1.8	0.7	61	128	189			INDX	FOOT					00	20	13	
15 0503	8/22/1958	1.3	1.8	0.5	0	0	0			INDX	FOOT					00	20	13	
15 0503	10/13/1961	0.3	1.8	1.5	17	8	25			INDX	FOOT	1	4	0	0	20	13		
15 0503	10/22/1962	0.3	1.8	1.5	18	32	50			INDX	FOOT	1	4	0	0	20	13		
15 0503	10/6/1964	0.3	1.8	1.5	10	125	135			INDX	FOOT	1	0	0	0	20	13		
15 0503	10/29/1964	0.3	1.8	1.5	206	85	291			INDX	FOOT	1	4	0	0	20	13		
15 0503	10/29/1965	0.3	1.8	1.5	114	91	205			INDX	FOOT	1	4	0	0	20	13		
15 0503	10/11/1966	0.3	1.8	1.5	12	114	126			INDX	FOOT	1	0	0	0	20	13		
15 0503	10/31/1967	0.3	1.8	1.5	132	26	158			INDX	FOOT	1	4	0	0	20	13		
15 0503	10/19/1968	0.3	1.8	1.5	62	33	95			INDX	FOOT	1	0	0	0	20	13		
15 0503	10/22/1968	6.0	6.5	0.5	24	8	32			SUPP	FOOT					21			
15 0503	10/26/1970	0.3	1.8	1.5	50	10	60	75		INDX	FOOT	1	4	0	0	22	13		
15 0503	10/5/1972	0.3	1.8	1.5	21	46	67	95		INDX	FOOT	1	4	0	0	20	13		
15 0503	10/5/1972	1.8	2.3	0.5	5	14	19	90		SUPP	FOOT	1	0	0	0	20			
15 0503	10/17/1973	0.3	1.6	1.3	0	8	8	90		INDX	FOOT	1	4	0	0	13	00		
15 0503	9/10/1974	0.3	1.6	1.3	6	1	7	65		INDX	FOOT	0	0	0	0	13	20	31	
15 0503	9/11/1974	3.9	4.2	0.3	0	0	0			SUPP	FOOT					20	57		
15 0503	9/19/1974	0.4	1.6	1.2	20	2	22	75	15	INDX	FOOT	0	0	0	0	60	30	20	
15 0503	10/1/1974	0.4	1.6	1.2	21	11	32	70	60	SUPP	FOOT	1	0	0	0	06	0		
15 0503	10/29/1974	0.4	1.6	1.2	17	4	21	75		INDX	FOOT	0	0	0	0	31			
15 0503	9/30/1975	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					60			
15 0503	10/7/1975	0.0	0.0	0.0	0	1	1	90		SPOT	FOOT								
15 0503	10/21/1975	0.3	1.8	1.5	9	4	13	65		INDX	FOOT	4	0	0	0	31			
15 0503	9/17/1976	0.3	1.8	1.5	21	12	33	50		INDX	FOOT	1	0	0	0	30	31	60	
15 0503	9/17/1976	1.8	1.9	0.1	20	3	23	60		SUPP	FOOT					30	31		
15 0503	10/1/1976	0.3	1.8	1.5	7	14	21	60		INDX	FOOT	1	4	0	0	31	60	50	
15 0503	10/1/1976	1.8	2.3	0.5	3	3	6	70		SUPP	FOOT	1	0	0	0	60			
15 0503	9/26/1977	0.0	1.8	1.8	30	20	50	70		INDX	FOOT					20	33	60	
15 0503	10/5/1977	0.0	1.8	1.8	8	33	41	90		INDX	FOOT	4	0	0	0	20	31	60	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0503	9/11/1978	5.3	5.4	0.1	1	2	3	99		SUPP	FOOT					20	60		
15 0503	9/13/1978	0.3	1.8	1.5	18	2	20	70		INDX	FOOT								
15 0503	9/15/1978	5.3	6.0	0.7	0	3	3	90		SUPP	FOOT								
15 0503	10/9/1978	1.8	3.0	1.2	1	24	25	85		SUPP	FOOT					20	60		
15 0503	10/26/1979	0.3	1.6	1.3	3	2	5	50		INDX	FOOT	1	0	0	0	25	60	53	
15 0503	9/18/1980	0.3	1.8	1.5	93	25	118	85		INDX	FOOT	4	0	0	0				
15 0503	10/1/1980	0.3	1.8	1.5	47	18	65	80		INDX	FOOT								
15 0503	10/24/1980	0.3	1.8	1.5	0	18	18	90		INDX	FOOT					20			
15 0503	9/14/1981	0.0	0.3	0.3	2	0	2	95		SUPP	FOOT	4	0	0	0	20			40
15 0503	9/21/1981	0.0	0.3	0.3	0	0	0	50		INDX	FOOT	1	0	0	0	00	28	31	40
15 0503	9/24/1981	0.3	1.8	1.5	31	10	41	90		INDX	FOOT	1	0	0	0	24	31		
15 0503	10/5/1981	0.3	1.8	1.5	1	5	6	95	6	INDX	FOOT	4	0	0	0	11	23	31	40
15 0503	10/15/1981	5.3	6.0	0.7	0	0	0	85		SUPP	FOOT	4	0	0	0	20	32		
15 0503	10/19/1981	0.3	1.8	1.5	0	2	2	85		INDX	FOOT	4	0	0	0	20	31		40
15 0503	10/20/1981	0.4	1.6	1.2	0	4	4	60		INDX	FOOT	0	4	0	3				
15 0503	10/28/1981	0.3	1.8	1.5	12	1	13	35		INDX	FOOT	4	0	0	0	30			40
15 0503	10/5/1982	0.3	1.8	1.5	3	5	8	85		INDX	FOOT	1	4	0	0	20	33	60	
15 0503	10/12/1982	0.3	1.8	1.5	11	12	23	90		INDX	FOOT	1	4	0	0	20	31	33	
15 0503	10/19/1982	0.3	1.8	1.5	2	5	7	80		INDX	FOOT	0	0	1	4	20	31	33	
15 0503	10/27/1982	0.3	1.8	1.5	10	5	15	85		INDX	FOOT	4	0	0	0	24	31	33	
15 0503	9/8/1983	0.6	0.0	0.0	6	0	0	70		SPOT	FOOT					60			
15 0503	9/20/1983	0.0	1.8	1.8	105	35	140	80		INDX	FOOT					21			
15 0503	9/28/1983	0.3	1.8	1.5	29	59	88	90		INDX	FOOT	1	0	0	0	20			
15 0503	10/5/1983	0.3	1.8	1.5	4	3	7	85		INDX	FOOT	1	0	0	0	20			
15 0503	10/5/1983	0.3	1.8	1.5	13	48	61	65	0	INDX	FOOT	1	0	0	0	21			40
15 0503	10/5/1983	1.9	0.0	0.0	0	0	0	95		SPOT	FOOT					20	60		
15 0503	10/12/1983	0.3	1.8	1.5	1	10	11	85		INDX	FOOT	1	4	0	0	20			
15 0503	10/18/1983	0.3	1.8	1.5	7	10	17	85		INDX	FOOT	1	0	0	0	20	31		
15 0503	10/21/1983	1.8	3.0	1.2	0	14	14	65		SUPP	FOOT	1	4	0	0	31			40
15 0503	10/25/1983	0.3	1.8	1.5	1	9	10	95		INDX	FOOT	0	0	0	4	20			
15 0503	10/31/1983	0.3	1.8	1.5	2	0	2	75		INDX	FOOT	1	4	0	0	31			
15 0503	9/5/1984	1.3			4	0	4		1	SPOT	FOOT				0	13	24		
15 0503	9/11/1984	0.3	1.8	1.5	54	8	62	95		INDX	FOOT					20			
15 0503	9/19/1984	0.3	1.8	1.5	50	29	79	90		INDX	FOOT	1	4	0	0	20			
15 0503	9/21/1984	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20	31		40
15 0503	9/21/1984	0.3	1.8	1.5	83	14	97	90		INDX	FOOT					20	31		40
15 0503	9/21/1984	1.8	3.0	1.2	13	59	72	95		INDX	FOOT					20	31		40
15 0503	9/28/1984	0.3	2.3	2.0	18	64	82	85		INDX	FOOT	4	0	0	0	20			
15 0503	10/1/1984	0.3	1.8	1.5	17	66	83	70		INDX	FOOT	4	0	0	0	20	31		40
15 0503	10/1/1984	1.8	3.0	1.2	6	76	82	75		INDX	FOOT	4	0	0	0	20	31		40
15 0503	10/5/1984	0.3	2.3	2.0	2	33	35	85		INDX	FOOT	1	4	0	0	20			
15 0503	10/9/1984	0.3	1.8	1.5	2	27	29	75		INDX	FOOT	4	0	0	0	20	60		40
15 0503	10/9/1984	1.8	3.0	1.2	2	26	28	75		INDX	FOOT	4	0	0	0	20	60		40
15 0503	10/11/1984	0.3	2.3	2.0	6	16	22	40		INDX	FOOT	1	0	0	0	31	24		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0503	10/16/1984	0.3	1.8	1.8	1	12	13	75		INDX	FOOT	4	0	0	0	21			40
15 0503	10/16/1984	1.8	3.0	1.2	0	11	11	90		INDX	FOOT	4	0	0	0	20	60		40
15 0503	10/18/1984	0.3	1.8	1.5	1	14	15	90		INDX	FOOT	4	0	0	0	20			
15 0503	10/23/1984	0.3	1.8	1.5	9	11	20	85		INDX	FOOT	4	0	0	0	21	60		40
15 0503	10/23/1984	0.3	1.8	1.5	5	6	11	85		SUPP	FOOT	4	0	0	0	20			
15 0503	10/23/1984	1.8	3.0	1.2	0	2	2	85		INDX	FOOT	4	0	0	0	21	60		40
15 0503	10/30/1984	0.3	1.8	1.5	44	2	46	65		SUPP	FOOT	4	0	0	0	20			
15 0503	10/30/1984	0.3	1.8	1.5	53	4	57	70		INDX	FOOT	4	0	0	0	20			40
15 0503	10/30/1984	1.8	3.0	1.2	0	2	2	90		INDX	FOOT	4	0	0	0	20			40
15 0503	9/19/1985	0.0	1.8	1.8	140	64	204	85		INDX	FOOT	1	0	0	0				
15 0503	10/3/1985	0.4	2.3	1.9	9	132	141	90		SUPP	FOOT	1	4			20			
15 0503	10/10/1985	1.8	3.3	1.5	0	85	85	90		INDX	FOOT					20			
15 0503	10/18/1985	0.3	2.5	2.2	1	0	1	75		INDX	FOOT	1	3	4		20			
15 0503	10/30/1985	5.3	6.0	0.7	1	0	1	65		SUPP	FOOT	4	0	0	0	24	31		
15 0503	9/9/1986	0.1	2.3	2.2	485	46	531	90		INDX	FOOT	4	1	0	0	20			
15 0503	9/19/1986	0.1	2.3	2.2	786	320	1,106	90		INDX	FOOT	1	0	0	0				
15 0503	10/2/1986	0.2	2.3	2.1	164	493	657	90		INDX	FOOT	1	4	0	0	20			
15 0503	10/8/1986	0.2	2.3	2.1	125	472	597	95		INDX	FOOT	1	4	5	0	20			
15 0503	10/16/1986	0.3	2.1	1.8	40	485	525	90		INDX	FOOT	1	4	0	0	20			
15 0503	10/29/1986	0.3	2.1	1.8	9	19	28	80		INDX	FOOT	4	0	0	0	24	31	70	
15 0503	9/1/1987	0.3	2.1	1.8	35	4	39	90		INDX	FOOT	4	0	0	0				
15 0503	9/16/1987	0.3	2.1	1.8	287	44	331	90		INDX	FOOT	1	4	0	0	20	60		
15 0503	9/24/1987	0.3	2.1	1.8	108	103	211	90		INDX	FOOT	1	3	4	0	20			
15 0503	10/6/1987	0.3	2.1	1.8	8	84	92	95		INDX	FOOT	1	0	0	0	20	60		
15 0503	9/8/1988	0.3	2.1	1.8	248	20	268	99		INDX	FOOT	1	0	0	0	20			
15 0503	9/19/1988	0.3	2.1	1.8	208	155	363	85		INDX	FOOT	1	4	5	0	20	61		
15 0503	9/28/1988	0.3	2.1	1.8	67	119	186	90		INDX	FOOT	1	0	0	0	61			
15 0503	10/6/1988	0.3	2.1	1.8	15	192	207	80		INDX	FOOT	1	4	0	0	20	61		
15 0503	10/18/1988	0.3	2.1	1.8	12	93	105	85		INDX	FOOT	1	4	0	0	20	61		
15 0503	10/28/1988	0.3	2.1	1.8	2	13	15	90		INDX	FOOT	1	4	0	0	20			
15 0503	9/8/1989	0.3	2.1	1.8	126	11	137			INDX	FOOT	1	0	0	0	20			
15 0503	9/15/1989	0.3	2.1	1.8	209	85	294			INDX	FOOT	1	3	0	0	20			
15 0503	9/25/1989	0.3	2.1	1.8	97	16	113	85		INDX	FOOT	1	0	0	0	20	60		
15 0503	10/5/1989	0.3	2.1	1.8	15	115	130	90		INDX	FOOT	1	3	4	0	20	60		
15 0503	9/6/1990	0.3	2.1	1.8	96	4	100	90		INDX	FOOT	1	0	0	0	20	60		
15 0503	9/18/1990	0.3	2.1	1.8	115	39	154	90		INDX	FOOT	1	4	0	0	20	45	61	
15 0503	9/28/1990	0.3	2.1	1.8	18	40	58	85		INDX	FOOT	1	4	0	0	20	60	61	
15 0503	10/8/1990	0.3	2.1	1.8	1	65	66	85		INDX	FOOT	1	4	0	0	20	61		
15 0503	9/9/1991	0.3	2.1	1.8	60	5	65	85		INDX	FOOT					21	60		
15 0503	9/18/1991	0.3	2.1	1.8	96	34	130	90		INDX	FOOT	1	3	5	0	20	31		
15 0503	9/27/1991	0.3	2.1	1.8	18	29	47	75		INDX	FOOT	1	3	5	0	60	61	21	
15 0503	10/7/1991	0.3	2.1	1.8	30	41	71	85		INDX	FOOT	1	3	5	0	60	20		
15 0503	10/16/1991	0.3	2.1	1.8	2	14	16	80		INDX	FOOT	1	4	0	0	20			
15 0503	9/2/1992	0.3	2.1	1.8	34	1	35	90		INDX	FOOT					20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0503	9/14/1992	0.3	2.1	1.8	65	24	89	85		INDX	FOOT	0	0	0	1	20	60	61	
15 0503	9/23/1992	0.3	2.1	1.8	14	11	25	70		INDX	FOOT					21	60	61	
15 0503	10/8/1992	0.3	2.1	1.8	3	20	23	85		INDX	FOOT	0	0	0	4	20	60	61	
15 0503	10/16/1992	0.3	2.1	1.8	11	17	28	90		INDX	FOOT					20	61		
15 0503	10/23/1992	0.3	2.1	1.8	96	7	103	75		INDX	FOOT					24			
15 0503	8/23/1993	0.3	2.1	1.8	3	0	3	90		INDX	FOOT					20	60	61	
15 0503	9/1/1993	0.3	2.1	1.8	29	7	36	95		INDX	FOOT	0	0	0	1	20	61		
15 0503	9/10/1993	0.3	2.1	1.8	72	22	94	60		INDX	FOOT					20	61		
15 0503	9/21/1993	0.3	2.1	1.8	69	43	112	85		INDX	FOOT					20	60	61	
15 0503	9/30/1993	0.3	2.1	1.8	31	50	81	85		INDX	FOOT	1	3	4	0	20			
15 0503	10/5/1993	0.3	2.1	1.8	33	43	76	90		INDX	FOOT	0	0	0	1	20	31	61	
15 0503	10/13/1993	0.3	2.1	1.8	19	38	57	90		INDX	FOOT	1	3	4	5	20	31	61	
15 0503	10/20/1993	0.3	2.1	1.8	3	27	30	90		INDX	FOOT	0	0	0	4	20	31	60	
15 0503	9/6/1994	0.3	2.1	1.8	143	5	148	90		INDX	FOOT	0	0	0	1	20	31	60	
15 0503	9/16/1994	0.3	2.1	1.8	308	51	359	95		INDX	FOOT	4	0	0	0	20	61		
15 0503	9/30/1994	0.3	2.1	1.8	91	151	242	90	98	INDX	FOOT	1	4	5	0	20	61	60	
15 0503	10/7/1994	0.3	2.1	1.8	38	106	144	85		INDX	FOOT	0	1	4	5	20	60	61	
15 0503	10/17/1994	0.3	2.1	1.8	22	86	108	90		INDX	FOOT	0	1	4	5	20	60	61	
15 0503	8/17/1995	0.3	2.1	1.8	2	0	2	80		INDX	FOOT	4	7	0	0	24	60	61	
15 0503	8/30/1995	0.3	2.1	1.8	190	2	192	85		INDX	FOOT	3	5	0	0	23	60	61	
15 0503	9/11/1995	0.3	2.1	1.8	264	97	361	90		INDX	FOOT	1	3	4	0	20	60	61	
15 0503	9/26/1995	0.3	2.1	1.8	53	106	159	95		INDX	FOOT	1	4	0	0	20	60	61	
15 0503	10/13/1995	0.3	2.1	2.1	11	9	20	80		INDX	FOOT	4	0	0	0	21	60	61	
15 0503	10/24/1995	0.3	2.1	1.8	89	10	99	90		INDX	FOOT	4	0	0	0	21	60	61	
15 0503	8/16/1996	0.3	2.1	1.8	4	0	4	90		INDX	FOOT					20	60		
15 0503	8/23/1996	0.3	2.1	1.8	13	0	13	90		INDX	FOOT	5	0	0	0	20	60	61	
15 0503	9/3/1996	0.3	2.1	1.8	158	11	169	90		INDX	FOOT	1	4	0	0	20	34	60	
15 0503	9/13/1996	0.3	2.1	1.8	175	60	235	90		INDX	FOOT	1	4	5	0	20	60	61	
15 0503	9/20/1996	0.3	2.1	1.8	79	77	156	90		INDX	FOOT					21			
15 0503	10/1/1996	0.3	2.1	1.8	42	63	105	85		INDX	FOOT					20			
15 0503	10/8/1996	0.3	2.1	1.8	46	41	87	95		INDX	FOOT	4	8	0	0	20	61		
15 0503	10/30/1996	5.3	6.0	0.7	2	0	2	80		SUPP	FOOT					20	32		
15 0503	8/25/1997	0.3	1.2	0.9	1	0	1	90		INDX	FOOT	1	0	0	0	00	20		
15 0503	8/25/1997	1.6	2.1	0.5	0	0	0	90		INDX	FOOT	1	0	0	0	00	20	60	
15 0503	8/29/1997	0.0	1.8	1.8	1	0	1			INDX	FOOT	1	0	0	0	11	23	31	
15 0503	9/2/1997	0.3	2.1	1.8	11	1	12	90		INDX	FOOT	1	3			20	60		
15 0503	9/9/1997	0.3	2.1	1.8	124	1	125	90		INDX	FOOT	1	0	0	0	20	61	60	
15 0503	9/15/1997	0.3	2.1	1.8	211	15	226	80		INDX	FOOT	1	0	0	0	21	31	61	
15 0503	9/22/1997	0.0	1.8	1.8	48	15	63		17	INDX	FOOT	4	0	0	0	15	24	32	
15 0503	9/25/1997	0.3	2.1	1.8	48	75	123	90		INDX	FOOT	1	4	0	0	21	60	61	
15 0503	10/17/1997	0.3	2.1	1.8	11	3	14	85		INDX	FOOT	4	0	0	0	23	61		
15 0503	10/23/1997	0.0	1.8	1.8	2	2	4			SUPP	FOOT	4	0	0	0	23	33	70	
15 0503	10/28/1997	0.3	2.1	1.8	20	3	23	90		INDX	FOOT					20	61		
15 0503	9/1/1998	0.3	2.1	1.8	74	3	77	95		INDX	FOOT	4	0	0	0	20	60	61	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
15 0503	9/9/1998	0.3	2.1	1.8	42	20	62	95		INDX	FOOT	4	0	0	0	20	60	61	
15 0503	9/17/1998	0.3	2.1	1.8	74	25	99	95		INDX	FOOT	4	1	0	0	20	60	61	
15 0503	9/25/1998	0.3	2.1	1.8	42	19	61	90		INDX	FOOT	4	3	1	0	20	60	61	
15 0503	10/7/1998	0.3	2.1	1.8	14	10	24	95		INDX	FOOT	4	3	1	0	20	60	61	
15 0503	10/14/1998	0.3	2.1	1.8	27	3	30	65		INDX	FOOT	4	1	0	0	24	60	61	
15 0503	10/20/1998	0.3	2.1	1.8	67	0	67	95		INDX	FOOT	4	1	0	0	20	61		
15 0503	10/28/1998	0.3	2.1	1.8	453	29	482	85		INDX	FOOT					60	20		
15 0505	10/26/1982	0.0	0.8	0.8	5	0	5	80		INDX	FOOT	4	0	0	0	23	34		
15 0505	10/30/1996	0.0	0.8	0.8	114	12	126	90		SUPP	FOOT					20	33		
15 0517	10/5/1972	0.0	0.2	0.2	3	7	10	95		SUPP	FOOT					20	01		
16 0001	10/8/1943		0.0	0.0						SPOT	FOOT					64	60		
16 0001	10/23/1952	8.0	9.0	1.0	0	10	10			SUPP	FOOT	1	0	0	0				
16 0001	9/18/1963	8.0	9.0	1.0	15	0	15			SUPP	FOOT					20			
16 0001	10/9/1964	8.0	9.0	1.0	9	0	9			SUPP	FOOT	1	0	0	0	23			
16 0001	10/21/1964	6.0	9.0	3.0	0	20	20			SUPP	FOOT	1	0	0	0	20			
16 0001	10/18/1965	6.0	9.0	3.0	0	2	2			SUPP	BOAT	1	3	4	0	20			
16 0001	10/14/1966	6.0	9.0	3.0	0	2	2			SUPP	BOAT	1	0	0	0	20			
16 0001	9/20/1976	5.3	9.0	3.7	226	7	233	90		SUPP	BOAT	1	0	0	0	20	60		
16 0001	9/21/1976	0.5	4.0	3.5	1	0	1	40		SUPP	BOAT	1	0	0	0	21	32		FW
16 0001	10/11/1976	5.3	9.0	3.7	0	2	2	85		SUPP	BOAT	1	0	0	0	20	31		
16 0001	10/3/1977	5.3	9.0	3.7	4	0	4	90		SUPP	BOAT	1	3	0	0	20	31	60	
16 0001	10/17/1977	5.3	9.0	3.7	1	0	1	90		SUPP	BOAT	1	3	4	0	31	20	33	
16 0001	9/25/1978	0.0	2.2	2.2	0	0	0	70		SUPP	BOAT								
16 0001	9/25/1978	5.3	9.0	3.7	0	0	0	70		SUPP	BOAT	1	0	0	0				
16 0001	10/9/1978	0.0	2.2	2.2	0	0	0	80		SUPP	BOAT	1	0	0	0				
16 0001	10/9/1978	5.3	9.0	3.7	0	0	0	80		SUPP	BOAT	1	0	0	0				
16 0001	10/9/1979	5.3	9.0	3.7	0	0	0	80		SUPP	BOAT	1	3	4	0	20			
16 0001	9/19/1980	5.2	9.1	3.9	18	0	18	90		SUPP	FOOT	1	4	0	0	20			
16 0001	9/30/1980	5.3	9.0	3.7	7	0	7	80		INDX	BOAT	1	4	5	0	20			
16 0001	10/7/1980	5.3	9.0	3.7	3	3	6	95		SUPP	BOAT	1	4	0	0	20			
16 0001	9/11/1981	5.7	9.0	3.3	0	0	0	33		INDX	FOOT	4	0	0	0	21			40
16 0001	9/11/1981	9.0	11.7	2.7	0	0	0	70		INDX	FOOT					21	57		40
16 0001	9/16/1981	4.0	5.7	1.7	0	0	0	99		SUPP	FOOT	1	0	0	0	20	51		40
16 0001	9/22/1981	5.0	7.0	2.0	0	0	0	56		INDX	FOOT					24	38		40
16 0001	10/2/1981	5.7	9.0	3.3	0	0	0	10		SUPP	BOAT	1	0	0	0				40
16 0001	10/14/1981	5.3	9.0	3.7	1	0	1	50		SUPP	BOAT	1	0	0	0	20	31	60	
16 0001	10/21/1981	5.3	9.0	3.7	3	0	3	65		INDX	RAFT	1	4	0	0			23	
16 0001	10/22/1981	5.7	9.0	1.3	0	0	0	80		SUPP	BOAT					23			40
16 0001	10/22/1981	9.5	11.7	2.2	0	0	0	80		SUPP	BOAT					20			40
16 0001	10/23/1981	9.0	13.0	4.0	0	0	0	90		SUPP	FOOT	1	5	0	0	21	57		40
16 0001	9/22/1982	5.2	9.0	3.8	0	0	0	95		INDX	BOAT	1	0	0	0	20			
16 0001	10/7/1983	9.0	13.4	4.4	0	0	0	99		INDX	FOOT					11	20		40
16 0001	10/12/1983	9.0	13.4	4.4	0	0	0	99	0	INDX	FOOT					11	20		40
16 0001	10/19/1983	9.0	13.4	2.7	0	0	0	70	0	INDX	FOOT					11	20	60	40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data scuce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0001	10/25/1983	9.0	13.4	4.4	0	0	0	70	0	INDX	FOOT					11	20		40
16 0001	9/18/1984	5.3	9.0	3.7	0	0	0	95		INDX	BOAT	1				20			
16 0001	10/23/1984	9.0	13.4	4.4	7	0	7	90	0	INDX	FOOT	4	0	0	0	20	33	60	40
16 0001	9/26/1985	5.3	9.0	3.7	2	2	4	85		INDX	BOAT	1	4			20			
16 0001	10/13/1988	2.2	5.3	3.1	30	3	33	80		SUPP	RAFT	1	4	0	0	20			
16 0001	10/18/1993	5.3	6.3	1.0	1	0	1	80		SUPP	RAFT	1	4	0	0	20	33	60	
16 0001	10/3/1994	6.3	8.0	1.7	1	0	1	70		SUPP	RAFT	0	0	1	4				
16 0001	10/29/1996	12.3	15.6	2.3	6	1	7	90		INDX	FOOT	1	4	0	0	20	61		
16 0001	9/24/1998	6.3	8.0	1.7	2	0	2	85		SUPP	RAFT	1	5	0	0	20	33		
16 0005	9/21/1976	0.2	0.0	0.0	0	0	0	60		SPOT	FOOT	1	0	0	0	65			FW
16 0005	9/21/1976	0.5	1.0	0.5	4	0	4	80		SUPP	FOOT	1	0	0	0	20			FW
16 0005	10/22/1990	1.0	1.1	0.1	2	0	2	70		SUPP	RAFT	1	4	0	0	20			
16 0010	10/12/1983	0.0	0.3	0.3	0	0	0	90	0	INDX	FOOT					11	20	60	40
16 0010	10/19/1983	0.0	0.3	0.3	0	0	0	85		INDX	FOOT					11	20	60	40
16 0011	9/24/1952	0.8	0.0	0.0	20	56	76			SPOT						65			
16 0011	10/23/1952				0	107	107				FOOT	1	0	0	0	64			
16 0011	9/18/1963	0.0	0.8	0.8	0	0	0			SUPP	FOOT	3	1	0	0	20			
16 0011	10/9/1964	0.0	0.8	0.8	0	0	0			SUPP	FOOT	1	0	0	0	23			
16 0011	10/9/1964	2.1	3.1	1.0	9	0	9			SUPP	FOOT	1	0	0	0		23		
16 0011	10/21/1964	0.0	0.8	0.8	0	0	0			SUPP	FOOT	2	0	0	0	20			
16 0011	10/14/1966	0.0	0.8	0.8	0	0	0			SUPP	FOOT	1	4	0	0	20			
16 0011	9/20/1976	0.0	0.8	0.8	8	0	8	90		SUPP	BOAT	1	0	0	0	20	60		
16 0011	9/20/1976	0.8	2.2	1.4	1	1	2	90		SUPP	BOAT	1	0	0	0	20	60		
16 0011	10/11/1976	0.0	0.8	0.8	0	11	11	85		SUPP	BOAT	1	0	0	0	20	31		
16 0011	10/11/1976	0.8	2.2	1.4	0	2	2	85		SUPP	BOAT	1	0	0	0	20	31		
16 0011	10/3/1977	0.0	0.8	0.8	14	0	14	90		SUPP	BOAT	1	0	0	0	20	31	60	
16 0011	10/17/1977	0.0	0.8	0.8	0	0	0	90		SUPP	BOAT	1	4	0	0	20	31	33	
16 0011	10/9/1979	0.0	2.2	2.2	0	0	0	80		SUPP	BOAT	1	3	4	0	20			
16 0011	9/19/1980	0.0	0.8	0.8	0	0	0	90		SUPP	BOAT					20			
16 0011	9/19/1980	0.8	3.1	2.3	0	0	0	90		SUPP	FOOT					20			
16 0011	10/7/1980	0.0	2.2	2.2	1	1	2	95		SUPP	BOAT	1	0	0	0	20			
16 0011	9/22/1982	0.0	2.2	2.2	0	0	0	95		INDX	BOAT	1	0	0	0	20			
16 0011	10/20/1982	0.0	2.2	2.2	2	0	2	90		INDX	BOAT	1	0	0	0	20			
16 0011	9/22/1983	0.0	2.2	2.2	2	0	2	85		INDX	BOAT	1	4	0	0	20			
16 0011	9/18/1984	0.0	2.2	2.2	0	0	0	95		INDX	BOAT	1				20			
16 0011	9/19/1985	0.0	2.2	2.2	2	0	2	85		INDX	BOAT	1				20			
16 0011	9/26/1985	0.0	2.2	2.2	0	1	1	85		INDX	BOAT	1				20			
16 0012	10/30/1981	0.0	0.3	0.3	0	0	0	75		INDX	FOOT	4	0	0	0	27	38		40
16 0012	10/28/1988	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					20			
16 0013	9/24/1952	0.0	0.5	0.5	6	2	8			INDX	FOOT					00			
16 0013	9/22/1981	0.0	3.0	3.0	0	0	0	88		INDX	FOOT					20	57		40
16 0013	10/30/1981	0.0	1.7	1.7	0	0	0	60		INDX	FOOT	1	4	0	0	25	38		40
16 0013	10/27/1988	0.0	1.7	1.7	3	0	3	90		INDX	FOOT								22
16 0013	10/28/1988	0.0	1.7	1.7	0	0	0	90		INDX	FOOT	1	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species	Comments			Agency
16 0014	10/28/1988	0.0	0.1	0.1	0	0	0	99		INDX	FOOT		00	54		
16 0105	9/27/1983	0.0	0.2	0.2	0	0	0	95	0	SUPP	FOOT		20	11		40
16 0105	10/7/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT		11	20		40
16 0105	10/12/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT		11	20		40
16 0105	10/19/1983	0.0	0.1	0.1	0	0	0	70	0	SUPP	FOOT		11	20	60	40
16 0215	10/18/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT		11	54		40
16 0215	10/25/1983	0.0	0.2	0.2	0	0	0	99	0	SUPP	FOOT		11	20		40
16 0216	10/18/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT		11	54		40
16 0216	10/26/1983	0.0	0.2	0.2	0	0	0	99	0	SUPP	FOOT		11	20		40
16 0217	10/18/1983	0.0	0.3	0.3	0	0	0	99	0	SUPP	FOOT		11	54		40
16 0217	10/26/1983	0.0	0.2	0.2	0	0	0	99	0	SUPP	FOOT		11	20		40
16 0221	10/11/1983	0.0	0.5	0.5	0	0	0	25	0	SUPP	FOOT		22	60		40
16 0221	10/18/1983	0.0	0.5	0.5	0	0	0	80	0	SUPP	FOOT		11	21	60	40
16 0221	10/25/1983	0.0	0.5	0.5	0	0	0	80	0	SUPP	FOOT		11	21		40
16 0222	10/16/1947	0.0	0.0	0.0	0	2	2			SPOT			65			
16 0224	10/4/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT		11	54		40
