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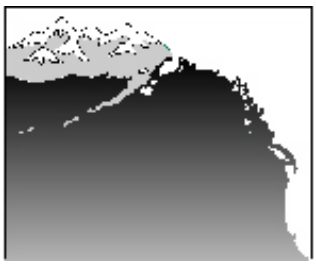

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Reconstruction of Bristol Bay Sockeye Salmon Returns Using Age and Genetic Composition of Catch

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Introduction

The harvest of sockeye salmon (*Oncorhynchus nerka*) in Bristol Bay, Alaska is actively managed throughout the fishing season, by temporal regulation of effort, to achieve river system specific escapement goals (Hilborn 2012, Minard and Meacham 1987). For biologically optimal escapement goals to be estimated, the relationship between spawning abundance and the number of returning recruits across time must be known with accuracy. Difficulty in ascertaining the true number of recruits arises when fish bound for multiple river systems are harvested in a single commercial fishing district, or intercepted in alternative fishing districts while migrating toward their stream or origin. Run reconstruction is a tool for partition catches amongst stocks so complete brood tables may be generated, and the underlying spawner-recruit relationship identified. While traditional run reconstruction approaches have employed coded wire tag (Johnson 1990) or age-composition data (Branch and Hilborn 2010, Chasco et al. 2007), the advent of cost-effective genetic tools for mixed-stock analysis of historical commercial catches (Smith et al. 2011) provide an addition source of data to inform the reconstruction process, and specifically to estimate inequalities in the "availability" of stocks to harvest in specific fishing areas.

The purpose of this report was to reconstruct historical sockeye salmon (*Oncorhynchus nerka*) runs to Bristol Bay, Alaska for use by the Alaska Department of Fish and Game (ADF&G) in evaluating biological escapement goals for component populations. Annual inshore run sizes (1963-2011) were reconstructed for each of the 18 observed age classes by partitioning annual catches from the mixed-stock terminal fishing districts and accounting for observed interception of stocks in non-destination fishing districts. Age and genetic composition of catch data were used to partition catches and estimate escapement age composition for years in which those data were unavailable. Results of this reconstruction process indicate that in western Bristol Bay the traditional run reconstruction methods routinely overestimated the productivity $(recruits/spawner)$ of Igushik River (mean: 32%) and Nushagak River (mean: 15%) stocks while underestimating the productivity of the Wood River stock. In eastern Bristol Bay, differences in annual productivity estimated by the run reconstruction procedure incorporating both age and genetic-composition of catch data and that estimated by traditional methods were more varied across the time series, with productivity of the Egegik River stock routinely overestimated (mean: 9%) and productivity of the Alagnak River stock routinely underestimated (mean: 15%) by the traditional method.

Data

Data used to reconstruct annual runs to the eight major Bristol Bay watersheds were of three types: 1) abundance (i.e. catch and escapement), 2) age composition and 3) genetic composition of catches from the five major Bristol Bay commercial fishing districts.

Catch and Escapement

Daily catch and escapement data from ADF&G records (provided by Tim Baker, Fred West and Lowell Fair) were used as the basis for the reconstruction process. While models were fit to annual abundance estimates, daily catch and escapement numbers were necessary for generating weighted annual averages of age composition. Annual escapement estimates by river system were collected by tower counts, sonar enumeration, and aerial surveys. Given the change in enumeration procedure for the Nushagak River in 1980 from Nuyakuk tower counts to the lower Nushagak sonar station at Portage Creek and assumed unreliability of early sonar counts (1980-1983, 1985-1986), daily Nushagak system escapement estimates were generated by Lowell Fair (ADF&G Anchorage) by combining upriver escapement estimates with system-wide aerial surveys and migration timing estimates from observations of tagged individuals. In order to account for the changeover in escapement enumeration sonar technology from Bendix to Didson systems in 2006, Greg Buck (ADF&G Anchorage) provided updated escapement estimates standardized to be equivalent with counts provided by the new Didson enumeration system (1963-2005).

Age composition

Age composition estimates for commercial fishing district catches and up-river escapements were provided by ADF&G records of scale sampling, which occurred during several discrete sampling periods spanning the duration of annual sockeye inshore migration (June–August). In order to generate representative annual estimates of age composition, proportions by age class from each sampling period were averaged, with individual sampling periods weighted by the total proportion of fish caught or escaping during that sampling period. The annual age composition estimates generated as weighted averages across sampling periods within each season, are assumed to be more representative than unweighted averages.

Age composition information for escaping fish was either unavailable or unreported for specific systems in several years throughout the time series (1963-2011). The reconstruction model was only fit to available age-composition data and likely proportions by age class for missing river and year combinations were estimated.

Genetic composition of catch

Genetic composition of catch estimates were obtained from in-season catch sampling by ADF&G for 2006-2008 (Dann et al. 2009) and 2009-2011 (Dann, ADF&G). Genetic composition of catch estimates for earlier years:

***Nushagak District**: 1965, 1977, 1980, 1982, 1983, 1985, 1993, 1995, 1999;*
***Naknek-Kvichak District**: 1964, 1965, 1975, 1977, 1980, 1982, 1983, 1985, 1993, 1995, 1997, 1999, 2002, 2005.*
***Egegik District:** 1964, 1965, 1977, 1980, 1982, 1983, 1985, 1993, 1995, 1997, 1999, 2002.*
***Ugashik District:** 1964, 1965, 1983, 1985, 1993, 1995, 1999, 2002.*

were obtained from mixed-stock analysis of historical scale samples, by Matt Smith and Jim Seeb at the International Program for Salmon Ecological Genetics (Smith *et al.* In prep). See Smith et al. (2011) for full discussion of procedure. Igushik, Wood and Nushagak stocks comprised the majority of fish caught within the Nushagak commercial

district (mean = 96.9%), so all observed genetic proportions of catch (p_s^{gen}) were normalized amongst these three stocks so as to sum to one (Eq. 1). Similarly, Kvichak, Naknek, Alagnak, Egegik and Ugashik bound fish comprised the majority of catches within commercial fishing districts on the east side of Bristol Bay, so they were treated as an isolated system and genetic proportions of catch were similarly normalized.

Eq. 1) $$p_s^{gen} = \frac{p_s^{gen}}{\sum_{s}^{stocks} p_s^{gen}}, stocks = \{Igushik, Wood, Nushagak\}$$

Methods

Parameters

The run reconstruction model uses a maximum likelihood based approach to fit model predictions to available data and estimate parameter values. The model structure centers on estimating the annual abundance of "groups" of fish, which represent specific stock and age class combinations. For the reconstruction of western Bristol Bay run sizes there are 54 model groups (3-stocks × 18-age classes) in total. These represent the 54 parameters of interest, necessary for generating brood tables for the Igushik River, Wood River and Nushagak River stocks. In addition to these run size parameters, gear selectivity or the likelihood of capture for age classes relative to one another were included as parameters. Five selectivity parameters were estimated, one representing each ocean age class (i.e. fish having spent 1,2,3,4 and 5 years at sea). To ensure that during the calculation phase each model group is tied to the appropriate selectivity parameter (i.e. 0.2's, 1.2's, 2.2's and 3.2's all linked to the selectivity parameter representing 2-ocean individuals) a system of pointers within the model describes the relationship between each group and each associated catch parameter. The choice to estimate separate selectivity parameters for the distinct ocean age classes only, was predicated on the knowledge that duration of marine rather than freshwater residency is the primary determinant of size in maturing adults (Quinn 2005), and size is a key determinant of whether or not a fish will become entangled in the gillnet (Kendall and Quinn 2009). The reconstruction of eastern Bristol Bay returns included the same five selectivity parameters, but a greater number of model groups for which annual run sizes were estimated (90 parameters total).

The final set of parameters to be estimated were the availability of each stock to harvest within each commercial fishing district. Availability parameters quantify the relative likelihood of interception in non-destination fishing districts and the inherent variation in catchability of multiple stocks within one district. As the western Bristol Bay reconstruction deals with a single commercial fishing district, these availability parameters describe variation in the catchability of the three stocks within the Nushagak District only. Differences in stock specific availability may arise from variation in migration pathway through the fishing district and the spatial heterogeneity of fishing effort (i.e. lower availability of Igushik-bound fish due to their migration through the shallows in western Nushagak Bay). Three availability parameters are estimated for the Nushagak District. For the reconstruction of eastern Bristol Bay which comprises three

discrete commercial fishing districts, availability parameters represent both the relative catchability of stocks within the fishing district associated with their natal river system (i.e. Kvichak River, Alagnak River and Naknek River stocks within the Naknek-Kvichak commercial fishing district) and the likelihood of interception for fish of a specific stock in an alternative commercial fishing district during the inshore migration toward their natal river system (i.e. the Kvichak River stock in the Egegik commercial fishing district), were estimated. Given the large number of parameters to be estimated for each year reconstructed, group run sizes were fixed at zero if that age class was not represented in either the catch or escapement scale samples for that year.

Estimation Structure

Eq. 2) $C_{a,s,d} = N_{a,s,d} * \left(1 - e^{-A_{s,d} * S_A * F_d}\right)$

The core component of the estimation process for annual group run sizes is the continuous (Baranov) catch equation (Eq. 2). Within the continuous catch equation, $A_{s,d}$ is the availability by stock and district, S_a is the selectivity by age class, and F is the instantaneous fishing mortality rate by district in a specific year (Branch and Hilborn 2010, Megrey 1989). This equation of course becomes significantly less complex when dealing with the Nushagak commercial fishing district in isolation and not allowing for interception.

Eq. 3) $$-\ln(L) = \sum_{d}^{districts} -\log\left(\frac{1}{\sigma_{catch} * \sqrt{2 * \pi}}\right) * e^{-\frac{\left(C_d - \hat{C}_d\right)^2}{2 * \sigma_{catch}^2}}$$

Eq. 4) $$-\ln(L) = \sum_{s}^{stocks} -\log\left(\frac{1}{\sigma_{escapement} * \sqrt{2 * \pi}}\right) * e^{-\frac{\left(E_s - \hat{E}_s\right)^2}{2 * \sigma_{escapement}^2}}$$

Eq. 5) $$-\ln(L) = \sum_{d}^{districts} \left[-N_d * \sum_{a}^{age} p_{d,a}^{C} * \ln\left(\hat{p}_{d,a}^{C}\right)\right]$$

Eq. 6) $$-\ln(L) = \sum_{s}^{stocks} \left[-N_s * \sum_{a}^{age} p_{s,a}^{E} * \ln\left(\hat{p}_{s,a}^{E}\right)\right]$$

Eq. 7) $$-\ln(L) = \sum_{d}^{districts} \left[-N_d * \sum_{s}^{stocks} p_{d,s}^{G} * \ln\left(\hat{p}_{d,s}^{G}\right)\right]$$

Eq. 8) $$penalty = 1000 * \left(\frac{\sum_{p=1}^{N} selectivity_p}{N} - 1\right)^2$$, N = number of selectivity parameters

Eq. 9) $$penalty = \sum_{d}^{districts} 1000 * \left(\frac{\sum_{s=1}^{N_{stocks}} availability_{d,s}}{N_{stocks}} - 1\right)^2$$

Model predictions for catch and escapement, as well as age composition of each, and genetic composition of catch generated for a particular year by the model were compared with observed data using a series of likelihoods generated from applicable error distributions. Log-normally distributed observation error was assumed for both catch (Eq. 3) and escapement (Eq. 4). A multinomial likelihood was employed to compare observed (p) and predicted ($\hat{p}$) age class proportions from the catch (Eq. 5) and escapement (Eq. 6). Similarly, predicted genetic proportions of catch in each district were confronted with available data using a multinomial likelihood (Eq. 7). For the two latter data types the likelihood was weighted by the number of fish sampled for that year in each fishing district (N_d) or at each escapement counting station (N_s). An additional penalty was added to ensure that the estimated selectivity parameters (Eq. 8) and availability parameters within each district (Eq. 9) averaged to one.

Procedure

The AD Model Builder software platform (Fournier et al. 2012) was used to conduct the minimization in each year that fit model predictions to available data and generated group run size estimates for the brood and return tables. Model fitting took place in two sequential phases. First, the model was fit to all years for which genetic data were available for all commercial fishing districts (western Bristol Bay: 1965, 1977, 1980, 1982, 1983, 1985, 1993, 1995, 1999, 2006-2011; eastern Bristol Bay: 1964, 1965, 1983, 1985, 1993, 1995, 1999, 2002, 2006-2011), estimating availability, selectivity, and group run size parameters in those years. Next, the average values of the estimated availability parameters were calculated across all years in which data were available, and availability values were fixed at these average values, while the model was fit to the remaining years without complete genetic data for all districts. For fishing district and year combinations without genetic data, only group run size and gear selectivity parameters were estimated.

The efficacy of the reconstruction model in fitting to all available data sources was evaluated for each year to ensure a high degree of coherence between model predictions and observed data. Model fits to annual catch and escapement numbers (fig. 1, fig. 2), age composition of commercial catches and upriver escapement (fig. 3, fig.4), and genetic composition of district catches (fig. 5, fig. 6), were compared to observed data to ensure the model fit well to those data in all years. For years in which model convergence or the ability to fit observed data was questionable, starting parameter values or the estimation phase for model parameters were altered to ensure accurate fits.

Set Net and Special Harvest Area Catches

Bristol Bay commercial salmon catches were further partitioned beyond the district level to account for known differences in the stock composition of specific setnet and in-river special harvest area catches, which arise from their geographic proximity to river mouths. For the purpose of this report "subdistricts" represent spatially explicit and gear type specific zones of harvest within the larger commercial fishing districts. Given the difference in relative stock composition of catches from these subdistricts, these catches were removed from the reported total district catches, which were partitioned

each year, and allocated post-hoc depending on their stock composition. In western Bristol Bay, catches from Igushik River set net sites and those from the Wood River Special Harvest are known to be almost entirely comprised of fish bound for those rivers respectively. Therefore, catches from these two subdistricts were withheld from the western Bristol Bay reconstruction and allocated post-hoc in each year proportional to the age composition of those catches. If no age-composition data were available for a specific year, the set net or special harvest area catch was allocated in proportion to the observed escapement age composition for the applicable river system.

Kvichak set net, Alagnak River Special Harvest Area, and Naknek River Special Harvest area catches were all withheld from the general reconstruction process for eastern Bristol Bay, and allocated post-hoc. Genetic composition of catch data available for Kvichak set net catches (2006, 2008, 2009) and the Naknek River Special Harvest Area catches (2006-2007) were used to partition annual catches from these two subdistricts amongst eastern Bristol Bay stocks. For years in which genetic composition of catch data were unavailable, subdistrict catches were partitioned based on the average of available genetic data. Partitioned subdistrict catches were allocated amongst age classes proportional to available age-composition data for those catches, or proportional to the age composition of escapements to the applicable river system if subdistrict age-composition estimates were unavailable.

South Peninsula and High Seas Catches

In order to completely reconstruct total annual run sizes to the eight main Bristol Bay river systems, it was necessary to allocate sockeye caught in the South Peninsula commercial fishery (1963-2011) and high seas salmon fishery (1963-1987). In each year, these catches were summed and allocated in proportion to the reconstructed inshore run sizes of the eight reconstructed Bristol Bay stocks and Togiak River catch plus escapement. The offshore (South Peninsula and high-seas) catch allocated to a specific river system was then apportioned amongst age classes based on the reconstructed age composition of all returns to that river system in each year. Offshore catches apportioned by river system and age class were then added to stock-specific brood and return tables.

Results

Results of the run reconstruction process are presented as model fits to observed data and reconstructed run size tables. The relationship between model predicted and observed catch and escapement data for western (fig. 1) and eastern (fig. 2) Bristol Bay, indicate that the run reconstruction model was able to capture the high inter-annual variability in catch and escapement numbers with accuracy. The ability of the run reconstruction model to fit the observed age composition of commercial fishing district catches and upriver escapements for western (fig. 3) and eastern (fig. 4) Bristol Bay, and are presented as observed proportions on the x-axis and model predicted proportions on the y-axis, with each circle representing a specific year for which the model was fit. While perfect fits to these data by the run reconstruction model, would be represented by all points falling along the dashed line, some deviations are observed to occur. The majority of deviations between model-predicted and observed age composition occur in

age classes the represent a proportionally small component of total returns. This arises from the fact that the reconstruction model is better able to fit the more prominent age classes for which more data exist. Model fits to age composition data (fig. 3; fig. 4) additionally highlight the fact that better fits are on average achieved to escapement rather than catch data. Greater deviation between predicted and observed age composition data for catches is best explained by the fact that these data must necessarily represent the amalgamated age composition of all stocks represented in the reconstruction (i.e. 5 for eastern and 3 for western Bristol Bay), while escapement age composition only need represent the portion of that pool of fish migrating upstream after fishery removals. Similarly, this explains the superior efficacy of the reconstruction model in fitting to age composition data from western Bristol Bay catches which are comprised of three stocks only. From the perspective of model results, this trend is acceptable as the model fits reasonably well to the predominant age classes represented in the brood and return tables. Run reconstruction model fits to observed genetic composition catch by district for western (fig. 5) and eastern (fig. 6) Bristol Bay indicate that the model is able to accurately capture the large variation in genetic proportions across years, especially in later years where genetic sample sizes are larger, as both the age and genetic composition likelihoods are weighted in proportion to sample sizes.

Run reconstruction model outputs include annual run sizes for each stock and age class combination, incorporating historical offshore catches and the post-hoc allocated set net and special harvest area catches (table 1, table 2). In addition, results of the reconstruction process are also presented as stock-specific brood tables (table 3, table 4), with brood year escapements and subsequent offspring returns across age classes. The small annual deviations between model-predicted and observed catch and escapement (fig.1; fig. 2) were reallocated within the brood (table 3; table 4) and return tables (table 1; table 2), across stocks and age classes in proportion to their reconstructed representation within annual returns. For the purposes of spawner-recruit analysis, the number of observed recruits from a specific brood year, per spawning individual, has also been calculated.