16 0224	10/11/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT		11	54	60	40
16 0224	10/18/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT		11	54		40
16 0224	10/25/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT		11	54		40
16 0225	10/8/1943		0.0	0.0	0	0	0			SPOT			65			
16 0225	10/22/1981	0.0	0.1	0.1	0	0	0	99		SUPP	FOOT		20			40
16 0225	10/29/1981	0.0	0.1	0.1	0	0	0	99		SUPP	FOOT		20			40
16 0225	10/4/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54		40
16 0225	10/11/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54	60	40
16 0225	10/18/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54		40
16 0225	10/25/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54		40
16 0226	10/22/1981	0.0	0.1	0.1	0	0	0	99		SUPP	FOOT		20			40
16 0226	10/29/1981	0.0	0.1	0.1	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/4/1983	0.0	0.5	0.5	0	0	0	99		INDX	FOOT		11	54		40
16 0228	10/11/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54	60	40
16 0228	10/18/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54		40
16 0228	10/25/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	54		40
16 0228	8/28/1952	0.0	0.2	0.2	0	0	0			INDX	FOOT		20			
16 0228	9/25/1952	0.0	0.2	0.2	0	0	0			INDX	FOOT		20			
16 0228	9/20/1979	0.0	0.5	0.5	27	0	27	80		SUPP	FOOT	3 0 0 0				
16 0228	9/24/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/2/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/8/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/15/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/22/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/29/1981	0.0	0.5	0.5	0	0	0	99		SUPP	FOOT		20			40
16 0228	10/29/1982	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	0 0 0 0	20	33	60	
16 0228	10/4/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11			40
16 0228	10/11/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT		11	20		40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0228	10/18/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11	20		40
16 0228	10/25/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11	20		40
16 0228	10/26/1988	0.0	0.4	0.4	0	0	0	95		INDX	FOOT					20			
16 0228	10/21/1997	0.0	0.6	0.6	0	0	0	95		INDX	FOOT					20			
16 0228	10/27/1998	0.0	0.0	0.0	0	0	0	99		SPOT	FOOT					20	60		
16 0230	10/18/1946	0.0	0.3	0.3	14	47	61			SUPP	FOOT					28			
16 0230	9/21/1955	0.5	0.6	0.1	30	0	30			SUPP	FOOT	3	0	0	0				
16 0230	10/29/1971	0.4	0.7	0.3	6	318	324	99		SUPP	FOOT	1	0	0	0	12	20		
16 0230	9/25/1972	0.4	0.7	0.3	310	3	313	90		SUPP	FOOT					20			
16 0230	10/16/1974	0.0	0.3	0.3	208	100	308	98		INDX	FOOT	0	0	0	0	20			
16 0230	10/28/1974	0.0	0.3	0.3	171	136	307	95		INDX	FOOT	0	0	0	0				
16 0230	9/8/1975	0.0	0.7	0.7	2	0	2	95		INDX	FOOT								
16 0230	9/23/1975	0.0	0.7	0.7	290	7	297	95		INDX	FOOT					20			
16 0230	10/8/1975	0.0	0.7	0.7	168	92	260	90		INDX	FOOT								
16 0230	10/24/1975	0.0	0.7	0.7	20	24	44	90		INDX	FOOT					23			
16 0230	9/13/1976	0.2	0.7	0.5	411	11	422	90		INDX	FOOT								
16 0230	9/21/1976	0.0	0.7	0.7	763	147	910	95		INDX	FOOT					20	60		
16 0230	9/30/1976	0.0	0.7	0.7	639	537	1,172	80		INDX	FOOT								
16 0230	9/13/1977	0.4	0.7	0.3	58	1	59	85		INDX	FOOT								
16 0230	9/16/1977	0.0	0.7	0.7	196	67	263	90		INDX	FOOT	1	0	0	0				
16 0230	10/17/1977	0.1	0.7	0.6	24	115	139	98		INDX	FOOT	1	3	0	0	12	20	60	
16 0230	9/5/1978	0.2	0.7	0.5	110	0	110	95		INDX	FOOT	4	0	0	0				
16 0230	9/19/1978	0.2	0.7	0.5	529	67	596	80		INDX	FOOT								
16 0230	10/5/1978	0.0	0.7	0.7	108	317	425	90		INDX	FOOT								
16 0230	10/11/1978	0.0	0.7	0.7	24	377	401	90		INDX	FOOT								
16 0230	10/18/1978	0.0	0.7	0.7	4	430	434	90		INDX	FOOT	1	0	0	0				
16 0230	10/25/1978	0.0	0.7	0.7	33	181	214	90		INDX	FOOT								
16 0230	9/20/1979	0.2	0.7	0.5	76	21	97	85		INDX	FOOT	3	0	0	0				
16 0230	10/10/1979	0.0	0.7	0.7	2	25	27	95		INDX	FOOT					20	60		
16 0230	10/15/1979	0.1	0.7	0.6	0	8	8	90		INDX	FOOT					60			
16 0230	10/24/1979	0.1	0.7	0.6	0	0	0	30		INDX	FOOT					31			
16 0230	9/15/1980	0.2	0.7	0.5	44	0	44	90		INDX	FOOT	4	0	0	0				
16 0230	9/25/1980	0.0	0.6	0.6	72	5	77	99		INDX	FOOT	4	0	0	0	20			
16 0230	10/7/1980	0.2	0.7	0.5	88	33	121	90		INDX	FOOT								
16 0230	10/17/1980	0.2	0.7	0.5	16	69	85	90		INDX	FOOT					20			
16 0230	9/16/1981	0.0	0.0	0.0	0	0	0	86	0	SPOT	FOOT					21	57		40
16 0230	9/16/1981	0.0	0.5	0.0	0	0	0	99	0	SUPP	FOOT					21	57		40
16 0230	9/17/1981	0.0	0.3	0.3	78	8	86	90	17	INDX	FOOT	4	0	0	0				40
16 0230	9/23/1981	0.1	0.7	0.6	147	19	166	85		INDX	FOOT	3	0	0	0				
16 0230	9/24/1981	0.0	0.2	0.2	62	0	62	95	11	SUPP	FOOT					20			40
16 0230	10/1/1981	0.2	0.7	0.5	139	54	193	90		INDX	FOOT	3	4	0	0				
16 0230	10/2/1981	0.0	0.2	0.2	22	25	47	95		SUPP	FOOT					20			40
16 0230	10/9/1981	0.0	0.2	0.2	0	36	36	95		SUPP	FOOT					23			40
16 0230	10/15/1981	0.0	0.2	0.2	0	20	20	95		SUPP	FOOT					20			40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0230	10/19/1981	0.3	0.7	0.4	2	20	22	80		INDX	FOOT								
16 0230	10/22/1981	0.0	0.3	0.3	0	28	28	95		SUPP	FOOT					20			40
16 0230	10/29/1981	0.0	0.2	0.2	0	0	0	80		INDX	FOOT	4	0	0	0	23	30		40
16 0230	9/14/1982	0.2	0.7	0.5	10	1	11	90		INDX	FOOT					20			
16 0230	9/27/1982	0.1	0.7	0.6	39	7	46	99		INDX	FOOT					20			
16 0230	10/15/1982	0.2	0.7	0.5	7	11	18	90		INDX	FOOT	0	0	0	0	21	31	60	
16 0230	9/29/1983	0.0	0.7	0.7	11	4	15	85		INDX	FOOT	3	4	0	0	20	60		
16 0230	10/12/1983	0.0	0.7	0.7	3	12	15	95		INDX	FOOT	1	3	0	0	20			
16 0230	10/19/1983	0.0	0.7	0.7	0	12	12	95		INDX	FOOT	3	0	0	0	20			
16 0230	9/7/1984	0.5			0	0	0	99		SPOT	FOOT					20			
16 0230	9/24/1984	0.0	0.7	0.7	83	9	92	99		INDX	FOOT	4	0	0	0	20			
16 0230	10/1/1984	0.0	0.7	0.7	77	28	105	99		INDX	FOOT	4	0	0	0	20			
16 0230	10/8/1984	0.0	0.7	0.7	60	51	111	99		INDX	FOOT	1	0	0	0	20			
16 0230	10/15/1984	0.0	0.7	0.7	16	22	38	99		INDX	FOOT	4	0	0	0	20			
16 0230	10/22/1984	0.0	0.7	0.7	1	27	28	99		INDX	FOOT					20			
16 0230	10/29/1984	0.0	0.7	0.7	0	26	26	90		INDX	FOOT					20			
16 0230	10/3/1985	0.0	0.7	0.7	39	15	54	99		INDX	FOOT					20			
16 0230	10/14/1985	0.3	0.7	0.4	6	21	27	90		INDX	FOOT	4				20			
16 0230	9/16/1986	0.0	0.7	0.7	19	2	21	95		INDX	FOOT								
16 0230	9/22/1986	0.1	0.7	0.6	48	1	49	95		INDX	FOOT								
16 0230	10/1/1986	0.1	0.7	0.6	38	19	57	90		INDX	FOOT					20			
16 0230	10/7/1986	0.2	0.7	0.5	13	31	44	95		INDX	FOOT					20			
16 0230	10/15/1986	0.3	0.7	0.4	6	31	37	90		INDX	FOOT					20			
16 0230	10/21/1986	0.0	0.2	0.2	4	19	23	90		INDX	FOOT					20			
16 0230	10/30/1986	0.0	0.3	0.3	3	1	4	70		INDX	FOOT					27	30	38	
16 0230	9/3/1987	0.3	0.7	0.4	0	0	0	90		INDX	FOOT	3	0	0	0				
16 0230	9/15/1987	0.3	0.7	0.4	10	0	10	99		INDX	FOOT	3	0	0	0	20			
16 0230	9/30/1987	0.4	0.7	0.3	11	11	22	95		INDX	FOOT	3	0	0	0				
16 0230	10/9/1987	0.3	0.7	0.4	7	7	14	99		INDX	FOOT	3	0	0	0	20			
16 0230	9/16/1988	0.0	0.7	0.7	39	0	39	95		INDX	FOOT					20	61		
16 0230	9/27/1988	0.0	0.7	0.7	124	12	136	90		INDX	FOOT					61			
16 0230	10/4/1988	0.0	0.7	0.7	103	33	136	90		INDX	FOOT	4	0	0	0	61			
16 0230	10/13/1988	0.0	0.7	0.7	32	83	115	90		INDX	FOOT					20	61		
16 0230	10/26/1988	0.0	0.7	0.7	4	33	37	95		INDX	FOOT	4	0	0	0	20	60	61	
16 0230	9/8/1989	0.0	0.7	0.7	0	0	0	80		INDX	FOOT	3	0	0	0	20			
16 0230	9/18/1989	0.0	0.7	0.7	9	0	9	95		INDX	FOOT	3	0	0	0	20			
16 0230	9/26/1989	0.0	0.7	0.7	18	1	19	80		INDX	FOOT	3	0	0	0	20	60		
16 0230	10/9/1989	0.3	0.7	0.4	10	7	17	90		INDX	FOOT	1	3	4	0	20			
16 0230	10/20/1989	0.0	0.7	0.7	0	2	2	70		INDX	FOOT	3	4	0	0	20	60		
16 0230	9/27/1990	0.0	0.7	0.7	0	0	0	90		INDX	FOOT	1	0	0	0	20			
16 0230	10/9/1990	0.0	0.7	0.7	2	0	2	90		INDX	FOOT	1	4	0	0	20	61	60	
16 0230	10/17/1990	0.0	0.7	0.7	0	0	0	75		INDX	FOOT	4	0	0	0	60	23		
16 0230	10/25/1990	0.6	0.7	0.1	0	0	0	35		INDX	FOOT					00	24		
16 0230	10/31/1990	0.0	0.7	0.7	35	0	35	75		INDX	FOOT	4	0	0	0	23	61		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souca - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0230	9/18/1991	0.0	0.7	0.7	15	0	15	90		INDX	FOOT	3	0	0	0	61	20	31	
16 0230	10/16/1991	0.3	0.7	0.4	10	5	15	80		INDX	FOOT	1	3	0	0	23	60		
16 0230	10/29/1991	0.0	0.7	0.7	7	3	10	95		INDX	FOOT	4	0	0	0	20	61		
16 0230	9/10/1992	0.2	0.7	0.5	8	0	8	95		INDX	FOOT					20	60	61	
16 0230	9/18/1992	0.0	0.7	0.7	39	7	46	95		INDX	FOOT					20	60	61	
16 0230	9/29/1992	0.2	0.7	0.5	28	26	54	95		INDX	FOOT					20	60	61	
16 0230	10/7/1992	0.0	0.7	0.7	8	21	29	90		INDX	FOOT					20	61		
16 0230	10/12/1992	0.2	0.7	0.5	15	39	54	95		INDX	FOOT					20	61		
16 0230	10/21/1992	0.0	0.7	0.7	17	12	29	90		INDX	FOOT					60	61	21	
16 0230	10/30/1992	0.0	0.7	0.7	211	14	225	80		INDX	FOOT					24	60	61	
16 0230	9/2/1993	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20	60		
16 0230	9/9/1993	0.0	0.7	0.7	0	0	0	95		INDX	FOOT	0	0	0	3	20			
16 0230	9/22/1993	0.0	0.7	0.7	6	0	6	90		INDX	FOOT	0	0	4	3	31	20	61	
16 0230	10/6/1993	0.0	0.7	0.7	45	19	64	95		INDX	FOOT	0	0	1	3	20	61		
16 0230	10/18/1993	0.0	0.7	0.7	0	4	4	95		INDX	FOOT	0	1	3	4	20	61		
16 0230	10/29/1993	0.0	0.7	0.7	8	2	10	95		INDX	FOOT	0	0	3	4	20	31	33	
16 0230	9/12/1994	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20	60	61	
16 0230	9/20/1994	0.0	0.7	0.7	15	0	15	90		INDX	FOOT					20	60	61	
16 0230	10/4/1994	0.0	0.7	0.7	35	7	42	90		INDX	FOOT	4	0	0	0	20	61		
16 0230	10/12/1994	0.0	0.7	0.7	48	14	62	95		INDX	FOOT	4	0	0	0	20	61		
16 0230	10/28/1994	0.0	0.7	0.7	18	8	26	95		INDX	FOOT					20	60		
16 0230	9/25/1995	0.0	0.7	0.7	52	9	61	90		INDX	FOOT	1	3	0	0	20	60	61	
16 0230	10/6/1995	0.0	0.7	0.7	18	7	25	95		INDX	FOOT	1	3	0	0	20	60	61	
16 0230	10/23/1995	0.0	0.7	0.7	1	4	5	95		INDX	FOOT	4	0	0	0	20	61		
16 0230	9/5/1996	0.3	0.7	0.4	3	0	3	85		INDX	FOOT	4	0	0	0	00	20	60	
16 0230	9/19/1996	0.0	0.7	0.7	5	2	7	95		INDX	FOOT	4	0	0	0	20			
16 0230	9/27/1996	0.0	0.7	0.7	29	4	33	95		INDX	FOOT	1	4	0	0	20	61		
16 0230	10/11/1996	0.0	0.7	0.7	19	17	36	95		INDX	FOOT	1	4	0	0	20	61		
16 0230	10/24/1996	0.0	0.7	0.7	93	6	99	75		INDX	FOOT	1	0	0	0	24			
16 0230	8/25/1997	0.0	0.7	0.7	0	0	0	99		INDX	FOOT	3	4	0	0	20			
16 0230	9/2/1997	0.0	0.7	0.7	0	0	0	95		INDX	FOOT	1	3	0	0	20			
16 0230	9/9/1997	0.0	0.7	0.7	0	0	0	80		INDX	FOOT	3	0	0	0	20	43	60	
16 0230	9/16/1997	0.0	0.7	0.7	8	0	8	70		INDX	FOOT	1	3	4	0	21	34	60	
16 0230	9/22/1997	0.0	0.7	0.7	2	1	3	90		INDX	FOOT	1	3	4		20	61		
16 0230	10/7/1997	0.0	0.7	0.7	4	4	8	85		INDX	FOOT	1	3	4	0	23			
16 0230	10/21/1997	0.0	0.7	0.7	10	0	10	95		INDX	FOOT	1	4	0	0	20	60	61	
16 0230	10/23/1998	0.0	0.7	0.7	1	3	4	95		INDX	FOOT	4	1	0	0	20	61		
16 0230	10/30/1998	0.0	0.7	0.7	17	1	18	95		INDX	FOOT					60	20		
16 0243	10/16/1947	0.0	0.1	0.1	10	0	10			INDX	FOOT					00	60		
16 0243	8/28/1952		0.0	0.0						SPOT	FOOT					60			
16 0243	9/25/1952	0.0	0.7	0.7	106	6	112			INDX	FOOT					60			
16 0243	10/24/1952	0.0	0.7	0.7	13	30	43			INDX	FOOT								
16 0243	10/19/1962	0.0	0.7	0.7	2	12	14			INDX	FOOT	1	4	0	0	20			
16 0243	10/18/1978	0.1	0.0	0.0	0	0	0			SPOT	FOOT	4	0	0	0				

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0243	10/18/1978	0.3	0.0	0.0	0	0	0			SPOT	FOOT								
16 0243	10/25/1978	0.2	0.0	0.0	0	0	0			SPOT	FOOT								
16 0243	9/20/1979	0.3	0.0	0.0	0	0	0	90		SPOT	FOOT								
16 0243	10/5/1979	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					20	60		
16 0243	10/15/1979	0.0	0.7	0.7	0	0	0	80		INDX	FOOT								
16 0243	10/22/1979	0.0	0.7	0.7	0	0	0	80		INDX	FOOT								
16 0243	10/24/1979	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					00			
16 0243	10/30/1979	0.0	0.7	0.7	0	0	0	90		INDX	FOOT	4	0	0	0				
16 0243	10/17/1980		0.0	0.0				99		SPOT	FOOT					57			
16 0243	9/16/1981	0.0	0.0	0.0	0	0	0	99	0	SPOT	FOOT					57			40
16 0243	9/17/1981	0.0	0.8	0.8	0	0	0	95		INDX	FOOT								40
16 0243	9/24/1981	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20			40
16 0243	10/2/1981	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20			40
16 0243	10/7/1981	0.7	0.9	0.2	0	0	0	30		INDX	FOOT					00	27		
16 0243	10/8/1981	0.0	0.8	0.8	0	0	0	95		SUPP	FOOT					20			40
16 0243	10/15/1981	0.0	0.8	0.8	0	0	0	95		SUPP	FOOT					20			40
16 0243	10/22/1981	0.0	0.7	0.7	0	1	1	80		INDX	FOOT	4	0	0	0	23	31	33	40
16 0243	10/28/1981	0.0	0.7	0.7	0	0	0			SUPP	FOOT								40
16 0243	10/29/1981	0.0	0.5	0.5	0	0	0	85		INDX	FOOT					23	33		
16 0243	10/29/1981	0.5	1.2	0.7	0	0	0	85		SUPP	FOOT					23	60		
16 0243	10/15/1982	0.0	0.5	0.5	0	0	0	98		INDX	FOOT	0	0	0	0	20	31	33	
16 0243	10/28/1982	0.0	0.7	0.7	0	0	0	95		INDX	FOOT	4	0	0	0	20			
16 0243	10/28/1982	0.7	1.2	0.5	1	0	1	90		SUPP	FOOT	4	0	0	0	20	60		
16 0243	9/27/1983	0.0	0.7	0.7	0	0	0	99	0	INDX	FOOT					11			40
16 0243	10/4/1983	0.0	1.6	1.6	0	0	0	99	0	INDX	FOOT					11			40
16 0243	10/11/1983	0.0	1.6	1.6	0	0	0	99	0	INDX	FOOT					11	20		40
16 0243	10/12/1983	0.5	0.0	0.0	0	0	0	95		SPOT	FOOT					20	60		
16 0243	10/18/1983	0.0	1.6	1.6	0	0	0	99	0	INDX	FOOT					11	20		40
16 0243	10/25/1983	0.0	1.6	1.6	0	0	0	95	0	INDX	FOOT					11	20		40
16 0243	10/29/1984	0.0	0.7	0.7	0	0	0	99		INDX	FOOT					20			
16 0243	10/14/1985	0.0	0.1	0.1	0	0	0	90		INDX	FOOT					20			
16 0243	10/30/1985	0.0	0.1	0.1	0	0	0	90		SPOT	FOOT					20			
16 0243	10/26/1988	0.0	1.2	1.2	0	0	0	95		INDX	FOOT	4	0	0	0	20			
16 0243	10/28/1989	0.0	1.2	1.2	0	0	0	99		INDX	FOOT					24	60		
16 0243	10/31/1990	0.0	1.2	1.2	0	0	0	95		INDX	FOOT					60	23		
16 0243	10/30/1992	0.0	1.2	1.2	1,002	11	1,013	90		INDX	FOOT					23	61		
16 0248	10/16/1947	0.0	0.2	0.2	0	0	0			INDX	FOOT					00	28		
16 0248	8/28/1952	0.0	0.0	0.0	0	0	0			SPOT						65			
16 0248	9/25/1952	0.0	0.5	0.5	0	0	0			INDX	FOOT					00			
16 0248	10/23/1952	0.0	0.5	0.5	3	0	3			INDX	FOOT					00			
16 0248	9/21/1955	0.0	0.5	0.5	0	0	0			INDX	FOOT					00			
16 0248	10/18/1978	0.2	0.0	0.0	0	0	0			SPOT	FOOT								
16 0248	10/25/1978	0.2	0.0	0.0	0	0	0			SPOT	FOOT								
16 0248	10/5/1979	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0248	10/15/1979	0.0	0.7	0.7	0	0	0	80		INDX	FOOT								
16 0248	10/22/1979	0.0	0.7	0.7	0	0	0	80		INDX	FOOT								
16 0251	9/27/1946	0.3	1.4	1.1	1,510	16	1,526			INDX	FOOT					00	63	20	
16 0251	10/26/1946	0.3	2.5	2.2	16	274	290			INDX	FOOT	1	0	0	0	26			
16 0251	9/25/1952	0.3	1.4	1.1	852	501	1,353			INDX	FOOT					00			
16 0251	10/23/1952	0.3	1.4	1.1	80	1,902	1,982			INDX	FOOT					00			
16 0251	9/10/1953	0.3	1.4	1.1	77	1	78			INDX	FOOT	1	3	0	0	00	20		
16 0248	10/24/1979	0.0	0.7	0.7	0	0	0	35		INDX	FOOT					00			
16 0248	10/30/1979	0.0	0.7	0.7	0	0	0	95		INDX	FOOT								
16 0248	9/17/1981	0.0	0.7	0.7	0	0	0	95	0	SUPP	FOOT					57			40
16 0248	9/24/1981	0.0	0.7	0.7	0	0	0	99		INDX	FOOT								40
16 0248	10/2/1981	0.0	0.7	0.7	0	0	0	99		SUPP	FOOT					20			40
16 0248	10/7/1981	0.3	0.7	0.4	0	0	0	40		SUPP	FOOT					27			
16 0248	10/8/1981	0.0	0.7	0.7	0	0	0	99		SUPP	FOOT					20			40
16 0248	10/15/1981	0.0	0.7	0.7	0	0	0	99		INDX	FOOT					20			40
16 0248	10/22/1981	0.0	0.7	0.7	0	0	0	99		INDX	FOOT					20			40
16 0248	10/29/1981	0.0	0.7	0.7	2	0	2	85		INDX	FOOT					23	33		
16 0248	10/29/1981	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					24	31	31	40
16 0248	10/15/1982	0.1	1.0	0.9	0	0	0	98		INDX	FOOT	0	0	0	0	48	21	60	
16 0248	10/26/1982	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			
16 0248	9/27/1983	0.0	0.1	0.1	0	0	0	99	0	INDX	FOOT					11	48		40
16 0248	10/4/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11			40
16 0248	10/11/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT					11	20	60	40
16 0248	10/12/1983	0.1	0.0	0.0	0	0	0	95		SPOT	FOOT					20	60	48	
16 0248	10/18/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT					11	20	60	40
16 0248	10/25/1983	0.0	0.3	0.3	0	0	0	95	0	INDX	FOOT					11	20	60	40
16 0248	10/29/1984	0.0	0.7	0.7	0	0	0	99		INDX	FOOT					20			
16 0248	10/14/1985	0.0	0.0	0.0	0	0	0			SPOT	FOOT					20			
16 0248	10/30/1985	0.0	0.1	0.1	0	0	0	90		SPOT	FOOT					20			
16 0248	10/26/1988	0.0	0.7	0.7	0	0	0	95		INDX	FOOT	4	0	0	0	20			
16 0248	10/26/1989	0.0	0.7	0.7	0	0	0	99		INDX	FOOT	4	0	0	0	24			
16 0248	10/31/1990	0.0	0.7	0.7	0	0	0	90		INDX	FOOT	4	0	0	0	60	23		
16 0248	10/30/1992	0.0	0.7	0.7	2	1	3	90		INDX	FOOT					23	61		
16 0248	10/23/1997	0.0	0.7	0.7	0	0	0	95		INDX	FOOT					20			
16 0251	9/15/1943	0.1	0.6	0.5	50	0	50			INDX	FOOT					00	07		
16 0251	10/8/1943		0.0	0.0						SPOT						65	60		
16 0251	9/12/1946	0.3	2.5	2.2	31	0	31			INDX	FOOT								
16 0251	10/10/1954	0.3	1.4	1.1	270	321	591			INDX	FOOT					00	20		
16 0251	10/16/1956	0.3	1.4	1.1	111	116	227			INDX	FOOT					27	00	31	
16 0251	10/1/1958	0.3	1.4	1.1	1,054	267	1,321			INDX	FOOT					20			
16 0251	9/17/1959	0.5	2.0	1.5	2,912	56	2,968			INDX	FOOT	3	0	0	0	23			
16 0251	9/24/1959	0.3	2.0	1.7	2,288	82	2,370			INDX	FOOT	3	0	0	0	23			
16 0251	10/5/1959	0.3	2.0	1.7	941	948	1,889			INDX	FOOT	1	3	4	0	23			
16 0251	9/27/1960	0.3	2.0	1.7	1,445	160	1,605			INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0251	10/1/1961	0.3	2.0	1.7	325	11	336			INDX	FOOT	1	3	0	0	20			
16 0251	10/16/1961	0.3	2.5	2.2	268	80	348			INDX	FOOT	1	3	0	0	20			
16 0251	10/1/1962	1.4	2.0	0.6	1,023	131	1,154			INDX	FOOT					26			
16 0251	9/19/1963	0.3	2.0	1.7	627	24	651			INDX	FOOT	1	3	0	0	20			
16 0251	9/24/1964	0.3	2.0	1.7	2,485	294	2,779			INDX	FOOT	1	4	0	0	20			
16 0251	9/24/1965	0.3	2.0	1.7	1,475	199	1,674			INDX	FOOT	1	3	0	0	20			
16 0251	9/28/1966	0.3	2.0	1.7	1,518	575	2,093			INDX	FOOT	1	4	0	0	20			
16 0251	10/10/1967	1.4	2.0	0.6	770	14	784			INDX	FOOT	1	3	0	0	27	34	60	
16 0251	9/30/1968	0.3	2.0	1.7	3,922	2,258	6,180			INDX	FOOT	1	0	0	0	23	13		
16 0251	9/28/1969	0.3	2.0	1.7	917	4	921	70		INDX	FOOT	1	3	0	0	23	13		
16 0251	10/14/1969	1.0	2.0	1.0	685	48	733	75		INDX	FOOT	1	3	0	0	20	32	13	
16 0251	9/28/1970	0.3	2.0	1.7	685	67	752	90		INDX	FOOT	1	0	0	0	20	13		
16 0251	10/5/1971	0.3	2.0	1.7	1,996	414	2,410	90		INDX	FOOT	1	3	5	0	20	13		
16 0251	10/6/1972	0.3	2.0	1.7	2,309	289	2,598	85		INDX	FOOT	1	4	0	0	20	13		
16 0251	9/4/1973	0.3	1.4	1.1	763	190	953	50		INDX	FOOT	1	3	6	0	00			
16 0251	9/9/1974	0.0	1.0	1.0	0	0	0	75		INDX	FOOT	1	0	0	0	13	23		
16 0251	9/18/1974	0.1	1.0	0.9	144	0	144	70	85	INDX	FOOT	1	0	0	0	60	20		
16 0251	10/2/1974	0.1	1.0	0.9	452	15	467	70		INDX	FOOT	1	0	0	0	60			
16 0251	10/16/1974	0.1	1.0	0.9	324	73	397	90		INDX	FOOT	1	0	0	0	20			
16 0251	10/28/1974	0.1	1.0	0.9	142	259	401	80		INDX	FOOT	0	0	0	0	20			
16 0251	9/12/1975	0.3	1.0	0.7	16	0	16	60		INDX	FOOT	3	0	0	0				
16 0251	9/23/1975	0.0	1.0	1.0	1,356	10	1,366	70		INDX	FOOT	3	0	0	0				
16 0251	10/8/1975	0.0	1.0	1.0	1,137	482	1,619	55		INDX	FOOT	1	3	0	0				
16 0251	10/24/1975	0.3	1.0	0.7	13	13	26	70		INDX	FOOT	3	0	0	0	24	60	61	
16 0251	9/10/1976	0.3	1.0	0.7	536	20	556	60		INDX	FOOT					20	31	32	
16 0251	9/21/1976	0.3	1.0	0.7	2,130	165	2,295	75		INDX	FOOT					60			
16 0251	9/30/1976	0.3	1.0	0.7	1,243	1,508	2,751	78		INDX	FOOT								
16 0251	9/28/1977	0.2	1.0	0.8	500	6	506	70		INDX	FOOT	1	3	4	0				
16 0251	10/10/1977	0.2	1.0	0.8	235	390	625	85		INDX	FOOT	3	0	0	0				
16 0251	10/17/1977	0.2	1.0	0.8	21	32	53	90		INDX	FOOT	3	4	0	0	12	20	60	
16 0251	10/17/1977	1.0	2.0	1.0	28	31	59	90		SUPP	FOOT	3	4	0	0	12	20	60	
16 0251	9/7/1978	0.2	1.0	0.8	635	0	635	60		INDX	FOOT	3	0	0	0				
16 0251	9/22/1978	0.2	1.0	0.8	1,471	48	1,519	75		INDX	BOAT	1	0	0	0				
16 0251	10/5/1978	0.0	1.0	1.0	901	320	1,221	80		INDX	FOOT	1	0	0	0				
16 0251	10/12/1978	0.0	1.0	1.0	180	393	573	80		INDX	FOOT	1	0	0	0				
16 0251	10/18/1978	0.2	2.0	1.7	84	365	449	90		INDX	FOOT	1	4	0	0				
16 0251	10/25/1978	0.3	1.0	0.7	79	328	407	75		INDX	FOOT	1	0	0	0				
16 0251	9/6/1979	0.1	1.0	0.9	251	0	251	90		INDX	FOOT	3	0	0	0				
16 0251	9/12/1979	0.2	1.0	0.8	329	0	329	80		INDX	BOAT	3	0	0	0				
16 0251	9/24/1979	0.1	1.0	0.9	822	177	999	80		INDX	BOAT	1	3	0	0				
16 0251	10/5/1979	0.1	1.0	0.9	176	165	341	80		INDX	FOOT	3	0	0	0	23	61		
16 0251	10/15/1979	0.0	1.0	1.0	71	316	387	80		INDX	FOOT	1	3	0	0				
16 0251	10/24/1979	0.0	1.0	1.0	0	10	10	30		INDX	FOOT	3	0	0	0	27	70	30	
16 0251	9/15/1980	0.3	1.0	0.7	38	0	38	90		INDX	FOOT	1	4	0	0				

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0251	9/30/1980	0.3	1.9	1.6	123	8	131	75		INDX	FOOT	4	0	0	0				
16 0251	10/17/1980	0.3	1.0	0.7	36	83	119	90		INDX	FOOT	4	0	0	0	20			
16 0251	9/9/1981	1.0	1.5	0.5	8	0	8	99		INDX	FOOT	3	0	0	0	23			40
16 0251	9/16/1981	0.0	2.0	2.0	37	3	40	75	12	INDX	FOOT	1	3	0	0	13	16	21	40
16 0251	9/23/1981	0.7	2.0	1.3	257	7	264	90	39	INDX	FOOT	1	3	4	0	06	23	66	40
16 0251	9/29/1981	0.2	1.0	0.8	10	0	10	50		INDX	FOOT	3	0	0	0	60			
16 0251	10/1/1981	0.0	2.0	2.0	297	1	298	66	120	INDX	FOOT	1	3	4	0	16	23	53	40
16 0251	10/2/1981	0.0	1.0	1.0	76	4	80	65		INDX	FOOT	1	3	0	0	27	31		
16 0251	10/16/1981	0.0	2.0	2.0	38	13	51	60		INDX	FOOT	1	3	4	0				40
16 0251	10/16/1981	0.2	2.0	1.8	6	4	10	90		INDX	FOOT	0	3	0	4				
16 0251	10/22/1981	0.0	2.0	2.0	0	5	5	65		INDX	BOAT	3	4	0	0	23			40
16 0251	9/14/1982	0.2	1.0	0.8	41	0	41	90		INDX	FOOT					20			
16 0251	9/27/1982	0.1	1.0	0.9	354	13	367	90		INDX	FOOT	1	0	0	0				
16 0251	10/6/1982	0.1	1.0	0.9	289	70	359	70		INDX	FOOT	1	0	0	0				
16 0251	10/13/1982	0.2	2.0	1.8	96	112	208	85		INDX	FOOT	0	0	0	1	21	31	33	
16 0251	9/8/1983	0.4	0.0	0.0	20	0	20	60		SPOT	FOOT	3	0	0	0				
16 0251	9/9/1983	0.0	1.2	1.2	8	0	8	70		INDX	FOOT	1	3	0	0	20	32		22
16 0251	9/9/1983	1.2	2.0	0.8	4	0	4	95		SUPP	FOOT	1	3	0	0	20			22
16 0251	9/14/1983	0.0	1.2	1.2	6	0	6	75		INDX	FOOT	1	3	0	0	20	32		22
16 0251	9/14/1983	1.2	2.0	0.8	5	0	5	85		SUPP	FOOT	1	3	4	0	20	33		22
16 0251	9/16/1983	0.1	1.0	0.9	70	0	70	90		INDX	FOOT	1	3	0	0	20			
16 0251	9/23/1983	0.0	1.2	1.2	71	1	72	70		INDX	FOOT	1	3	4	0	20	60		40
16 0251	9/23/1983	1.2	1.4	0.2	3	0	3	70	0	INDX	FOOT	3	0	0	0	06	20	60	40
16 0251	9/23/1983	1.4	2.0	0.6	22	2	24	85		INDX	FOOT	1	3	4	0	20	31	60	40
16 0251	9/29/1983	0.2	2.0	1.8	58	9	21	75		INDX	FOOT	3	1	5	0	20	33		
16 0251	9/30/1983	0.0	1.2	1.2	59	0	59	80		INDX	FOOT	1	3	0	0	60			40
16 0251	9/30/1983	1.2	2.0	0.8	22	4	26	60		INDX	FOOT	1	3	0	0	60			40
16 0251	10/6/1983	0.0	1.2	0.2	5	3	8	95		INDX	FOOT	1	3	0	0	21	60		40
16 0251	10/6/1983	0.2	2.0	1.8	23	7	30	95		INDX	FOOT	1	3	4	0	20			
16 0251	10/6/1983	1.2	2.0	0.8	8	15	23	95		INDX	FOOT	1	3	0	0	21	60		40
16 0251	10/6/1983	2.0	2.2	0.2	26	15	41	90		INDX	FOOT	1	3	0	0	21	60		40
16 0251	10/13/1983	0.2	2.0	1.8	7	20	27	90		INDX	FOOT	1	3	4	5	20			
16 0251	10/14/1983	0.0	1.2	1.2	6	18	24	70		INDX	FOOT	1	3	0	0	20	33		40
16 0251	10/14/1983	1.2	2.0	0.8	10	18	28	90		INDX	FOOT	1	3	0	0	20	60		40
16 0251	10/19/1983	0.2	2.0	1.8	0	31	31	90		INDX	FOOT	1	3	4	5	20			
16 0251	10/21/1983	0.0	1.2	1.2	2	33	35	70		INDX	FOOT	1	3	4	0	20	32	60	40
16 0251	10/21/1983	1.2	2.0	0.8	2	56	58	65		INDX	FOOT	3	4	0	0	20	60		40
16 0251	10/26/1983	0.2	2.0	1.8	6	11	17	90		INDX	FOOT	1	3	4	5	20			
16 0251	10/28/1983	0.0	1.2	1.2	5	19	24	70		INDX	FOOT	1	3	4	0	20	33	60	40
16 0251	10/28/1983	1.2	2.0	0.8	1	27	28	85		INDX	FOOT	1	3	4	0	20	33	60	40
16 0251	9/6/1984	0.2	1.0	0.8	0	0	0	95		INDX	FOOT					20	33		40
16 0251	9/7/1984	0.8	1.0	0.2	0	0	0	90		SUPP	FOOT								
16 0251	9/25/1984	0.2	1.0	0.8	40	1	41	99		INDX	FOOT	4	0	0	0	20			
16 0251	10/1/1984	0.2	1.0	0.8	56	8	64	90		INDX	FOOT	1	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0251	10/15/1984	0.1	1.0	0.9	2	0	2	50		INDX	FOOT	4	0	0	0	24			
16 0251	10/22/1984	0.1	1.0	0.9	0	3	3	85		INDX	FOOT					23			
16 0251	10/29/1984	0.1	1.0	0.9	1	9	10	85		INDX	FOOT	4	0	0	0	23			
16 0251	9/16/1985	0.0	1.0	1.0	46	0	46	85		INDX	BOAT	3	0	0	0				
16 0251	9/30/1985	0.0	1.0	1.0	44	22	66	90		INDX	FOOT					20			
16 0251	10/10/1985	0.0	1.0	1.0	20	33	53	90		INDX	FOOT	3	4			20			
16 0251	9/16/1986	0.0	1.0	1.0	31	0	31	90		INDX	FOOT								
16 0251	9/22/1986	0.1	1.0	0.9	41	2	43	95		INDX	FOOT								
16 0251	10/1/1986	0.2	1.8	1.6	77	20	97	90		INDX	FOOT					20			
16 0251	10/7/1986	0.2	1.8	1.6	41	31	72	95		INDX	FOOT	4	0	0	0				
16 0251	10/15/1986	0.2	2.0	1.8	20	32	52	90		INDX	FOOT	4	0	0	0	20			
16 0251	10/21/1986	0.2	2.0	1.8	15	53	68	90		INDX	FOOT	4	0	0	0	20			
16 0251	9/28/1987	0.3	1.8	1.5	17	8	25	90		INDX	FOOT	1	3	0	0	20			
16 0251	10/8/1987	0.3	1.8	1.5	2	12	14	70		INDX	FOOT	1	3	4	0				
16 0251	10/21/1987	0.3	1.8	1.5	4	0	4	95		INDX	FOOT	1	3	4	0	20			
16 0251	9/16/1988	0.3	1.8	1.5	40	1	41	95		INDX	FOOT	1	0	0	0	20	61		
16 0251	9/27/1988	0.3	1.8	1.5	112	10	122	75		INDX	FOOT	1	4	0	0	61			
16 0251	10/4/1988	0.3	1.8	1.5	195	55	250	85		INDX	FOOT	1	4	5	0	61			
16 0251	10/13/1988	0.3	1.8	1.5	78	179	257	70		INDX	FOOT	1	0	0	0	20	60	61	
16 0251	10/26/1988	0.3	1.8	1.5	28	67	95	80		INDX	FOOT	1	4	0	0	20	31	61	
16 0251	9/8/1989	0.3	1.8	1.5	0	0	0	80		INDX	FOOT	0	0	0	3	20			
16 0251	9/18/1989	0.3	1.8	1.5	1	0	1	85		INDX	FOOT	3	0	0	0	20			
16 0251	9/28/1989	0.3	1.8	1.5	9	4	13	90		INDX	FOOT	1	3	0	0	20			
16 0251	10/9/1989	0.3	1.8	1.5	2	2	4	90		INDX	FOOT	1	3	4	0	20	60		
16 0251	10/20/1989	0.3	1.8	1.5	3	10	13	65		INDX	FOOT	1	3	4	0	20			
16 0251	9/20/1990	0.3	1.8	1.5	12	1	13	85		INDX	FOOT	1	4	0	0	20	60	61	
16 0251	10/2/1990	0.3	1.8	1.5	16	0	16	85		INDX	FOOT	1	4	0	0	20	61		
16 0251	10/15/1990	0.3	1.8	1.5	18	1	19	70		INDX	FOOT	1	4	0	0	24	60	61	
16 0251	10/25/1990	0.3	1.8	1.5	28	6	34	40		INDX	FOOT	1	4	0	0	25	60		
16 0251	10/31/1990	0.0	1.8	1.8	7	0	7	75		INDX	RAFT	4	0	0	0	24			
16 0251	9/12/1991	0.3	1.8	1.5	4	0	4	85		INDX	FOOT	3	0	0	0	60	20		
16 0251	9/23/1991	0.3	1.8	1.5	23	3	28	85		INDX	RAFT	3	4	0	0	60			
16 0251	10/3/1991	0.3	1.8	1.5	26	10	36	85		INDX	RAFT	1	3	4	0	20			
16 0251	10/10/1991	0.4	1.8	1.4	14	22	36	85		INDX	FOOT	1	3	4	0	60	20		
16 0251	10/17/1991	0.3	1.8	1.5	6	13	19	90		INDX	FOOT	1	3	4	0	60	20		
16 0251	10/24/1991	0.3	1.8	1.5	0	2	2	85		INDX	FOOT	1	3	4	0	60			
16 0251	9/10/1992	0.3	1.8	1.5	31	0	31	90		INDX	FOOT	0	0	1	4	20	60	61	
16 0251	9/21/1992	0.3	1.8	1.5	41	1	42	85		INDX	FOOT	1	0	0	0	20	60	61	
16 0251	9/21/1992	1.8	2.0	0.2	9	0	9	80		SUPP	FOOT	1	0	0	0	20	61		
16 0251	9/29/1992	0.3	1.8	1.5	32	2	34	95		INDX	FOOT	0	0	0	1	20	60	61	
16 0251	10/7/1992	0.3	1.8	1.5	8	6	14	75		INDX	FOOT					20	61		
16 0251	10/15/1992	0.3	1.8	1.5	2	3	5			INDX	FOOT					20	61		
16 0251	10/22/1992	0.3	1.8	1.5	213	2	215	70		INDX	FOOT					61	23		
16 0251	8/26/1993	0.3	1.8	1.5	0	0	0	95		INDX	FOOT	0	0	0	3	23	60	61	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0251	9/10/1993	0.3	1.8	1.5	0	0	0	85		INDX	FOOT	0	0	0	3	20	60	61	
16 0251	9/21/1993	0.3	1.8	1.5	5	1	6	90		INDX	FOOT	0	1	3	4	20	60	61	
16 0251	9/30/1993	0.3	1.8	1.5	18	0	18	95		INDX	FOOT	0	0	1	3	20	60	61	
16 0251	10/6/1993	0.3	1.8	1.5	43	2	45	95		INDX	FOOT	0	1	3	4	20	61		
16 0251	10/18/1993	0.3	1.8	1.5	11	4	15	95		INDX	FOOT	0	1	3	4	20	61		
16 0251	10/27/1993	0.3	1.8	1.5	11	2	13	90		INDX	FOOT	0	0	3	4	20	33	61	
16 0251	9/8/1994	0.3	1.8	1.5	25	0	25	95		INDX	FOOT	0	0	0	4	20	60	61	
16 0251	9/19/1994	0.3	1.8	1.5	99	1	100	90		INDX	FOOT	0	0	1	4	20	60	61	
16 0251	9/28/1994	0.3	1.8	1.5	115	4	119	90		INDX	FOOT	0	0	1	4	20	33	61	
16 0251	10/7/1994	0.3	1.8	1.5	96	22	118	90		INDX	FOOT	1	4	0	0	20			
16 0251	10/17/1994	0.3	1.8	1.5	35	8	43	90		INDX	FOOT	4	0	0	0	20	61		
16 0251	8/7/1995	1.2	1.5	0.3	0	0	0	40		INDX	FOOT					00	27	60	
16 0251	8/16/1995	0.3	1.8	1.5	0	0	0	90		INDX	FOOT	3	0	0	0	23	60	61	
16 0251	8/29/1995	0.3	1.8	1.5	3	0	3	95		INDX	FOOT	3	6	0	0	23	60	61	
16 0251	9/6/1995	0.3	1.8	1.5	16	0	16	95		INDX	FOOT	1	3	6	0	20	60	61	
16 0251	9/19/1995	0.3	1.8	1.5	239	15	254	90		INDX	FOOT	1	3	4	0	20	60	61	
16 0251	10/2/1995	0.3	1.8	1.5	59	45	104	90		INDX	FOOT	1	3	4	0	20	60	61	
16 0251	10/19/1995	0.3	1.8	1.5	20	5	25	75		INDX	FOOT	1	3	4	0	24	60	61	
16 0251	9/5/1996	0.3	1.8	1.5	7	0	7	95		INDX	FOOT	4	7	0	0	20	61		
16 0251	9/18/1996	0.3	1.8	1.5	247	3	250	85		INDX	FOOT	1	4	0	0	20	60	61	
16 0251	9/30/1996	0.3	1.8	1.5	224	16	240			INDX	FOOT	4	5	8	0	20	61		
16 0251	10/7/1996	0.3	1.8	1.5	216	59	275	90		INDX	FOOT	4	0	0	0	20			
16 0251	10/21/1996	0.3	1.8	1.5	1,110	30	1,140	75		INDX	FOOT	4	0	0	0	24	60	61	
16 0251	8/22/1997	1.6	1.8	0.2	4	0	4	95		SUPP	FOOT	1	3	0	0	20	60		
16 0251	9/3/1997	0.3	1.8	1.5				90		INDX	FOOT	1	3	0	0	20	60		
16 0251	9/10/1997	0.3	1.8	1.5	24	0	24	95		INDX	FOOT	1	3	0	0	20	60	61	
16 0251	9/24/1997	0.3	1.8	1.5	9	0	9	85		INDX	RAFT	3	0	0	0	21			
16 0251	10/7/1997	0.3	1.8	1.3	7	10	17	75		INDX	RAFT					27	61		
16 0251	10/16/1997	0.3	1.6	1.3	5	0	5	70		INDX	RAFT	3	0	0	0	28	60		
16 0251	8/12/1998	0.3	1.8	1.5	0	0	0	95		INDX	FOOT					20			
16 0251	8/24/1998	0.3	1.8	1.5	2	0	2	95	1	INDX	FOOT					20	60		
16 0251	9/2/1998	0.5	1.8	1.3	5	1	6	95		INDX	FOOT	3	4	0	0	20	60	61	
16 0251	9/10/1998	0.3	1.8	1.5	20	2	22	95		INDX	FOOT	4	1	0	0	20	60	61	
16 0251	9/21/1998	0.3	1.8	1.5	46	1	47	95		INDX	FOOT	4	1	0	0	20	60	61	
16 0251	10/1/1998	0.3	1.8	1.5	18	17	35	95		INDX	FOOT	4	1	0	0	20	61		
16 0251	10/9/1998	0.3	1.8	1.5	16	7	23	70		INDX	FOOT	4	1	0	0	24	60	61	
16 0251	10/19/1998	0.3	1.8	1.5	1	4	5	75		INDX	FOOT	4	1	0	0	23	60	61	
16 0251	10/27/1998	0.3	1.8	1.5	204	2	206	95		INDX	FOOT					60	20		
16 0252	9/27/1983	0.0	0.2	0.2	0	0	0	85	0	SUPP	FOOT					11	33		40
16 0252	10/7/1983	0.0	0.3	0.3	0	0	0	75		SUPP	FOOT					11	33	60	40
16 0252	10/28/1983	0.0	0.3	0.3	0	0	0	90	0	SUPP	FOOT					11	20		40
16 0253	9/25/1952	0.0	0.1	0.1	6	0	6			INDX	FOOT					00			
16 0253	10/10/1954				108	1	109				FOOT					64			
16 0253	10/1/1958	0.0	0.5	0.5	0	0	0			INDX	FOOT					00	20		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0253	9/24/1959	0.0	1.0	1.0	441	61	502			INDX	FOOT	3	0	0	0	20	60		
16 0253	10/10/1967	0.0	1.0	1.0	324	95	419			INDX	FOOT	1	3	0	0	20			
16 0253	9/30/1968	0.0	0.4	0.4	63	246	309			INDX	FOOT	1	0	0	0	23	00		
16 0253	9/26/1969	0.0	0.4	0.4	28	2	30	90		INDX	FOOT	1	3	0	0	20	00		
16 0253	10/14/1969	0.0	0.5	0.5	91	57	148	90		INDX	FOOT	1	3	0	0	20	00		
16 0253	9/28/1977	0.0	0.4	0.4	17	9	26	90		INDX	FOOT	3	0	0	0				
16 0253	9/5/1978	0.0	0.1	0.1	5	0	5	99		SUPP	FOOT								
16 0253	9/22/1978	0.0	0.3	0.3	48	29	77	90		INDX	FOOT					60			
16 0253	10/5/1978	0.0	0.4	0.4	0	13	13	95		INDX	FOOT								
16 0253	10/12/1978	0.0	0.3	0.3	1	11	12	90		INDX	FOOT								
16 0253	10/18/1978	0.0	0.2	0.2	1	13	14	95		INDX	FOOT								
16 0253	10/25/1978	0.0	0.4	0.4	0	7	7	95		INDX	FOOT								
16 0253	9/13/1979	0.2	0.8	0.6	26	1	27	95		INDX	FOOT								
16 0253	9/24/1979	0.0	0.4	0.4	1	7	8	99		INDX	FOOT	3	0	0	0	20	60		
16 0253	10/5/1979	0.0	1.0	1.0	0	4	4	90		INDX	FOOT	3	0	0	0				
16 0253	10/15/1979	0.0	0.7	0.7	0	5	5	80		INDX	FOOT	3	0	0	0				
16 0253	10/24/1979	0.0	0.7	0.7	12	0	12	80		INDX	FOOT	3	0	0	0	26	60		
16 0253	9/9/1981	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			40
16 0253	9/16/1981	0.0	0.0	0.0	0	0	0	99		SPOT	FOOT					57			40
16 0253	9/29/1981	0.0	0.1	0.1	102	2	104	90		INDX	FOOT	1	3	0	0	24			
16 0253	10/1/1981	0.0	1.0	1.0	175	10	185	89	8	INDX	FOOT	1	3	4	0	16	23	53	40
16 0253	10/16/1981	0.0	1.0	1.0	10	8	18	95	17	INDX	FOOT	3	0	0	0				40
16 0253	10/16/1981	0.0	0.7	0.7	3	11	14	90		INDX	FOOT								
16 0253	10/22/1981	0.0	1.0	1.0	3	9	12	95		INDX	FOOT	3	0	0	0	00	23		40
16 0253	10/29/1981	0.0	1.6	1.6	7	11	18	80		INDX	FOOT	1	4	0	0	23			
16 0253	9/14/1982	0.1	0.0	0.0	0	0	0	99		SPOT	FOOT					57			
16 0253	10/6/1982	0.0	0.5	0.5	11	0	11	90		INDX	FOOT					57			
16 0253	10/28/1982	0.0	1.6	1.6	10	1	11	85		INDX	FOOT					23	61		
16 0253	9/16/1983	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					57			
16 0253	9/23/1983	0.0	0.2	0.2	2	2	4	80	0	SUPP	FOOT	3	0	0	0	20	33	60	40
16 0253	10/6/1983	0.0	0.3	0.3	1	3	4	95		SUPP	FOOT	3	0	0	0	21	60		40
16 0253	10/6/1983	0.0	0.2	0.2	2	2	4	95		INDX	FOOT	3	0	0	0	20			
16 0253	10/13/1983	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	3	0	0	0	20			
16 0253	10/14/1983	0.0	0.3	0.3	0	2	2	95		SUPP	FOOT	3	0	0	0	20	33		40
16 0253	10/19/1983	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	3	0	0	0	20			
16 0253	10/26/1983	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	3	0	0	0	20			
16 0253	10/15/1984	0.0	0.3	0.3	5	0	5	99		INDX	FOOT					20			
16 0253	10/22/1984	0.0	0.3	0.3	0	1	1	99		INDX	FOOT					20			
16 0253	10/29/1984	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					20			
16 0253	9/16/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
16 0253	9/22/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
16 0253	10/15/1986	0.0	0.2	0.2	0	0	0	90		INDX	FOOT					20			
16 0253	10/21/1986	0.0	0.2	0.2	0	0	0	90		INDX	FOOT					20			
16 0253	9/3/1987	0.0	0.2	0.2	0	0	0	90		INDX	FOOT					60			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0253	9/27/1988	0.0	0.8	0.8	12	0	12	90		INDX	FOOT					00	60		
16 0253	10/13/1988	0.0	1.6	1.6	0	8	8	95		INDX	FOOT					20	61		
16 0253	10/26/1988	0.0	1.6	1.6	1	2	3	95		INDX	FOOT					20	61		
16 0253	9/1/1989	1.6		0.0	0	0	0			SPOT	FOOT					20			
16 0253	10/9/1990	0.0	0.4	0.4	0	0	0	95		INDX	FOOT					00	60	20	
16 0253	10/17/1990	0.0	1.6	1.6	0	0	0	95		INDX	FOOT	4	0	0	0	20			
16 0253	10/25/1990	0.0	1.6	1.6	0	0	0	70		INDX	FOOT	4	0	0	0	25			
16 0253	10/31/1990	0.0	1.6	1.6	0	0	0	85		INDX	FOOT	4	0	0	0	23			
16 0253	10/3/1991	0.0	1.0	1.0	0	1	1	90		INDX	FOOT	3	0	0	0	20			
16 0253	10/10/1991	0.0	1.0	1.0	1	0	1	90		INDX	FOOT	3	0	0	0	20			
16 0253	10/17/1991	0.0	1.0	1.0	0	1	1	90		INDX	FOOT	3	0	0	0	60	20		
16 0253	10/15/1992	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					60	20		
16 0253	10/22/1992	0.0	1.8	1.8	17	0	17	90		INDX	FOOT					61	23		
16 0253	10/30/1992	0.0	1.8	1.8	229	6	235	70		INDX	FOOT					28	61		
16 0253	10/18/1993	1.6	0.0	0.0	0	0	0	99		SPOT	FOOT					20	60	65	
16 0253	10/27/1993	0.0	0.8	0.8	0	0	0	95		INDX	FOOT	0	0	0	4	20	00	60	
16 0253	10/10/1995	0.0	1.0	1.0	1	0	1	80		INDX	FOOT	3	0	0	0	00	23	60	
16 0253	9/19/1997	0.0	1.6	1.6	25	0	25	85		INDX	FOOT	3	0	0	0	24	60	61	
16 0253	10/7/1997	0.0	1.6	1.6	23	1	24	95		INDX	FOOT	3	4	0	0	23	60	61	
16 0253	10/16/1997	0.0	1.6	1.6	0	0	0	90		INDX	FOOT	4	0	0	0	23	61		
16 0253	10/23/1997	0.0	1.6	1.6	3	1	4	95		INDX	FOOT	3	4	0	0	20	61		
16 0253	10/19/1998	0.0	0.1	0.1	0	0	0	95		SPOT	FOOT	4	0	0	0	20	65		
16 0253	10/27/1998	0.0	0.7	0.7	7	2	9	99		INDX	FOOT					60	20	61	
16 0318	9/27/1983	0.0	0.3	0.3	0	0	0	99	0	SUPP	FOOT					11	20	60	40
16 0318	10/6/1983	0.0	0.3	0.3	0	0	0	99	0	SUPP	FOOT					11	21		40
16 0318	10/14/1983	0.0	0.3	0.3	0	0	0	99	0	SUPP	FOOT					20	11		40
16 0318	10/21/1983	0.0	0.3	0.3	0	0	0	99		SUPP	FOOT					20	60		40
16 0318	10/28/1983	0.0	0.3	0.3	0	0	0	90	0	SUPP	FOOT					11	20	60	40
16 0326	10/5/1983	0.0	1.0	1.0	0	0	0	99		INDX	FOOT					11	54		40
16 0326	10/12/1983	0.0	1.0	1.0	0	0	0	90	0	INDX	FOOT					11			40
16 0326	10/27/1983	0.0	1.0	1.0	0	0	0	95	0	INDX	FOOT					11	20		40
16 0332	8/28/1952	0.0	0.0	0.0	0	0	0			SPOT									
16 0332	10/1/1959	0.0	0.8	0.8	3	0	3			INDX	FOOT					20	60		
16 0332	9/13/1979	0.0	0.3	0.3	7	0	7	90		SUPP	FOOT					60			
16 0332	10/16/1981	0.0	0.8	0.8	1	0	1	99		INDX	FOOT								40
16 0332	10/29/1981	0.0	0.8	0.8	3	0	3	75		INDX	FOOT					23	33		
16 0332	10/28/1982	0.0	0.8	0.8	0	0	0	85		INDX	FOOT					23			
16 0332	10/14/1985	0.0	0.1	0.1	0	0	0	90		INDX	FOOT					20			
16 0332	10/30/1985	0.0	0.1	0.1	0	0	0	90		SPOT	FOOT					20			
16 0332	10/31/1990	0.0	0.8	0.8	4	0	4	80		INDX	FOOT	4	0	0	0	23	60		
16 0332	10/30/1992	0.4	0.0	0.0	0	0	0	25		SPOT	FOOT					60			
16 0351	10/19/1943					12					FOOT					64	60		
16 0351	9/28/1945		0.0	0.0	300					SPOT	FOOT	3	0	0	0	60	65		
16 0351	9/12/1946	1.8	2.3	0.5	7	0	7			INDX	FOOT	1	0	0	0	00			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0351	9/27/1946	2.1	2.3	0.2	105	6	111			INDX	FOOT					00			
16 0351	10/26/1946	0.1	2.3	2.2	17	119	136			INDX	FOOT								
16 0351	9/25/1952		0.0	0.0	50	10	60			SPOT	FOOT					60	65		
16 0351	10/24/1952		0.0	0.0						SPOT	FOOT					60	65		
16 0351	9/10/1953	1.8	2.3	0.5	4	0	4			INDX	FOOT	1	3	0	0	00	20		
16 0351	10/12/1953		0.0	0.0						SPOT	FOOT	3	0	0	0	60			
16 0351	9/4/1954	0.1	2.3	2.2	514	1	515			INDX	FOOT	1	0	0	0	20	60		
16 0351	10/1/1958	0.1	2.3	2.2	880	1,052	1,932			INDX	FOOT					20			
16 0351	9/3/1959	0.1	2.3	2.2	127	0	127			INDX	FOOT	1	3	0	0	20	60		
16 0351	9/10/1959	0.1	2.3	2.2	737	3	740			INDX	FOOT	1	3	0	0	20			
16 0351	9/26/1959	0.1	2.3	2.2	794	190	984			INDX	FOOT	1	3	0	0	23	34		
16 0351	10/1/1959	0.1	2.3	2.2	3,500					INDX	FOOT	1	3	0	0	20	60		
16 0351	9/19/1960	0.1	2.3	2.2	738	19	757			INDX	FOOT	1	0	0	0	20			
16 0351	9/29/1961	0.1	2.3	2.2	337	39	376			INDX	FOOT	1	3	0	0	20			
16 0351	10/6/1961	0.1	2.3	2.2	282	119	301			INDX	FOOT	1	3	0	0	20			
16 0351	9/21/1962	0.1	2.3	2.2	1,030	8	1,038			INDX	FOOT	1	0	0	0	20			
16 0351	9/23/1963	0.1	0.6	0.5	100					INDX	FOOT					00	20	60	
16 0351	9/24/1964	0.1	2.3	2.2	2,134	347	2,481			INDX	FOOT	1	0	0	0	20			
16 0351	9/24/1965	0.1	2.3	2.2	1,109	269	1,378			INDX	FOOT	1	3	0	0	20			
16 0351	10/15/1965	0.1	2.3	2.2	171	325	496			INDX	FOOT	1	3	0	0	23			
16 0351	9/28/1966	0.1	2.3	2.2	1,813	165	1,978			INDX	FOOT					20			
16 0351	10/18/1967	0.1	2.3	2.2	37	365	402			INDX	FOOT	1	3	5	0	20	60		
16 0351	9/30/1968	0.1	2.3	2.2	1,869	1,940	3,809			INDX	FOOT					23	13		