The reconstructed productivity (recruits-per-spawner) by brood year were compared to those listed in the ADFG brood tables for western (fig. 7) and eastern (fig. 8) Bristol Bay. For Nushagak District commercial catches this run reconstruction process incorporating both age and genetic-composition of catch data suggests that previous reconstruction techniques were significantly overestimating the contribution of the Igushik River stock to Nushagak District catches and therefore productivity was routinely overestimated by 32% on average (fig. 7). Conversely, it appears that the contribution of the Wood River stock to Nushagak District commercial catches was routinely underestimated, with these new reconstruction results suggesting an average productivity 12% higher than tradition reconstruction methods (fig. 7). The comparison of annual productivities for eastern Bristol Bay component stocks estimated by the current run reconstruction procedure with those estimated by traditional methods, show less consistent overestimation or underestimation of stock-specific productivities across the time series (fig. 8). These new reconstruction results indicate that productivity of the Egegik River stock was overestimated by an average of 9% and productivity of the Alagnak River stock underestimated by 15% on average, by previous run reconstruction methods which did not incorporate information derived from both age and genetic-

composition data (fig. 8). It is important to note that these reconstruction results indicate that the magnitude of under and overestimation of productivity for the Alagnak River stock by the traditional method is greater than that of other eastern Bristol Bay stocks. This means that either the post-hoc allocation of Alagnak River Special Harvest Area catches or the incorporation of genetic-composition of catch data, greatly influenced the estimated contribution of this stock to total commercial harvests.

District catches, partitioned by the run reconstruction model amongst component stocks (without set net and special harvest area catches) are presented for both western (fig. 9) and eastern (fig. 10) Bristol Bay. The partitioned Nushagak District catches indicate that the Wood River stock makes up the highest proportion of reconstructed catches in all years, followed by the Nushagak River, and Igushik River fish comprising a relatively small proportion of total district catches in each year. Partitioned catches for the eastern Bristol Bay commercial fishing districts (fig. 10) indicate that fish bound for the Kvichak River system comprise the majority of catches within the Naknek-Kvichak fishing district in each year and have principally driven the high interannual variability on total catch over the time series. In addition, while Kvichak River stock makes up some small component of catches in both the Egegik and Ugashik commercial fishing districts, it is not the principal driver of interannual variability in catches for those districts. From these partitioned catches it is clear that the Egegik River stock did not represent a significant proportion of catches in either Naknek-Kvichak or Ugashik commercial fishing districts until returns to the Egegik River saw a marked increase in the early 1980's (fig. 10). Finally, it should be noted that across the time series and specifically in recent years, the Naknek River stock comprised an increasing proportion of Naknek-Kvichak District commercial catches.

For electronic versions of reconstructed brood and return tables, please contact Curry Cunningham (curryc2@uw.edu).

Acknowledgements

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References:

Branch, T.A., and Hilborn, R. 2010. A general model for reconstructing salmon runs. Canadian Journal of Fisheries and Aquatic Sciences 67(5): 886-904.

Chasco, B., Hilborn, R., and Punt, A.E. 2007. Run reconstruction of mixed-stock salmon fisheries using age-composition data. Canadian Journal of Fisheries and Aquatic Sciences 64(11): 1479-1490.

Dann, T.H., Habicht, C., Jasper, J.R., Hoyt, H.A., Barclay, A.W., Templin, W.D., Baker, T.T., West, F.W., and Fair, L.F. 2009. Genetic stock composition of the commercial harvest of sockeye salmon in Bristol Bay, Alaska, 2006-2008 09-06. Alaska Department of Fish and Game, Anchorage, Alaska.

Fournier, D.A., Skaug, H.J., Ancheta, J., Ianelli, J., Magnusson, A., Maunder, M.N., Nielsen, A., and Sibert, J. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. Optimization Methods and Software 27(2): 233-249.

Hilborn, R. 2012. The evolution of quantitative marine fisheries management 1985-2010. Natural Resource Modeling 25(1): 122-144.

Johnson, J.K. 1990. Regional overview of coded wire tagging of anadromous salmon and steelhead in Northwest America. Am. Fish. Soc. Symp 7: 127-133.

Kendall, N.W., and Quinn, T.P. 2009. Effects of population-specific variation in age and length on fishery selection and exploitation rates of sockeye salmon (Oncorhynchus nerka). Canadian Journal of Fisheries and Aquatic Sciences 66(6): 896-908.

Megrey, B.A. 1989. Review and comparison of age-structured stock assessment models from theoretical and applied points of view. In Mathematical Analysis of Fish Stock Dynamics. Edited by E.F. Edwards and B.A. Megrey. American Fisheries Society, Bethesda, Maryland. pp. 8-48.

Minard, R.E., and Meacham, C.P. 1987. Sockeye salmon (Oncorhynchus nerka) management in Bristol Bay, Alaska. Canadian Special Publication of Fisheries and Aquatic Sciences 96: 336-342.

Quinn, T.P. 2005. The behavior and ecology of Pacific salmon and trout. University of Washington Press, Seattle.

Smith, M.J., Pascal, C.E., Grauvogel, Z., Habicht, C., Seeb, J.E., and Seeb, L.W. 2011. Multiplex preamplification PCR and microsatellite validation enables accurate single nucleotide polymorphism genotyping of historical fish scales. Molecular ecology resources 11 Suppl 1: 268-277.

Figures:

Catch and Escapement

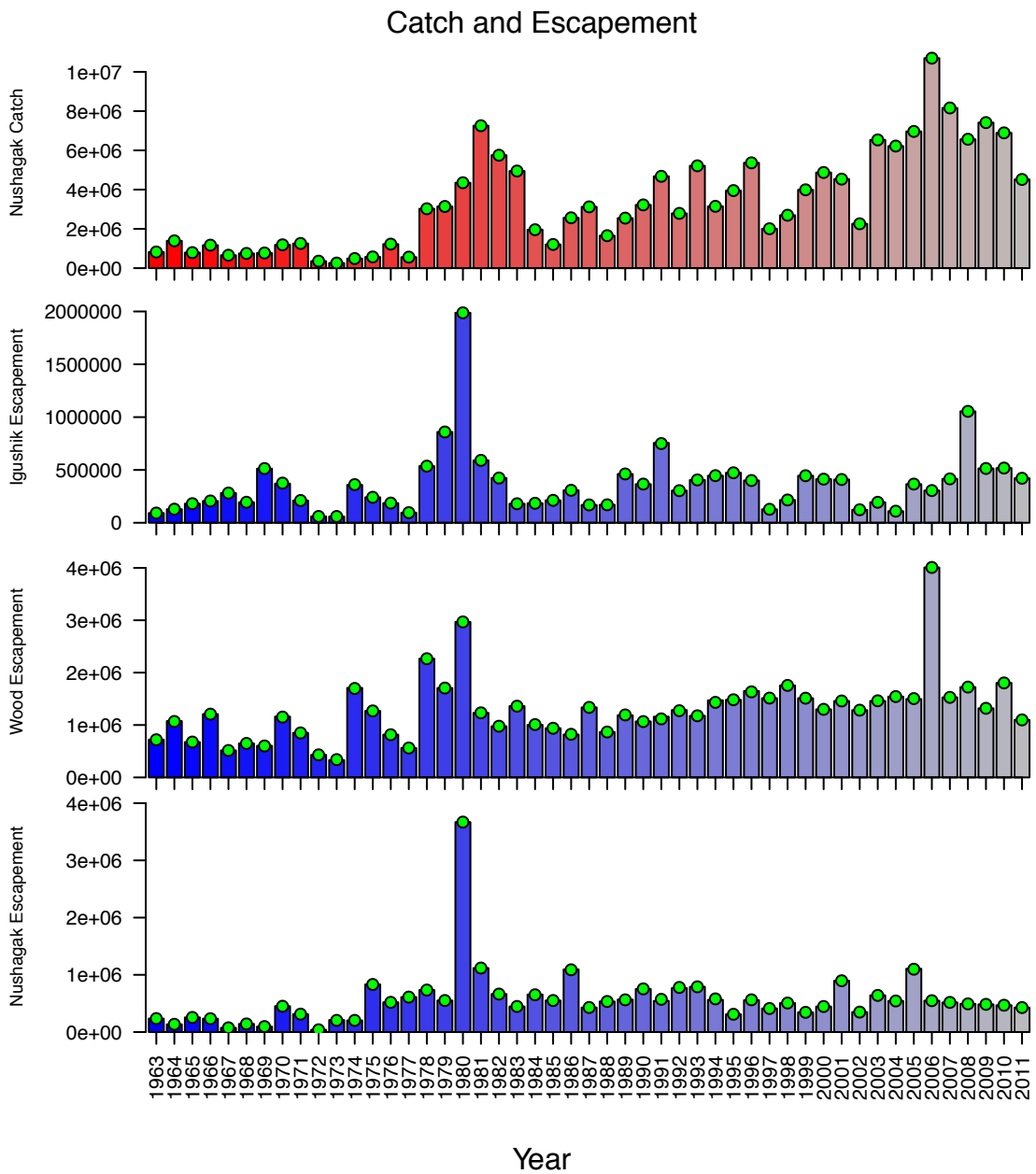

Figure 1: Run reconstruction model fits to catches in the Nushagak District, and escapement to the Igushik, Wood and Nushagak Rivers. Bars are annual catch (red) and escapement (blue) observations by ADF&G. Dots (green) are model fits to these data.

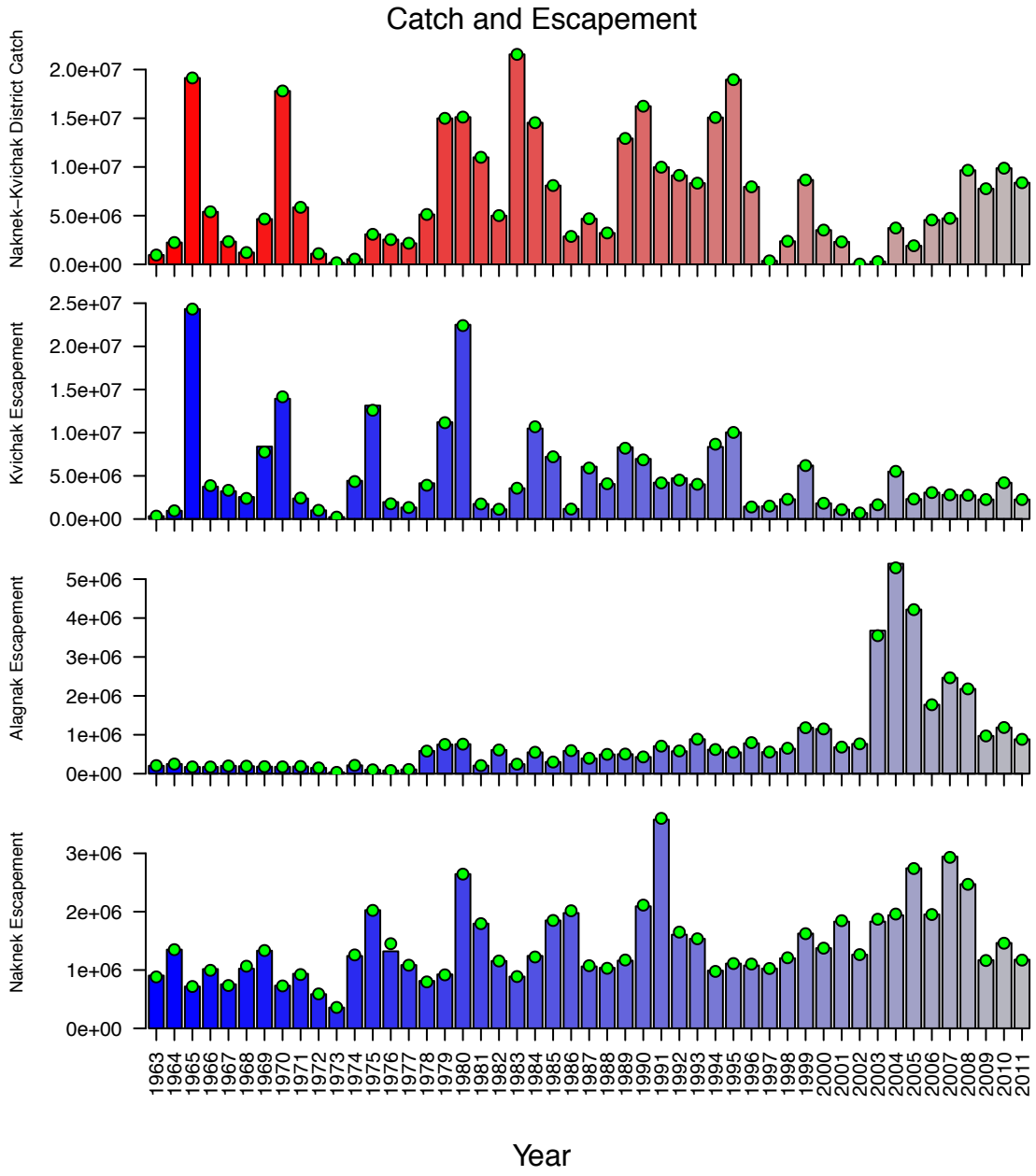

Figure 2a: Model fits to catches in the Naknek-Kvichak District, and escapements to the Kvichak, Alagnak and Naknek Rivers. Bars are annual observations and dots are model fits to these data.

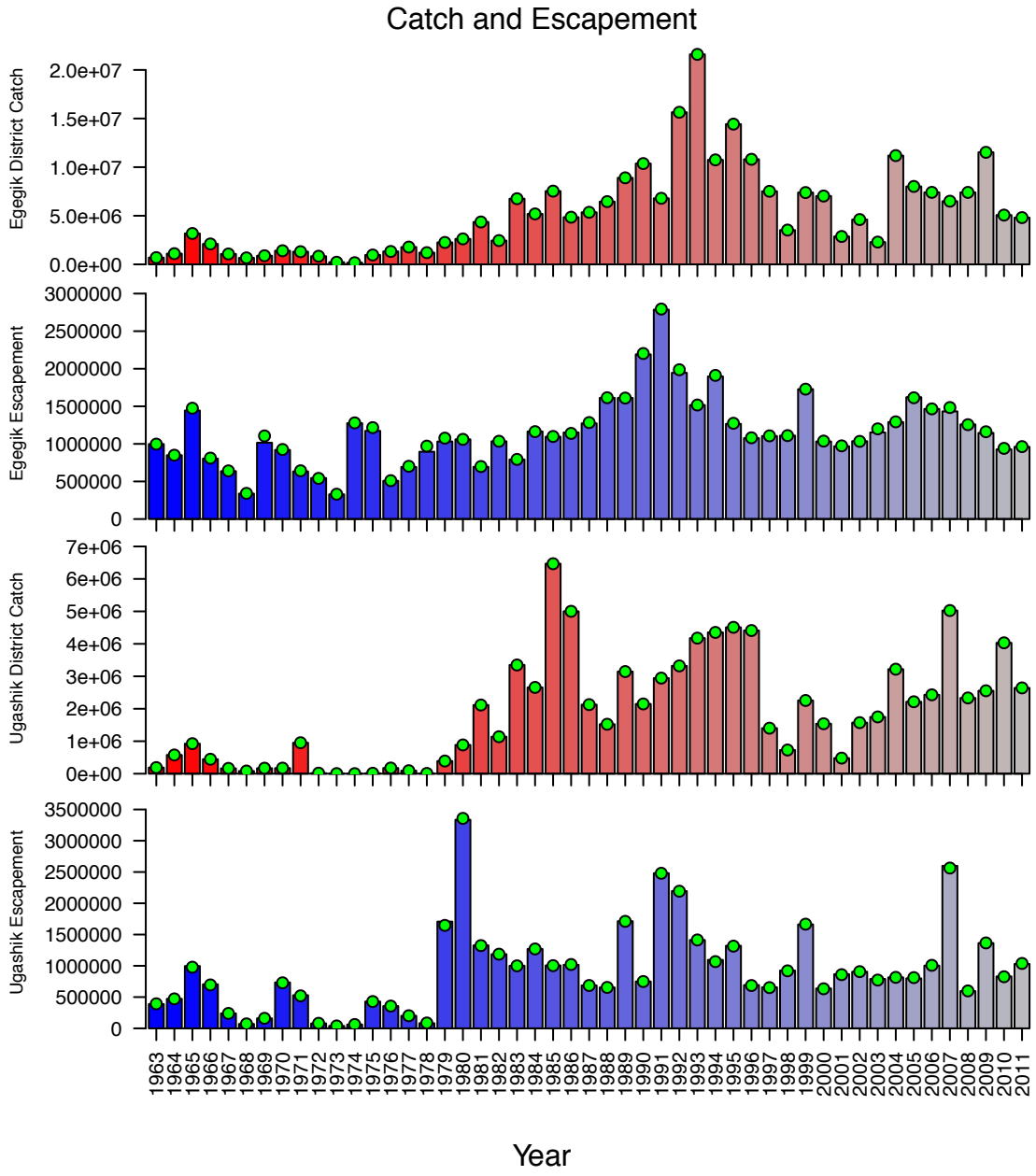

Figure 2b: Model fits to catches in the Egegik and Ugashik Districts, and escapements to the Egegik and Ugashik Rivers. Bars are annual observations and dots are model fits to these data.

Age Composition

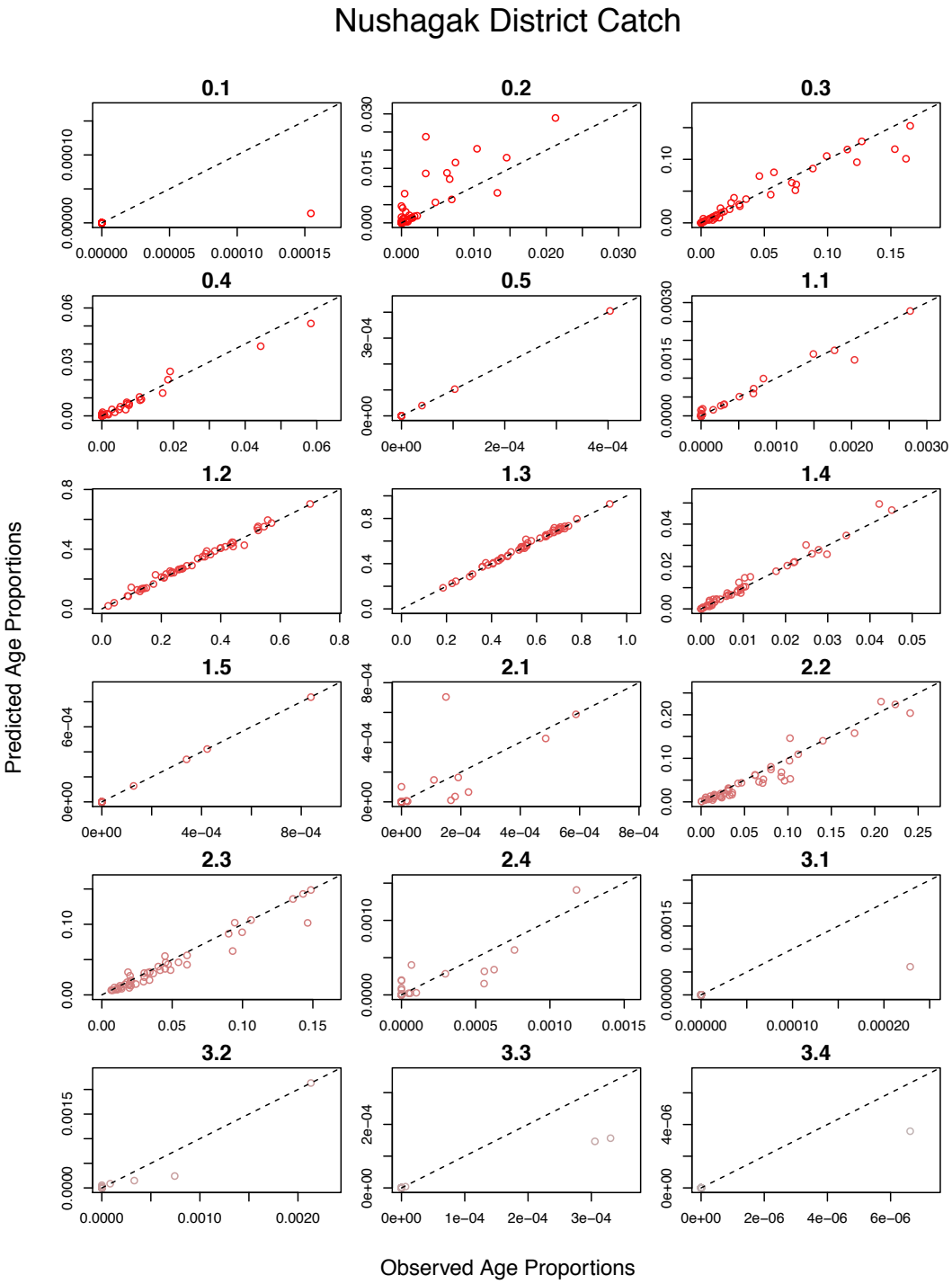

Figure 3a: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Nushagak commercial fishing district catches. Perfect model fits would result in annual points falling along the dashed diagonal line.

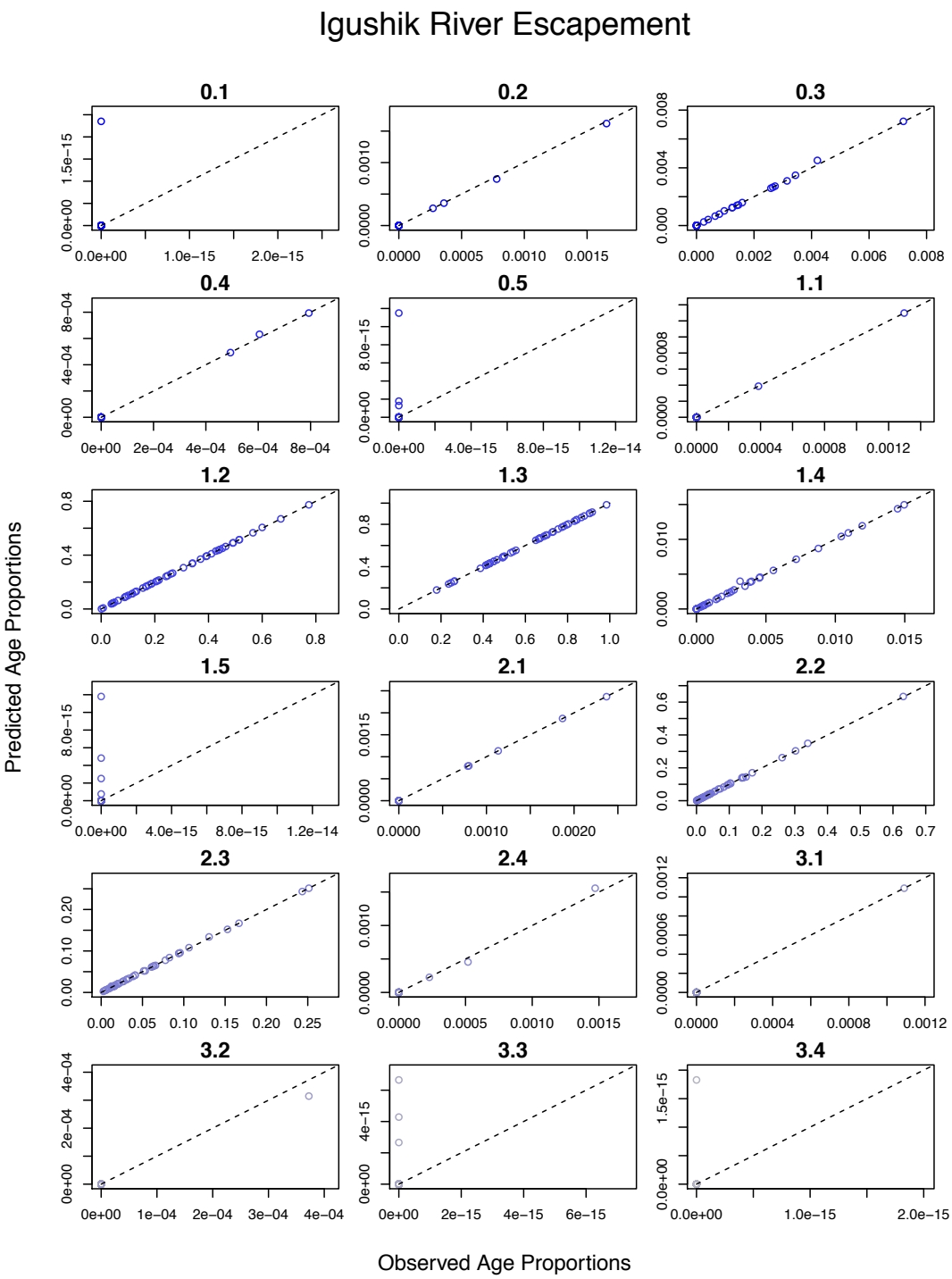

Figure 3b: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Igushik River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

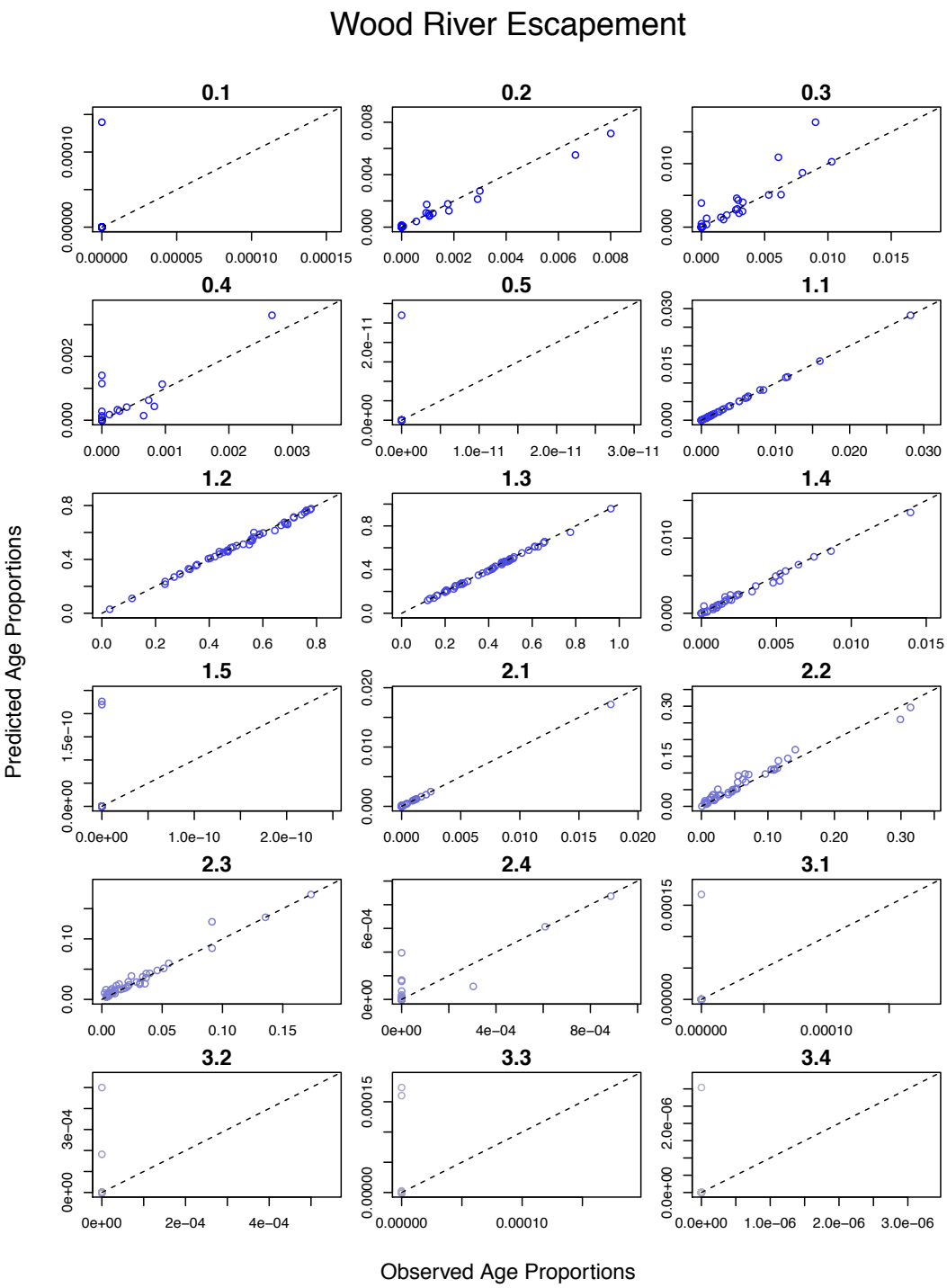

Figure 3c: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Wood River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

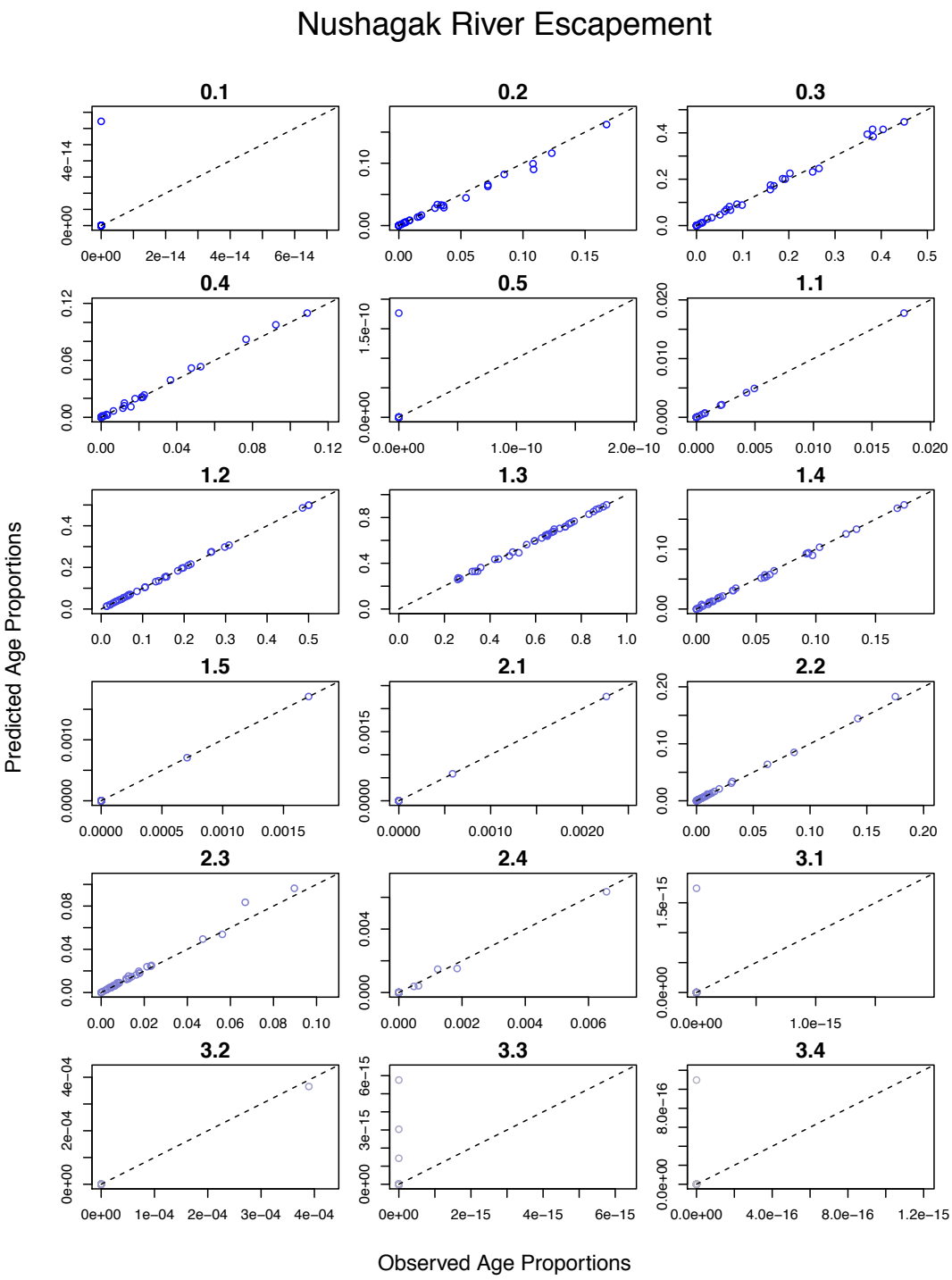

Figure 3d: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Nushagak River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

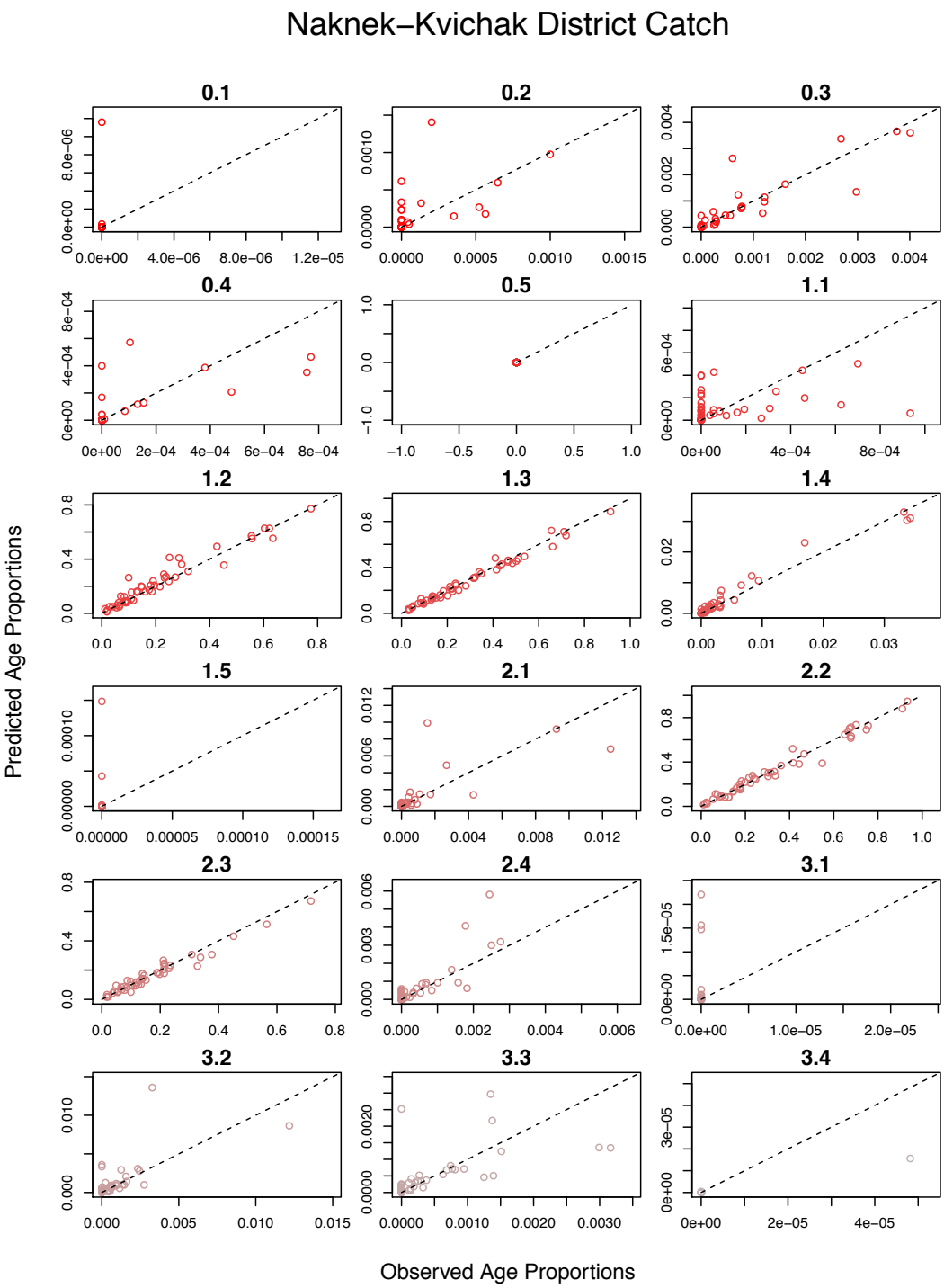

Figure 4a: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Naknek-Kvichak commercial fishing district catches. Perfect model fits would result in annual points falling along the dashed diagonal line.