16 0351	9/26/1969	0.1	2.3	2.2	1,347	10	1,357	60		INDX	FOOT	3	0	0	0	23	13		
16 0351	9/26/1969	2.3	2.8	0.5	69	0	69	60		SUPP	FOOT	3	0	0	0	23	13		
16 0351	10/12/1969	0.1	2.3	2.2	345	307	652	70		INDX	FOOT	1	3	0	0	20	13		
16 0351	9/28/1970	0.1	2.3	2.2	1,051	70	1,121	80		INDX	FOOT	1	4	0	0	20	13		
16 0351	9/14/1971	0.1	2.3	2.2	271	0	271	70		INDX	FOOT	1	3	0	0	23	13		
16 0351	9/28/1971	0.1	2.3	2.2	1,306	26	1,332	70		INDX	FOOT	1	3	0	0	24	34	13	
16 0351	9/26/1972	0.5	2.3	1.8	2,020	5	2,025	60		INDX	FOOT	1	0	0	0	00	34	13	
16 0351	10/6/1972	0.1	2.3	2.2	5,438	896	6,334	85		INDX	FOOT	1	0	0	0	20	13		
16 0351	10/9/1973	0.1	2.3	2.2	1,982	1,897	3,879	90		INDX	FOOT	1	3	0	0				
16 0351	9/18/1974	0.1	2.2	2.1	173	1	174	60	119	INDX	FOOT	1	0	0	0	20	60		
16 0351	10/2/1974	0.3	2.3	2.0	1,271	28	1,299	60		INDX	FOOT	0	0	0	0	60			
16 0351	10/16/1974	0.1	2.2	2.1	676	452	1,128	80		INDX	FOOT	1	0	0	0	20			
16 0351	10/28/1974	0.1	2.2	2.1	223	657	880	90		INDX	FOOT	0	0	0	0	20	30		
16 0351	9/8/1975	0.1	1.1	1.0	13	0	13	90		SUPP	FOOT								
16 0351	9/23/1975	0.1	2.3	2.2	690	6	696	65		INDX	FOOT	3	0	0	0	23			
16 0351	10/8/1975	0.1	2.3	2.2	494	191	685	65		INDX	FOOT	3	4	0	0				
16 0351	10/24/1975	0.1	2.3	2.2	15	14	29	70		INDX	FOOT	3	0	0	0	24	60	61	
16 0351	9/10/1976	0.2	1.2	1.0	345	7	342	65		INDX	FOOT					20	32		
16 0351	9/21/1976	0.3	2.3	2.0	2,565	230	2,795	70		INDX	FOOT								
16 0351	9/21/1976	2.3	2.8	0.5	596	50	646	70		SUPP	FOOT					60			
16 0351	10/5/1976	0.3	2.3	2.0	410	2,803	3,213	60		INDX	BOAT	1	0	0	0				

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0351	9/12/1977	0.1	2.3	2.2	187	3	190	75		INDX	FOOT								
16 0351	9/22/1977	0.1	2.3	2.2	671	0	671	50		INDX	FOOT	3	0	0	0				
16 0351	10/10/1977	0.0	2.3	2.3	402	521	923	80		INDX	FOOT	3	0	0	0	21			
16 0351	9/22/1978	0.0	2.3	2.3	1,021	47	1,068	60		INDX	BOAT	1	4	0	0				
16 0351	10/11/1978	0.1	2.3	2.2	19	343	362	85		INDX	FOOT								
16 0351	10/18/1978	0.1	2.3	2.2	14	375	389	85		INDX	FOOT	6	0	0	0	60			
16 0351	10/25/1978	0.1	2.3	2.2	9	261	270	80		INDX	FOOT								
16 0351	9/12/1979	0.1	2.3	2.2	79	0	79	65		INDX	BOAT	3	0	0	0				
16 0351	9/24/1979	0.2	2.3	2.1	718	96	814	85		INDX	BOAT	3	4	0	0	20			
16 0351	10/5/1979	0.1	2.3	2.2	87	60	147	80		INDX	FOOT	3	0	0	0	20	33	53	
16 0351	10/17/1979	0.1	2.3	2.2	31	135	166	85		INDX	FOOT	3	4	0	0	20	31	60	
16 0351	10/24/1979	0.1	2.3	2.2	0	0	0	30		INDX	FOOT	3	0	0	0				
16 0351	9/5/1980	0.3	1.2	0.9	5	0	5	60	2	SUPP	FOOT								
16 0351	9/30/1980	0.3	2.3	2.0	333	11	344	90		INDX	BOAT	1	4	0	0	20			
16 0351	10/17/1980	0.3	2.3	2.0	134	132	266	90		INDX	FOOT					20			
16 0351	9/9/1981	0.0	0.5	0.5	1	0	1	99		INDX	FOOT	3	0	0	0	20	51		40
16 0351	9/16/1981	4.5	5.0	0.5	0	0	0	99		SUPP	FOOT					57	20		40
16 0351	9/23/1981	0.1	2.3	2.2	207	5	212	90	25	INDX	FOOT	3	4	0	0	23			40
16 0351	9/29/1981	0.2	0.0	0.0	0	0	0			SPOT						28	39		
16 0351	10/15/1981	0.0	2.3	2.3	47	37	84	85	22	INDX	BOAT	1	3	4	0				40
16 0351	10/16/1981	0.2	2.3	2.1	0	12	12	70		INDX	FOOT	0	3	0	4				
16 0351	9/14/1982	0.0	2.3	2.3	16	0	16	80		INDX	FOOT					20			
16 0351	9/24/1982	0.0	2.3	2.3	253	2	255	65		INDX	BOAT					20			
16 0351	10/15/1982	0.0	2.3	2.3	101	69	170	85		INDX	FOOT	0	0	0	0	33	31	23	
16 0351	9/8/1983	1.2	2.0	0.8	3	0	3	95		SUPP	FOOT	3	0	0	0	20			22
16 0351	9/16/1983	0.0	2.3	2.3	22	0	22	85		INDX	FOOT	3	0	0	0	20			
16 0351	9/16/1983	0.3	1.0	0.7	2	0	2	90		INDX	FOOT	3	0	0	0	20	33		22
16 0351	9/16/1983	1.2	2.0	0.8	22	0	22	90		SUPP	FOOT	1	3	0	0	20	33		22
16 0351	9/16/1983	2.0	2.5	0.5	3	0	3	90		SUPP	FOOT	3	0	0	0	20	33		22
16 0351	9/23/1983	0.1	0.3	0.2	5	0	5	70	0	INDX	FOOT	4	3	0	0	00	20	60	40
16 0351	9/23/1983	0.3	1.0	0.7	4	1	5	60		INDX	FOOT	3	0	0	0	00	20	60	40
16 0351	9/23/1983	1.0	1.2	0.2	7	1	8	80		INDX	FOOT	3	0	0	0	20	31	60	40
16 0351	9/23/1983	1.2	2.0	0.8	46	1	47	85		INDX	FOOT	1	3	4	0	20	31	60	40
16 0351	9/29/1983	0.0	2.3	2.3	5	4	9	85		INDX	FOOT	3	0	0	0	20	33	60	
16 0351	9/29/1983	0.3	1.0	0.7	0	4	4	60		INDX	FOOT	1	3	0	0	31	60		40
16 0351	9/29/1983	1.0	1.2	0.2	0	4	4	90		INDX	FOOT	1	3	0	0	20	31	60	40
16 0351	10/5/1983	0.3	1.0	0.7	0	2	2	75		INDX	FOOT	3	0	0	0	20	33	60	40
16 0351	10/5/1983	1.0	1.2	0.2	0	2	2	90		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/6/1983	0.1	2.3	2.2	2	2	4	95		INDX	FOOT	3	4	0	0	20			
16 0351	10/12/1983	0.1	0.3	0.2	0	1	1	70		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/12/1983	1.0	1.2	0.2	0	2	2	90		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/12/1983	1.2	2.0	0.8	3	5	8	90		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/13/1983	0.1	2.3	2.2	0	9	9	90		INDX	FOOT	3	4	0	0	20			
16 0351	10/19/1983	0.1	2.3	2.2	0	10	10	85		INDX	FOOT	3	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0351	10/20/1983	0.3	1.0	0.7	0	3	3	75		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/20/1983	1.0	1.2	0.2	0	4	4	85		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/20/1983	1.2	2.0	0.8	1	12	13	85		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/20/1983	2.0	2.5	0.5	2	7	9	85		INDX	FOOT	3	4	0	0	20	60		40
16 0351	10/26/1983	0.1	2.3	2.2	0	2	2	90		INDX	FOOT	3	4	0	0	20			
16 0351	10/27/1983	0.3	1.0	0.7	0	7	7	80		INDX	FOOT	3	4	0	0	20	60		40
16 0351	10/27/1983	1.0	1.2	0.2	0	4	4	80		INDX	FOOT	3	0	0	0	20	60		40
16 0351	10/27/1983	1.2	2.0	0.8	0	8	8	80		INDX	FOOT	1	3	4	0	20	60		40
16 0351	9/7/1984	0.5			0	0	0	80		SPOT	FOOT					20			
16 0351	9/25/1984	0.1	2.3	2.2	72	0	72	90		INDX	FOOT	4	0	0	0	20			
16 0351	10/1/1984	0.1	2.3	2.2	163	9	172	90		INDX	FOOT					20			
16 0351	10/15/1984	0.1	2.3	2.2	17	1	18	40		INDX	FOOT					26			
16 0351	10/22/1984	0.1	2.3	2.2	15	12	27	75		INDX	FOOT	4	0	0	0	23	31		
16 0351	10/29/1984	0.1	2.3	2.2	17	8	25	85		INDX	FOOT					23			
16 0351	9/30/1985	0.0	1.5	1.5	19	8	27	80		INDX	FOOT					20			
16 0351	10/8/1985	0.1	2.3	2.2	1	17	18	90		SUPP	FOOT	3	0	0	0	20			
16 0351	10/18/1985	0.0	2.3	2.3	3	6	9	80		INDX	FOOT	3				20			
16 0351	9/16/1986	0.0	2.3	2.3	20	0	20	90		INDX	FOOT								
16 0351	9/22/1986	0.1	2.3	2.3	35	0	35	90		INDX	FOOT								
16 0351	10/1/1986	0.0	2.3	2.3	96	6	102	90		INDX	FOOT					20			
16 0351	10/7/1986	0.2	2.3	2.1	65	20	85	90		INDX	FOOT					20			
16 0351	10/15/1986	0.0	2.3	2.3	16	53	69	90		INDX	FOOT	4	0	0	0	20			
16 0351	10/21/1986	0.2	1.5	1.3	8	38	46	90		INDX	FOOT	4	0	0	0	20			
16 0351	9/15/1987	0.1	2.3	2.2	2	0	2	90		INDX	FOOT	3	0	0	0	20			
16 0351	9/28/1987	0.0	2.3	2.3	5	0	5	80		INDX	FOOT	3	0	0	0	20			
16 0351	10/8/1987	0.1	2.3	2.2	3	2	5	90		INDX	FOOT	1	3	4	0				
16 0351	9/16/1988	0.0	2.3	2.3	27	0	27	95		INDX	FOOT	4	0	0	0	20			
16 0351	9/27/1988	0.0	2.3	2.3	167	1	168	70		INDX	FOOT	1	0	0	0	60	61		
16 0351	10/4/1988	0.0	2.3	2.3	259	19	278	90		INDX	RAFT	1	4	0	0	20			
16 0351	10/13/1988	0.0	2.3	2.3	72	143	215	80		INDX	FOOT	1	4	6	0	20	61		
16 0351	10/26/1988	0.0	2.3	2.3	41	29	70	90		INDX	RAFT	1	4	0	0	20	60		
16 0351	9/8/1989	0.0	2.3	2.3	0	0	0	75		INDX	FOOT	3	0	0	0	20			
16 0351	9/18/1989	0.0	2.3	2.3	0	0	0	80		INDX	FOOT	3	4	0	0				
16 0351	9/29/1989	0.1	2.3	2.2	22	1	23	80		INDX	FOOT	1	3	0	0				
16 0351	10/9/1989	0.2	2.3	2.1	1	5	6	85		INDX	FOOT	1	3	4	0	20			
16 0351	10/20/1989	0.1	2.3	2.2	16	11	27	85		INDX	FOOT	3	4	0	0	20			
16 0351	9/20/1990	0.0	2.3	2.3	8	0	8	85		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	10/2/1990	0.0	2.3	2.3	4	0	4	80		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	10/15/1990	0.0	2.3	2.3	18	0	18	55		INDX	FOOT	1	0	0	0	25	60	61	
16 0351	10/25/1990	0.3		0.0				40		SPOT	FOOT					00	24		
16 0351	10/31/1990	0.0	2.3	2.3	31	0	31	70		INDX	RAFT	4	0	0	0	24			
16 0351	9/5/1991	0.0	2.3	2.3	0	0	0	65		INDX	FOOT	0	0	0	3	60			
16 0351	9/23/1991	0.0	2.3	2.3	47	11	58	80		INDX	RAFT	3	5	0	0				
16 0351	10/3/1991	0.0	2.3	2.3	13	12	25	85		INDX	RAFT	1	3	4	5	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0351	10/10/1991	0.0	2.3	2.3	39	13	52	85		INDX	RAFT	1	3	4	5	20			
16 0351	10/17/1991	0.0	2.3	2.3	5	12	17	85		INDX	RAFT	3	4	0	0				
16 0351	10/24/1991	0.0	2.3	2.3	7	3	10	85		INDX	RAFT	1	3	4	0				
16 0351	9/10/1992	0.1	2.3	2.2	34	1	35	85		INDX	FOOT	0	0	0	4	20	60	61	
16 0351	9/23/1992	0.1	2.3	2.2	165	9	174	80		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	9/29/1992	0.1	2.3	2.2	266	29	295	90		INDX	FOOT	0	0	1	4	20	60	61	
16 0351	10/7/1992	0.1	2.3	2.2	183	93	276	75		INDX	FOOT	1	0	0	0	20	61		
16 0351	10/15/1992	0.0	2.3	2.3	32	111	143	90		INDX	FOOT					20	61		
16 0351	10/22/1992	0.0	2.3	2.3	12	31	43	60		INDX	FOOT					31	61	24	
16 0351	9/8/1993	0.0	2.3	2.3	0	0	0	95		INDX	FOOT	0	0	0	3	20			
16 0351	9/22/1993	0.0	2.3	2.3	6	0	6	90		INDX	FOOT	0	0	0	3	20	31	61	
16 0351	9/30/1993	0.0	2.3	2.3	43	3	46	85		INDX	FOOT	0	0	1	3	20	60	61	
16 0351	10/7/1993	0.0	2.3	2.3	53	4	57	95		INDX	FOOT	0	1	3	4	20	33	61	
16 0351	10/18/1993	0.0	2.3	2.3	18	1	19	85		INDX	FOOT	0	1	3	4	20	60	61	
16 0351	10/27/1993	0.0	2.3	2.3	81	1	82	90		INDX	FOOT	0	0	3	4	20	33	61	
16 0351	9/12/1994	0.0	2.3	2.3	1	0	1	90		INDX	FOOT					20	60	61	
16 0351	9/19/1994	0.0	2.3	2.3	66	1	67	90		INDX	FOOT	0	0	0	4	20	60	61	
16 0351	9/28/1994	0.0	2.3	2.3	47	1	48	90		INDX	FOOT	0	0	0	4	20	33	61	
16 0351	10/7/1994	0.1	2.3	2.2	67	11	78			INDX	FOOT					20			
16 0351	10/17/1994	0.0	2.3	2.3	87	15	102	90		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	8/7/1995	0.1	0.0	0.0	0	0	0	20		SPOT	FOOT					27	60	65	
16 0351	8/15/1995	0.0	2.3	2.3	0	0	0	80		INDX	FOOT	3	0	0	0	23	60		
16 0351	8/29/1995	0.0	2.3	2.3	0	0	0	90		INDX	FOOT	3	4	0	0	23	60		
16 0351	9/6/1995	0.0	2.3	2.3	24	0	24	90		INDX	FOOT	3	4	0	0	20	60	61	
16 0351	9/15/1995	0.0	2.3	2.3	455	2	457	85		INDX	FOOT	1	3	4	0	20	60	61	
16 0351	9/27/1995	0.3	2.3	2.0	177	76	253	80		INDX	FOOT	3	4	0	0	61	60		
16 0351	10/23/1995	0.1	2.3	2.2	113	8	121	90		INDX	RAFT	3	4	0	0	23	60	61	
16 0351	9/5/1996	0.0	2.3	2.3	33	0	33	95		INDX	FOOT	4	0	0	0	20	33	61	
16 0351	9/18/1996	0.0	2.3	2.3	830	12	842	90		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	9/30/1996	0.0	2.3	2.3	1,265	244	1,509	95		INDX	FOOT	1	4	0	0	20	61		
16 0351	10/7/1996	0.0	2.3	2.3	357	486	843	90		INDX	FOOT	4	0	0	0	20			
16 0351	10/21/1996	0.0	2.3	2.3	266	136	402	75		INDX	FOOT					24	60	61	
16 0351	9/3/1997	0.1	2.3	2.2	21	0	21	90		INDX	FOOT	1	3	0	0	20	60		
16 0351	9/10/1997	0.1	2.3	2.2	74	0	74	90		INDX	FOOT	1	3			20	60	61	
16 0351	9/24/1997	0.1	2.3	2.2	163	3	166	85		INDX	RAFT	1	3	5	0	21			
16 0351	10/16/1997	0.1	2.3	2.2	25	0	25	65		INDX	RAFT	3				27	60	61	
16 0351	8/12/1998	0.0	2.3	2.3	0	0	0	90		INDX	FOOT					20			
16 0351	8/24/1998	0.0	2.3	2.3	0	0	0	95		INDX	FOOT					20			
16 0351	9/2/1998	0.0	2.3	2.3	1	0	1	95		INDX	FOOT	4	0	0	0	20	61		
16 0351	9/11/1998	0.0	2.3	2.3	20	0	20	95		INDX	FOOT	4	0	0	0	20	60	61	
16 0351	9/21/1998	0.0	2.3	2.3	68	1	69	95		INDX	FOOT	5	4	1	0	20	60	61	
16 0351	10/1/1998	0.0	2.3	2.3	63	8	71	95		INDX	FOOT	4	1	0	0	20	60	61	
16 0351	10/9/1998	0.0	2.3	2.3	48	12	60	75		INDX	FOOT	4	1	0	0	24	60	61	
16 0351	10/19/1998	0.0	2.3	2.3	28	3	31	75		INDX	FOOT	4	0	0	0	23	60	61	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0351	10/27/1998	0.0	2.3	2.3	42	1	43	95		INDX	FOOT					60	20		
16 0351 A	9/27/1983	0.0	0.2	0.2	0	0	0	95	0	SUPP	FOOT					20	11		40
16 0351 A	10/5/1983	0.0	0.2	0.2	0	0	0	95		SUPP	FOOT					11	20	60	40
16 0351 A	10/12/1983	0.1	0.3	0.2	0	0	0	70	0	SUPP	FOOT					11			40
16 0355	9/26/1969	0.0	0.1	0.1	4	1	5			SUPP	FOOT	3	0	0	0	23			
16 0355	10/15/1981	0.0	0.2	0.2	1	0	1	90		SUPP	FOOT	1	4	0	0				40
16 0355	10/29/1981	0.0	0.1	0.1	2	0	2	95		SUPP	FOOT					23			
16 0355	10/28/1982	0.0	0.1	0.1	0	0	0	60		SUPP	FOOT					24			
16 0355	10/31/1990	0.0	0.1	0.1	0	0	0	95		INDX	FOOT					20			
16 0355	10/27/1993	0.0	0.1	0.1	0	0	0	95		INDX	FOOT	0	0	0	4	20			
16 0355	10/23/1995	0.0	0.1	0.1	0	1	1	99		INDX	FOOT	4	0	0	0	20			
16 0355	10/16/1997	0.0	0.1	0.1	5	0	5	95		INDX	FOOT	3	4	0	0	23	60		
16 0355	10/19/1998	0.0	0.1	0.1	0	0	0	95		INDX	FOOT	4	0	0	0	20	60		
16 0355	10/27/1998	0.0	0.1	0.1	0	0	0	99		INDX	FOOT	4	0	0	0	20			
16 0438	10/15/1981	0.0	0.5	0.5	0	0	0	95		SUPP	FOOT					57			40
16 0438	10/29/1981	0.0	0.5	0.5	1	0	1	95		SUPP	FOOT					20			
16 0438	10/28/1982	0.2	0.5	0.3	0	0	0	95		SUPP	FOOT	4	0	0	0	20			
16 0438	9/28/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT					11	57	60	40
16 0438	10/5/1983	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	54	60	40
16 0438	10/12/1983	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT					11			40
16 0438	10/27/1983	0.0	0.2	0.2	0	0	0	95	0	INDX	FOOT					11	20		40
16 0438	10/23/1995	0.0	0.5	0.5	0	0	0	99		INDX	FOOT					20			
16 0438	10/23/1995	0.5	0.6	0.1	0	0	0	99		SUPP	FOOT					20			
16 0441 A	9/28/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT					11	57		40
16 0441 A	10/3/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT					11	54		40
16 0441 A	10/10/1983	0.0	0.4	0.4	0	0	0	99	0	SUPP	FOOT					11	54		40
16 0441 A	10/17/1983	0.0	0.4	0.4	0	0	0	99	0	SUPP	FOOT					11	20		40
16 0442	9/15/1943	0.0	0.1	0.1	1	0	1			SUPP	FOOT	3	0	0	0				
16 0442	10/19/1943		0.0	0.0	2	0	2			SPOT		3	0	0	0	6			
16 0442	9/28/1945		0.0	0.0	1	0	1			SPOT		3	0	0	0	60			
16 0442	9/28/1945	3.6	4.0	0.4	136	26	162			SUPP	FOOT								
16 0442	9/28/1945	10.0	0.0	0.0	1	1	2			SPOT		3	0	0	0				
16 0442	9/12/1946	3.6	4.0	0.4	21	0	21			SUPP	FOOT	1	0	0	0				
16 0442	9/27/1946	0.0	0.2	0.2	30	16	46			SUPP	FOOT	1	0	0	0				
16 0442	9/27/1946	3.6	4.6	1.0	120	19	139			SUPP	FOOT	1	0	0	0				
16 0442	10/26/1946	0.0	0.2	0.2	45	68	113			SUPP	FOOT					28			
16 0442	9/30/1947	0.0	3.2	3.2	236	91	327			SUPP	FOOT	3	0	0	0	25			
16 0442	9/30/1947	3.6	7.6	4.0	2	16	18			SUPP	FOOT	3	0	0	0	25			
16 0442	9/30/1947	7.6	11.5	3.9	0	22	22			SUPP	FOOT	3	0	0	0	25			
16 0442	9/11/1953	3.6	5.7	2.1	24	2	26			SUPP	FOOT	1	3	0	0				
16 0442	9/4/1954	3.6	5.7	2.1	16	0	16			SUPP	FOOT	1	3	0	0				
16 0442	10/1/1958	3.6	5.7	2.1	6	1	7			SUPP	FOOT	3	0	0	0				
16 0442	9/24/1959	3.6	5.7	2.1	4	0	4			SUPP	FOOT	3	0	0	0	24			
16 0442	9/28/1959	3.6	5.7	2.1	37	5	42			SUPP	FOOT	1	3	0	0	25			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0442	9/19/1960	3.6	5.7	2.1	10	1	11			SUPP	FOOT	1	0	0	0	20			
16 0442	9/16/1962	3.6	5.7	2.1	4	0	4			SUPP	FOOT	1	0	0	0				
16 0442	9/8/1964	3.6	5.7	2.1	3	0	3		2	SUPP	FOOT	1	0	0	0	20			
16 0442	9/30/1965	3.6	5.7	2.1	0	3	3			SUPP	FOOT	1	3	0	0	20			
16 0442	9/7/1968	3.6	5.7	2.1	3	0	3			SUPP	FOOT	1	0	0	0	23	13		
16 0442	10/6/1969	0.0	3.2	3.2	52	17	69	99		SUPP	FOOT					20	13		
16 0442	10/6/1969	3.6	3.7	0.1	0	0	0	99		SUPP	FOOT					20	13		
16 0442	10/9/1971	1.2	3.2	2.0	21	33	54	70		SUPP	FOOT	1	3	0	0	21	13		
16 0442	10/9/1971	3.6	5.7	2.1	2	2	4	70		SUPP	FOOT	1	3	0	0	21	13		
16 0442	9/14/1972	0.0	0.5	0.5	59	0	59	80		SUPP	FOOT					20	13		
16 0442	10/6/1972	0.0	2.0	2.0	665	137	802	80		SUPP	FOOT	1	4	0	0	20	13		
16 0442	10/3/1973	0.0	3.2	3.2	353	270	623	70		SUPP	FOOT	1	3	0	0				
16 0442	10/3/1974	0.3	10.0	9.7	111	6	117	70	60	SUPP	BOAT	1	0	0	0	60			
16 0442	10/21/1974	0.0	6.7	6.7	4	21	25	80		SUPP	BOAT	1	6	0	0	60	20		
16 0442	9/29/1975	0.1	6.7	6.6	267	1	268	75		SUPP	BOAT	3	4	1	0				
16 0442	9/10/1976	0.0	1.4	1.4	620	29	649	65		INDX	FOOT					20	32		
16 0442	9/22/1976	0.0	1.4	1.4	1,118	419	1,537	60		SUPP	FOOT					60			
16 0442	9/22/1976	0.0	3.2	3.2	1,330	429	1,759	60		SUPP	FOOT	1				34	60	61	
16 0442	10/4/1976	0.0	6.7	6.7	192	889	1,081	70		SUPP	BOAT	1	0	0	0				
16 0442	9/12/1977	0.1	2.3	2.2	357	2	359	70		SUPP	FOOT	3	0	0	0				
16 0442	9/29/1977	0.1	6.7	6.6	981	115	1,096	70		SUPP	BOAT	1	3	0	0	60			
16 0442	10/11/1977	0.1	0.7	0.6	64	53	117	70		SUPP	BOAT	1	3	4	0				
16 0442	10/11/1978	0.1	2.3	2.2	9	32	41	65		INDX	FOOT	1	0	0	0	38			
16 0442	9/25/1980	0.1	1.3	1.2	618	11	629	80		SUPP	BOAT	4	6	0	0	21	60		
16 0442	10/7/1980	0.1	2.3	2.2	194	55	249	55		INDX	BOAT	1	4	0	0	38			
16 0442	9/8/1981	0.0	0.2	0.2	0	0	0			INDX	FOOT	3	0	0	0				40
16 0442	9/16/1981	3.5	4.5	1.0	0	0	0	99		INDX	FOOT								40
16 0442	9/24/1981	0.0	2.0	2.0	25	11	36	68	31	INDX	FOOT	3	4	0	0	13	25		40
16 0442	9/29/1981	0.0	2.6	2.6	0	1	1	7		INDX	FOOT	3	0	0	0	06	29	38	40
16 0442	9/29/1981	0.3	0.0	0.0	0	0	0			SPOT						28	39		
16 0442	10/14/1981	0.0	3.6	3.6	9	2	11	70		INDX	BOAT	3	4	0	0				40
16 0442	10/16/1981	0.2	3.7	3.5	16	0	16	70		SUPP	BOAT	1	3	4	0	24			
16 0442	10/22/1981	0.0	3.6	3.6	13	14	27	70	12	INDX	BOAT	3	4	0	0	23			40
16 0442	9/14/1982	0.0	3.2	3.2	101	0	101	90		INDX	BOAT					20			
16 0442	9/24/1982	0.0	3.6	3.6	190	5	195	75		INDX	BOAT	1	0	0	0				
16 0442	10/13/1982	0.1	2.3	2.2	31	17	48	90		INDX	RAFT	0	0	0	1	60	20	33	
16 0442	9/13/1983	1.0	1.3	0.3	4	0	4	50		SUPP	FOOT	3	0	0	0	22	38		22
16 0442	9/23/1983	0.1	2.3	2.2	14	0	14	75		INDX	BOAT	3	0	0	0	20	31		
16 0442	9/26/1983	0.8	1.0	0.2	4	1	5	50		INDX	FOOT	3	4	0	0	20	31	60	40
16 0442	9/26/1983	1.0	1.8	0.8	13	0	13	50		INDX	FOOT	3	0	0	0	20	31	60	40
16 0442	10/3/1983	0.0	0.8	0.8	4	0	4	40		INDX	FOOT	1	3	0	0	21	33		40
16 0442	10/3/1983	0.8	1.0	0.2	2	1	3	40		INDX	FOOT	1	3	4	0	21	33	60	40
16 0442	10/3/1983	1.0	1.3	0.3	4	0	4	40		INDX	FOOT	3	0	0	0				40
16 0442	10/10/1983	0.0	0.8	0.8	0	2	2	70		INDX	FOOT	3	0	0	0	20	33	60	40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0442	10/10/1983	0.8	1.0	0.2	19	2	21	80		INDX	FOOT	3	0	0	0	21	33	60	40
16 0442	10/10/1983	1.3	1.8	0.5	1	3	4	80		INDX	FOOT	3	0	0	0	21	33	60	40
16 0442	10/13/1983	0.1	2.3	2.2	0	0	0	90		INDX	FOOT					20			
16 0442	10/17/1983	0.8	1.0	0.2	4	5	9	90		INDX	FOOT	1	3	4	0	20	60		40
16 0442	10/17/1983	1.3	1.8	0.5	0	1	1	85		INDX	FOOT	3	0	0	0	20	60		40
16 0442	10/20/1983	0.1	2.3	2.2	6	1	7	85		INDX	FOOT	3	4	0	0	20			
16 0442	10/24/1983	0.0	0.8	0.8	1	0	1	55		INDX	FOOT	3	0	0	0	21	60		40
16 0442	10/24/1983	0.8	1.0	0.2	2	1	3	55		INDX	FOOT	3	0	0	0	21	60		40
16 0442	10/24/1983	1.3	1.8	0.5	0	1	1	55	0	INDX	FOOT	3	0	0	0	21	60		40
16 0442	10/26/1983	0.1	2.3	2.3	0	2	2	60		INDX	FOOT	3	0	0	0	21			
16 0442	9/7/1984	0.2			0	0	0	30		SPOT	FOOT					20			
16 0442	10/2/1984	0.1	2.3	2.2	128	20	148	80		INDX	FOOT	1	0	0	0	20			
16 0442	10/15/1984	0.1	2.3	2.2	2	11	13	40		INDX	FOOT	4	0	0	0	27			
16 0442	10/22/1984	0.1	2.3	2.2	1	1	2	70		INDX	FOOT					23			
16 0442	10/29/1984	0.1	2.3	2.2	0	0	0	85		INDX	FOOT					23			
16 0442	9/16/1985	0.0	3.2	3.2	137	0	137	70		INDX	BOAT	3	0	0	0				
16 0442	9/27/1985	0.0	6.0	6.0	23	22	45	70		SUPP	FOOT					20			
16 0442	10/17/1985	0.0	6.7	6.7	9	3	12	85		SUPP	BOAT	3	4			20			
16 0442	9/16/1986	0.0	2.3	2.3	23	1	24	90		INDX	FOOT								
16 0442	9/22/1986	0.1	2.3	2.2	18	0	18	90		INDX	FOOT								
16 0442	10/1/1986	0.1	2.3	2.2	6	4	10	90		INDX	FOOT								
16 0442	10/7/1986	0.1	2.3	2.2	11	2	13	90		INDX	FOOT	1	0	0	0	20			
16 0442	10/14/1986	0.2	2.1	1.9	14	3	17	90		INDX	FOOT					20			
16 0442	10/21/1986	0.1	2.3	2.2	3	1	4	90		INDX	FOOT	4	0	0	0	20			
16 0442	9/17/1987	0.0	6.7	6.7	5	0	5	75		INDX	RAFT	1	3	0	0	21			
16 0442	9/30/1987	0.0	6.7	6.7	4	0	4	70		INDX	FOOT	1	3	0	0	21			
16 0442	10/21/1987	0.0	6.7	6.7	0	3	3	80		INDX	FOOT	1	3	4	0	20	60		
16 0442	9/13/1988	0.0	3.2	3.2	148	1	149	70		INDX	FOOT					21	61		
16 0442	10/4/1988	0.0	2.3	2.3	163	28	191	65		INDX	RAFT					24			
16 0442	10/13/1988	0.0	2.3	2.3	20	144	164	60		INDX	FOOT					21	61		
16 0442	10/26/1988	0.0	2.3	2.3	7	11	18	70		INDX	RAFT	1	4	0	0	21	60		
16 0442	9/8/1989	0.3	6.7	6.4	2	0	2	60		INDX	FOOT	1	3	6	0	24			
16 0442	9/18/1989	0.0	6.7	6.7	2	0	0	70		INDX	FOOT	1	3	0	0				
16 0442	9/28/1989	0.0	2.3	2.3	10	3	13	60		INDX	FOOT	1	3	0	0				
16 0442	10/9/1989	0.0	6.7	6.7	0	0	0	70		INDX	FOOT	3	4	0	0				
16 0442	10/20/1989	0.0	6.0	6.0	1	0	1	60		INDX	FOOT	1	3	4	0	24			
16 0442	9/20/1990	0.0	2.3	2.3	0	0	0	65		INDX	FOOT					22	60		
16 0442	10/2/1990	0.4	0.0	0.0	0	0	0	35		SPOT	FOOT								
16 0442	10/15/1990	0.4			0	0	0	25		SPOT	FOOT					00	25	60	
16 0442	10/17/1990	0.0	2.3	2.3	8	0	8	60		INDX	FOOT					25	60	61	
16 0442	10/25/1990	0.4		0.0				30		SPOT	FOOT					00	28		
16 0442	9/20/1991	0.0	2.3	2.3	97	7	104	60		INDX	RAFT	3	0	0	0	24	60		
16 0442	9/30/1991	0.1	6.7	6.6	54	12	66	75		INDX	RAFT	1	3	0	0	60			
16 0442	10/8/1991	0.0	2.3	2.3	33	28	61	80		INDX	RAFT	1	3	4	0	20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0442	10/22/1991	0.0	6.7	6.7	2	9	11	65		INDX	RAFT	1	3	4	0	60	21		
16 0442	9/10/1992	0.0	2.3	2.3	117	3	120	80		INDX	FOOT	0	0	0	1	20	60	61	
16 0442	9/21/1992	0.1	2.2	2.1	170	18	188	70		INDX	FOOT	1	0	0	0	21	60	61	
16 0442	9/29/1992	0.0	2.3	2.3	234	29	263	70		INDX	FOOT	0	0	0	1	21	60	61	
16 0442	10/7/1992	0.0	2.3	2.3	37	101	138	75		INDX	FOOT					20	61		
16 0442	10/15/1992	0.0	2.3	2.3	2	44	46	90		INDX	FOOT					20	61		
16 0442	10/22/1992	0.0	2.3	2.3	9	8	17	60		INDX	FOOT					31	61	24	
16 0442	9/8/1993	0.0	2.3	2.3	0	0	0	55		INDX	FOOT	0	0	0	3	24	38	60	
16 0442	9/21/1993	0.0	2.3	2.3	8	0	5	85		INDX	FOOT					20	60	61	
16 0442	9/21/1993	0.0	2.3	2.3	8	0	8	85		INDX	FOOT	0	0	1	3	20	60	61	
16 0442	9/30/1993	0.0	2.3	2.3	57	3	60	90		INDX	FOOT	0	0	1	3	20	61		
16 0442	9/30/1993	2.5	6.1	3.6	2	0	2	90		SUPP	FOOT	0	0	1	3	20	60		
16 0442	10/7/1993	0.0	2.3	2.3	21	7	28	80		INDX	FOOT	0	1	3	4	20	60	61	
16 0442	10/7/1993	2.5	6.1	3.6	12	0	12	80		SUPP	FOOT	0	1	3	4	20	60		
16 0442	10/18/1993	0.0	2.3	2.3	27	3	30	95		INDX	FOOT	0	1	3	4	20	60	61	
16 0442	10/27/1993	0.0	2.3	2.3	27	2	29	70		INDX	FOOT	0	1	3	4	21	31	60	
16 0442	9/12/1994	0.0	2.3	2.3	6	0	6	95		INDX	FOOT					20	60	61	
16 0442	9/19/1994	0.0	2.3	2.3	82	0	82	90		INDX	FOOT			1	4	20	60	61	
16 0442	9/28/1994	0.0	2.3	2.3	71	4	75	90		INDX	FOOT	0	0	1	4	20	61		
16 0442	10/7/1994	0.0	2.3	2.3	72	31	103	90		INDX	FOOT	1	4	0	0	20			
16 0442	10/17/1994	0.0	2.3	2.3	18	19	37	95		INDX	FOOT	1	4	0	0	20	81		
16 0442	8/7/1995	0.1	0.0	0.0	0	0	0	20		SPOT	FOOT					27	60	65	
16 0442	8/28/1995	0.0	6.7	6.7	39	0	39	85		SUPP	RAFT	1	3	0	0	23	60	61	
16 0442	9/8/1995	0.0	3.2	3.2	261	1	262	90		INDX	RAFT	1	3	4	0	00	20	60	
16 0442	9/19/1995	0.0	3.2	3.2	1,570	61	1,631	90		INDX	FOOT	1	3	4	0	20	60	61	
16 0442	9/19/1995	3.6	6.7	3.1	8	0	8	90		SUPP	FOOT	1	3	4	0	20	60	61	
16 0442	10/2/1995	0.0	3.2	3.2	350	124	474	80		INDX	FOOT	1	3	4	0	21	60	61	
16 0442	10/2/1995	3.6	6.7	3.1	6	0	6	60		SUPP	FOOT	1	3			21	60	61	
16 0442	10/23/1995	0.0	2.3	2.3	6	3	9	80		INDX	RAFT	1	3	4	0	23	60	61	
16 0442	10/23/1995	2.3	3.1	0.8	2	0	2	80		SUPP	RAFT	1	3	4	0	23	60		
16 0442	9/5/1996	0.0	2.3	2.3	305	0	305	95		INDX	FOOT	4	0	0	0	20	33	61	
16 0442	9/16/1996	0.0	2.3	2.3	3,041	69	3,110	80		INDX	FOOT	4	0	0	0	20	60	61	
16 0442	9/30/1996	0.0	2.3	2.3	1,976	950	2,926	95		INDX	FOOT	4	0	0	0	20	60	61	
16 0442	10/7/1996	0.0	2.3	2.3	240	789	1,029	85		INDX	FOOT	4	0	0	0	21			
16 0442	10/21/1996	0.0	2.3	2.3	19	231	250	90		INDX	FOOT					23	60	61	
16 0442	8/22/1997	6.7			0	0	0	95		SPOT	FOOT					20			
16 0442	9/4/1997	0.0	2.3	2.3	0	0	0	75		INDX	FOOT	3	0	0	0	21	60		
16 0442	9/10/1997	0.0	2.3	2.3	20	0	20	90		INDX	FOOT	3	0	0	0	20	60	61	
16 0442	9/23/1997	0.0	2.3	2.3	17	2	19	85		INDX	RAFT	3	5	0	0	24	33		
16 0442	9/23/1997	2.3	6.7	4.4	0	0	0	85		SUPP	RAFT	3	5	0	0	24	33		
16 0442	8/12/1998	0.0	2.3	2.3	0	0	0	90		INDX	FOOT					20	60		
16 0442	8/24/1998	0.0	2.3	2.3	0	0	0	95		INDX	FOOT					20			
16 0442	9/2/1998	0.0	2.3	2.3	7	0	7	95		INDX	FOOT					20	60	61	
16 0442	9/11/1998	0.0	2.3	2.3	98	1	99	95		INDX	FOOT	1	0	0	0	20	60	61	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (: WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Da.. ource - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0442	9/21/1998	0.0	2.3	2.3	144	3	147	90		INDX	FOOT	4	0	0	0	20	60		
16 0442	10/1/1998	0.0	2.3	2.3	74	75	149	95		INDX	FOOT	1	4	0	0	20	60	61	
16 0442	10/9/1998	0.0	2.3	2.3	14	56	70	70		INDX	FOOT	4	1	0	0	24	60	61	
16 0442	10/19/1998	0.0	2.3	2.3	1	0	1	85		INDX	FOOT	4	1	0	0	23	60	61	
16 0442	10/27/1998	0.0	2.3	2.3	4	0	4	95		INDX	FOOT	1	4	0	0	60	20	61	
16 0442 A	9/10/1976	0.0	0.1	0.1	0	3	3	90		INDX	FOOT					20			
16 0442 A	9/26/1983	0.0	0.5	0.5	0	0	0	99	0	SUPP	FOOT					11	20		40
16 0442 A	10/3/1983	0.0	0.5	0.5	0	0	0	99	0	SUPP	FOOT					11			40
16 0442 A	10/10/1983	0.0	0.2	0.2	0	0	0	99	0	SUPP	FOOT					11			40
16 0442 A	10/17/1983	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					20			40
16 0442 A	10/24/1983	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					11	20		40
16 0442 A	10/26/1988	0.0	0.2	0.2	0	0	0	95		INDX	FOOT					20			
16 0449	10/19/1943	0.0	0.2	0.2	7	1	8			INDX	FOOT	3	0	0	0				
16 0449	9/28/1945	0.0	0.2	0.2	10	2	12			INDX	FOOT	3	0	0	0				
16 0449	10/17/1967	0.0	0.2	0.2	0	1	1			INDX	FOOT	1	3	0	0	20			
16 0449	9/26/1969	0.0	0.2	0.2	5	0	5	90		INDX	FOOT	1	3	0	0	20			
16 0449	10/6/1969	0.0	0.2	0.2	20	8	28	99		INDX	FOOT	1	3	0	0	20			
16 0449	9/18/1974	0.0	0.3	0.3	0	0	0	99	0	INDX	FOOT	0	0	0	0	57	11		
16 0449	10/17/1979	0.0	0.2	0.2	0	0	0	99		INDX	FOOT	3	0	0	0				
16 0449	10/2/1981	0.0	0.2	0.2	14	0	14	85		INDX	FOOT	1	3	0	0				
16 0449	10/7/1981	0.0	0.3	0.3	2	0	2	15		INDX	FOOT	3	0	0	0	28	38		40
16 0449	10/14/1981	0.0	0.3	0.3	8	3	11	99	10	INDX	FOOT	1	3	4	0				40
16 0449	10/20/1981	0.0	0.3	0.3	1	6	7	80	25	INDX	FOOT	1	3	0	0	21			40
16 0449	10/27/1981	0.0	0.3	0.3	0	0	0	50		INDX	FOOT					38	71		40
16 0449	10/6/1983	0.0	0.3	0.3	0	0	0	95		INDX	FOOT	3	0	0	0	20			
16 0449	10/12/1983	0.0	0.3	0.3	0	1	1	95		INDX	FOOT	3	0	0	0	20			
16 0449	10/20/1983	0.0	0.3	0.3	0	0	0	95		INDX	FOOT					20			
16 0449	10/26/1983	0.0	0.3	0.3	0	0	0	95		INDX	FOOT	3	0	0	0	20			
16 0449	9/16/1986	0.0	0.3	0.3	0	0	0	95		INDX	FOOT								
16 0449	9/22/1986	0.0	0.3	0.3	0	0	0	99		INDX	FOOT								
16 0449	10/14/1986	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			
16 0449	9/20/1991	0.0	0.2	0.2	1	0	1	99		INDX	FOOT	1	3	0	0	20			
16 0449	10/22/1991	0.2	0.3	0.1	0	0	0	85		SUPP	FOOT					20			
16 0449	9/8/1993	0.0	0.2	0.2	0	0	0	95		INDX	FOOT					20			
16 0449	9/21/1993	0.0	0.2	0.2	0	0	0	99		INDX	FOOT	0	0	0	3	20			
16 0449	9/30/1993	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	0	0	0	3	20	60		
16 0449	10/7/1993	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	0	0	3	4	20	60		
16 0449	10/27/1993	0.0	0.2	0.2	0	0	0	95		INDX	FOOT	0	0	0	3	20			
16 0449	10/10/1995	0.0	0.2	0.2	0	0	0	85		INDX	FOOT	4	0	0	0	23	60		
16 0449	10/10/1995	0.2	0.3	0.1	1	0	1	85		SUPP	FOOT	4	0	0	0	23	60		
16 0449	10/23/1995	0.0	0.2	0.2	1	0	1	95		INDX	FOOT	4	0	0	0	20	61		
16 0449	10/23/1995	0.2	0.3	0.1	0	0	0	95		SUPP	FOOT	4	0	0	0	20			
16 0449	9/22/1997	0.0	0.2	0.2	0	0	0	90		INDX	FOOT	3				20	60		
16 0449	9/22/1997	0.2	0.3	0.1	0	0	0	90		SUPP	FOOT	0	0	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data source - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
16 0558	9/28/1983	0.0	0.2	0.2	0	0	0	90	0	SUPP	FOOT					11	20		40
16 0558	10/3/1983	0.0	0.2	0.2	0	0	0	90	0	SUPP	FOOT					11			40
16 0558	10/10/1983	0.0	0.2	0.2	0	0	0	99	0	SUPP	FOOT					11			40
16 0558	10/17/1983	0.0	0.2	0.2	0	0	0	99		SUPP	FOOT					11	20		40
16 0558	10/24/1983	0.0	0.2	0.2	0	0	0	95	0	SUPP	FOOT					11	20		40
17 0001	9/28/1983	0.0	0.1	0.1	0	0	0	99	0	INDX	FOOT					11	20	60	40
17 0001	10/10/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11	20		40
17 0001	10/17/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11	54		40
17 0001	10/31/1983	0.0	0.5	0.5	0	0	0	99	0	INDX	FOOT					11	54		40
17 0002	9/17/1979	0.0	0.0	0.0	0	0	0			SPOT	FOOT					54			
17 0002	10/22/1979	0.0	0.2	0.2	0	0	0	80		INDX	FOOT								
17 0002	10/17/1980		0.0	0.0						SPOT	FOOT					54			
17 0002	9/29/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT					11	20	57	40
17 0002	10/8/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT					11	20	57	40
17 0002	10/16/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					57			40
17 0002	10/20/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT								40
17 0002	10/29/1982	0.0	0.2	0.2	0	0	0	90		INDX	FOOT	0	0	0	0	20	33	31	
17 0002	10/20/1983	0.1	0.0	0.0	0	0	0	99		SPOT	FOOT					60			
17 0002	10/23/1997	0.0	0.3	0.3	0	0	0	95		INDX	FOOT	4	0	0	0	23			
17 0004	9/17/1979	0.0	0.0	0.0	0	0	0			SPOT	FOOT					54			
17 0004	10/22/1979	0.0	0.2	0.2	0	0	0	80		INDX	FOOT								
17 0004	10/17/1980		0.0	0.0				99		SPOT	FOOT					57			
17 0004	9/29/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	20	57	40
17 0004	10/8/1981	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					11	20	57	40
17 0004	10/16/1981	0.0	0.2	0.2	0	0	0	99		INDX	FOOT					57			40
17 0004	10/20/1981	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								40
17 0004	10/29/1982	0.0	0.3	0.3	0	0	0	95		INDX	FOOT	0	0	0	0	20	33	60	
17 0004	9/28/1983	0.0	0.1	0.1	0	0	0	99		INDX	FOOT					11	54	60	40
17 0004	10/10/1983	0.0	0.7	0.7	0	0	0	99	0	INDX	FOOT					11	54		40
17 0004	10/17/1983	0.0	0.7	0.7	0	0	0	99	0	INDX	FOOT					11	20		40
17 0004	10/20/1983	0.1	0.0	0.0	0	0	0	99		SPOT	FOOT					60			
17 0004	10/31/1983	0.0	0.7	0.7	0	0	0	99	0	INDX	FOOT					11	54		40
17 0004	10/23/1997	0.0	0.5	0.5	0	0	0	95		INDX	FOOT					20			
17 0012	9/2/1959	0.0	0.6	0.6	8	1	9			SUPP	FOOT					00	20	13	
17 0012	9/30/1959	0.6	2.6	2.0	526	75	601			SUPP	FOOT	4	0	0	0	00	20	13	
17 0012	10/18/1960	0.6	2.6	2.0	12	122	134			SUPP	FOOT	1	0	0	0	20	13	60	
17 0012	10/27/1961	0.6	2.6	2.0	1	3	4			SUPP	FOOT	1	4	0	0	20	00	13	
17 0012	10/14/1966	0.0	0.6	0.6	134	606	740			SUPP	FOOT	4	0	0	0	20	13	60	
17 0012	10/14/1966	0.6	2.6	2.0	75	442	517		271	SUPP	FOOT	1	4	0	0	20	13	60	
17 0012	10/10/1967	0.0	2.6	2.6	665	282	947			SUPP	FOOT	1	3	4	0	26	60	13	
17 0012	9/26/1968	0.0	0.6	0.6	672	422	1,094			INDX	FOOT					20	13	00	
17 0012	9/26/1968	0.6	2.6	2.0	1,002	1,138	2,140			INDX	FOOT	1	0	0	0	20	13	00	
17 0012	9/28/1969	0.0	2.6	2.6	537	28	565	80		INDX	FOOT	1	4	0	0	20	13		
17 0012	9/25/1970	0.0	2.6	2.6	315	48	363	80		INDX	FOOT	1	0	0	0	20	13		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0012	9/29/1971	0.0	2.6	2.6	739	27	766	90		INDX	FOOT	1	4	0	0	20	13		
17 0012	9/25/1972	0.0	2.6	2.6	586	21	607	70		INDX	FOOT	1	4	0	0	20	13		
17 0012	10/4/1972	0.0	2.6	2.6	1,122	156	1,278	85		INDX	FOOT	1	0	0	0	20	13		
17 0012	10/13/1972	0.0	2.6	2.6	208	891	1,099	80		INDX	FOOT	1	4	0	0	20	13		
17 0012	10/4/1973	0.0	2.6	2.6	770	803	1,573	90		INDX	FOOT	1	0	0	0				
17 0012	9/18/1974	0.0	2.6	2.6	65	1	66	80	44	SUPP	FOOT					20	61		
17 0012	9/30/1974	0.0	2.6	2.6	402	84	486	80	218	SUPP	FOOT	1	4	0	0				
17 0012	10/18/1974	0.0	2.6	2.6	24	350	374	90	156	SUPP	FOOT	1	3	0	0				
17 0012	9/8/1975	0.0	2.6	2.6	29	1	30	80	6	SUPP	FOOT	3	0	0	0	60			
17 0012	9/18/1975	0.0	2.6	2.6	201	5	206	75	136	SUPP	FOOT	4	0	0	0				
17 0012	9/22/1975	0.0	2.6	2.6	692	32	724			SUPP	FOOT					60			
17 0012	9/24/1975	0.0	2.6	2.6	752	32	784	80	301	INDX	FOOT	1	3	4	0				
17 0012	9/30/1975	0.0	2.6	2.6	858	353	1,211			SUPP	FOOT					60			
17 0012	10/6/1975	0.0	2.6	2.6	172	204	376	50		SUPP	FOOT	1	4	0	0	60			
17 0012	10/15/1975	0.0	0.7	0.7	10	2	12	50	7	SUPP	FOOT								
17 0012	10/15/1975	0.7	2.8	2.1	0	2	2	50		SUPP	FOOT	1	4	0	0	24	74		
17 0012	9/10/1976	0.0	2.0	2.0	469	27	496	70		INDX	FOOT					20	33		
17 0012	9/21/1976	0.0	2.6	2.6	1,233	1,490	2,723	70		INDX	FOOT					60			
17 0012	9/30/1976	0.0	2.6	2.6	34	2,375	2,409	80		INDX	FOOT	1	0	0	0				
17 0012	9/13/1977	0.0	2.6	2.6	56	2	58	80		INDX	FOOT	4	0	0	0	60			
17 0012	10/13/1977	0.0	2.6	2.6	473	268	741	70		INDX	FOOT	1	4	0	0	21	31	60	
17 0012	9/7/1978	0.2	1.7	1.5	275	2	277	85		INDX	FOOT	1	4	0	0				
17 0012	9/21/1978	0.0	2.6	2.6	1,329	77	1,406	60		INDX	FOOT								
17 0012	10/5/1978	0.0	2.6	2.6	43	444	487	80		INDX	FOOT								
17 0012	10/12/1978	0.0	2.6	2.6	9	368	377	80		INDX	FOOT								
17 0012	10/26/1978	0.0	2.6	2.6	0	275	275	85		INDX	FOOT								
17 0012	9/17/1979	0.0	0.7	0.7	148	8	156	85		INDX	FOOT	3	4	0	0	21	31	51	
17 0012	9/27/1979	0.0	2.6	2.6	131	158	289	90		INDX	FOOT					20	60		
17 0012	10/10/1979	0.0	2.7	2.7	10	20	30	80		INDX	FOOT	1	4	0	0	20	31	60	
17 0012	10/22/1979	0.0	2.6	2.6	0	1	1	80		INDX	FOOT	4	0	0	0	28			
17 0012	9/5/1980	0.0	0.5	0.5	0	0	0	75	0	SUPP	FOOT								
17 0012	9/22/1980	0.0	2.6	2.6	178	17	195	90		INDX	FOOT					24			
17 0012	10/1/1980	0.0	2.6	2.6	127	108	235	80		INDX	FOOT								
17 0012	10/15/1980	0.0	2.6	2.6	15	166	181	90		INDX	FOOT					20			
17 0012	9/10/1981	0.0	0.8	0.8	13	0	13	90		INDX	FOOT					20	51	33	40
17 0012	9/17/1981	1.0	2.5	1.5	8	0	8	75	5	INDX	FOOT	4	0	0	0	00	11	72	40
17 0012	9/18/1981	0.0	1.0	1.0	43	9	52	90	12	INDX	FOOT	4	0	0	0	00	20		40
17 0012	9/23/1981	0.0	2.6	2.6	62	36	98	95		INDX	FOOT								
17 0012	9/25/1981	0.0	2.6	2.6	78	34	112	89	14	INDX	FOOT	4	0	0	0	13	23	51	40
17 0012	9/28/1981	0.0	2.6	2.6	48	17	65	65	49	INDX	FOOT	4	0	0	0	16	27	70	40
17 0012	10/1/1981	0.0	2.6	2.6	37	14	51	75		INDX	FOOT	0	0	0	0	27			
17 0012	10/13/1981	0.0	2.6	2.6	0	18	18	89	12	INDX	FOOT	1	4	0	0				40
17 0012	10/19/1981	0.0	2.6	2.6	1	17	18	88	22	INDX	FOOT	1	3	4	0				40
17 0012	10/21/1981	0.5	2.7	2.2	1	1	2	75	0	SUPP	FOOT	1	4						FW

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0012	9/9/1982	0.0	0.7	0.7	7	0	7	75	10	SUPP	FOOT	0	0	0	4	20			
17 0012	9/15/1982	0.0	0.6	0.6	18	1	19	90		INDX	FOOT					20			
17 0012	9/25/1982	0.0	2.6	2.6	92	18	110	60		INDX	FOOT								
17 0012	10/6/1982	0.0	2.6	2.6	6	70	76	70		INDX	FOOT								
17 0012	10/13/1982	1.0	2.6	1.6	0	2	2	90		INDX	FOOT	1	4	0	0	23	33	38	
17 0012	9/2/1983	0.0	0.6	0.6	5	0	5	85	2	INDX	FOOT	4	0	0	0				40
17 0012	9/6/1983	0.0	0.6	0.6	36	0	36	85		INDX	FOOT	4	0	0	0				40
17 0012	9/21/1983	0.0	2.6	2.6	16	9	25	95		INDX	FOOT					20	60		
17 0012	10/3/1983	0.0	2.7	2.7	11	15	26	80	2	INDX	FOOT	4	0	0	0				40
17 0012	10/6/1983	0.0	2.6	2.6	10	17	27	95		INDX	FOOT	3	0	0	0	20			
17 0012	10/10/1983	0.0	2.7	2.7	4	13	17	90	0	INDX	FOOT	4	0	0	0				40
17 0012	10/13/1983	0.0	2.6	2.6	37	13	50	95		INDX	FOOT					20			
17 0012	10/17/1983	0.0	2.7	2.7	2	4	6	90	0	INDX	FOOT	4	0	0	0				40
17 0012	10/20/1983	0.0	2.6	2.6	0	5	5	90		INDX	FOOT					20	31		
17 0012	10/26/1983	0.0	2.6	2.6	0	2	2	85		INDX	FOOT					20	31		
17 0012	9/6/1984	0.0	0.7	0.7	35	0	35	95	1	INDX	FOOT	4	0	0	0	20	33		40
17 0012	9/6/1984	0.7	0.9	0.2	4	0	4	95	1	INDX	FOOT					20	33		40
17 0012	9/12/1984	0.3	0.7	0.4	4	4	8	94		INDX	FOOT	4	0	0	0	20			40
17 0012	9/12/1984	0.7	0.9	0.2	2	1	3	90		INDX	FOOT	4	0	0	0	20			40
17 0012	9/24/1984	0.0	2.6	2.6	12	43	55	99		INDX	FOOT					20			
17 0012	10/2/1984	0.0	2.6	2.6	11	41	53	99		INDX	FOOT					20			
17 0012	10/8/1984	0.0	2.6	2.6	2	29	31	99		INDX	FOOT					20			
17 0012	10/15/1984	0.0	2.6	2.6	5	18	23	85		INDX	FOOT					21			
17 0012	10/22/1984	0.0	2.6	2.6	2	6	8	90		INDX	FOOT					20			
17 0012	10/29/1984	0.0	2.6	2.6	0	0	0	90		INDX	FOOT					20			
17 0012	9/25/1985	0.0	2.6	2.6	24	20	44	90		INDX	FOOT					20			
17 0012	10/3/1985	0.0	2.6	2.6	0	24	24	90		INDX	FOOT					20			
17 0012	10/31/1985	0.0	2.6	2.6	0	0	0	50		INDX	FOOT								
17 0012	9/17/1986	0.0	2.6	2.6	0	0	0	90		INDX	FOOT								
17 0012	9/23/1986	0.0	2.6	2.6	1	1	2	90		INDX	FOOT								
17 0012	10/1/1986	0.0	2.0	2.0	4	11	15	90		INDX	FOOT								
17 0012	10/14/1986	0.0	2.0	2.0	8	7	15	90		INDX	FOOT	4	0	0	0	20			
17 0012	10/20/1986	0.0	2.0	2.0	1	8	9	90		INDX	FOOT	4	0	0	0	20			
17 0012	10/27/1986	0.0	1.0	1.0	0	4	4	80		INDX	FOOT	4	0	0	0	24	38		
17 0012	9/28/1987	0.0	0.7	0.7	1	7	8	90		INDX	FOOT	4	0	0	0	20			
17 0012	10/8/1987	0.0	0.5	0.5	0	7	7	90		INDX	FOOT					20	60		
17 0012	9/16/1988	0.0	2.7	2.7	45	13	58	95		INDX	FOOT	4	0	0	0	20			
17 0012	9/26/1988	0.0	2.7	2.7	34	31	65	80		INDX	FOOT	1	4	0	0	61			
17 0012	10/5/1988	0.0	2.7	2.7	26	43	69	85		INDX	FOOT	1	4	0	0	20	61		
17 0012	10/17/1988	0.0	2.7	2.7	1	59	60	90		INDX	FOOT	1	4	0	0	20	61		
17 0012	10/27/1988	0.0	2.7	2.7	0	43	43	90		INDX	FOOT	1	4	0	0	20	61		
17 0012	9/13/1989	0.0	0.4	0.4	0	1	1	90		INDX	FOOT	4	0	0	0	20	60		
17 0012	9/22/1989	0.0	0.4	0.4	0	1	1	80		INDX	FOOT	4	0	0	0	20			
17 0012	10/4/1989	0.0	1.0	1.0	0	1	1	90		INDX	FOOT	3	4	0	0	20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0012	10/13/1989	0.0	2.7	2.7	0	0	0	90		INDX	FOOT	4	0	0	0	20			
17 0012	10/26/1989	0.0						0		SPOT	FOOT					27			
17 0012	9/27/1990	0.0	2.7	2.7	0	0	0	85		INDX	FOOT	4	0	0	0	20	60		
17 0012	10/9/1990	0.0	2.7	2.7	5	1	6	90		INDX	FOOT	4	0	0	0	20	61		
17 0012	10/17/1990	0.0	2.7	2.7	2	1	3	90		INDX	FOOT	4	0	0	0	20	60	61	
17 0012	10/26/1990	0.0	2.7	2.7	3	0	3	60		INDX	FOOT	4	0	0	0	23	61	60	
17 0012	9/10/1991	0.0	2.7	2.7	11	2	13	90		INDX	FOOT	1	4	0	0	60	20		
17 0012	9/25/1991	0.0	2.7	2.7	12	12	24	90		INDX	FOOT	1	3	4	0	20			
17 0012	10/16/1991	0.0	2.7	2.7	4	15	19	50		INDX	FOOT	4	0	0	0	25	60		
17 0012	10/29/1991	0.0	2.7	2.7	1	15	16	90		INDX	FOOT	1	4	0	0	20	61		
17 0012	8/27/1992	0.0	2.7	2.7	4	0	4	99		INDX	FOOT	4	0	0	0	20	60	59	
17 0012	9/9/1992	0.0	2.7	2.7	47	1	48	80		INDX	FOOT	0	0	0	4	20	60		
17 0012	9/18/1992	0.0	2.7	2.7	227	60	287	80		INDX	FOOT	0	0	0	4	20	60	61	
17 0012	9/25/1992	0.0	2.7	2.7	121	105	226	90		INDX	FOOT	0	0	0	4	20	60	61	
17 0012	10/6/1992	0.0	2.7	2.7	15	98	113	85		INDX	FOOT	0	0	0	4	20	61		
17 0012	10/12/1992	0.0	2.7	2.7	7	157	164	90		INDX	FOOT	4	0	0	0	20	61		
17 0012	8/24/1993	0.0	2.7	2.7	9	0	9	85		INDX	FOOT	0	1	3	4	23	60	61	
17 0012	9/2/1993	0.0	2.7	2.7	7	0	7	90		INDX	FOOT	0	1	3	4	20	61		
17 0012	9/9/1993	0.0	2.7	2.7	3	0	3	90		INDX	FOOT	0	1	3	4	20	61		
17 0012	9/16/1993	0.0	2.7	2.7	13	0	13	85		INDX	FOOT	0	1	3	4	31	13	60	
17 0012	9/22/1993	0.0	2.7	2.7	28	3	31	90		INDX	FOOT	1	4	3	0	20	31	60	