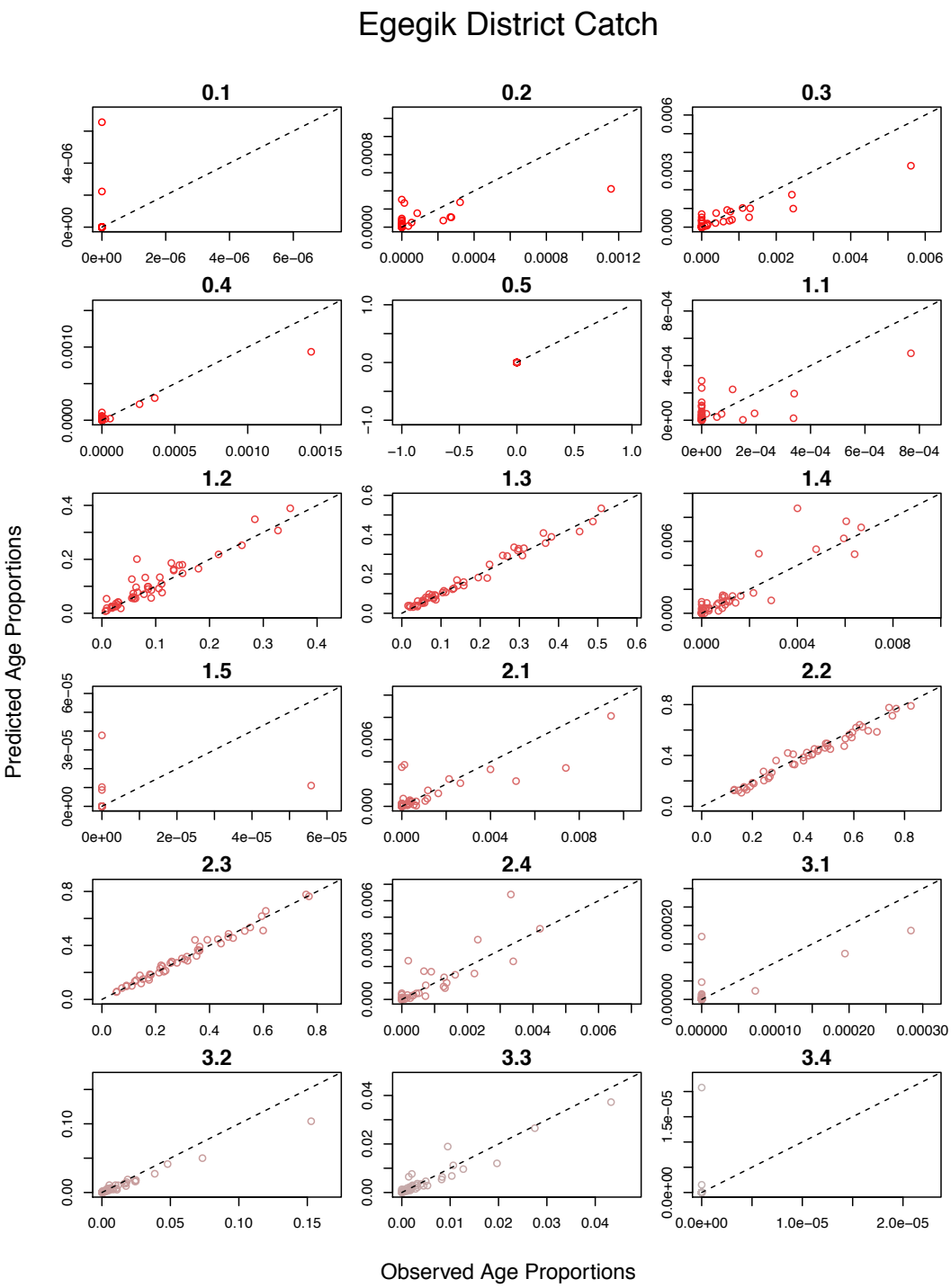

Figure 4b: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Egegik commercial fishing district catches. Perfect model fits would result in annual points falling along the dashed diagonal line.

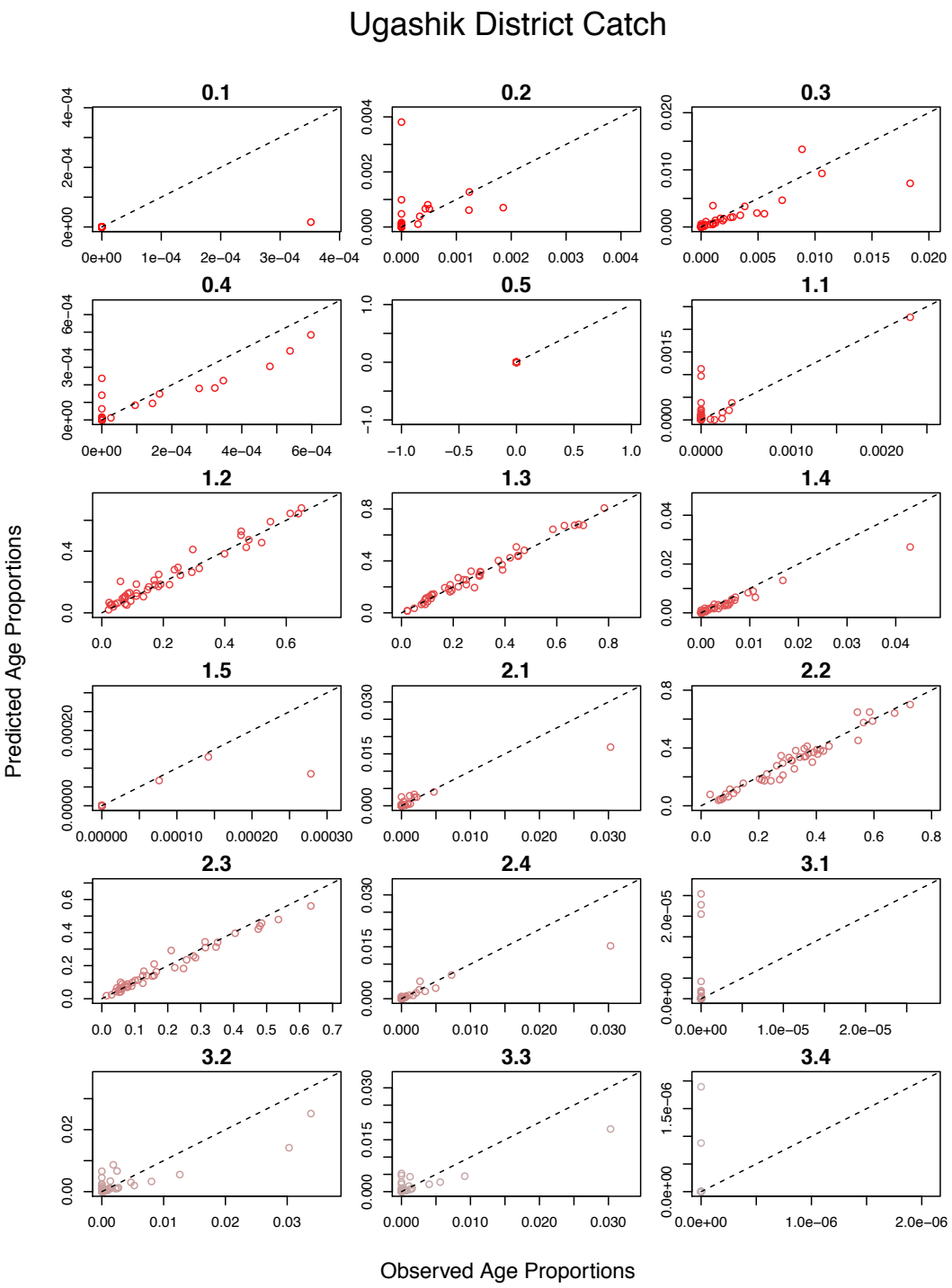

Figure 4c: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Ugashik commercial fishing district catches. Perfect model fits would result in annual points falling along the dashed diagonal line.

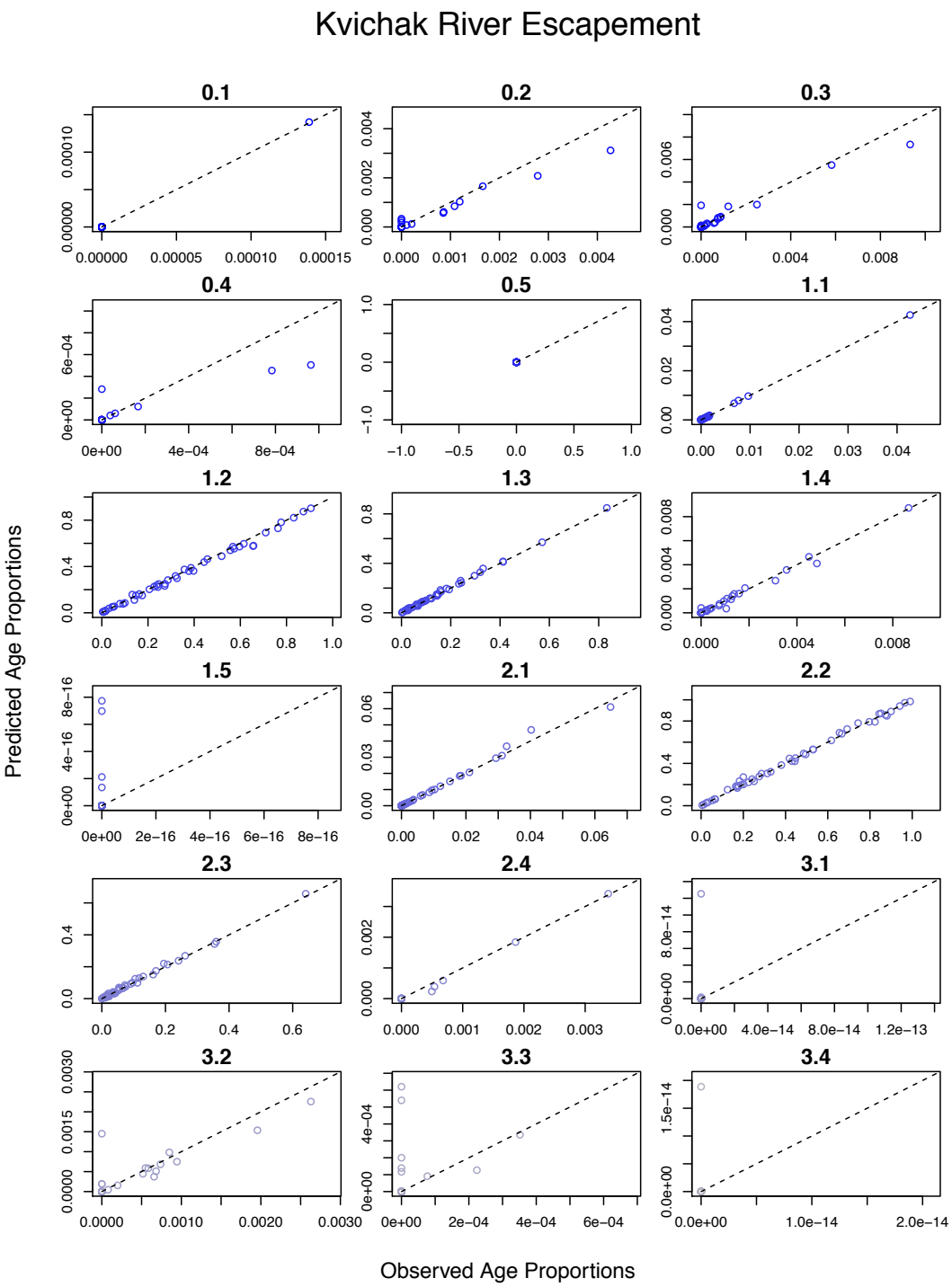

Figure 4d: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Kvichak River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

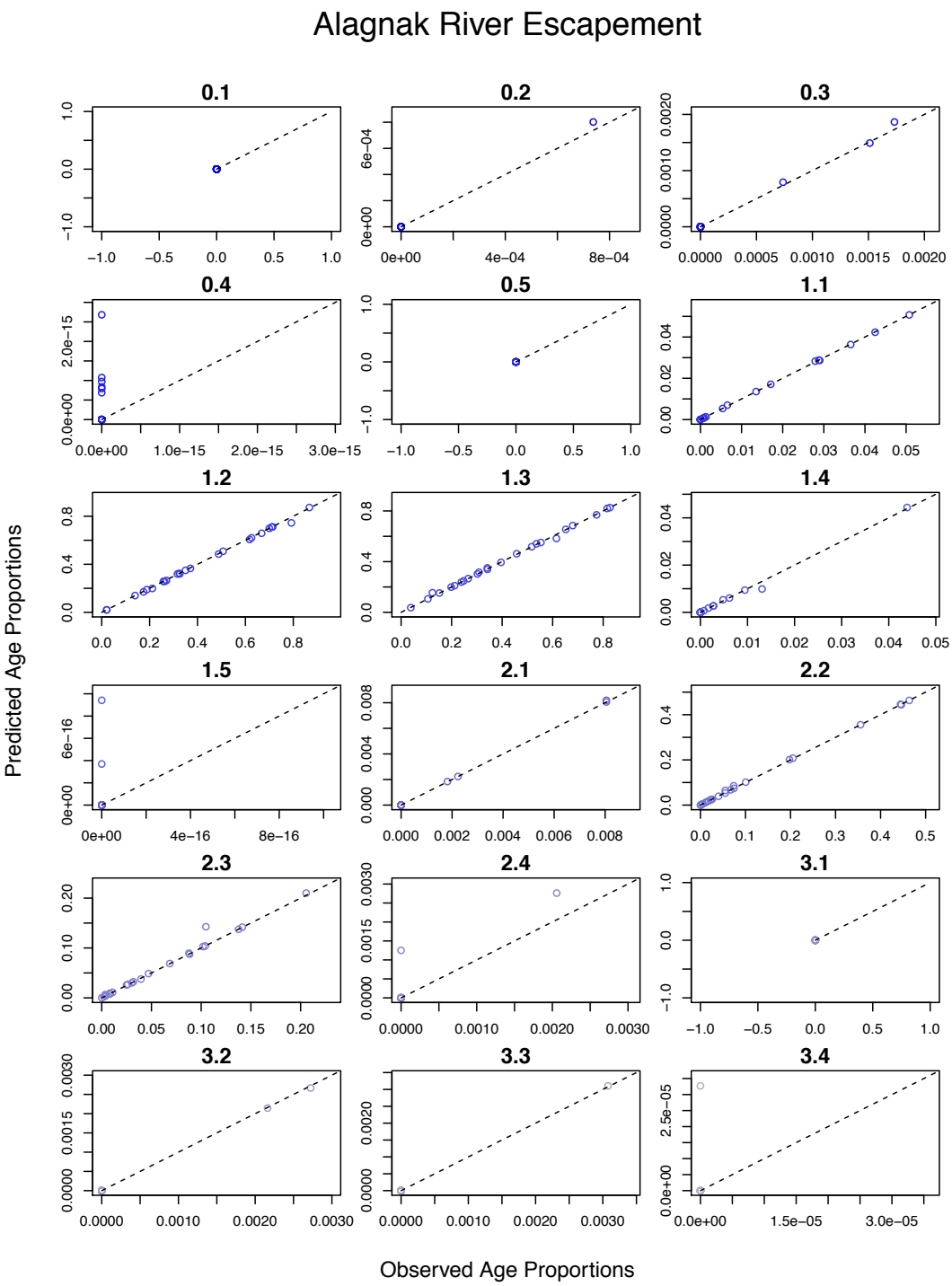

Figure 4e: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Alagnak River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