17 0012	9/29/1993	0.0	2.7	2.7	40	4	44	90		INDX	FOOT	0	1	3	4	20	61		
17 0012	10/6/1993	0.0	2.7	2.7	21	18	39	95		INDX	FOOT	0	1	3	4	20	60	61	
17 0012	10/14/1993	0.0	2.7	2.7	6	11	17	95		INDX	FOOT	0	0	1	4	20	60	61	
17 0012	10/19/1993	0.0	2.7	2.7	5	11	16	90		INDX	FOOT	0	0	1	4	20	61	60	
17 0012	10/29/1993	0.0	2.7	2.7	4	2	6	90		INDX	FOOT	0	0	0	4	20	31	60	
17 0012	9/8/1994	0.0	2.3	2.3	25	0	25	95		INDX	FOOT	4	0	0	0	20	60		
17 0012	9/16/1994	0.0	2.8	2.8	66	1	67	95	48	INDX	FOOT	4	0	0	0	20	61	60	
17 0012	9/23/1994	0.0	2.4	2.4	153	12	165	95		INDX	FOOT	4	0	0	0	20	60	61	
17 0012	9/30/1994	0.0	2.8	2.8	112	36	148	95	115	INDX	FOOT	4	1	0	0	20	60		
17 0012	10/7/1994	0.0	2.7	2.7	40	92	132	95		INDX	FOOT	0	0	0	1	20	60	61	
17 0012	10/17/1994	0.0	2.7	2.7	25	83	108	95		INDX	FOOT					20	60	61	
17 0012	10/26/1994	0.1	2.6	2.7	31	8	39	85		INDX	FOOT	4	0	0	0	60	20	61	
17 0012	8/4/1995	0.0	2.8	2.8	0	0	0	90		INDX	FOOT	4	0	0	0	23	60		
17 0012	8/14/1995	0.0	2.8	2.8	0	0	0	95		INDX	FOOT	4	5	0	0	23	60		
17 0012	8/21/1995	0.0	2.8	2.8	13	1	14	95		INDX	FOOT	1	3	4	5	23	60		
17 0012	8/31/1995	0.0	2.8	2.8	77	1	78	90		INDX	FOOT	1	3	4		23	60	61	
17 0012	9/7/1995	0.0	2.8	2.8	828	10	838	95		INDX	FOOT	1	3	4	5	20	60	61	
17 0012	9/15/1995	0.0	2.8	2.8	1,425	267	1,692	95		INDX	FOOT	1	3	4		20	60	61	
17 0012	9/25/1995	0.0	2.8	2.8	1,168	966	2,134	90	240	INDX	FOOT	1	3	4		20	60	61	
17 0012	10/6/1995	0.0	2.8	2.8	453	1,039	1,492	90		INDX	FOOT	1	3	4	0	20	60	61	
17 0012	10/19/1995	0.0	2.8	2.8	52	51	103	90		INDX	FOOT	1	3	4		23	60	61	
17 0012	8/19/1996	0.0	2.8	2.8	0	1	1	90		INDX	FOOT					20	60		
17 0012	8/26/1996	0.0	2.8	2.8	6	0	6	95	6	INDX	FOOT					20	60	61	

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0012	9/4/1996	0.0	2.8	2.8	1,190	13	1,203	90		INDX	FOOT	1	4	5	0	20	60	61	
17 0012	9/12/1996	0.0	2.8	2.8	4,420	358	4,778	90		INDX	FOOT	1	4			20	60	61	
17 0012	9/19/1996	0.0	2.8	2.8	2,977	1,908	4,885	90		INDX	FOOT	4				20			
17 0012	9/27/1996	0.0	2.8	2.8	1,465	3,503	4,968	90		INDX	FOOT	4				20	60	61	
17 0012	10/11/1996	0.0	2.8	2.8	181	4,414	4,595	90		INDX	FOOT	4				20	60		
17 0012	8/21/1997	0.0	0.6	0.6	2	0	2	99		INDX	FOOT	3	5	0	0	20	60		
17 0012	8/27/1997	0.0	2.8	2.8	18	0	18	95		INDX	FOOT	3	4	5	0	20	60	61	
17 0012	9/4/1997	0.0	2.8	2.8	214	1	215	90		INDX	FOOT					20	61		
17 0012	9/22/1997	0.0	2.8	2.8	2,653	216	2,869	85		INDX	FOOT	1	3	4	5	24	60	61	
17 0012	10/23/1997	0.0	2.8	2.8	72	28	100	90		INDX	FOOT	1	0	0	0	24	60	61	
17 0012	9/1/1998	0.0	2.8	2.8	281	9	290	95		INDX	FOOT					20	60	61	
17 0012	9/10/1998	0.0	2.8	2.8	939	102	1,041	95		INDX	FOOT					20	60		
17 0012	9/21/1998	0.0	2.8	2.8	662	630	1,292	95		INDX	FOOT	1	4	0	0	20	60		
17 0012	10/1/1998	0.0	2.8	2.8	206	830	1,036	95		INDX	FOOT	4	0	0	0	20	60		
17 0012	10/9/1998	0.0	2.8	2.8	84	218	302	95		INDX	FOOT	4	0	0	0	20	60		
17 0012	10/23/1998	0.0	2.8	2.8	11	34	45	95		INDX	FOOT	4	0	0	0	20	61		
17 0046	10/4/1989	0.0	0.9	0.9	0	0	0			INDX	FOOT					20	60		
17 0076	10/15/1947	0.0	1.8	1.8	310	1,501	1,811			INDX	FOOT	4	0	0	0	07	20	13	
17 0076	9/25/1952	0.2	0.8	0.6	332	210	542			INDX	FOOT						23	13	
17 0076	9/25/1952	0.8	1.8	1.0	165	9	174			INDX	FOOT					23		14	
17 0076	10/24/1952		0.0	0.0						SPOT	FOOT					65	60	13	
17 0076	10/12/1953	0.2	0.8	0.6	559	140	699			INDX	FOOT					20	60	13	
17 0076	10/10/1954	0.8	1.8	1.0	252	647	899			INDX	FOOT					20	60	14	
17 0076	10/1/1958	0.8	1.8	1.0	345	36	381			INDX	FOOT					20	14		
17 0076	10/18/1960		0.0	0.0	0	0	0			SPOT	FOOT					20	57	65	
17 0076	10/27/1960	0.8	1.8	1.0	4	0	4			INDX	FOOT					24	14		
17 0076	10/14/1966	0.2	0.8	0.6	93	617	710			INDX	FOOT					20			
17 0076	10/14/1966	0.8	1.8	1.0	0	141	141		96	INDX	FOOT					20	14		
17 0076	10/5/1967	0.2	0.8	0.6	352	126	478			INDX	FOOT	1	3	0	0	20	13	60	
17 0076	10/5/1967	0.8	1.8	1.0	90	3	93			INDX	FOOT					20	14	60	
17 0076	9/26/1968	0.2	0.8	0.6	258	91	349			INDX	FOOT					20	44	13	
17 0076	9/26/1968	0.8	1.8	1.0	315	38	353			INDX	FOOT					20	44	14	
17 0076	10/9/1968	0.2	0.8	0.6	8	408	416			INDX	FOOT					20	13		
17 0076	10/9/1968	0.8	1.8	1.0	36	350	386			INDX	FOOT	1	0	0	0	20	14		
17 0076	9/25/1970	0.2	0.8	0.6	7	2	9	90	25	INDX	FOOT					20	13		
17 0076	9/29/1971	0.2	0.8	0.6	47	2	49	90		INDX	FOOT					20	13		
17 0076	9/26/1972	0.2	0.8	0.6	44	2	46	95		INDX	FOOT					20	13		
17 0076	10/4/1972	0.2	0.8	0.6	80	12	92	90		INDX	FOOT					20	13		
17 0076	10/13/1972	0.2	0.8	0.6	67	104	171	90		INDX	FOOT	1	0	0	0	20	13		
17 0076	10/4/1973	0.2	0.8	0.6	60	98	158	90		INDX	FOOT	1	0	0	0	13			
17 0076	9/18/1974	0.0	0.8	0.8	2	0	2	80	0	SUPP	FOOT	0	0	0	0	20			
17 0076	9/30/1974	0.0	0.8	0.8	4	6	10	95	27	SUPP	FOOT	0	0	0	0	60			
17 0076	10/18/1974	0.0	0.8	0.8	4	40	44	90	37	SUPP	FOOT	0	0	0	0				
17 0076	9/8/1975	0.0	0.8	0.8	1	0	1	90	2	INDX	FOOT								

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0076	9/18/1975	0.0	0.8	0.8	75	3	78	80	47	INDX	FOOT								
17 0076	9/22/1975	0.0	0.8	0.8	210	31	241			INDX	FOOT					60			
17 0076	9/24/1975	0.0	0.8	0.8	277	29	306	90	301	INDX	FOOT					60	20		
17 0076	9/30/1975	0.0	0.8	0.8	352	224	576			SUPP	FOOT					60			
17 0076	10/15/1975	0.0	0.8	0.8	2	61	63	50	58	INDX	FOOT	4	0	0	0	60	21	30	
17 0076	9/10/1976	0.0	0.8	0.8	95	7	102	90	20	INDX	FOOT					00	20	33	
17 0076	9/10/1976	0.8	1.8	1.0	30	0	30	90	4	INDX	FOOT					00	20	33	
17 0076	9/22/1976	0.0	0.8	0.8	505	510	1,015	90		INDX	FOOT								
17 0076	9/22/1976	0.8	1.8	1.0	270	81	351	85	110	SUPP	FOOT								
17 0076	9/30/1976	0.0	0.8	0.8	6	705	711	90		INDX	FOOT								
17 0076	9/30/1976	0.8	1.8	1.0	2	119	121	90		SUPP	FOOT								
17 0076	9/13/1977	0.0	1.8	1.8	4	2	6	90		INDX	FOOT					60			
17 0076	9/22/1977	0.0	1.8	1.8	164	5	169	85		INDX	FOOT								
17 0076	10/13/1977	0.0	1.8	1.8	179	109	288	70		INDX	FOOT	1	4	0	0	20	33	60	
17 0076	9/7/1978	0.0	1.8	1.8	188	3	191	75		INDX	FOOT								
17 0076	9/21/1978	0.0	1.8	1.8	804	53	857	70		INDX	FOOT								
17 0076	10/5/1978	0.0	1.8	1.8	27	467	494	90		INDX	FOOT								
17 0076	10/12/1978	0.0	1.8	1.8	1	220	221	85		INDX	FOOT	1	4	0	0				
17 0076	10/26/1978	0.0	1.8	1.8	4	95	99	85		INDX	FOOT	1	4	0	0				
17 0076	9/17/1979	0.0	1.8	1.8	65	9	74	90		INDX	FOOT					42	60		
17 0076	9/27/1979	0.0	1.8	1.8	22	80	102	99		INDX	FOOT					20	60		
17 0076	10/10/1979	0.0	1.8	1.8	1	4	5	99		INDX	FOOT	3	0	0	0	20	60		
17 0076	9/22/1980	0.0	1.8	1.8	88	3	91	90		INDX	FOOT					20			
17 0076	10/1/1980	0.0	1.8	1.8	27	34	61	90		INDX	FOOT					20			
17 0076	10/15/1980	0.0	1.8	1.8	28	45	73	90		INDX	FOOT					20			
17 0076	9/10/1981	0.0	0.8	0.8	5	2	7	80		INDX	FOOT								40
17 0076	9/21/1981	0.0	1.0	1.0	43	5	48	85	11	INDX	FOOT					21	57		40
17 0076	9/23/1981	0.0	1.8	1.8	19	0	19	95		INDX	FOOT					60			
17 0076	9/25/1981	0.0	2.0	2.0	53	4	57	85	30	INDX	FOOT	4	0	0	0	23	48	60	40
17 0076	9/29/1981	0.0	1.0	1.0	54	7	61	85	17	INDX	FOOT	4	0	0	0	00	16	47	40
17 0076	10/1/1981	0.0	1.8	1.8	55	2	57	90		INDX	FOOT	4	0	0	0	20			
17 0076	10/30/1981	3.0	4.3	1.3	25	0	25	70		SUPP	FOOT	4	0	0	0	23	31	60	
17 0076	9/15/1982	0.0	0.8	0.8	24	0	24	99		INDX	FOOT					20			
17 0076	9/25/1982	0.0	0.8	0.8	67	22	89	70		INDX	FOOT								
17 0076	10/6/1982	0.0	0.8	0.8	17	79	96	85		INDX	FOOT					20			
17 0076	10/13/1982	0.0	1.8	1.8	0	77	77	90		INDX	FOOT	4	0	0	0	21	32	31	
17 0076	10/29/1982	3.0	4.3	1.3	3	0	3	80		SUPP	FOOT	4	0	0	0	23			
17 0076	9/21/1983	0.0	1.8	1.8	58	2	60	90		INDX	FOOT					20			
17 0076	9/28/1983	0.0	0.8	0.8	83	10	93	80	0	INDX	FOOT								40
17 0076	9/26/1983	0.8	1.8	1.0	0	0	0	85	0	INDX	FOOT								40
17 0076	10/3/1983	0.0	1.8	1.8	8	9	17	70	0	INDX	FOOT								40
17 0076	10/6/1983	0.0	1.8	1.8	41	17	58	95		INDX	FOOT	1	4	0	0	20			
17 0076	10/10/1983	0.0	1.8	1.8	0	1	1	80		INDX	FOOT								40
17 0076	10/13/1983	0.0	1.8	1.8	58	10	68	95		INDX	FOOT	1	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0076	10/20/1983	0.0	1.8	1.8	6	3	9	90		INDX	FOOT	4	0	0	0	20			
17 0076	10/26/1983	0.0	1.8	1.8	2	13	15	95		INDX	FOOT	4	0	0	0	20			
17 0076	9/7/1984	0.2	0.8	0.6	6	0	6	95		INDX	FOOT	4	0	0	0	20	33	60	40
17 0076	9/18/1984	0.0	0.8	0.8	53	7	60	95		INDX	FOOT					20			40
17 0076	9/24/1984	0.0	1.8	1.8	47	20	67	99		INDX	FOOT	4	0	0	0	20			
17 0076	9/25/1984	0.0	0.8	0.8	67	23	90	95		INDX	FOOT					20	60		40
17 0076	9/25/1984	0.8	1.0	0.2	3	3	6	95		INDX	FOOT					20	60		40
17 0076	10/2/1984	0.0	1.8	1.8	9	62	71	99		INDX	FOOT	4	0	0	0	20			
17 0076	10/3/1984	0.0	1.8	1.8	13	71	84	80		INDX	FOOT	4	0	0	0	60			
17 0076	10/8/1984	0.0	1.8	1.8	18	69	87	99		INDX	FOOT	4	0	0	0	20			
17 0076	10/11/1984	0.0	0.8	0.8	3	52	55	85		INDX	FOOT					20	60		40
17 0076	10/11/1984	0.8	1.8	1.0	2	0	2	85	0	INDX	FOOT	1	4	0	0	20	31	60	40
17 0076	10/15/1984	0.0	1.8	1.8	1	49	50			INDX	FOOT	4	0	0	0	20			
17 0076	10/17/1984	0.0	0.8	0.8	13	41	54	90		INDX	FOOT	4	0	0	0	20	60		40
17 0076	10/22/1984	0.0	1.8	1.8	0	46	46	99		INDX	FOOT					20			
17 0076	10/25/1984	0.0	0.8	0.8	11	35	46	90		INDX	FOOT	4	0	0	0	20	60		40
17 0076	10/29/1984	0.0	1.8	1.8	0	14	14	99		INDX	FOOT	4	0	0	0	20			
17 0076	9/25/1985	0.0	1.8	1.8	0	1	1	99		INDX	FOOT					20			
17 0076	10/3/1985	0.0	1.8	1.8	0	0	0	99		INDX	FOOT					20			
17 0076	10/31/1985	0.0	0.8	0.8	0	0	0	85		INDX	FOOT								
17 0076	9/17/1986	0.0	1.8	1.8	0	0	0	95		INDX	FOOT								
17 0076	9/23/1986	0.0	1.8	1.8	4	0	4	90		INDX	FOOT								
17 0076	9/30/1986	0.1	0.8	0.7	7	0	7	90		INDX	FOOT					20			
17 0076	10/14/1986	0.1	0.8	0.7	0	0	0	90		INDX	FOOT					20			
17 0076	10/20/1986	0.0	0.8	0.8	2	0	2	90		INDX	FOOT					20			
17 0076	10/27/1986	0.0	1.8	1.8	0	0	0	90		INDX	FOOT	4	0	0	0	20			
17 0076	9/28/1987	0.0	0.8	0.8	26	11	37	99		INDX	FOOT					20	60		
17 0076	10/8/1987	0.0	0.8	0.8	0	4	4	99		INDX	FOOT					20	60		
17 0076	10/26/1987	0.0	0.7	0.7	0	1	1	90		INDX	FOOT	4	0	0	0	20			
17 0076	9/16/1988	0.0	1.8	1.8	14	3	17	90		INDX	FOOT					20	61		
17 0076	9/26/1988	0.0	1.8	1.8	123	12	135	90		INDX	FOOT	4	0	0	0	61			
17 0076	10/5/1988	0.0	1.8	1.8	33	83	116	90		INDX	FOOT	4	0	0	0	20	61		
17 0076	10/17/1988	0.0	1.8	1.8	3	58	61	90		INDX	FOOT					61	20		
17 0076	10/27/1988	0.0	1.8	1.8	0	28	28	95		INDX	FOOT					20	61		
17 0076	9/13/1989	0.0	0.9	0.9	0	0	0	90		INDX	FOOT					20	60		
17 0076	9/22/1989	0.0	0.8	0.8	0	1	1	85		INDX	FOOT					20	60		
17 0076	10/4/1989	0.0	0.9	0.9	0	0	0	90		INDX	FOOT					20	60		
17 0076	10/13/1989	0.0	1.0	1.0	0	0	0	90		INDX	FOOT					20			
17 0076	10/26/1989	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					20			
17 0076	9/27/1990	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					20			
17 0076	10/9/1990	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20			
17 0076	10/17/1990	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					20			
17 0076	10/26/1990	0.0	1.8	1.8	0	0	0	85		INDX	FOOT	4	0	0	0	23			
17 0076	9/10/1991	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0076	9/25/1991	0.0	1.8	1.8	1	0	1	90		INDX	FOOT					60	20		
17 0076	10/16/1991	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					20	47	48	
17 0076	10/29/1991	0.0	1.8	1.8	0	0	0	90		INDX	FOOT	4	0	0	0	20	60	61	
17 0076	9/9/1992	0.0	1.8	1.8	6	1	7	98		INDX	FOOT					60	61		
17 0076	9/18/1992	0.0	1.8	1.8	3	2	5	90		INDX	FOOT					20	60	61	
17 0076	9/25/1992	0.0	1.8	1.8	1	2	3	95		INDX	FOOT					20	60	61	
17 0076	10/6/1992	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20	48	60	
17 0076	8/24/1993	0.0	1.8	1.8	0	0	0	60		INDX	FOOT					24	38	60	
17 0076	9/2/1993	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20	60		
17 0076	9/9/1993	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20			
17 0076	9/16/1993	0.0	1.8	1.8	5	2	7	90		INDX	FOOT	0	0	0	4	20	31	60	
17 0076	9/22/1993	0.0	1.8	1.8	5	2	7	95		INDX	FOOT	0	0	0	4	60	31	20	
17 0076	9/29/1993	0.0	1.8	1.8	4	4	8	95		INDX	FOOT	0	0	3	4	20	60	61	
17 0076	10/6/1993	0.0	1.8	1.8	2	3	5	95		INDX	FOOT	0	0	0	4	20	60	61	
17 0076	10/14/1993	0.0	1.8	1.8	1	1	2	95		INDX	FOOT	0	0	0	4	20	61		
17 0076	10/19/1993	0.0	1.8	1.8	0	0	0	85		INDX	FOOT	0	0	0	0	20	48		
17 0076	10/29/1993	0.0	1.8	1.8	0	0	0	95		INDX	FOOT	0	0	0	4	20	31	48	
17 0076	9/8/1994	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20	48	60	
17 0076	10/7/1994	0.0	1.8	1.8	0	0	0	95		INDX	FOOT					20	48	60	
17 0076	9/7/1995	0.0	0.8	0.8	9	0	9	95		INDX	FOOT					00	20	60	
17 0076	9/15/1995	0.0	1.8	1.8	16	2	18	95		INDX	FOOT					20	60	61	
17 0076	9/25/1995	0.0	1.8	1.8	26	4	30	95		INDX	FOOT	4	0	0	0	20	60	61	
17 0076	10/6/1995	0.0	1.8	1.8	1	2	3	95		INDX	FOOT	3	0	0	0	20	61		
17 0076	10/19/1995	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					23	60		
17 0076	9/4/1996	0.0	0.8	0.8	4	0	4	95		PART	FOOT					20	60		
17 0076	9/12/1996	0.0	1.8	1.8	103	1	104	95		INDX	FOOT	4	0	0	0	20	61		
17 0076	9/19/1996	0.0	1.8	1.8	103	26	129	95		INDX	FOOT	4	0	0	0	20			
17 0076	9/27/1996	0.0	1.8	1.8	88	77	165	95		INDX	FOOT	4	0	0	0	20	61		
17 0076	10/11/1996	0.0	1.8	1.8	5	100	105	95		INDX	FOOT	4	0	0	0	20	61		
17 0076	9/4/1997	0.0	1.8	1.8	0	0	0	95		INDX	FOOT	4	0	0	0	20	60		
17 0076	9/22/1997	0.0	1.8	1.8	12	0	12	90		INDX	FOOT	4				20	61		
17 0076	10/17/1997	0.0	1.8	1.8	3	0	3	90	2	INDX	FOOT					23			
17 0076	9/1/1998	0.0	1.8	1.8	3	1	4	95		INDX	FOOT	4	0	0	0	20	60	61	
17 0076	9/10/1998	0.0	1.8	1.8	16	0	16	95		INDX	FOOT	4	0	0	0	20	60	61	
17 0076	9/19/1998	0.0	1.8	1.8	186	13	199	95	66	INDX	FOOT	0	0	0	4	20	60		
17 0076	9/29/1998	0.0	1.8	1.8	62	116	178	95		INDX	FOOT	4	0	0	0	20	60		
17 0076	10/8/1998	0.0	1.8	1.8	16	70	86	95		INDX	FOOT	4	0	0	0	20	60		
17 0076	10/13/1998	0.0	0.8	0.8	4	28	32	80		INDX	FOOT	4	0	0	0	20			
17 0076	10/13/1998	0.8	1.8	1.0	0	0	0	80		INDX	FOOT	4	0	0	0	20			
17 0076	10/20/1998	0.0	0.8	0.8	0	18	18	80		INDX	FOOT	4	0	0	0	20			
17 0129	9/30/1981	0.0	1.8	1.8	0	0	0	80		SUPP	FOOT	1	4	0	0	00	22	51	40
17 0129	10/7/1981	0.0	1.0	1.0	0	0	0	70		SUPP	FOOT	1	4	0	0	25	42	50	40
17 0129	10/12/1981	0.0	1.0	1.0	0	0	0	65		INDX	FOOT					00			40
17 0129	10/23/1981	0.0	1.8	1.8	0	0	0	90		INDX	FOOT								40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0129	10/11/1983	0.0	0.7	0.7	0	1	1	50		INDX	FOOT					60			40
17 0129	9/20/1996	0.0	0.6	0.6	0	0	0	90		SUPP	FOOT	1	0	0	0	21	31		
17 0170	9/8/1981	0.0	1.7	0.0	0	0	0	90		INDX	FOOT					11	20	00	40
17 0170	9/17/1981	0.0	1.8	1.8	0	0	0	86		SUPP	FOOT					21	57		40
17 0170	9/30/1981	0.0	1.8	1.8	0	0	0	90		INDX	FOOT					11	21	48	40
17 0170	10/12/1981	0.0	1.8	1.8	0	0	0	80		INDX	FOOT								40
17 0170	9/27/1983	0.0	1.0	1.0	0	0	0	80	0	INDX	FOOT								40
17 0170	10/4/1983	0.0	1.0	1.0	0	0	0	50		INDX	FOOT					60			40
17 0181	9/8/1981	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					41	00	00	40
17 0181	9/30/1981	0.0	0.3	0.3	0	0	0	85		INDX	FOOT					22	41	60	40
17 0181	10/12/1981	0.0	0.2	0.2	0	0	0	95		INDX	FOOT					20	41		40
17 0181	9/27/1983	0.0	0.4	0.4	0	0	0	70	0	SUPP	FOOT					60			40
17 0203	10/7/1974	0.0	0.3	0.3	9	3	12	50	23	SUPP	FOOT								
17 0203	10/18/1974	0.0	0.3	0.3	2	6	8	50	31	SUPP	FOOT								
17 0203	10/2/1975	1.2	1.5	0.3	16	2	18	75		SUPP	FOOT					60			
17 0203	10/15/1975	1.0	2.0	1.0	0	0	0	10		SUPP	FOOT								
17 0203	10/4/1983	0.0	2.0	2.0	5	2	7	50	0	SUPP	FOOT								40
17 0203	10/11/1983	0.0	2.0	2.0	1	0	1	10		SUPP	FOOT								40
17 0219	9/25/1972	0.1	0.5	0.4	50	6	56	95		SUPP	FOOT					20			
17 0219	10/4/1972	0.0	0.5	0.5	127	30	157	90		SUPP	FOOT					20			
17 0219	9/30/1973	0.1	1.5	1.4	0	0	0	95		SUPP	FOOT	0	0	0	0				
17 0219	9/23/1974	0.0	1.6	1.6	49	2	51	90		SUPP	FOOT	0	0	0	0	60			
17 0219	10/7/1974	0.0	1.6	1.6	554	41	595	95	81	SUPP	FOOT	1	0	0	0		60		
17 0219	10/18/1974	0.0	1.6	1.6	5	90	95	80	80	SUPP	FOOT	0	1	0	0				
17 0219	9/8/1975	0.0	0.0	0.0	5	0	5	90	2	SPOT	FOOT								
17 0219	9/18/1975	0.0	1.0	1.0	55	0	55	75	23	SUPP	FOOT					60			
17 0219	10/3/1975	0.0	1.4	1.4	67	260	327	85		SUPP	FOOT					60	61		
17 0219	10/3/1975	1.4	1.8	0.4	3	10	13	60		SUPP	FOOT					20	31	38	
17 0219	10/15/1975	0.0	0.6	0.6	0	16	16	50	40	SUPP	FOOT								
17 0219	9/10/1976	0.0	1.5	1.5	110	1	111	95	14	INDX	FOOT					20			
17 0219	9/14/1976	0.0	1.5	1.5	363	11	374	95	130	INDX	FOOT					21			DG
17 0219	9/14/1976	1.0	1.3	0.3	13	0	13	80		SUPP	FOOT								
17 0219	9/14/1976	1.5	4.2	2.7	13	0	13	99		SUPP	FOOT					21			DG
17 0219	9/21/1976	0.0	1.5	1.5	375	157	542	90		INDX	FOOT					21			DG
17 0219	9/21/1976	1.5	1.8	0.3	34	1	35	90		SUPP	FOOT					21			DG
17 0219	9/28/1976	0.0	1.5	1.5	62	272	334	90		INDX	FOOT					20			DG
17 0219	9/28/1976	1.5	1.7	0.2	2	6	8	99		SUPP	FOOT					20			DG
17 0219	10/5/1976	0.0	1.5	1.5	17	97	114	99		INDX	FOOT					20			DG
17 0219	10/5/1976	1.5	4.0	2.5	0	2	2	99		SUPP	FOOT	4	0	0	0	20			DG
17 0219	10/13/1976	0.0	1.5	1.5	9	45	54	99		INDX	FOOT	4	0	0	0	20			DG
17 0219	10/13/1976	1.5	4.2	2.7	0	0	0	99		SUPP	FOOT					20			DG
17 0219	10/20/1976	0.0	1.5	1.5	1	39	40	99		INDX	FOOT					20			DG
17 0219	10/20/1976	1.5	1.7	0.2	0	0	0	99		SUPP	FOOT					20			DG
17 0219	10/27/1976	0.0	1.5	1.5	0	8	8	99		INDX	FOOT					20			DG

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0219	10/27/1976	1.5	1.7	0.2	0	0	0	99		SUPP	FOOT					20			DG
17 0219	9/14/1977	0.0	1.5	1.5	11	2	13	50		INDX	FOOT								
17 0219	9/14/1977	1.5	2.2	0.8	0	0	0			SUPP	FOOT								
17 0219	9/21/1977	0.0	1.5	1.5	86	6	92	50		INDX	FOOT								
17 0219	9/21/1977	1.5	2.2	0.7	0	0	0			SUPP	FOOT								DG
17 0219	9/22/1977	0.0	1.4	1.4	71	2	73	90		SUPP	FOOT								
17 0219	9/28/1977	0.0	1.5	1.5	184	14	198	50		INDX	FOOT								
17 0219	9/28/1977	1.5	2.2	0.7	3	0	3	95		SUPP	FOOT								DG
17 0219	10/5/1977	0.0	1.5	1.5	161	49	210	50		INDX	FOOT								
17 0219	10/5/1977	1.5	2.2	0.7	7	0	7	75		SUPP	FOOT								DG
17 0219	10/13/1977	0.0	1.5	1.5	73	56	129	50		INDX	FOOT								
17 0219	10/13/1977	1.5	2.2	0.7	0	0	0			SUPP	FOOT								DG
17 0219	10/19/1977	0.0	1.5	1.5	36	67	103	50		INDX	FOOT								
17 0219	10/19/1977	1.5	2.0	0.5	0	0	0			SUPP	FOOT								
17 0219	10/26/1977	0.0	1.5	1.5	11	28	39	50		INDX	FOOT								
17 0219	10/26/1977	1.5	2.0	0.5	0	0	0			SUPP	FOOT								
17 0219	9/6/1978	0.0	2.1	2.1	36	0	36	90		INDX	FOOT					60			DG
17 0219	9/13/1978	0.0	2.1	2.1	194	2	196	80		INDX	FOOT								DG
17 0219	9/19/1978	0.0	2.1	2.1	323	6	329	90		INDX	FOOT	6	0						
17 0219	9/20/1978	0.0	2.1	2.1	323	17	340	80		INDX	FOOT								DG
17 0219	9/27/1978	0.0	2.1	2.1	207	101	308	80		INDX	FOOT								DG
17 0219	10/4/1978	0.0	2.1	2.1	32	62	94	80		INDX	FOOT								DG
17 0219	10/11/1978	0.0	2.1	2.1	32	68	100	80		INDX	FOOT								DG
17 0219	10/26/1978	0.0	2.1	2.1	2	10	12	90		INDX	FOOT								
17 0219	9/17/1979	1.5	0.0	0.0	0	0	0			SPOT	FOOT					20	57		