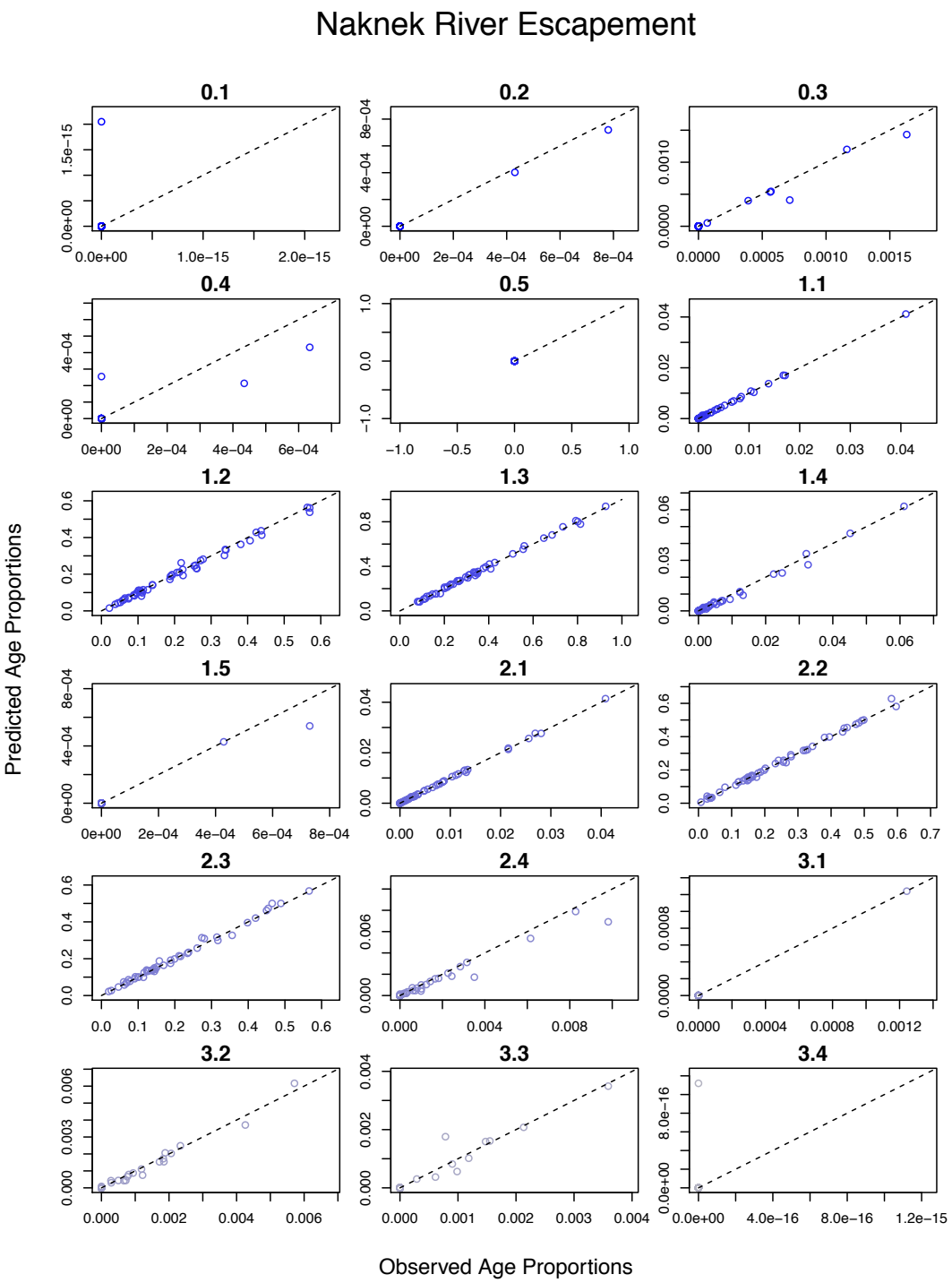

Figure 4f: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Naknek River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

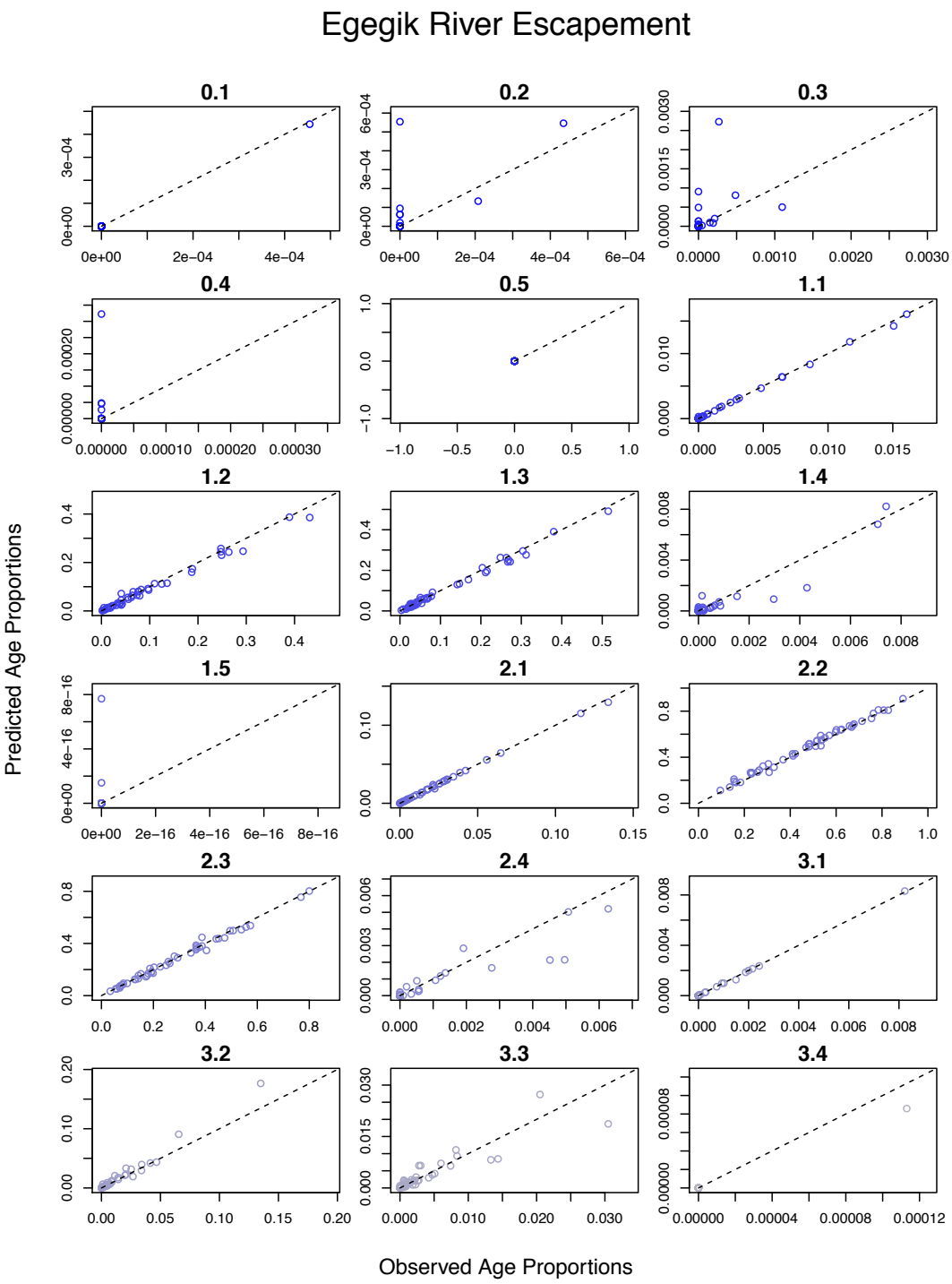

Figure 4g: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Egegik River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

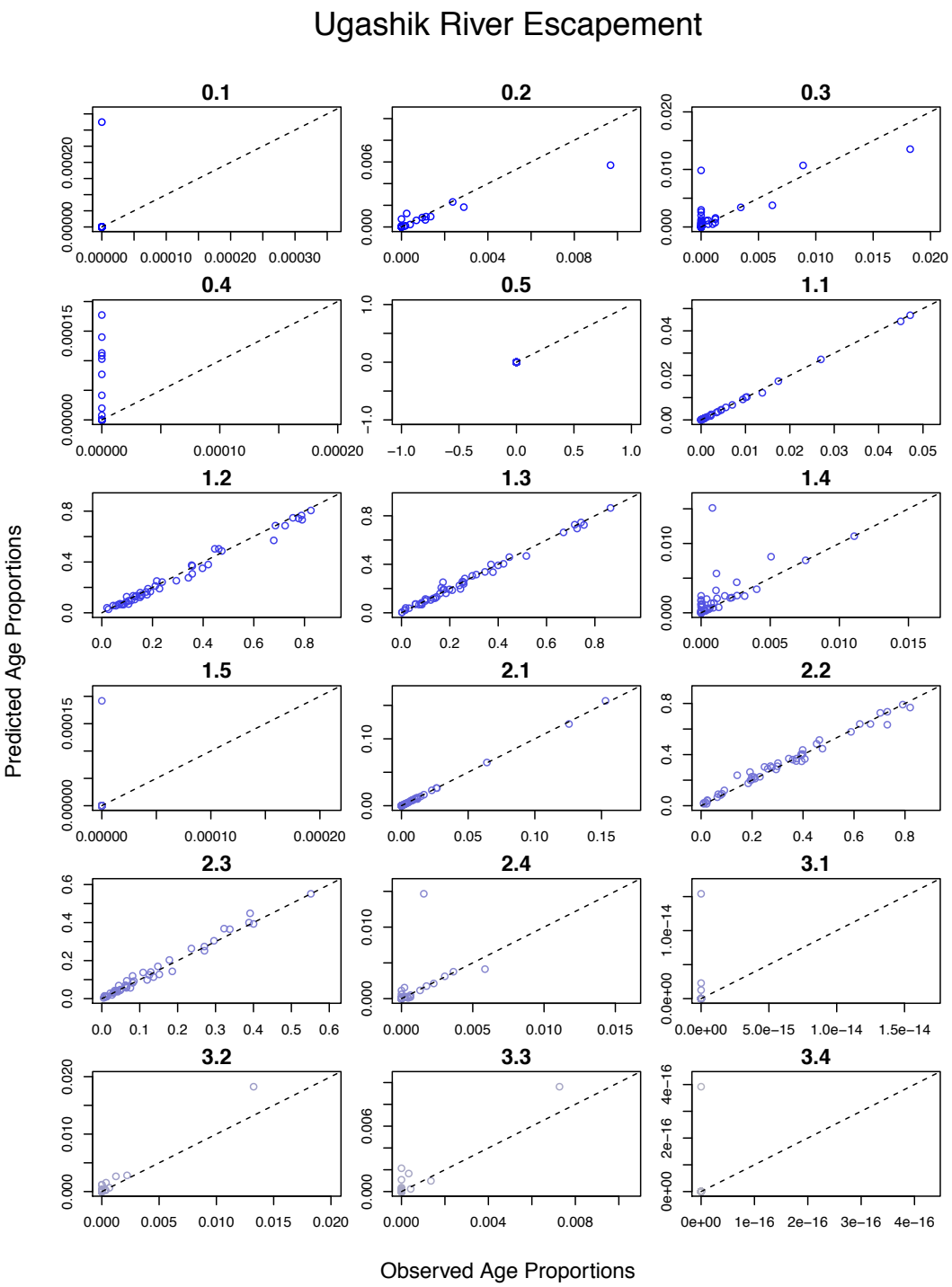

Figure 4h: Run reconstruction model fitted age proportions (y-axis) compared to observed age composition (x-axis) of sockeye in Ugashik River escapements. Perfect model fits would result in annual points falling along the dashed diagonal line.

Genetic Composition

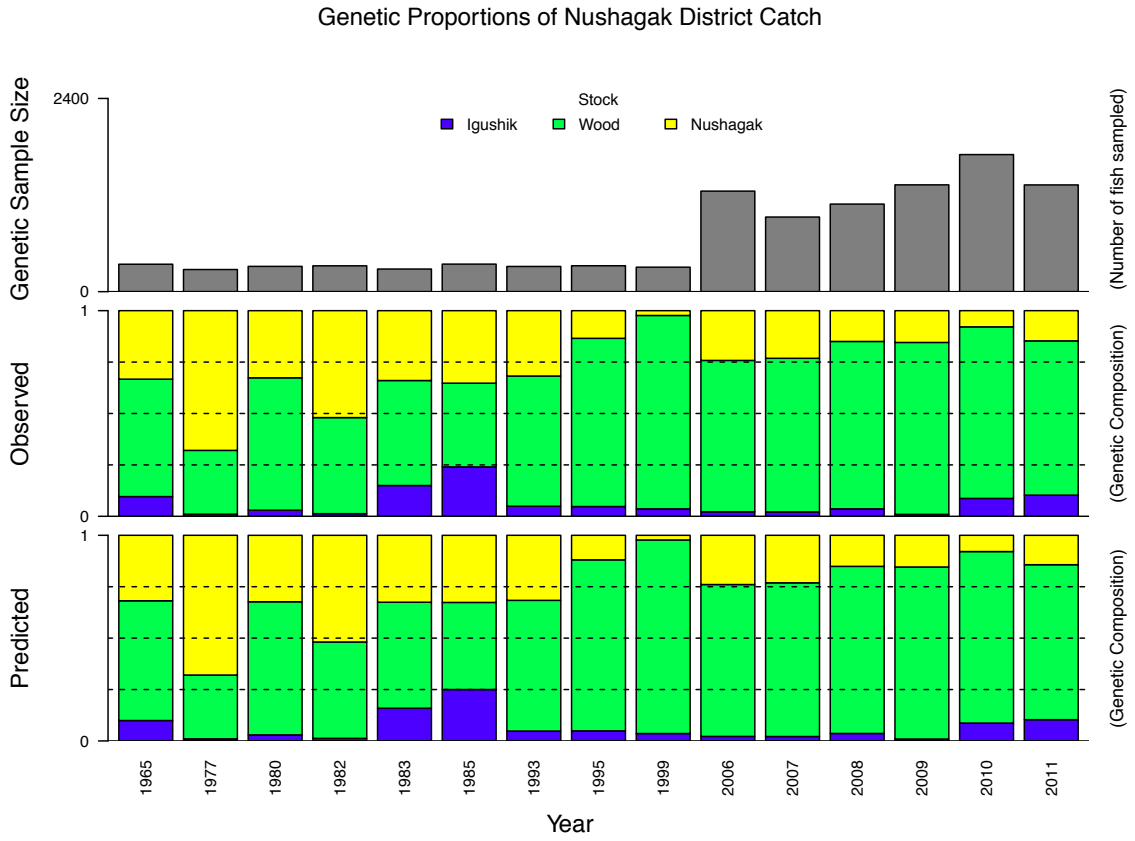

Figure 5: Run reconstruction model fits to genetic composition of catch data for the Nushagak commercial fishing district by year. The first row displays the number of fish sampled for mixed-stock analysis in each year. The second and third rows display the observed and model fitted genetic proportions of commercial catches in the Nushagak District respectively, by stock.

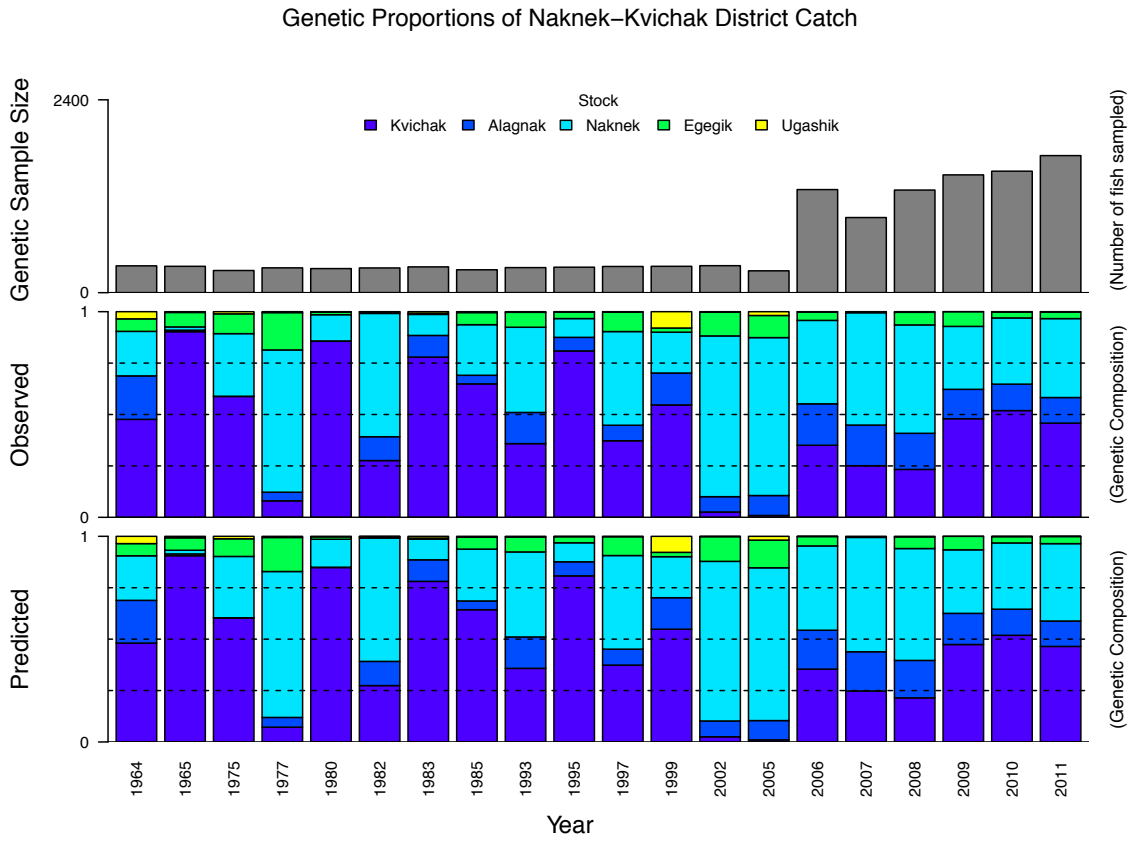

Figure 6a: Run reconstruction model fits to genetic composition of catch data for the Naknek-Kvichak commercial fishing district by year. Rows display annual sample sizes, observed genetic proportions and model-predicted genetic proportions of Naknek-Kvichak District catches.