17 0219	9/16/1981	0.0	1.0	1.0	116	37	153	90		INDX	FOOT								
17 0219	9/14/1982	0.0	1.8	1.8	159			90		SUPP	FOOT								DG
17 0219	10/20/1986	0.0	1.5	1.5	71	50	121	90		INDX	FOOT	0	0	0	0	20			
17 0219	10/27/1986	0.0	1.0	1.0	45	34	79	90		INDX	FOOT	4	0	0	0	20			
17 0219	9/15/1987	0.0	0.8	0.5	0	0	0	90		INDX	FOOT					20	60		
17 0219	9/25/1987	0.0	1.5	1.5	99	9	108	95		INDX	FOOT					20	61		
17 0219	10/7/1987		1.0	1.0	189	109	298	90		INDX	FOOT	4	0	0	0	20	60		
17 0219	9/21/1982	0.0	1.8	1.8	267			90		SUPP	FOOT								DG
17 0219	9/28/1982	0.0	1.8	1.8	224			90		SUPP	FOOT								DG
17 0219	10/11/1982	0.0	1.8	1.8	126			85		SUPP	FOOT								DG
17 0219	9/28/1983	0.0	0.8	0.8	62	3	65	90		SUPP	FOOT								DG
17 0219	9/28/1983	0.8	1.8	1.0	23	0	23	85		SUPP	FOOT								DG
17 0219	10/4/1983	0.0	0.5	0.5	51	25	76	75	55	SUPP	FOOT					20			
17 0219	10/11/1983	0.0	0.8	0.8	30	24	54	85		SUPP	FOOT								DG
17 0219	10/11/1983	0.8	1.8	1.0	2	4	6	80		SUPP	FOOT								DG
17 0219	10/21/1983	0.0	0.8	0.8	14	36	50			SUPP	FOOT								DG
17 0219	10/21/1983	0.8	1.7	0.9	0	0	0	90		SUPP	FOOT								DG
17 0219	9/17/1984	0.1	1.5	1.3	11	0	11	90	4	INDX	FOOT					20			40
17 0219	9/18/1984	0.0	0.5	0.5	19	1	20	99		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0219	9/24/1984	0.0	0.8	0.7	47	0	47	70		INDX	FOOT					21	31	60	40
17 0219	9/25/1984	0.1	1.0	0.9	33	2	35	95		INDX	FOOT					20	60		
17 0219	10/2/1984	0.0	0.8	0.8	72	16	88	60		INDX	FOOT					20	60		40
17 0219	10/2/1984	0.8	1.5	0.7	33	2	35	65		INDX	FOOT					20			40
17 0219	10/8/1984	0.1	1.0	0.9	76	14	90	90		INDX	FOOT					20			
17 0219	10/10/1984	0.2	0.8	0.5	42	15	57	60		INDX	FOOT					21	60		40
17 0219	10/10/1984	0.8	1.5	0.8	56	20	76	60		INDX	FOOT					21	60		40
17 0219	10/18/1984	0.0	0.8	0.8	49	26	75	95		INDX	FOOT					20			40
17 0219	10/18/1984	0.8	1.5	0.7	56	42	98	95		INDX	FOOT					20	60		40
17 0219	10/24/1984	0.0	0.8	0.8	19	36	55	85		INDX	FOOT					20			40
17 0219	10/24/1984	0.8	1.5	0.7	38	46	84	85		INDX	FOOT					20	60		40
17 0219	10/31/1984	0.2	0.8	0.6	4	11	15	90		INDX	FOOT					20			40
17 0219	10/31/1984	0.8	1.5	0.7	7	57	64	90		INDX	FOOT					20			40
17 0219	10/4/1985	0.0	1.5	1.5	16	5	21	99		INDX	FOOT					20			
17 0219	10/10/1985	0.0	0.5	0.5	2	15	17	90		SUPP	FOOT					20			
17 0219	9/17/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
17 0219	9/23/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
17 0219	9/30/1986	0.0	0.7	0.7	38	7	45	90		INDX	FOOT					20			
17 0219	10/8/1986	0.0	1.5	1.5	61	24	85	95		INDX	FOOT					20			
17 0219	10/16/1987	0.0	1.0	1.0	88	153	241	80		INDX	FOOT					20			
17 0219	10/26/1987	0.0	1.0	1.0	23	38	61	95		INDX	FOOT					20	60		
17 0219	9/15/1988	0.0	1.5	1.5	59	2	61	95		INDX	FOOT					20	61		
17 0219	9/26/1988	0.0	1.5	1.5	322	61	383	90		INDX	FOOT					60			
17 0219	10/5/1988	0.0	1.5	1.5	250	247	497	90		INDX	FOOT					20	61		
17 0219	10/17/1988	0.0	1.5	1.5	46	348	394	95		INDX	FOOT					20	61		
17 0219	10/27/1988	0.0	0.8	0.8	0	231	231	95		INDX	FOOT					20	60		
17 0219	9/13/1989	0.0	0.7	0.7	0	0	0	90		INDX	FOOT					20	60		
17 0219	9/22/1989	0.0	0.8	0.8	4	3	7	80		INDX	FOOT					20	60		
17 0219	10/4/1989	0.0	1.3	1.3	10	11	21	90		INDX	FOOT					20	60		
17 0219	10/13/1989	0.0	1.0	1.0	0	9	9	90		INDX	FOOT					20	60		
17 0219	9/5/1990	0.0	1.5	1.5	0	0	0	90		INDX	FOOT					20	60		
17 0219	9/19/1990	0.0	1.5	1.5	3	0	3	85		INDX	FOOT	4	0	0	0	60	61		
17 0219	10/1/1990	0.0	1.5	1.5	5	6	11	85		INDX	FOOT					20	61		
17 0219	10/10/1990	0.0	1.5	1.5	13	3	16	85		INDX	FOOT					20	61		
17 0219	10/18/1990	0.0	1.5	1.5	11	12	23	80		INDX	FOOT					20	60	61	
17 0219	9/16/1991	0.0	0.7	0.7	1	0	1	98		INDX	FOOT					00	20	60	
17 0219	10/22/1996	0.0	0.8	0.8	0	0	0	80	0	INDX	FOOT					20			
17 0219	10/22/1996	0.8	0.8		80	0	80	99		TOTL	WEIR					62	60		
17 0219	10/22/1996	0.8	0.0	0.0	80	0	80	99		TOTL	WEIR					62	60		
17 0219	9/8/1997	0.0	0.8	0.8	0	0	0	90	1	INDX	FOOT					20			
17 0219	9/15/1997	0.0	0.8	0.8	1	1	2	90	0	INDX	FOOT					20			
17 0219	9/22/1997	0.0	0.8	0.8	10	0	10	90	6	INDX	FOOT					20	60		
17 0219	9/29/1997	0.0	0.8	0.8	3	5	8	90	10	INDX	FOOT					20	60		
17 0219	9/27/1991	0.0	0.7	0.7	0	7	7	85		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0219	10/9/1991	0.0	0.3	0.3	0	4	4	75	6	INDX	FOOT					20	60		
17 0219	10/16/1991	0.0	0.2	0.2	0	0	0	75		INDX	FOOT					20	00		
17 0219	9/3/1992	0.0	1.5	1.5	0	1	1	95		INDX	FOOT					60			
17 0219	9/15/1992	0.0	1.5	1.5	3	0	3	80		INDX	FOOT					20	60	61	
17 0219	9/24/1992	0.0	1.5	1.5	0	1	1	90		INDX	FOOT					20	60	61	
17 0219	10/6/1992	0.0	1.5	1.5	6	11	17	90		INDX	FOOT					20	60	61	
17 0219	10/12/1992	0.0	1.5	1.5	3	1	4	95		INDX	FOOT					20	61		
17 0219	10/21/1992	0.0	1.5	1.5	0	0	0	95		INDX	FOOT								
17 0219	8/31/1993	0.1	1.5	1.4	0	0	0	95		INDX	FOOT					20	60		
17 0219	9/20/1993	0.0	0.6	0.6	7	4	11	75		INDX	FOOT					20	60		
17 0219	9/27/1993	0.0	0.5	0.5	0	5	5	70	9	INDX	FOOT					20			
17 0219	10/4/1993	0.0	0.5	0.5	0	0	0	75		INDX	FOOT	0	0	0	0	20			
17 0219	10/11/1993	0.0	0.3	0.3	0	0	0	75		INDX	FOOT					20			
17 0219	9/19/1994	0.0	0.3	0.3	0	0	0	80		INDX	FOOT					20			
17 0219	9/27/1994	0.0	0.3	0.3	0	2	2	80	0	INDX	FOOT					20	60		
17 0219	10/5/1994	0.0	0.3	0.3	0	0	0	80		INDX	FOOT					20			
17 0219	9/14/1995	0.0	0.3	0.3	5	0	5	85	3	INDX	FOOT					20			
17 0219	9/24/1995	0.0	0.4	0.4	4	0	4	80		INDX	FOOT					20	60		
17 0219	10/2/1995	0.0	0.5	0.5	15	2	17	75	17	INDX	FOOT					21			
17 0219	10/9/1995	0.0	0.4	0.4	5	3	8	75		INDX	FOOT					20			
17 0219	10/18/1995	0.0	0.3	0.3	0	1	1	80		INDX	FOOT	4	0	0	0	20			
17 0219	8/29/1996	0.0	0.2	0.2	0	0	0	90		INDX	FOOT					20			
17 0219	9/15/1996	0.0	0.8	0.8	3	0	3	60		INDX	FOOT					20	31		
17 0219	9/19/1996	0.0	0.8	0.8	7	0	7	80	3	INDX	FOOT					20	31		
17 0219	9/20/1996	0.8	0.0	0.8	12	0	12	80	4	INDX	FOOT					20	31		
17 0219	9/23/1996	0.0	0.8	0.8	8	1	9	80	3	INDX	FOOT					20	31		
17 0219	9/25/1996	0.0	0.8	0.8	11	0	11	80	5	INDX	FOOT					20	31	60	
17 0219	9/30/1996	0.0	0.8	0.8	18	0	18	80	10	INDX	FOOT					20	31		
17 0219	10/7/1996	0.0	0.8	0.8	7	6	13	60	5	INDX	FOOT					20			
17 0219	10/14/1996	0.0	0.8	0.8	4	11	15	80	2	INDX	FOOT					20			
17 0219	10/5/1997	0.0	0.8	0.8	6	0	6	80	2	INDX	FOOT					20	31	60	
17 0219	10/13/1997	0.0	0.8	0.8	8	0	8	80	1	INDX	FOOT					23	31	60	
17 0219	10/21/1997	0.0	0.8	0.8	4	1	5	90	2	INDX	FOOT					20	60		
17 0219	10/29/1997	0.0	0.8	0.8	2	4	6	80	1	INDX	FOOT					23	60		
17 0219	8/22/1998	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20			
17 0219	9/2/1998	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20			
17 0219	9/14/1998	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20			
17 0219	9/19/1998	0.0	0.8	0.8	0	1	1	95	1	INDX	FOOT					20			
17 0219	9/27/1998	0.0	0.8	0.8	1	0	1	95	1	INDX	FOOT					20			
17 0219	10/5/1998	0.0	0.8	0.8	0	1	1	95	2	INDX	FOOT					20			
17 0219	10/17/1998	0.0	0.8	0.8	0	0	0	90	0	INDX	FOOT					20			
17 0219	10/26/1998	0.0	0.8	0.8	2	8	10	90	12	INDX	FOOT					20	60		
17 0219	10/29/1998	0.0	0.8	0.8	0	10	10	90	13	INDX	FOOT					20	60		
17 0245	10/15/1971	0.0	0.7	0.7	16	126	142	99		SUPP	FOOT	3	0	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0245	9/25/1972	0.0	0.7	0.7	113	23	136	95		SUPP	FOOT					20			
17 0245	9/25/1972	0.7	1.2	0.5	14	0	14	95		SUPP	FOOT					20			
17 0245	10/4/1972	0.0	0.8	0.8	223	84	307			SUPP	FOOT					20			
17 0245	9/30/1973	0.0	0.5	0.5	78	284	362	95		SUPP	FOOT	0	0	0	0				
17 0245	9/10/1974	0.5	0.0	0.0	0	0	0	95		SPOT	FOOT	0	0	0	0	13	20		
17 0245	9/23/1974	0.0	0.8	0.8	75	5	80	90		SUPP	FOOT	0	0	0	0	60			
17 0245	10/7/1974	0.0	0.8	0.8	88	116	204	80	103	SUPP	FOOT	1	0	0	0				
17 0245	10/18/1974	0.0	0.8	0.8	19	230	249	80	105	SUPP	FOOT	1	0	0	0				
17 0245	9/8/1975	0.0	0.0	0.0	7	0	7	90	6	SPOT	FOOT					60			
17 0245	9/18/1975	0.0	0.8	0.8	160	5	165	80	65	SUPP	FOOT	1	0	0	0				
17 0245	10/3/1975	0.0	1.1	1.1	114	389	503	90		SUPP	FOOT					60	61		
17 0245	10/11/1975	0.0	1.4	1.4	53	212	265	90		INDX	FOOT								DG
17 0245	10/15/1975	0.0	1.0	1.0	2	65	67	50	25	SUPP	FOOT	1	0	0	0	60			
17 0245	9/10/1976	0.0	0.8	0.8	100	2	102	95	17	INDX	FOOT					20			
17 0245	9/14/1976	0.0	0.8	0.8	165	30	195	95	64	INDX	FOOT					20			DG
17 0245	9/14/1976	0.8	1.7	0.9	117	30	147	95	25	SUPP	FOOT					20			DG
17 0245	9/21/1976	0.0	0.8	0.8	47	266	313	99		INDX	FOOT					20			DG
17 0245	9/21/1976	0.8	1.1	0.3	220	116	336	99		SUPP	FOOT					20			DG
17 0245	9/28/1976	0.0	0.8	0.8	25	110	135	99		INDX	FOOT					20			DG
17 0245	9/28/1976	0.8	1.3	0.5	99	286	385	99		SUPP	FOOT	4	0	0	0	20			DG
17 0245	10/5/1976	0.0	0.8	0.8	7	73	80	99		INDX	FOOT	1	0	0	0	20			DG
17 0245	10/5/1976	0.8	1.3	0.5	23	92	115	99		SUPP	FOOT					20			DG
17 0245	10/13/1976	0.0	0.8	0.8	10	33	43	99		INDX	FOOT					20			DG
17 0245	10/13/1976	0.8	1.3	0.5	3	28	31	99		SUPP	FOOT					20			DG
17 0245	10/20/1976	0.0	0.8	0.8	3	33	36	99		INDX	FOOT					20			DG
17 0245	10/20/1976	0.8	1.3	0.5	0	5	5	99		SUPP	FOOT					20			DG
17 0245	10/27/1976	0.0	0.8	0.8	1	32	33	99		INDX	FOOT					20			DG
17 0245	10/27/1976	0.8	1.3	0.5	0	8	8	99		SUPP	FOOT					20			DG
17 0245	9/14/1977	0.0	0.8	0.8	5	10	15	90		INDX	FOOT								
17 0245	9/21/1977	0.0	0.8	0.8	145	6	151	90		INDX	FOOT								
17 0245	9/21/1977	0.8	1.1	0.3	129	6	135	90		SUPP	FOOT								
17 0245	9/22/1977	0.0	1.3	1.3	141	11	152	85		SUPP	FOOT								
17 0245	9/28/1977	0.0	0.8	0.8	179	44	223	70		INDX	FOOT								
17 0245	9/28/1977	0.8	1.4	0.6	131	25	156	70		SUPP	FOOT								
17 0245	10/5/1977	0.0	0.8	0.8	123	119	242	90		INDX	FOOT								
17 0245	10/5/1977	0.8	1.4	0.6	78	44	122	90		SUPP	FOOT								
17 0245	10/13/1977	0.0	0.8	0.8	32	143	175	90		INDX	FOOT								
17 0245	10/13/1977	0.8	1.4	0.6	21	47	68	90		SUPP	FOOT								
17 0245	10/19/1977	0.0	0.8	0.8	10	90	100	90		INDX	FOOT								
17 0245	10/19/1977	0.8	1.4	0.6	2	16	18	90		SUPP	FOOT								
17 0245	10/26/1977	0.0	0.8	0.8	1	25	26	90		INDX	FOOT								
17 0245	10/26/1977	0.8	2.4	0.6	0	2	2	90		SUPP	FOOT								
17 0245	9/6/1978	0.0	1.4	1.4	52	5	57	90		INDX	FOOT								DG
17 0245	9/13/1978	0.0	1.4	1.4	513	29	542	90		INDX	FOOT								DG

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0245	9/19/1978	0.0	1.4	1.4	511	69	580	95		INDX	FOOT	1							
17 0245	9/27/1978	0.0	1.4	1.4	329	393	722	90		INDX	FOOT								DG
17 0245	10/4/1978	0.0	1.4	1.4	121	224	345	85		INDX	FOOT	1	4						
17 0245	10/11/1978	0.0	1.4	1.4	53	212	265	90		INDX	FOOT								DG
17 0245	10/26/1978	0.0	1.4	1.4	7	65	72	85		INDX	FOOT	1							
17 0245	9/17/1979	0.7	0.8	0.1	0	0	0			INDX	FOOT					00	57		
17 0245	10/27/1979	0.2			347		347			TOTL	WEIR					80			DG
17 0245	9/16/1981	0.0	1.3	1.3	269	45	314	90		INDX	FOOT								
17 0245	9/14/1982	0.0	0.8	0.8	287			90		SUPP	FOOT								DG
17 0245	9/21/1982	0.0	0.8	0.8	317			90		SUPP	FOOT								DG
17 0245	9/28/1982	0.0	0.8	0.8	167			90		SUPP	FOOT								DG
17 0245	10/11/1982	0.0	0.8	0.8	82			90		SUPP	FOOT								DG
17 0245	10/11/1982	0.8	1.3	0.5	74	502	576	90		SUPP	FOOT				0				DG
17 0245	9/28/1983	0.0	0.8	0.8	129	23	152	90		SUPP	FOOT								DG
17 0245	9/28/1983	0.8	1.2	0.4	105	14	119	85		SUPP	FOOT								DG
17 0245	10/11/1983	0.0	0.6	0.6	142	151	293	90		SUPP	FOOT								DG
17 0245	10/11/1983	0.6	1.5	0.9	58	56	114	90		SUPP	FOOT								DG
17 0245	10/21/1983	0.0	0.8	0.8	109	237	346	90		SUPP	FOOT								DG
17 0245	10/21/1983	0.8	1.2	0.4	32	57	89	90		SUPP	FOOT								DG
17 0245	9/17/1984	0.1	1.5	1.4	73	6	79	90	17	INDX	FOOT					20			40
17 0245	9/18/1984	0.0	1.4	1.4	176	18	194	99		INDX	FOOT					20			
17 0245	9/24/1984	0.1	1.5	1.4	294	43	337	95		INDX	FOOT					20			40
17 0245	9/25/1984	0.1	1.2	1.1	266	55	311	90		INDX	FOOT					20			
17 0245	10/2/1984	0.0	0.7	0.7	110	108	218	95		INDX	FOOT					20			40
17 0245	10/2/1984	0.7	1.5	0.8	167	106	273	95		INDX	FOOT					20			40
17 0245	10/8/1984	0.1	1.2	1.1	215	368	583	90		INDX	FOOT	1	0	0	0	20			
17 0245	10/10/1984	0.0	0.7	0.7	55	213	268	75		INDX	FOOT					20	60		40
17 0245	10/10/1984	0.7	1.5	0.8	79	162	241	75		INDX	FOOT					20	60		40
17 0245	10/18/1984	0.0	0.7	0.7	44	222	266	95		INDX	FOOT					20	60		40
17 0245	10/18/1984	0.7	1.5	0.8	69	183	252	95		INDX	FOOT					20			40
17 0245	10/24/1984	0.0	0.7	0.7	53	248	301	90		INDX	FOOT					20	60		40
17 0245	10/24/1984	0.7	1.5	0.8	61	164	225	90		INDX	FOOT					20	60		40
17 0245	10/31/1984	0.1	0.7	0.6	29	257	286	90		INDX	FOOT	4	0	0	0	20			40
17 0245	10/31/1984	0.7	1.5	0.8	14	211	225	90		INDX	FOOT					20			40
17 0245	10/4/1985	0.0	1.3	1.3	11	40	51	99		INDX	FOOT				4	20			
17 0245	10/10/1985	0.0	0.8	0.8	1	48	49	90		SUPP	FOOT					20			
17 0245	9/17/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
17 0245	9/23/1986	0.0	0.5	0.5	0	0	0	99		INDX	FOOT								
17 0245	9/30/1986	0.0	0.8	0.8	95	7	102	90		INDX	FOOT	4	0	0	0	20			
17 0245	10/8/1986	0.0	1.7	1.7	223	74	297	95		INDX	FOOT	4	0	0	0	20	60		
17 0245	10/20/1986	0.0	1.8	1.8	163	129	292	90		INDX	FOOT	1	4	0	0	20			
17 0245	10/27/1986	0.1	1.2	1.1	112	158	270	90		INDX	FOOT					21	38		
17 0245	9/15/1987	0.0	0.8	0.8	7	3	10	99		INDX	FOOT					20	60		
17 0245	9/25/1987	0.0	0.8	0.8	81	18	99	95		INDX	FOOT	4	0	0	0	20	61		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0245	9/25/1987	0.8	1.2	0.4	160	13	173	90		SUPP	FOOT					20	60		
17 0245	10/7/1987	0.0	0.8	0.8	235	160	395	95		INDX	FOOT					20			
17 0245	10/7/1987	0.8	1.3	0.5	209	167	376	95		SUPP	FOOT					20			
17 0245	10/16/1987	0.0	0.8	0.8	105	275	380	95		INDX	FOOT					20			
17 0245	10/16/1987	0.8	1.5	0.7	47	206	253	95		SUPP	FOOT					20	60		
17 0245	10/26/1987	0.0	0.8	0.8	88	151	239	95		INDX	FOOT					20			
17 0245	10/26/1987	0.8	1.3	0.5	34	59	93	95		SUPP	FOOT					20			
17 0245	9/15/1988	0.0	0.8	0.8	77	14	91	95		INDX	FOOT					20	61		
17 0245	9/15/1988	0.8	1.1	0.3	138	10	148	95		SUPP	FOOT					20	60		
17 0245	9/26/1988	0.0	0.8	0.8	369	75	444	90		INDX	FOOT					60			
17 0245	9/26/1988	0.8	1.0	0.2	418	103	521	90		SUPP	FOOT					60			
17 0245	10/5/1988	0.0	0.8	0.8	328	313	641	90		INDX	FOOT					61			
17 0245	10/5/1988	0.8	1.1	0.3	267	476	743	90		SUPP	FOOT					20	60		
17 0245	10/17/1988	0.0	0.8	0.8	96	545	641	95		INDX	FOOT					20	61		
17 0245	10/17/1988	0.8	1.8	1.0	58	563	621	95		SUPP	FOOT					20			
17 0245	10/27/1988	0.0	0.8	0.8	10	522	532	95		INDX	FOOT					20	61		
17 0245	9/13/1989	0.0	0.8	0.8	1	0	1	99		INDX	FOOT					20	60		
17 0245	9/22/1989	0.0	0.9	0.9	51	15	66	80		INDX	FOOT					20			
17 0245	10/4/1989	0.0	0.8	0.8	32	82	114	90		INDX	FOOT					20	60		
17 0245	10/4/1989	0.8	1.3	0.5	47	53	100	90		SUPP	FOOT					20	60		
17 0245	10/13/1989	0.0	0.8	0.8	34	154	188	90		INDX	FOOT	3	0	0	0	20			
17 0245	9/5/1990	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20	60		
17 0245	9/19/1990	0.0	0.8	0.8	27	11	38	95		INDX	FOOT					20	60	61	
17 0245	9/19/1990	0.8	0.9	0.1	2	0	2	90		SUPP	FOOT					20			
17 0245	10/1/1990	0.0	0.8	0.8	99	67	166	90		INDX	FOOT					20	60	61	
17 0245	10/10/1990	0.0	1.5	1.5	91	108	199	95		INDX	FOOT	4	0	0	0	20	61		
17 0245	10/18/1990	0.0	0.8	0.8	33	170	203	95		INDX	FOOT					20	60	61	
17 0245	9/16/1991	0.0	0.8	0.8	9	0	9	95		INDX	FOOT					20			
17 0245	9/27/1991	0.0	1.1	1.1	100	27	127	95		INDX	FOOT					20	61		
17 0245	10/8/1991	0.0	1.0	1.0	22	69	91	95		INDX	FOOT					20	61		
17 0245	10/16/1991	0.0	1.0	1.0	13	29	42	95		INDX	FOOT					20			
17 0245	9/3/1992	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					60			
17 0245	9/15/1992	0.0	0.8	0.8	21	17	38	90		INDX	FOOT					20	60	61	
17 0245	9/24/1992	0.0	0.8	0.8	186	74	260	95		INDX	FOOT					20	60	61	
17 0245	9/24/1992	0.8	1.0	0.2	13	20	33	95		SUPP	FOOT					20	60		
17 0245	10/5/1992	0.0	0.8	0.8	41	134	175	85		INDX	FOOT					20	60	61	
17 0245	10/12/1992	0.0	0.8	0.8	37	175	212	95		INDX	FOOT					20	61		
17 0245	10/21/1992	0.0	0.8	0.8	31	118	149	95		INDX	FOOT					61	20		
17 0245	8/31/1993	0.0	0.8	0.8	0	0	0	95		INDX	FOOT					20	60		
17 0245	9/20/1993	0.0	0.8	0.8	17	6	23	80		INDX	FOOT					20	60		
17 0245	9/20/1993	0.8	1.0	0.2	0	0	0	80		SUPP	FOOT					20			
17 0245	9/27/1993	0.0	0.8	0.8	104	12	116	85	61	INDX	FOOT	1	0	0	0	20	60		
17 0245	9/27/1993	0.8	1.0	0.2	0	0	0	90	0	SUPP	FOOT					20			
17 0245	10/4/1993	0.0	0.8	0.8	106	73	179	80		INDX	FOOT	1	0	0	0	20	60		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0245	10/4/1993	0.8	1.0	0.2	0	0	0	90		SUPP	FOOT					20			
17 0245	10/11/1993	0.0	0.8	0.8	102	69	171	85		INDX	FOOT					20	60		
17 0245	10/11/1993	0.8	1.0	0.2	1	1	2	90		SUPP	FOOT					20	60		
17 0245	10/18/1993	0.0	0.8	0.8	82	66	148	85		INDX	FOOT					20	60		
17 0245	10/18/1993	0.8	1.3	0.5	26	4	30	80		SUPP	FOOT					20			
17 0245	10/25/1993	0.0	0.8	0.8	53	38	91	85		INDX	FOOT	4	0	0	0	20	60		
17 0245	10/26/1993	0.8	1.1	0.3	18	8	26	90		SUPP	FOOT					20			
17 0245	9/9/1994	0.0	0.8	0.8	0	0	0	90		INDX	FOOT					20			
17 0245	9/16/1994	0.0	0.8	0.8	3	5	8	90	4	INDX	FOOT					20			
17 0245	9/23/1994	0.0	0.8	0.8	49	12	61	90		INDX	FOOT					20	60		
17 0245	9/29/1994	0.0	0.8	0.8	70	31	101	85		INDX	FOOT					20	60		
17 0245	9/29/1994	0.8	1.1	0.3	8	1	9	90		SUPP	FOOT					20			
17 0245	10/6/1994	0.0	0.8	0.8	32	58	90	90		INDX	FOOT					20			
17 0245	10/6/1994	0.8	1.1	0.3	18	11	29	90		SUPP	FOOT					20			
17 0245	10/13/1994	0.0	0.8	0.8	10	51	61	90		INDX	FOOT					20			
17 0245	10/13/1994	0.8	1.1	0.3	2	21	23	90		SUPP	FOOT					20			
17 0245	10/19/1994	0.0	0.8	0.8	2	44	46	90		INDX	FOOT					20			
17 0245	10/19/1994	0.8	1.1	0.3	0	20	20	90		SUPP	FOOT					20			
17 0245	9/7/1995	0.0	0.8	0.8	3	1	4	90	2	INDX	FOOT	4	0	0	0	20	60		
17 0245	9/14/1995	0.0	0.8	0.8	50	21	71	85		INDX	FOOT					20			
17 0245	9/22/1995	0.0	0.8	0.8	81	37	118	80		INDX	FOOT					20	61	60	
17 0245	9/29/1995	0.0	0.8	0.8	85	61	146	85		INDX	FOOT					20	60		
17 0245	10/2/1995	0.8	1.1	0.3	30	2	32	75		SUPP	FOOT					21			
17 0245	10/6/1995	0.0	0.8	0.8	74	74	148	85		INDX	FOOT					20	60		
17 0245	10/9/1995	0.8	1.1	0.3	5	10	15	85		SUPP	FOOT					20			
17 0245	10/12/1995	0.0	0.8	0.8	39	60	99	75		INDX	FOOT					20	60		
17 0245	10/18/1995	0.0	0.8	0.8	6	51	57	85		INDX	FOOT					20			
17 0245	10/18/1995	0.8	1.0	0.2	0	5	5	85		SUPP	FOOT					20			
17 0245	8/29/1996	0.0	0.2	0.2	0	0	0	90		INDX	FOOT					20			
17 [illegible]	9/19/1996	0.0	0.7	0.7	124	21	145	70		INDX	FOOT								
17 [illegible]	9/19/1996	0.7	1.3	0.6	58	7	65	80		SUPP	FOOT								
17 0245	9/26/1996	0.0	0.7	0.7	225	42	267	70		INDX	FOOT								
17 0245	9/26/1996	0.7	1.3	0.6	51	25	76	80		SUPP	FOOT								
17 0245	10/3/1996	0.0	0.7	0.7	157	149	306	70		INDX	FOOT								
17 0245	10/3/1996	0.7	1.3	0.6	35	46	81	80		SUPP	FOOT								
17 0245	10/10/1996	0.0	0.7	0.7	56	257	313	70		INDX	FOOT								