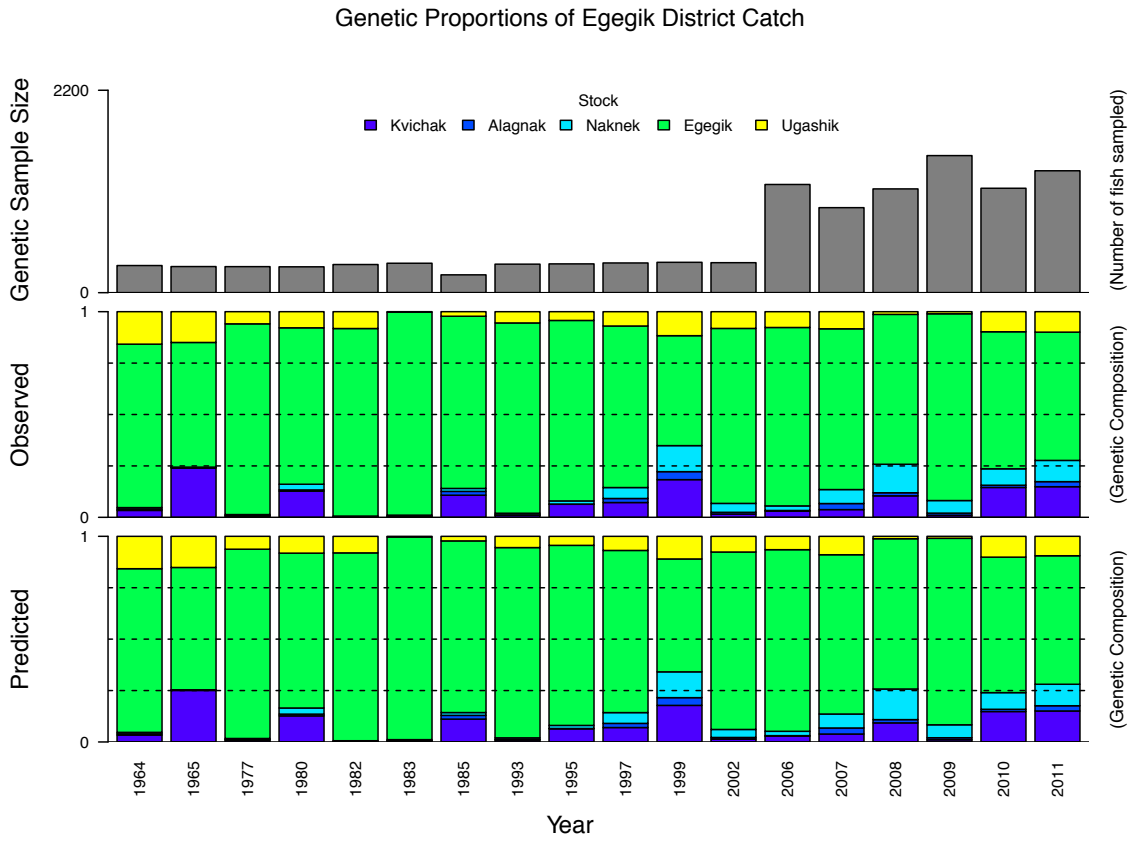

Figure 6b: Run reconstruction model fits to genetic composition of catch data for the Egegik commercial fishing district by year. Rows display annual sample sizes, observed genetic proportions and model-predicted genetic proportions of Egegik District catches.

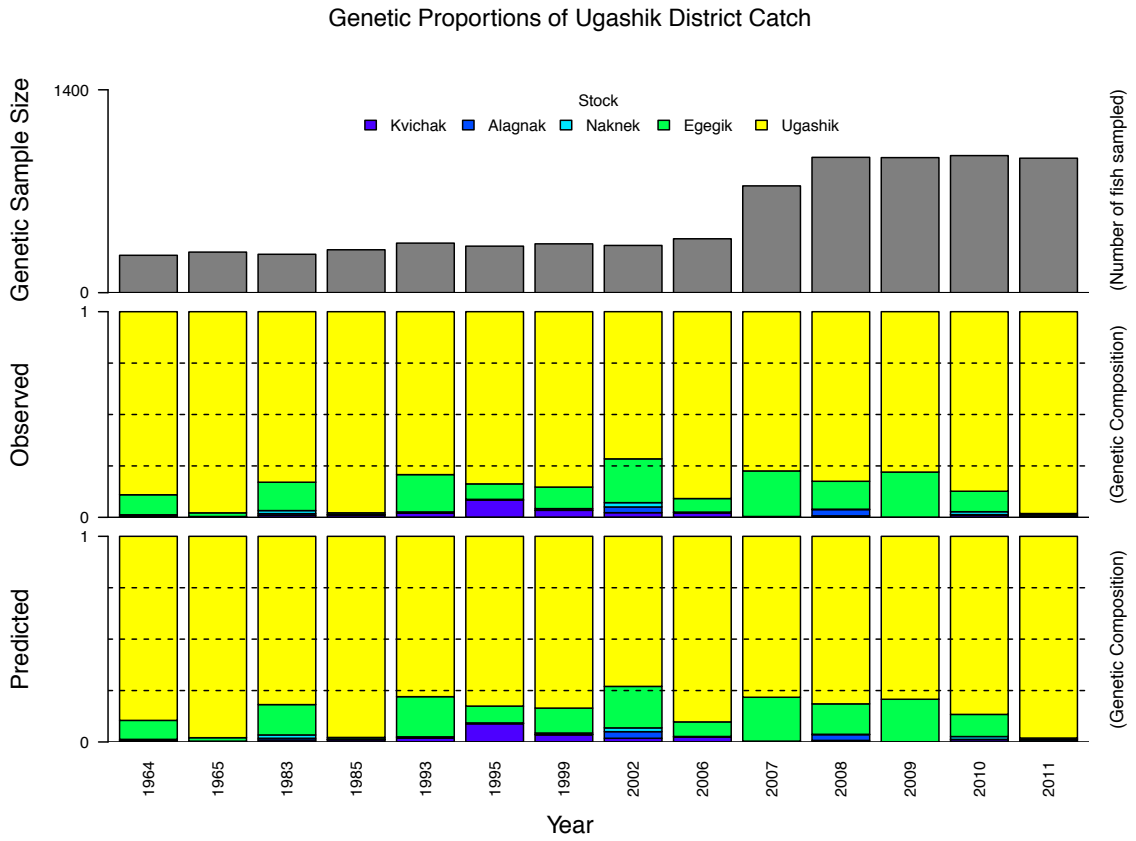

Figure 6c: Run reconstruction model fits to genetic composition of catch data for the Ugashik commercial fishing district by year. Rows display annual sample sizes, observed genetic proportions and model-predicted genetic proportions of Ugashik District catches.

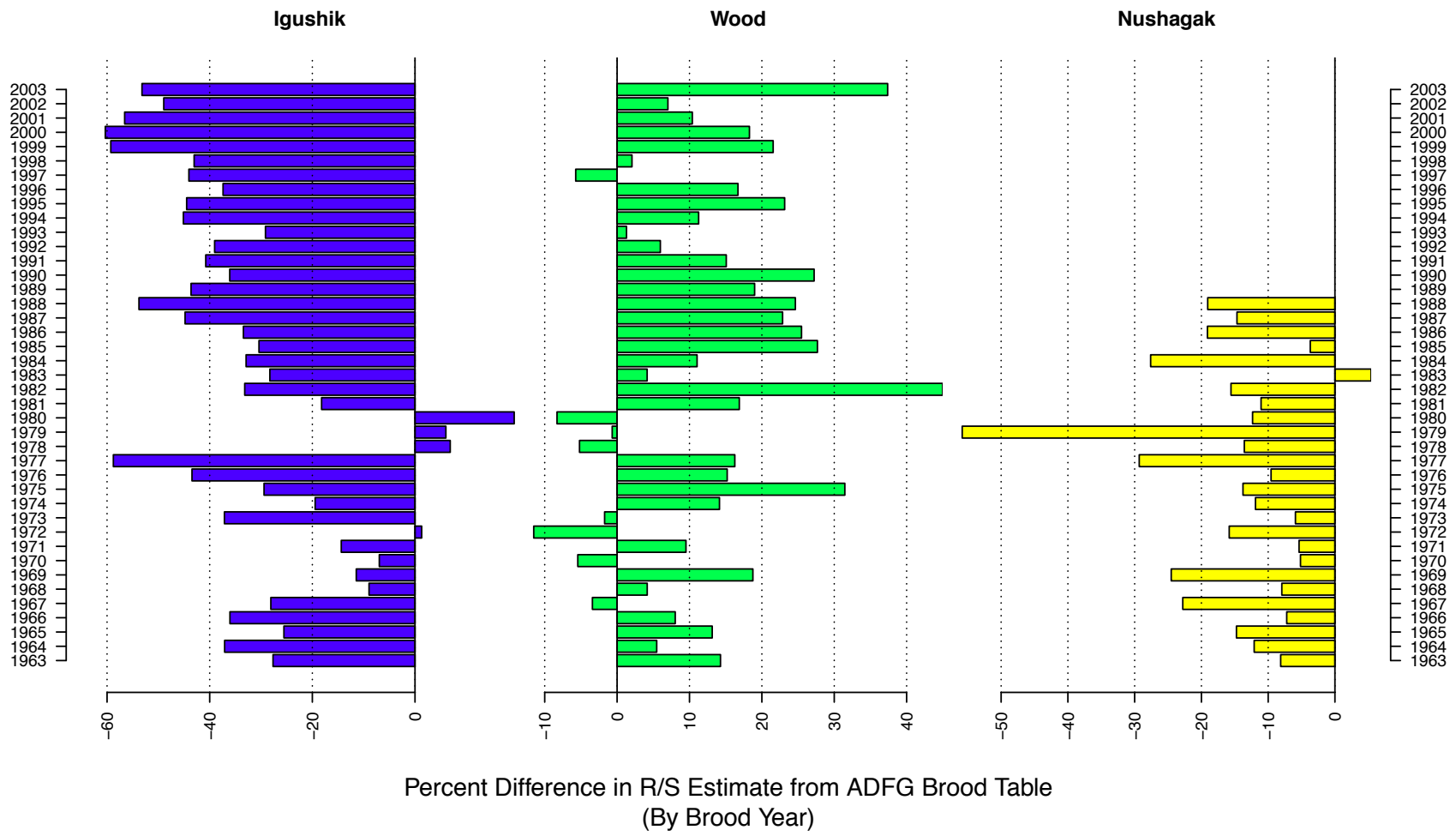

Figure 7: Percent difference between model estimated recruits-per-spawner and ADF&G brood tables, for western Bristol Bay.

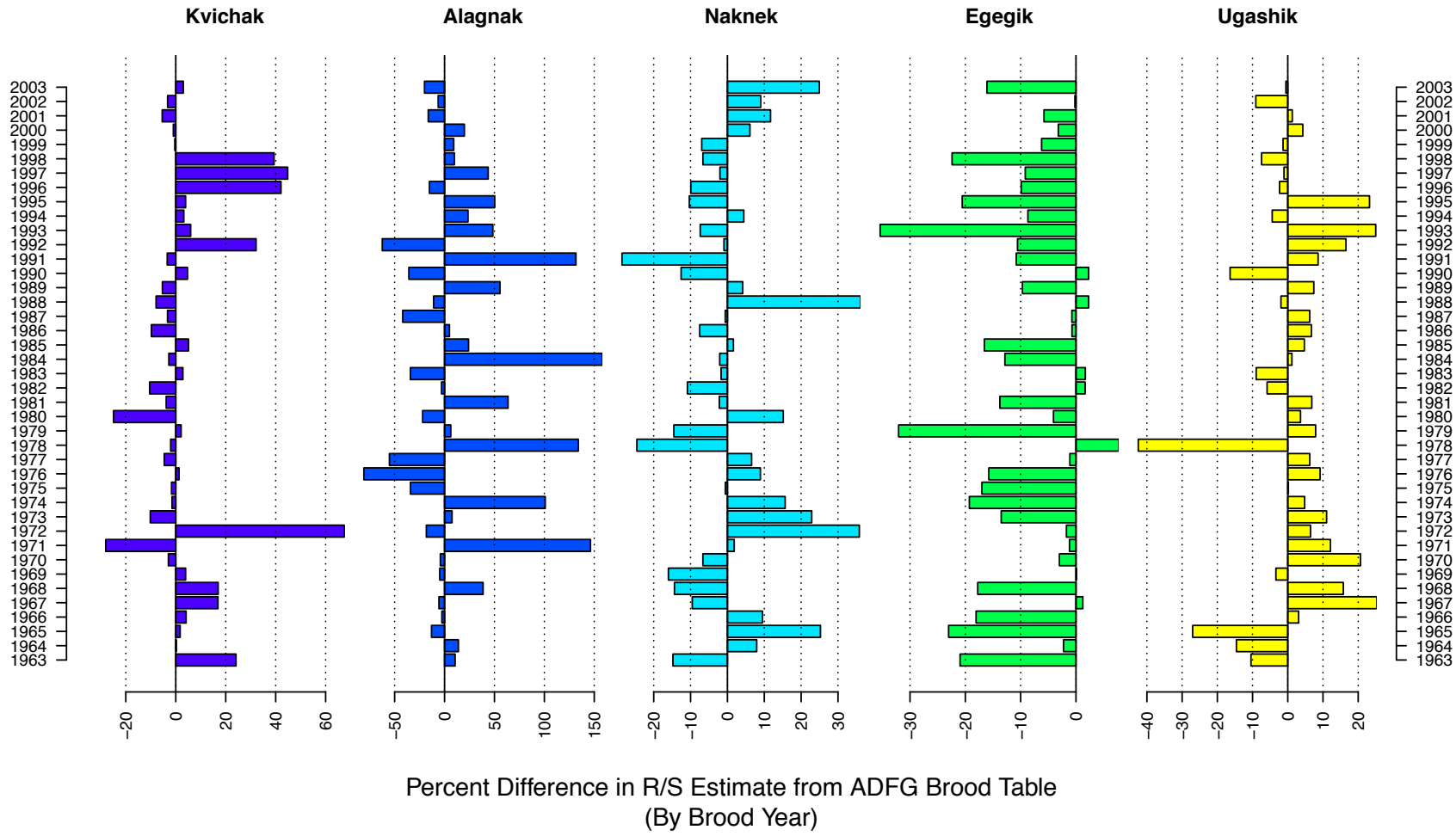

Figure 8: Percent difference between model estimated recruits-per-spawner and ADF&G brood tables, for eastern Bristol Bay.

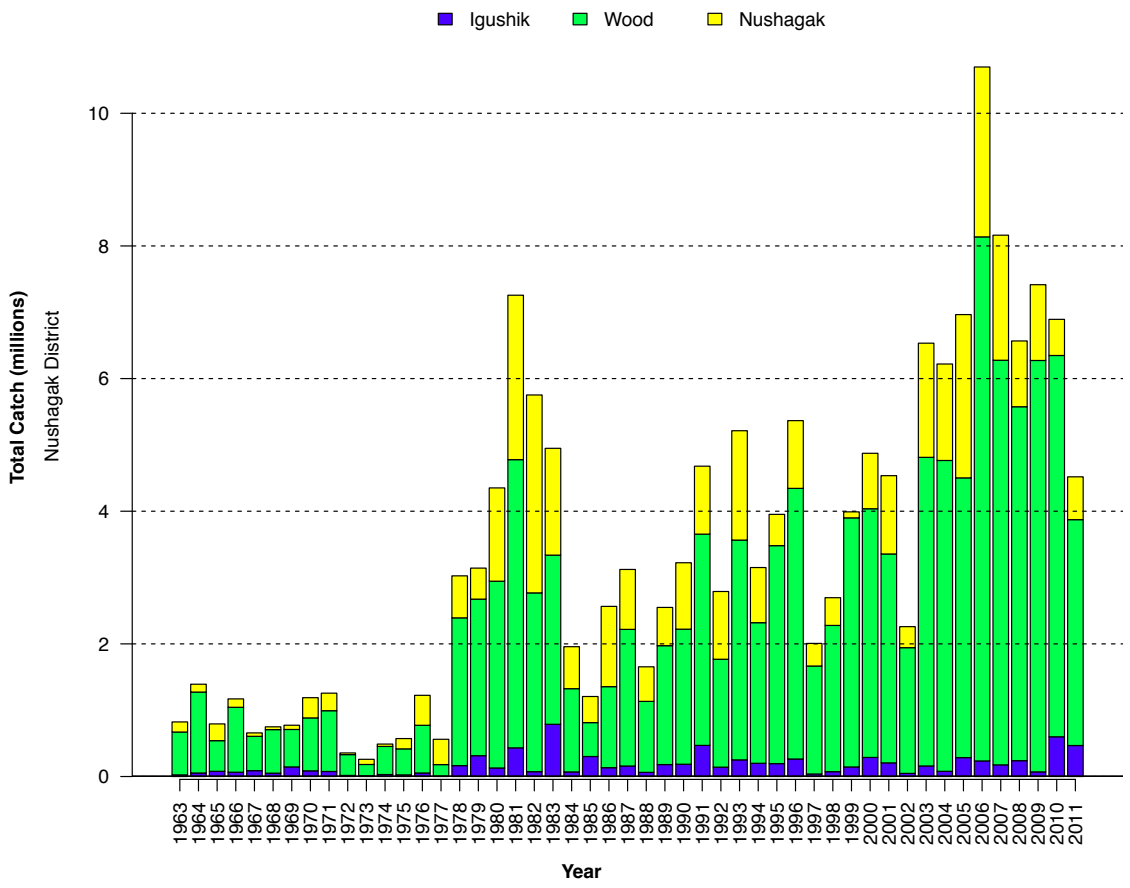

Figure 9: Catches in the Nushagak district as partitioned by the run reconstruction model amongst the stocks in western Bristol Bay, based upon available genetic composition of catch and age composition data. Post-hoc allocated Igushik set net and Wood River Special Harvest Area catches are not included.

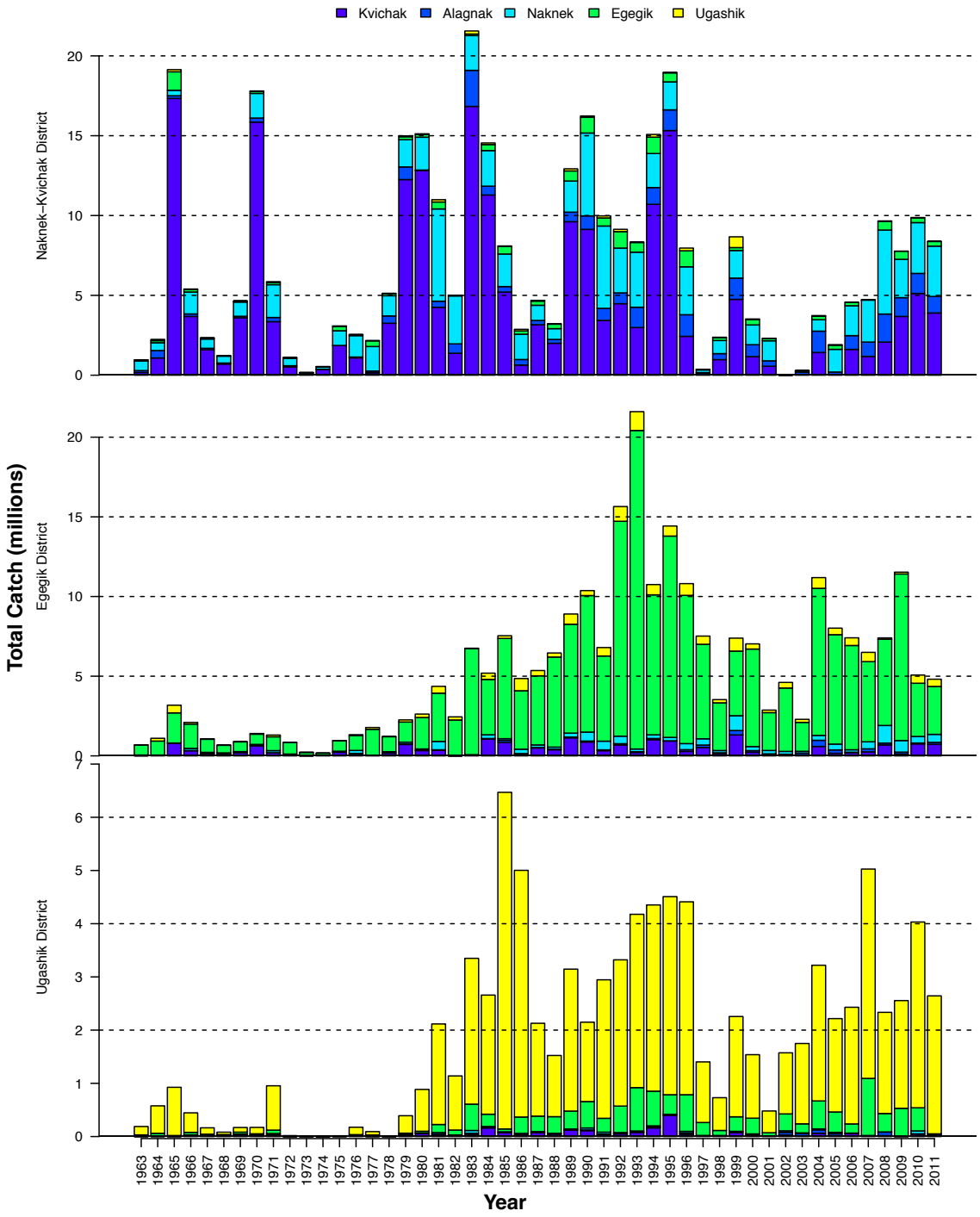

Figure 10: Commercial catches from the Naknek-Kvichak, Egegik, and Ugashik Districts as partitioned amongst eastern Bristol Bay stocks by the run reconstruction model. Post-hoc allocated Kvichak set net, Alagnak River Special Harvest Area, and Naknek River Special Harvest Area catches are not include

Table 1: Reconstructed total annual returns to western Bristol Bay river systems, including high seas and South Peninsula catches, Igushik River set net catches, and Wood River Special Harvest Area catches.

Table 1a: Igushik River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	0	-	-	0	75,779	37,357	-	-	0	14,002	9,213	-	-	-	-	-
1964	-	0	264	0	-	-	41,542	90,589	-	-	106	45,064	13,488	-	-	-	-	-
1965	-	-	78	-	-	-	28,373	225,973	-	-	-	26,635	16,194	-	-	-	-	-
1966	-	-	860	-	-	-	16,811	253,124	0	-	-	9,653	29,630	-	-	0	-	-
1967	-	105	292	0	-	-	196,558	200,762	211	-	-	5,144	9,303	-	-	-	-	-
1968	-	0	507	0	-	299	124,313	137,346	0	-	261	22,418	5,541	-	-	-	-	-
1969	-	0	0	-	-	0	319,406	325,005	-	-	0	103,991	11,591	-	-	-	0	-
1970	-	356	0	-	-	-	54,401	270,050	-	-	0	168,321	28,877	-	-	-	-	-
1971	-	452	430	0	-	-	43,479	232,637	0	-	0	5,392	52,842	-	-	-	-	-
1972	-	-	167	-	-	-	48,450	59,861	122	-	-	10,884	8,482	-	-	-	-	-
1973	-	-	88	31	0	-	830	101,707	59	0	-	513	10,676	0	-	-	61	-
1974	-	0	321	-	-	-	36,788	107,254	888	-	299	278,332	6,715	-	-	-	-	-
1975	-	93	1,291	-	-	-	58,279	144,568	1,387	-	-	62,987	88,831	-	-	-	-	-
1976	-	0	913	-	-	-	93,771	131,521	0	-	-	39,333	42,459	-	-	-	-	-
1977	-	49	1,279	61	-	-	17,241	117,097	197	-	-	5,306	28,794	12	-	-	-	-
1978	-	134	1,356	866	0	0	412,983	399,007	4,097	-	1,370	14,681	10,712	-	-	-	-	-
1979	-	0	0	-	-	-	543,521	589,285	0	-	-	240,733	18,927	-	-	0	-	-
1980	-	-	0	-	-	773	412,828	1,835,022	1,192	-	4,261	119,242	20,162	-	-	-	-	-
1981	-	-	2,917	-	-	-	174,667	741,008	1,199	-	0	106,555	311,785	-	-	-	-	-
1982	-	0	0	0	0	0	36,011	585,308	8,897	-	-	5,600	80,921	-	-	-	-	-
1983	-	0	196	0	-	-	611,312	368,460	46,621	-	-	146,031	14,540	196	-	0	-	-
1984	-	0	0	0	-	-	14,270	263,565	73	-	-	10,184	11,700	-	-	-	-	-
1985	-	0	0	0	-	-	243,467	353,924	0	-	-	34,537	11,078	-	-	140	-	-
1986	0	1,151	6,544	0	-	-	50,848	502,783	0	-	-	6,742	41,072	-	-	-	-	-
1987	-	0	0	0	-	-	105,984	272,741	51,416	-	-	7,067	34,236	-	-	-	-	-
1988	-	0	232	27	-	-	30,298	247,075	1,045	-	-	6,211	8,363	-	-	-	-	-
1989	-	2,705	6,293	0	-	-	395,498	419,161	1,685	-	-	52,282	28,971	-	-	-	-	-
1990	-	1,607	8,615	0	-	-	157,348	639,188	3,267	-	-	50,116	16,033	-	-	-	-	-
1991	-	0	12,589	2,213	-	-	75,588	1,497,275	5,889	-	-	9,445	41,160	1,680	-	-	-	-
1992	-	145	0	0	-	-	105,973	338,281	7,475	-	-	2,145	15,520	809	-	-	-	-
1993	-	46	2,991	91	-	166	213,200	479,542	5,679	-	-	5,734	9,626	-	-	-	-	-
1994	-	0	3,116	0	-	-	138,198	693,503	1,659	-	-	48,454	21,898	0	-	-	-	-
1995	-	0	905	0	-	-	170,953	883,941	5,198	-	-	95,135	28,293	-	-	-	-	-
1996	-	0	2,985	0	-	-	30,018	798,731	2,186	-	-	2,065	106,710	-	-	-	-	-
1997	-	-	0	0	-	-	100,426	91,714	2,464	0	-	5,335	8,821	0	-	-	0	-
1998	-	0	0	0	-	0	163,637	239,151	323	-	0	13,737	9,187	0	-	0	-	-
1999	-	-	-	-	-	-	376,062	435,419	0	-	-	42,976	4,862	0	-	-	-	-
2000	-	-	-	-	-	-	77,032	881,256	1,001	-	-	6,531	16,920	-	-	-	-	-
2001	-	-	1,199	-	-	0	1,927	800,393	5,961	-	-	807	8,446	-	-	-	-	-
2002	-	-	-	-	-	-	130,362	51,668	2,787	-	0	9,522	5,344	-	-	-	-	-
2003	-	-	-	-	-	0	60,852	393,266	1,857	-	67	2,907	33,171	63	-	-	-	-
2004	-	-	-	-	-	-	53,303	146,840	2,298	0	-	58,392	7,521	0	-	-	0	-
2005	-	-	-	-	-	0	31,827	660,546	0	-	-	12,377	96,336	0	-	-	-	-
2006	-	0	0	366	-	0	236,714	444,415	3,360	-	-	7,838	38,294	-	0	-	-	-
2007	-	-	-	-	-	0	654,572	161,990	2,298	0	-	34,264	3,462	0	-	-	-	0
2008	-	0	0	0	-	0	546,429	1,121,889	4,868	-	-	1,843	10,368	-	-	-	-	-
2009	-	-	-	-	-	0	236,271	646,647	423	-	-	12,172	20,330	-	-	-	-	-
2010	-	0	1,232	0	-	-	196,855	1,290,181	1,186	-	-	29,949	20,819	-	574	-	-	-
2011	-	0	0	-	-	0	208,047	1,000,434	2,816	-	-	23,181	62,822	-	-	432	-	-

Table 1b: Wood River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	0	-	-	5,684	907,852	451,856	-	-	15,166	172,395	45,045	-	-	-	-	-
1964	-	148	263	239	-	-	1,610,958	458,540	-	-	69	316,785	26,803	-	-	-	-	-
1965	-	851	2,736	-	-	1,739	218,861	942,241	-	-	-	96,536	39,543	-	-	-	-	-
1966	-	-	0	-	-	-	970,915	1,422,998	4,277	-	95	13,440	88,896	-	-	0	-	-
1967	-	0	0	504	-	117	591,145	422,690	871	-	659	109,138	25,286	-	-	-	-	-
1968	-	2,071	5,167	0	-	595	492,966	947,041	4,124	-	910	53,835	40,572	684	-	-	-	-
1969	-	0	2,100	-	-	5,584	597,032	320,746	-	-	134	386,106	39,341	-	-	-	243	-
1970	-	-	0	-	-	1,499	959,032	1,024,258	-	-	223	171,819	80,891	814	-	-	-	-
1971	-	-	7,435	0	-	909	575,431	1,205,631	4,897	-	527	50,018	218,813	-	-	-	-	-
1972	-	-	5,656	328	-	-	552,272	289,067	5,650	-	-	81,500	64,076	-	-	-	-	-
1973	-	-	1,899	0	39	3,952	60,777	565,465	653	316	-	3,926	97,783	248	-	-	-	-
1974	-	2,468	0	-	-	1,697	1,387,915	438,024	4,462	-	4,459	383,878	21,677	-	-	-	-	-
1975	-	1,695	19,061	-	-	1,707	444,270	1,022,201	10,313	-	-	179,643	94,957	-	-	-	-	-
1976	-	645	11,223	-	-	1,245	802,386	643,532	0	-	-	202,945	49,931	-	-	-	-	-
1977	-	0	1,261	0	-	2,409	233,282	422,945	0	-	-	41,828	111,167	-	-	-	-	-
1978	-	0	12,417	0	0	30,667	3,403,445	1,154,123	34,889	-	4,257	44,714	22,008	-	-	-	-	-
1979	-	0	0	-	-	1,967	1,796,332	1,924,881	0	-	-	437,456	24,991	-	-	0	-	-
1980	-	-	0	-	-	19,300	2,652,958	2,809,724	8,334	-	4,013	548,783	100,230	-	-	-	-	-
1981	-	-	0	-	-	-	1,275,546	3,010,833	7,864	-	0	617,473	1,097,316	-	-	-	-	-
1982	-	0	0	0	0	16,286	1,274,166	2,444,584	9,227	-	2,794	55,898	290,716	-	-	-	-	-
1983	-	0	0	0	-	-	2,360,529	688,659	0	-	-	1,025,110	27,016	3,349	-	1,968	-	-
1984	-	0	0	10,445	-	-	472,216	1,708,953	13,288	-	-	31,620	113,191	-	-	-	-	-
1985	-	0	0	0	-	3,628	613,922	810,844	1,419	-	-	72,534	25,417	-	-	-	-	-
1986	155	0	0	2,310	-	1,359	533,178	1,383,072	1,486	-	-	69,787	114,712	-	-	-	-	-
1987	-	0	1,041	0	-	382	1,839,383	1,388,423	0	-	-	125,734	162,822	-	-	-	-	-
1988	-	8,941	0	0	-	1,455	586,695	1,353,389	12,821	-	-	15,114	21,586	-	-	-	-	-
1989	-	3,188	16,157	1,241	-	2,187	1,380,822	1,499,000	2,818	-	-	80,679	113,650	-	-	-	-	-
1990	-	18,995	31,947	563	-	-	1,225,884	1,822,594	16,112	-	-	44,470	34,558	-	-	-	-	-
1991	-	7,723	74,929	1,261	-	1,124	1,579,965	2,760,108	3,605	-	148	52,691	24,716	-	-	-	-	-
1992	-	2,349	18,868	16,959	-	4,110	1,850,506	991,109	20,885	-	-	87,905	78,155	843	-	-	-	-
1993	-	5,651	19,841	4,368	-	1,442	2,563,487	1,935,323	6,777	-	-	90,117	121,126	-	-	-	-	-
1994	-	0	23,365	0	-	12,307	1,122,283	2,443,447	12,680	-	1,436	23,864	57,212	0	-	-	-	-
1995	-	8,953	8,271	5,426	-	1,295	2,739,167	1,824,009	2,447	-	-	301,351	46,747	949	-	-	-	-
1996	-	13,405	77,658	0	-	-	2,380,886	3,167,633	4,644	-	-	51,077	264,540	-	-	-	-	-
1997	-	-	1,681	6,088	-	10,892	1,710,296	1,931,609	65,018	911	-	85,259	66,660	0	-	-	619	-
1998	-	419	0	4,109	-	7,336	2,990,517	1,233,241	0	-	489	138,581	45,424	132	-	770	-	-
1999	-	-	-	-	-	-	4,452,435	2,383,374	2,588	-	-	400,066	163,437	1,182	-	-	-	-
2000	-	-	-	-	-	-	3,104,643	3,217,087	2,874	-	-	117,398	99,116	-	-	-	-	-
2001	-	-	-	-	-	2,776	204,615	4,383,745	9,319	-	-	2,900	40,742	-	-	-	-	-
2002	-	1,095	749	-	-	725	3,038,334	584,427	21,333	-	900	194,836	17,323	-	-	-	-	-
2003	-	-	-	-	-	4,297	2,291,700	3,535,682	25,529	-	448	148,017	227,699	-	-	-	-	-
2004	-	-	-	-	-	-	3,280,676	2,609,475	5,315	0	-	399,867	134,874	181	-	-	29	-
2005	-	-	-	-	-	44,386	2,176,259	3,230,094	8,219	-	-	112,748	309,514	314	-	-	-	-
2006	-	0	18,986	0	-	4,138	5,920,956	5,092,621	46,358	-	-	561,580	540,380	-	1,356	-	-	-
2007	-	-	-	-	-	10,784	5,460,152	2,140,999	13,504	0	-	242,412	62,794	0	-	-	-	35
2008	-	0	0	0	-	0	4,001,428	3,280,112	0	-	-	38,275	46,759	-	-	-	-	-
2009	-	-	-	-	-	40,677	2,659,363	4,737,761	73,578	-	-	119,736	114,808	-	-	-	-	-
2010	-	742	1,566	3,315	-	2,506	4,545,217	3,888,578	29,830	-	2,334	235,506	137,805	-	-	-	-	-
2011	-	678	0	2,347	-	0	1,421,241	3,009,281	9,582	-	-	180,699	87,671	-	-	-	-	-