17 0245	10/10/1996	0.7	1.3	0.6	2	79	81	80		SUPP	FOOT								
17 0245	10/17/1996	0.0	0.7	0.7	11	364	375	70		INDX	FOOT								
17 0245	9/18/1997	0.0	0.7	0.7	146	13	159			INDX	FOOT								
17 0245	9/18/1997	0.7	1.0	0.3	0	0	0			INDX	FOOT								
17 0245	9/29/1997	0.0	0.7	0.7	108	138	246			INDX	FOOT								
17 0245	9/29/1997	0.7	1.0	0.3	0	1	1			INDX	FOOT								
17 0245	10/14/1997	0.0	0.7	0.7	107	58	165			INDX	FOOT								
17 0245	10/14/1997	0.7	1.0	0.3	4	1	5			INDX	FOOT								

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0245	10/21/1997	0.0	0.7	0.7	58	135	193			INDX	FOOT								
17 0245	10/28/1997	0.0	0.7	0.7	56	110	166			INDX	FOOT								
17 0245	8/11/1998	0.0	0.3	0.3	0	0	0	95		SUPP	FOOT					20			
17 0245	8/21/1998	0.0	0.3	0.3	0	0	0	95		SUPP	FOOT					20			
17 0245	9/10/1998	0.0	0.3	0.3	0	0	0			SUPP	FOOT								
17 0245	9/10/1998	0.3	0.8	0.5	11	0	11			SUPP	FOOT								
17 0245	9/13/1998	0.0	0.3	0.3	4	10	14			SUPP	FOOT								
17 0245	9/13/1998	0.3	0.8	0.5	30	1	31			SUPP	FOOT								
17 0245	9/17/1998	0.0	0.3	0.3	12	16	28			SUPP	FOOT								
17 0245	9/17/1998	0.3	0.8	0.5	53	10	63			SUPP	FOOT								
17 0245	9/24/1998	0.0	0.3	0.3	19	16	35		12	INDX	FOOT								
17 0245	9/24/1998	0.3	0.8	0.5	188	43	231			INDX	FOOT								
17 0245	9/24/1998	0.8	1.1	0.3	0	0	0		0	SUPP	FOOT								
17 0245	9/28/1998	0.3	0.8	0.5	235	93	328			INDX	FOOT								
17 0245	10/1/1998	0.0	0.3	0.3	15	16	31			INDX	FOOT								
17 0245	10/1/1998	0.3	0.8	0.5	213	169	382			INDX	FOOT								
17 0245	10/1/1998	0.8	1.1	0.3	0	0	0			SUPP	FOOT								
17 0245	10/5/1998	0.0	0.3	0.3	6	18	24			INDX	FOOT								
17 0245	10/5/1998	0.3	0.8	0.5	121	250	371			INDX	FOOT								
17 0245	10/5/1998	0.8	1.1	0.3	8	0	8			SUPP	FOOT								
17 0245	10/8/1998	0.0	0.3	0.3	8	29	37			INDX	FOOT								
17 0245	10/8/1998	0.3	0.8	0.5	117	277	394			INDX	FOOT								
17 0245	10/8/1998	0.8	1.1	0.3	5	0	5			SUPP	FOOT								
17 0245	10/12/1998	0.0	0.3	0.3	8	29	37		4	INDX	FOOT								
17 0245	10/12/1998	0.3	0.8	0.5	74	400	474			INDX	FOOT								
17 0245	10/12/1998	0.8	1.1	0.3	2	0	2			SUPP	FOOT								
17 0245	10/15/1998	0.0	0.3	0.3	4	21	25			INDX	FOOT								
17 0245	10/15/1998	0.3	0.8	0.5	78	353	431			INDX	FOOT								
17 0245	10/15/1998	0.8	1.1	0.3	0	0	0			SUPP	FOOT								
17 0272	10/7/1974	0.0	0.0	0.0	0	0	0			SPOT	FOOT					57		60	
17 0285	10/25/1972	0.0	0.2	0.2	0	136	136			SUPP	FOOT					20			
17 0285	9/30/1973	0.0	0.3	0.3	34	92	126	95		SUPP	FOOT	0	0	0	0				
17 0285	9/23/1974	0.0	0.2	0.2	0	0	0	90		SUPP	FOOT					60			
17 0285	10/7/1974	0.0	0.2	0.2	0	2	2	90	7	SUPP	FOOT								
17 0285	10/3/1975	0.4	0.7	0.3	1	64	65	60	17	SUPP	FOOT					38			
17 0285	10/30/1981	0.0	1.5	1.5	1	101	102	90		SUPP	FOOT	4	0	0	0	20	31	60	
17 0285	9/29/1982	0.0	0.8	0.8	45	554	599	75		SUPP	FOOT					20	45	60	
17 0285	10/29/1982	0.0	1.5	1.5	0	140	140	90		SUPP	FOOT	4	0	0	0	20	31		
17 0285	9/26/1983	0.0	0.7	0.7	165	23	188	95	23	INDX	FOOT	4	0	0	0	13	20		40
17 0285	9/27/1983	0.0	1.0	1.0	148	47	195	95		INDX	FOOT	3	0	0	0	60			
17 0285	10/3/1983	0.0	1.5	1.5	59	64	123	95	137	INDX	FOOT					20	33		40
17 0285	10/11/1983	0.0	0.7	0.7	35	193	228	90	450	INDX	FOOT					20			40
17 0285	10/18/1983	0.0	0.7	0.7	21	207	228	90	335	INDX	FOOT					20			40
17 0285	10/25/1983	0.0	1.5	1.5	20	199	219	95	240	INDX	FOOT					20			40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souca - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0285	9/10/1984	0.0	0.7	0.7	33	1	34	95	4	INDX	FOOT					20	33		40
17 0285	9/17/1984	0.0	0.7	0.7	112	16	128	95		INDX	FOOT					20			40
17 0285	9/18/1984	0.0	1.2	1.2	114	26	140	90		INDX	FOOT					61			
17 0285	9/18/1984	0.0	1.3	1.3	84	18	102	99		INDX	FOOT					20			
17 0285	9/24/1984	0.0	0.7	0.7	80	98	178	95		INDX	FOOT					20	60		40
17 0285	9/25/1984	0.0	1.0	1.0	65	123	188	90		INDX	FOOT					60			
17 0285	9/25/1984	0.0	1.0	1.0	47	105	152	90		INDX	FOOT	4	0	0	0	20			
17 0285	10/2/1984	0.0	0.7	0.7	77	236	313	95		INDX	FOOT					20	60		40
17 0285	10/8/1984	0.0	1.0	1.0	40	176	216	90		INDX	FOOT					20			
17 0285	10/10/1984	0.0	0.7	0.7	59	264	323	75		INDX	FOOT					20	60		40
17 0285	10/18/1984	0.0	0.7	0.7	40	351	391	95		INDX	FOOT					20	60		40
17 0285	10/24/1984	0.0	0.7	0.7	43	298	341	90		INDX	FOOT					20	60		40
17 0285	10/31/1984	0.0	0.7	0.7	32	365	397	90		INDX	FOOT					20			40
17 0285	9/25/1985	0.0	0.7	0.7	24	16	40	99		INDX	FOOT					20			
17 0285	10/4/1985	0.0	0.7	0.7	14	37	51	99		INDX	FOOT				1	20			
17 0285	10/10/1985	0.0	0.5	0.5	9	52	61	90		SUPP	FOOT					20			
17 0285	9/17/1986	0.0	0.8	0.8	74	5	79	95		INDX	FOOT								
17 0285	9/23/1986	0.0	0.8	0.8	143	19	162	95		INDX	FOOT								
17 0285	9/30/1986	0.0	0.7	0.7	69	118	187	90		INDX	FOOT					20			
17 0285	10/8/1986	0.0	1.1	1.1	75	121	196	99		INDX	FOOT					20	60		
17 0285	10/20/1986	0.0	1.0	1.0	13	162	175	90		INDX	FOOT					20			
17 0285	10/27/1986	0.0	0.8	0.8	9	57	66	90		INDX	FOOT	4	0	0	0	20			
17 0285	8/24/1987	0.1			0	0	0	99		SPOT	FOOT					60			
17 0285	9/4/1987	0.0	0.3	0.3	0	0	0	99		INDX	FOOT					20			
17 0285	9/15/1987	0.0	0.7	0.7	142	4	146	95		INDX	FOOT					20	60		
17 0285	9/25/1987	0.0	0.8	0.8	188	99	287	95		INDX	FOOT					20	60		
17 0285	9/25/1987	0.8	1.5	0.7	0	0	0	95		SUPP	FOOT					20			
17 0285	10/7/1987	0.0	1.0	1.0	27	363	390	95		INDX	FOOT	4	0	0	0	20	60		
17 0285	10/16/1987	0.0	0.8	0.8	20	145	165	95		INDX	FOOT					20	60		
17 0285	10/26/1987	0.0	0.8	0.8	4	28	32	95		INDX	FOOT					20	60		
17 0285	9/15/1988	0.0	1.5	1.5	206	50	256	95		INDX	FOOT	1	0	0	0				
17 0285	9/26/1988	0.0	1.5	1.5	488	319	807	90		INDX	FOOT					60			
17 0285	10/5/1988	0.0	1.5	1.5	273	846	1,119	90		INDX	FOOT					61			
17 0285	10/17/1988	0.0	1.5	1.5	22	880	902	95		INDX	FOOT					20	61		
17 0285	10/27/1988	0.0	1.5	1.5	0	637	637	95		INDX	FOOT					20	61		
17 0285	9/13/1989	0.0	0.5	0.5	21	9	30	90		INDX	FOOT					20			
17 0285	9/22/1989	0.0	1.5	1.5	111	35	146	60		INDX	FOOT					20	60		
17 0285	10/4/1989	0.0	1.5	1.5	12	137	149	90		INDX	FOOT					20	60		
17 0285	10/13/1989	0.0	1.5	1.5	0	121	121	90		INDX	FOOT					20	60		
17 0285	9/5/1990	0.0	1.5	1.5	2	1	3	95		INDX	FOOT					20	60		
17 0285	9/19/1990	0.0	1.5	1.5	26	8	34	90		INDX	FOOT					20	60	61	
17 0285	10/1/1990	0.0	1.5	1.5	10	29	39	95		INDX	FOOT					20	60	61	
17 0285	10/10/1990	0.0	1.5	1.5	10	14	24	95		INDX	FOOT					20	60	61	
17 0285	10/18/1990	0.0	1.5	1.5	4	12	16	95		INDX	FOOT					20	61		

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data source - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0285	9/16/1991	0.0	0.8	0.8	4	4	8	99		INDX	FOOT					20	00	60	
17 0285	9/27/1991	0.0	0.8	0.8	60	7	67	95		INDX	FOOT					20			
17 0285	10/9/1991	0.0	0.7	0.7	33	53	86	95		INDX	FOOT	0	0	0	0	20			
17 0285	10/16/1991	0.0	0.7	0.7	16	20	36	95		INDX	FOOT					20			
17 0285	9/3/1992	0.0	1.5	1.5	47	0	47	90		INDX	FOOT					60	61		
17 0285	9/15/1992	0.0	1.5	1.5	216	83	299	80		INDX	FOOT					20	61		
17 0285	9/15/1992	0.0			150	73	223	95	18	INDX	FOOT					00	10	60	37
17 0285	9/24/1992	0.0	1.5	1.5	219	230	449	90		INDX	FOOT					20	60	61	
17 0285	10/6/1992	0.0	1.5	1.5	39	277	316	90		INDX	FOOT					20	60	61	
17 0285	10/12/1992	0.0	1.5	1.5	38	269	307	95		INDX	FOOT					20	60	61	
17 0285	10/21/1992	0.0	1.5	1.5	6	85	91	95		INDX	FOOT	0	0	0	4	20	61		
17 0285	8/31/1993	0.0	1.5	1.5	0	0	0	95		INDX	FOOT					20			
17 0285	9/16/1993	0.0	1.0	1.0	20	1	21	99		SUPP	FOOT					10	20	60	37
17 0285	9/20/1993	0.0	1.0	1.0	53	8	61	80		INDX	FOOT					20			
17 0285	9/27/1993	0.0	1.0	1.0	50	32	82	80		INDX	FOOT					20			
17 0285	10/4/1993	0.0	1.0	1.0	26	76	102	85		INDX	FOOT	3	0	0	0	20			
17 0285	10/11/1993	0.0	1.0	1.0	10	44	54	85		INDX	FOOT	3	0	0	0	20			
17 0285	10/18/1993	0.0	0.3	0.3	4	17	21	90		INDX	FOOT					20			
17 0285	10/27/1993	0.0	0.8	0.8	1	20	21	80		INDX	FOOT	4	0	0	0	20			
17 0285	9/8/1994	0.0	0.3	0.3	0	0	0	90		INDX	FOOT					20			
17 0285	9/15/1994	0.0	0.4	0.4	7	0	7	85	4	INDX	FOOT					20			
17 0285	9/22/1994	0.0	0.8	0.8	9	2	11	90		INDX	FOOT					20			
17 0285	9/23/1994	0.0	1.0	1.0	4	2	6	99	2	SUPP	FOOT					10	20	60	37
17 0285	9/30/1994	0.0	0.3	0.3	4	4	8	90		INDX	FOOT					20			
17 0285	10/7/1994	0.0	0.3	0.3	0	2	2	90		INDX	FOOT					20			
17 0285	10/7/1994	0.0	0.5	0.5	0	4	4	99	3	SUPP	FOOT					14	16	20	37
17 0285	8/22/1995	0.0	0.2	0.2	1	0	1	99	0	SUPP	FOOT					13	20	48	37
17 0285	8/31/1995	0.0	0.2	0.2	2	0	2	99	0	SUPP	FOOT					13	20	48	37
17 0285	9/8/1995	0.0	0.2	0.2	79	0	79	95	0	SUPP	FOOT					10	20	47	37
17 0285	9/11/1995	0.0	0.5	0.5	71	4	75	80		INDX	FOOT					20	33		
17 0285	9/15/1995	0.0	0.2	0.2	48	39	87	95	25	SUPP	FOOT					15	20	48	
17 0285	9/20/1995	0.0	1.0	1.0	86	51	137	85		INDX	FOOT					20			
17 0285	9/22/1995	0.0	0.2	0.2	42	74	116	95	43	SUPP	FOOT					15	20	48	
17 0285	9/27/1995	0.0	1.0	1.0	61	91	152	80		INDX	FOOT					20			
17 0285	9/28/1995	0.0	0.2	0.2	45	87	132	95	55	SUPP	FOOT					15	20	48	37
17 0285	10/4/1995	0.0	1.0	1.0	6	89	95	90		INDX	FOOT					20			
17 0285	8/29/1996	0.0	0.2	0.2	0	0	0	95	0	INDX	FOOT					20			
17 0285	9/10/1996	0.0	0.2	0.2	0	0	0	90	0	INDX	FOOT					20			
17 0285	9/13/1996	0.0	1.5	1.5	0	1	1	95	0	SUPP	FOOT					15	20		37
17 0285	9/18/1996	0.0	0.5	0.5	13	3	16	85		INDX	FOOT					20			
17 0285	9/19/1996	0.0	1.5	1.5	7	1	8	95	0	SUPP	FOOT					15	20		37
17 0285	9/26/1996	0.0	1.5	1.5	4	1	5	95	8	SUPP	FOOT					15	20		37
17 0285	9/28/1996	0.0	0.8	0.8	12	4	16	85		INDX	FOOT					20			
17 0285	10/4/1996	0.0	0.6	0.6	11	6	17	85		INDX	FOOT					20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data source - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
17 0285	10/7/1996	0.0	1.5	1.5	7	8	15	95	13	SUPP	FOOT					15	20		37
17 0285	10/11/1996	0.0	0.5	0.5	3	7	10	85		INDX	FOOT					20			
17 0285	9/10/1997	0.0	1.5	1.5	7	2	9	90	3	SUPP	FOOT					11	20	40	37
17 0285	9/24/1997	0.0	1.5	1.5	11	2	13	90	14	SUPP	FOOT					13	20		37
17 0285	10/2/1997	0.0	1.5	1.5	23	4	27	80	11	SUPP	FOOT					10	24		37
17 0285	10/8/1997	0.0	1.5	1.5	11	4	15	90	14	SUPP	FOOT					12	23		37
17 0285	10/16/1997	0.0	1.5	1.5	14	3	17	90	11	SUPP	FOOT					12	23		37
17 0285	8/25/1998	0.0	0.1	0.1	0	0	0	90	0							20			
17 0285	9/1/1998	0.0	0.1	0.1	0	0	0	90	0	INDX	FOOT					20			
17 0285	9/11/1998	0.0	0.3	0.3	12	0	12	80		INDX	FOOT					20			
17 0285	9/16/1998	0.0	0.4	0.4	47	1	48	80		INDX	FOOT					20	60		
17 0285	9/24/1998	0.0	0.5	0.5	52	14	66	85		INDX	FOOT					20	60		
17 0285	9/30/1998	0.0	0.5	0.5	25	18	43	85		INDX	FOOT					20			
17 0285	10/7/1998	0.0	0.5	0.5	9	20	29	80		INDX	FOOT					20			
17 0285	10/14/1998	0.0	0.2	0.2	1	4	5	80		INDX	FOOT					20			
17 0293	10/7/1974	0.0	0.0	0.0	0	0	0			SPOT	FOOT					60	57		
17 0301	10/25/1972	0.0	0.2	0.2	0	6	6			SUPP	FOOT					20			
17 0301	10/7/1974	0.0	0.0	0.0	0	0	0			SPOT	FOOT						57	60	
17 0301	9/26/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT					20	57	60	40
17 0301	10/3/1983	0.0	0.1	0.1	0	0	0	99	0	SUPP	FOOT					21	57		40
17 0301	10/4/1983	0.0	0.3	0.3	0	0	0	90	0	SUPP	FOOT					20			
18 0001	10/18/1974	0.0	0.0	0.0	0	0	0			SPOT	FOOT					57		60	
18 0018	9/24/1971	0.0	1.2	1.2	21	0	21	50		SUPP	FOOT	1	3	0	0	22			
18 0018	10/1/1971	0.0	1.2	1.2	18	6	24	60		SUPP	FOOT	1	3	0	0	03	21		
18 0018	10/1/1971	1.2	2.2	1.0	6	0	6	80		SUPP	FOOT	1	0	0	0	20			
18 0018	10/9/1971	0.0	1.2	1.2	6	4	10	60		SUPP	FOOT	1	4	3	0				
18 0018	9/19/1972	0.0	1.2	1.2	24	0	24	70		SUPP	FOOT					20			
18 0018	9/27/1972	0.0	1.2	1.2	43	2	45	70		SUPP	FOOT					03	20		
18 0018	10/13/1972	0.0	1.2	1.2	51	32	83	75		SUPP	FOOT					20			
18 0018	9/26/1973	0.0	2.0	2.0	20	2	22	50		SUPP	FOOT	1	3	0	0				
18 0018	10/3/1973	0.0	2.0	2.0	3	3	6	70		SUPP	FOOT	1	3	6	0				
18 0018	9/17/1974	0.0	1.2	1.2	15	0	15	75	10	SUPP	FOOT	1	0	0	0	60	30		
18 0018	10/3/1974	0.0	1.2	1.2	5	0	5	80	20	SUPP	FOOT	0	0	0	0			60	
18 0018	10/21/1974	0.0	1.2	1.2	4	4	8	50	20	SUPP	FOOT							60	
18 0018	9/24/1975	0.0	0.9	0.9	21	23	44	80		SUPP	FOOT	1	3	4	0	20	60		
18 0018	9/25/1975	0.0	4.3	4.3	20	4	24	60		SUPP	FOOT								
18 0018	9/22/1976	0.0	3.2	3.2	189	10	199	60		SUPP	FOOT	1	4	0	0	20	31		
18 0018	9/22/1976	3.2	6.5	3.3	0	0	0	60		SUPP	FOOT	1	0	0	0	20	31		
18 0018	9/26/1977	0.0	6.5	6.5	14	0	14	85		SUPP	FOOT	1	3	0	0	23			
18 0018	10/7/1977	0.1	6.5	6.4	28	3	31	90		SUPP	FOOT	3	0	0	0	24	60		
18 0018	9/17/1979	0.0	3.1	3.1	39	10	49	80		SUPP	FOOT	1	3	4	0				
18 0018	10/12/1979	0.0	6.4	6.4	60	61	121	80		SUPP	FOOT	1	3	4	0	60			
18 0018	9/30/1983	0.0	0.9	0.9	0	2	2	70	0	INDX	FOOT	1	3	4	0	20			40
18 0018	10/5/1983	0.9	3.3	2.4	0	1	1	70		INDX	FOOT	1	3	4	0	21	31		40

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
18 0018	10/3/1984	0.0	0.9	0.9	5	2	7	75		INDX	FOOT	4	0	0	0				40
18 0018	10/3/1984	0.9	3.3	2.4	0	2	2	60		INDX	FOOT	4	0	0	0	60			40
18 0018	9/23/1985	0.8	6.4	5.6	4	1	5	85		SUPP	FOOT	1	3	0	0				
18 0018	9/23/1985	6.4	10.4	4.1	2	0	2	85		SUPP	FOOT	3	1	0	0				
18 0018	10/15/1985	0.1	4.0	3.9	0	3	3	60		SUPP	FOOT	1	3	4		20			
18 0018	9/30/1987	0.0	0.9	0.9	0	1	1	95		SUPP	FOOT	1	3	4	0	20			
18 0018	10/19/1987	0.9	1.9	1.0	0	1	1	90		SUPP	FOOT					20			
18 0018	9/9/1988	0.0	0.9	0.9	13	0	13	80		SUPP	FOOT	1	4	0	0	20			
18 0018	9/15/1988	0.6	1.1	0.5	4	0	4	90		SUPP	FOOT								
18 0018	9/19/1988	0.9	3.3	2.4	3	0	3	70		SUPP	FOOT	1	4	0	0	20			
18 0018	10/10/1988	0.9	3.3	2.4	12	3	15	80		SUPP	FOOT	1	4	0	0	20	33		
18 0018	10/10/1988	4.0	6.4	2.4	1	0	1	80		SUPP	FOOT	1	4	0	0	20	33		
18 0018	10/6/1989	0.0	3.3	3.3	0	1	1	70		SUPP	FOOT	1	3	4	0	20	31		
18 0018	10/13/1989	0.0	6.4	6.4	0	2	2	75		SUPP	FOOT	1	3	4		21	60	61	
18 0018	10/8/1990	0.0	3.3	3.3	1	0	1	70		INDX	FOOT	1	4	0	0	20			
18 0018	10/18/1990	0.0	3.3	3.3	2	0	2	80		INDX	FOOT	1	4	0	0	23	33	60	
18 0018	9/24/1991	0.0	3.2	3.2	2	0	2	75		SUPP	FOOT	1	3	4	0	20	33		
18 0018	10/1/1992	0.0	3.3	3.3	3	0	3	80	7	SUPP	FOOT	1	0	0	0	20			
18 0018	10/9/1992	0.0	3.3	3.3	4	1	5	85	16	SUPP	FOOT	1	4	0	0	20			
18 0018	10/15/1992	0.0	3.3	3.3	7	5	12	85	21	SUPP	FOOT	1	4	0	0	20			
18 0018	10/21/1992	0.3	3.3	3.0	30	4	34	60		SUPP	FOOT	0	0	0	1	25	60		
18 0018	10/22/1992	0.0	3.3	3.3	7	3	10	70	17	SUPP	FOOT	1	4	0	0	23			
18 0018	9/29/1993	0.0	1.7	1.7	0	0	0	75		SUPP	FOOT	1	3	0	0	20			
18 0018	10/7/1993	0.0	3.2	3.2	0	0	0	80		SUPP	FOOT	1	3	0	0	20	60		
18 0018	10/14/1993	0.0	3.2	3.2	3	0	3	80		SUPP	FOOT	3	0	0	0	20			
18 0018	10/14/1993	0.0	3.3	3.3	3	0	3	80		SUPP	FOOT	3	1	0	0	20			
18 0018	9/16/1994	0.0	3.3	3.3	2	0	2	70		INDX	FOOT	1	4	0	0	20			
18 0018	9/29/1994	0.0	3.3	3.3	1	0	1	80		SUPP	FOOT	1	4	0	0	20	31		
18 0018	10/6/1994	0.0	3.3	3.3	1	0	1	70		SUPP	FOOT	1	4	0	0	20	31		
18 0018	10/25/1994	0.0	4.0	4.0	60	0	60	85		SUPP	FOOT	4	0	0	0	20	60		
18 0018	8/22/1995	0.0	3.3	3.3	2	0	2	70		INDX	FOOT	3				23			
18 0018	8/28/1995	0.0	3.3	3.3	6	0	6	70		INDX	FOOT	3				23			
18 0018	9/11/1995	0.0	3.3	3.3	2	0	2	70		INDX	FOOT	1	3			20			
18 0018	9/13/1995	0.0	3.3	3.3	2	0	2	75		INDX	FOOT	1	4	3		20			
18 0018	9/13/1995	9.2	10.8	1.6	1	0	1	70		INDX	FOOT	1	3			20			
18 0018	9/22/1995	0.0	3.3	3.3	1	0	1	85		SUPP	FOOT	1	3	4	0	20	31		
18 0018	9/26/1995	0.0	0.5	0.5	9	2	11	90		SUPP	FOOT	4	3			20	61	60	
18 0018	10/4/1995	0.0	3.3	3.3	16	11	27	85		SUPP	FOOT	1	3	4	0	21	31	33	
18 0018	10/13/1995	0.0	1.9	1.9	0	1	1	60		INDX	FOOT	3	0	0	0	24	31		
18 0018	10/16/1995	4.5	4.6	0.1	2	0	2	75	1	SPOT	FOOT	1	0	0	0	23	60		
18 0018	9/20/1996	0.0	3.3	3.3	1	0	1	60	5	INDX	FOOT	1	4	5		20	60		
18 0018	9/24/1996	3.3	6.4	3.1	1	0	1	85	2	SUPP	FOOT	1	0	0	0	20	60		
18 0018	9/27/1996	0.0	3.3	3.3	1	0	1	70		INDX	FOOT	1	0	0	0	20			
18 0018	10/1/1996	0.0	3.3	3.3	1	2	3	70		INDX	FOOT	1	4	0	0	20			

Appendix 16 - Table 4 - Historical spawning survey data for Hood Canal ESU, and WRIA 18 west of Dung (> WRIA 15.0369, < WRIA 19), August 1 - October 31 time period, 1943 - 1998 return years.

Data souce - WDFW spawning ground database (WDFW, Olympia WA), October 1999.

WRIA	Date	Lower River mile	Upper River mile	Length	Live	Dead	Live + dead	Vis	Redds	Type survey	Method	Other species				Comments			Agency
18 0018	10/14/1996	0.0	3.3	3.3	6	1	7	60		INDX	FOOT	1	4	0	0	23	34		
18 0018	9/11/1998	0.0	3.3	3.3	0	1	1	80		SUPP	FOOT					20	60		
18 0018	9/18/1998	0.0	3.3	3.3	6	0	6	65		SUPP	FOOT	1	4	0	0	20	60		
18 0018	9/30/1998	0.0	3.3	3.3	1	0	1	60		SUPP	FOOT	1	4	0	0	20			
18 0018	10/15/1998	6.4	9.2	2.8	2	0	2	80	3	SUPP	FOOT	4	0	0	0	20	60		
18 0018	10/26/1998	0.0	3.3	3.3	12	1	13	80		SUPP	FOOT	4	0	0	0	20			
18 0160	10/25/1972	0.0	1.7	1.7	0	0	0			SUPP	FOOT					20			
18 0160	10/10/1974	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					60	57		
18 0173	10/25/1972	0.0	1.3	1.3	0	0	0			SUPP	FOOT					20			
18 0173	10/10/1974	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					60	57		
18 0183	10/21/1974	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					57		60	
18 0185	9/25/1975	0.0	3.1	3.1	1	0	1			SUPP	FOOT	1	3	0	0	60			ST
18 0185	9/25/1975	1.1	3.1	2.0	1	0	1	80	1	SUPP	FOOT	1	3	0	0	20	60		
18 01	10/7/1988	0.0	1.1	1.1	0	0	0	90		SUPP	FOOT	1	4	0	0	20			DW
18 0	10/7/1988	1.1	1.8	0.7	0	0	0	90		SUPP	FOOT	1	4	0	0	20	60		DW
18 0185	10/7/1988	1.8	2.6	0.8	2	0	2	90		SUPP	FOOT	1	4	0	0	20	60		DW
18 0185	10/7/1988	2.6	4.2	1.6	1	0	1	99	1	SUPP	FOOT	1	4	0	0	20			DW
18 0185	10/7/1988	4.2	4.7	0.5	0	0	0	99		SUPP	FOOT	1	4	0	0	20			DW
18 0185	10/22/1988	0.0	1.1	1.1	1	0	1	90	1	SUPP	FOOT	4	0	0	0	20			DW
18 0185	10/22/1988	1.1	1.8	0.7	0	0	0	99		SUPP	FOOT	4	0	0	0	20			DW
18 0185	10/22/1988	1.8	2.6	0.8	0	0	0	90		SUPP	FOOT	1	4	0	0	20			DW
18 0185	10/22/1988	2.6	4.2	1.6	0	0	0	90		SUPP	FOOT	1	4	0	0	20			DW
18 0185	10/22/1988	4.2	4.7	0.5	0	0	0	90		SUPP	FOOT	4	0	0	0	20			DW
18 0185	10/6/1990	0.0	1.1	1.1	1	0	1	80		SUPP	FOOT	4	0	0	0	20			DW
18 0185	10/6/1990	1.1	4.7	3.6	0	0	0	80		SUPP	FOOT	4	0	0	0	20			DW
18 0185	9/20/1996	0.0	0.8	0.8	1	0	1	90		SUPP	FOOT	3	4	0	0	20			
18 0185	10/28/1998	0.0	3.9	3.9	2	0	2	99		SUPP	FOOT	4	0	0	0	60			08
18 0245	10/21/1974	0.0	0.0	0.0	0	0	0	90		SPOT	FOOT					60	57		
18 0272	10/26/1994	0.0	3.2	3.2	0	0	0		0	SUPP	RAFT					23	60		08
18 0272	10/31/1994	0.0	3.2	3.2	1	0	1		0	SUPP	RAFT					29	60		08
18 0272	10/23/1995	0.0	3.5	3.5	0	0	0	50		INDX	BOAT	1	0	0	0	25	38		FW
18 0272	10/30/1995	0.0	3.5	3.5	0	0	0	50		INDX	BOAT	1	0	0	0	22	38		FW
18 0272	9/27/1996	2.8	3.2	0.4	0	1	1			SUPP	BOAT	1				20			
18 0272	10/21/1998	0.2	2.8	2.6	1	2	3	70		SUPP	RAFT	1	4	0	0	23			
18 0272 A	10/29/1959	0.0	0.5	0.5	22	2	24			INDX	FOOT	3	0	0	0	20			
18 0273	10/15/1997	0.1	0.7	0.6	1	0	1	99	1	SUPP	FOOT	4	0	0	0				08
18 0285	10/25/1972	0.0	0.2	0.2	0	136	136			SUPP	FOOT					20			
18 0285	9/30/1973	0.0	0.3	0.3	34	92	126	95		SUPP	FOOT	0	0	0	0				