Table 1c: Nushagak River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	0	39,870	0	-	34,663	0	311,993	0	-	0	65,872	0	-	-	-	-	-
1964	-	6,980	51,366	3	-	0	0	0	0	-	-	169,011	38,995	-	-	-	-	-
1965	-	11,314	51,759	3,589	-	1,451	210,436	213,741	602	-	-	47,670	41,625	-	-	-	-	-
1966	-	0	19,634	0	-	0	31	22,240	2,225	-	-	166,547	188,107	-	-	12,801	-	-
1967	-	13,964	40,442	10,665	-	0	0	0	0	-	-	66,348	8,210	-	-	-	-	-
1968	-	2,117	9,661	38,789	-	0	0	0	22,925	-	-	124,685	20,282	-	-	-	-	-
1969	-	4,968	13,934	1,351	-	670	86,140	51,330	226	-	0	15,074	10,698	-	-	-	0	-
1970	-	9,148	83,443	-	-	2,290	91,353	672,474	-	-	0	5,089	1,963	-	-	-	-	-
1971	-	0	26,640	1,061	-	0	118,677	520,071	0	-	7,843	0	0	-	-	-	-	-
1972	-	-	0	-	-	-	35,190	47,474	0	-	-	4,510	0	-	-	-	-	-
1973	-	2,654	97,507	7,854	0	-	4,815	293,845	4,048	0	-	0	6,403	0	-	-	-	-
1974	-	1,211	3,370	5,026	-	3,816	127,285	66,889	2,760	-	486	36,821	4,530	-	-	-	-	-
1975	-	3,598	9,601	0	-	0	1	12,169	4,045	-	1	745,793	278,589	-	-	-	-	-
1976	-	4,046	75,229	-	-	-	71,034	807,916	3,442	-	-	28,355	93,565	-	-	-	-	-
1977	-	1,112	25,302	887	-	-	0	863,255	2,596	-	-	46,130	157,501	-	-	-	-	-
1978	-	15,231	0	1,816	128	33,598	0	1,231,778	0	-	0	61,562	87,718	-	-	-	-	-
1979	-	6,033	16,604	0	-	-	622,880	70	12,062	-	-	347,528	43,019	-	-	605	-	-
1980	-	-	62,381	13,548	-	0	190,047	4,934,293	0	-	0	154,757	34,914	-	-	-	-	-
1981	-	0	16,136	0	-	-	21,274	3,422,923	95,363	-	7,964	203,260	108,875	-	-	-	-	-
1982	-	72,863	345,825	63,770	2,596	0	89,106	3,028,330	57,970	-	-	0	406,715	-	-	-	-	-
1983	-	22,436	529,084	133,718	-	-	430,997	933,192	92,537	-	-	11,883	6,077	0	-	0	-	-
1984	-	30,304	523,065	0	-	-	19,768	767,683	0	-	-	0	0	-	-	-	-	-
1985	-	82,470	101,602	34,504	-	1,195	250,006	312,947	45,526	-	-	167,393	0	-	-	-	-	-
1986	0	115,055	420,279	8,931	-	276	125,109	1,576,925	8,820	-	-	2,612	121,331	-	-	-	-	-
1987	-	10,147	502,453	34,031	-	0	233,673	594,091	5,804	-	-	0	0	0	-	-	-	-
1988	-	85,591	218,564	111,520	-	-	46,771	543,194	71,345	-	-	5,890	6,628	573	-	-	-	-
1989	-	94,281	533,285	26,533	-	-	63,478	432,523	17,210	-	-	3,962	19,467	-	-	-	-	-
1990	-	174,615	803,990	63,475	-	-	98,020	638,819	20,858	-	-	2,858	1,890	-	-	-	-	-
1991	-	53,520	667,893	54,040	-	-	32,994	791,155	18,464	-	-	0	10,900	-	-	-	-	-
1992	-	87,497	450,950	217,691	-	-	206,199	660,535	200,174	-	-	15,735	50,092	0	-	-	-	-
1993	-	108,080	463,980	110,430	-	-	105,904	1,651,453	122,522	-	-	5,343	11,517	820	-	-	-	-
1994	-	13,534	588,590	19,981	-	401	37,828	693,606	72,229	-	-	1,126	7,214	1,955	-	-	-	-
1995	-	102,933	138,116	113,335	-	-	124,515	292,042	22,475	-	189	13,239	3,920	-	-	232	-	-
1996	-	41,501	340,638	4,627	-	-	130,535	1,073,215	8,433	-	-	2,430	21,791	-	-	-	-	-
1997	-	1,504	49,450	1,047	-	207	48,386	567,660	124,084	0	-	9,027	10,371	5,910	-	-	0	-
1998	-	2,076	28,616	0	-	563	70,182	828,615	56,242	-	0	773	4,493	0	-	0	-	-
1999	-	-	-	-	-	-	62,891	277,738	102,422	-	-	5,625	3,132	0	-	-	-	-
2000	-	-	-	-	-	-	363,788	925,449	7,774	-	-	13,338	34,269	-	-	-	-	-
2001	-	-	-	-	-	0	37,572	1,857,241	186,962	-	-	4,811	7,199	-	-	-	-	-
2002	-	-	-	-	-	-	154,934	423,105	99,273	-	0	4,075	10,398	-	-	-	-	-
2003	-	-	-	-	-	0	88,031	2,237,869	27,112	-	0	7,352	49,296	-	-	-	-	-
2004	-	-	-	-	-	-	240,485	1,540,403	207,961	3,142	-	13,098	57,380	0	-	-	0	-
2005	-	-	-	-	-	0	256,405	3,299,220	77,948	-	-	5,167	34,236	0	-	-	-	-
2006	-	8,269	38,496	6,429	-	0	192,085	2,525,696	389,773	-	-	5,094	16,590	-	0	-	-	-
2007	-	-	-	-	-	0	396,387	1,783,792	258,150	1,084	-	30,928	24,507	4,222	-	-	-	0
2008	-	4,273	55,992	18,884	-	2,387	160,719	1,230,046	68,193	363	-	0	7,787	-	-	-	-	-
2009	-	-	-	-	-	0	303,869	1,156,550	192,828	-	-	4,828	16,901	-	-	-	-	-
2010	-	4,215	6,070	8,550	-	1,034	95,890	826,261	72,574	-	-	7,976	13,032	-	-	-	-	-
2011	-	0	51,951	1,429	-	1,273	30,183	976,883	36,706	-	-	5,166	19,987	-	-	-	-	-

Table 2: Reconstructed total annual returns to eastern Bristol Bay river systems, including high seas and South Peninsula catches, Kvichak River set net catches, Alagnak River Special Harvest Area catches, and Naknek River Special Harvest Area catches.

Table 2a: Kvichak River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	-	-	-	-	236,514	32,838	1,413	-	951	139,962	203,661	-	-	0	0	-
1964	-	1,602	-	-	-	-	1,017,277	0	6,053	-	889,149	208,489	59,115	-	-	0	0	-
1965	-	-	0	-	-	0	415,245	456,190	0	-	0	47,748,183	5,451	-	-	2,236	0	-
1966	-	-	0	-	-	-	107,817	201,593	3,128	-	1,970	2,307,309	6,282,092	0	-	11,625	0	-
1967	-	-	606	-	-	3,244	31,231	133,173	0	-	113	4,720,118	647,560	-	-	5,316	4,061	-
1968	-	-	0	-	-	23,983	2,288,423	80,023	0	-	111,882	925,528	534,851	0	-	8,963	2,311	-
1969	-	4,763	-	-	-	3,429	10,321,864	288,371	0	-	485,629	2,613,881	336,813	-	-	0	0	-
1970	-	-	0	-	-	-	524,322	299,793	3,941	-	16,342	33,528,681	446,099	-	-	6,606	13,902	-
1971	-	1,788	14,745	0	-	-	342,819	885,878	0	-	2,299	4,568,771	1,159,447	-	-	1,292	1,068	-
1972	-	-	0	968	-	0	300,687	321,956	0	-	-	991,239	517,436	0	-	0	0	-
1973	-	-	748	-	-	611	149,287	38,561	65	-	6,124	104,011	109,957	1,122	-	0	0	-
1974	-	-	-	-	-	0	45,471	321,597	4,514	-	28,962	4,476,992	176,512	-	-	7,305	-	-
1975	-	-	-	-	-	4,360	321,013	40,280	-	-	45,182	15,247,973	546,728	0	-	12,149	1,946	-
1976	-	0	0	-	-	-	1,971,913	653,575	-	-	0	919,844	0	0	-	0	0	-
1977	-	0	1,204	-	-	14,322	531,509	142,305	-	-	2,634	886,252	95,529	-	-	1,142	575	-
1978	-	-	0	0	-	6,365	6,047,999	1,048,800	10,886	-	319,232	252,857	232,955	0	-	0	0	-
1979	-	0	-	-	-	5,347	5,468,931	1,845,015	0	-	314,282	16,927,229	351,748	-	-	14,490	0	-
1980	-	6,590	16,621	-	-	36,699	5,940,228	1,305,049	0	-	37,502	29,958,382	616,516	-	0	14,093	0	-
1981	-	-	4,899	-	-	1,122	2,024,758	675,758	-	-	2,130	3,806,686	382,348	-	-	3,654	0	-
1982	-	2,381	0	-	-	53,985	1,613,301	718,010	3,355	-	15,273	174,744	230,826	0	-	-	-	-
1983	-	-	0	-	-	1,374	18,868,217	1,063,136	0	-	69,687	1,372,783	121,674	0	-	0	0	-
1984	-	-	0	0	-	-	2,539,067	2,470,065	0	-	13,603	17,920,528	987,655	-	-	0	0	-
1985	-	-	5,260	-	-	0	745,192	1,385,016	0	-	0	8,290,979	3,664,847	0	-	0	1,957	-
1986	-	-	0	-	-	909	492,711	188,993	2,963	-	531	962,156	364,127	0	-	0	-	-
1987	969	0	0	0	-	0	9,266,210	385,798	0	-	2,975	514,154	147,129	0	-	0	-	-
1988	-	3,827	1,184	0	-	7,558	2,578,404	2,994,862	4,844	-	46,565	1,110,949	111,109	0	-	0	0	-
1989	-	1,587	6,640	0	-	0	1,051,189	1,438,287	4,091	0	36,957	17,556,989	386,091	0	0	0	0	-
1990	-	28,969	22,024	-	-	7,292	652,824	958,922	0	-	0	14,848,955	1,662,891	8,088	-	0	0	-
1991	-	8,516	55,108	371	-	6,196	4,714,523	868,041	3,134	-	32,602	1,539,168	1,382,720	0	-	1,295	0	-
1992	-	31,825	23,767	6,575	-	3,333	3,035,544	2,193,713	22,539	-	17,855	4,275,758	1,007,382	8,513	-	0	1,079	-
1993	-	5,137	59,837	981	-	2,740	1,860,267	1,958,030	3,167	-	146,440	3,697,594	329,014	0	-	0	0	-
1994	-	0	7,655	1,909	-	1,129	1,635,341	1,072,267	1,920	-	82,331	18,332,312	453,823	0	-	0	0	-
1995	-	3,449	2,556	0	-	-	2,192,134	890,663	0	-	1,939	22,043,353	3,276,252	0	-	12,478	0	-
1996	-	-	3,727	0	-	230	651,475	1,181,519	0	-	2,137	1,008,333	1,626,522	0	-	0	0	-
1997	-	0	0	0	-	1,849	1,088,225	300,919	12,039	-	679	752,668	237,176	1,146	-	0	0	-
1998	-	-	0	2,570	-	17,601	2,023,264	873,002	0	-	47,942	683,808	162,197	0	-	0	0	-
1999	-	-	-	-	-	-	7,737,408	1,062,178	4,931	-	0	3,920,081	478,384	0	-	0	0	-
2000	-	-	-	20	-	-	548,460	2,107,239	119	-	-	677,565	249,058	-	-	0	0	-
2001	-	-	93	-	-	74	159,978	1,687,279	8,040	0	19	24,701	97,969	111	-	0	0	-
2002	-	18	-	-	-	370	379,112	146,338	9,756	-	638	348,003	30,144	1,515	0	63	18	-
2003	-	-	-	-	-	20	1,015,499	439,050	726	0	51,078	348,018	187,060	79	-	314	0	-
2004	-	-	22	-	-	-	1,888,515	282,916	18,322	-	0	5,817,918	95,634	156	-	0	0	10
2005	-	-	25	-	-	3,394	635,233	1,310,018	12,451	-	1,456	746,171	215,761	0	-	1,537	0	-
2006	-	9,830	0	0	-	3,840	2,351,273	1,774,193	1,300	-	2,380	737,948	331,310	33	-	52	33	-
2007	-	-	-	-	-	-	3,196,747	983,112	9,337	-	0	119,114	702,240	0	-	0	0	-
2008	-	-	0	0	-	4,311	4,857,596	1,227,644	645	0	0	31,645	10,541	0	-	0	0	-
2009	-	-	-	-	-	2,912	1,267,168	2,876,962	9,523	-	0	2,615,328	127,900	0	-	0	-	-
2010	-	-	0	0	-	0	3,702,072	2,085,082	0	-	0	4,570,381	573,679	0	-	0	-	-
2011	-	-	1,141	0	-	-	1,600,069	2,849,294	9,034	-	24,401	1,246,886	1,856,830	0	-	0	0	-

Table 2b: Alagnak River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	-	-	-	-	331,300	13,120	-	-	0	20,219	13,499	-	-	0	0	-
1964	-	0	-	-	-	4,469	121,361	338,122	-	-	0	286,854	8,577	-	-	0	0	-
1965	-	-	727	-	-	11,965	50,293	116,448	0	-	0	166,915	50,739	-	-	773	0	-
1966	-	-	0	-	-	-	110,266	232,931	0	-	-	6,139	43,429	0	-	0	1,312	-
1967	-	-	0	-	-	6,377	231,002	104,885	0	-	415	1,626	0	-	-	0	0	-
1968	-	-	0	-	-	8,480	97,650	151,684	0	-	1,880	30,953	22,573	0	-	813	0	-
1969	-	0	-	-	-	9,662	110,323	90,731	0	-	510	112,243	819	-	-	0	0	-
1970	-	-	0	-	-	5,830	304,544	88,348	-	-	-	29,040	73,018	-	-	0	0	-
1971	-	411	461	0	-	8,143	260,360	229,248	5,497	-	2,325	13,317	17,531	-	-	0	0	-
1972	-	-	0	0	-	0	182,414	52,163	0	-	-	59,200	8,812	0	-	0	0	-
1973	-	-	0	-	-	0	1,354	52,504	0	-	-	685	9,010	-	-	0	0	-
1974	-	-	-	-	-	1,233	78,027	54,757	2,130	-	0	108,529	2,904	-	-	0	-	-
1975	-	-	-	-	-	1,462	28,838	58,491	-	-	-	8,320	15,545	0	-	0	0	-
1976	-	0	0	-	-	-	70,320	56,204	-	-	0	30,123	803	0	-	0	0	-
1977	-	0	0	-	-	-	0	27,572	-	-	-	0	207,343	-	-	0	0	-
1978	-	-	1,911	3,099	-	-	722,581	6,687	0	-	0	350,600	0	0	-	24,814	1,012	-
1979	-	0	-	-	-	0	0	0	1,378	-	0	1,551,297	0	-	-	67,512	0	-
1980	-	0	77,257	-	-	163,394	0	467,275	1,867	-	1	0	0	-	62,201	0	83,665	-
1981	-	-	3,287	-	-	-	0	157,897	-	-	-	0	492,798	-	-	0	13,252	-
1982	-	-	0	-	-	-	561,752	689,175	0	-	-	0	94,649	0	-	-	-	-
1983	-	-	1,045	-	-	-	947,783	1,026,219	0	-	16,623	512,955	145,046	14,903	-	0	0	-
1984	-	-	4,640	0	-	-	0	81,155	15,371	-	0	1,047,577	0	-	-	42,750	1,758	-
1985	-	-	0	0	-	23	177,314	380,424	13,760	-	0	264,177	870	15,971	-	0	0	-
1986	-	-	5,982	0	-	6,471	1,625	1,008,499	17	-	0	141	203	131	-	0	0	-
1987	0	511	11,675	0	-	80	24,378	770,664	251	-	0	2,115	3,045	0	-	0	0	-
1988	-	0	6,138	0	-	6,277	398,295	463,089	214	-	0	1,800	2,592	0	-	0	0	-
1989	-	0	33,827	1,460	-	236	146,430	1,274,378	738	0	0	6,222	10,040	0	0	0	0	-
1990	-	0	0	0	-	274	83,362	907,093	23,391	-	0	7,232	678,490	0	-	0	1,807	-
1991	-	0	0	2,282	-	133	40,450	1,003,372	416	-	0	3,509	680,531	4,144	-	0	2,745	-
1992	-	0	0	0	-	70	21,438	436,526	221	-	0	1,860	1,028,274	0	-	0	832	-
1993	-	-	0	0	-	89,462	726,501	733,351	486	-	0	590,636	362,273	0	-	1,327	8,374	-
1994	-	0	2,798	1,216	-	17,582	100,715	1,447,044	18,698	-	0	594,430	12,581	0	-	0	0	-
1995	-	0	0	218	-	350	982,041	1,321,478	12,093	-	0	9,235	13,298	0	-	0	0	-
1996	-	-	34,889	0	-	66	20,150	2,344,664	4,327	-	0	1,748	2,517	1,719	-	0	0	-
1997	-	0	10,418	824	-	578,975	8,046	167,329	68	-	0	572	54,253	0	-	2,585	1,584	-
1998	-	-	1,553	0	-	60	18,414	968,778	190	-	0	217,647	2,300	0	-	0	0	-
1999	-	-	-	-	-	-	2,079,632	702,957	76	-	0	2,172	318,454	0	-	0	0	-
2000	-	-	0	23	-	5,837	59,440	1,895,548	11,092	-	0	5,235	262,268	0	-	7,930	0	-
2001	-	-	109	0	-	11,523	7,671	1,267,106	1,954	0	22	2,630	7,217	130	-	0	0	-
2002	-	21	-	-	-	0	19,420	641,113	206,075	-	8,081	102,505	14,186	85	0	74	21	-
2003	-	-	-	-	-	2,061	816,823	2,468,197	41,820	0	92	281,313	658,290	92	-	369	0	-
2004	-	-	26	-	-	40,207	5,601,880	1,229,261	167	-	0	657,881	62,440	10,235	-	0	0	274
2005	-	-	321	288	-	29	134,552	4,139,039	544	-	35	45,160	1,076,097	0	-	0	0	-
2006	-	-	5,510	0	-	0	1,617,936	1,158,282	23,113	-	0	40,378	104,315	9,407	-	100	63	-
2007	-	-	-	-	-	1,837	2,529,847	1,509,339	9,690	-	0	60,266	81,492	0	-	0	0	-
2008	-	-	0	0	-	0	870,940	3,707,507	3,996	0	0	5,779	37,101	0	-	0	0	-
2009	-	-	-	-	-	1,341	758,941	1,395,698	122,281	-	0	111,642	21,763	0	-	0	-	-
2010	-	-	0	0	-	1,621	683,084	1,840,684	15,411	-	0	163,695	152,569	0	-	0	-	-
2011	-	-	0	0	-	826	515,085	1,619,461	7,543	-	0	62,057	128,197	0	-	0	0	-

Table 2c: Naknek River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	-	-	-	-	486,708	140,335	452	-	7,813	597,028	563,156	225	-	813	0	-
1964	-	0	113	-	-	-	1,072,773	230,913	98	-	4,347	532,280	101,204	-	-	1,666	0	-
1965	-	-	0	-	-	170	112,176	286,245	0	-	4,331	549,353	266,999	-	-	0	2,793	-
1966	-	-	0	-	-	-	130,455	971,787	0	-	5,809	330,857	1,443,356	0	-	2,522	0	-
1967	-	-	0	-	-	743	141,944	262,141	7,771	-	23,215	396,108	721,523	1,605	-	0	0	-
1968	-	-	0	-	-	12,877	342,531	416,187	1,575	-	34,421	700,970	303,501	0	-	6,576	3,444	-
1969	-	0	-	-	-	13,371	634,432	256,174	0	-	37,064	1,275,540	418,190	-	-	6,330	0	-
1970	-	-	0	-	-	-	918,493	600,345	-	-	2,025	854,535	309,692	-	-	4,430	0	-
1971	-	0	0	0	-	3,585	352,459	2,573,070	0	-	3,787	209,618	515,515	-	-	0	0	-
1972	-	-	0	0	-	0	126,410	522,757	3,000	-	-	330,689	485,528	0	-	0	0	-
1973	-	-	0	-	-	597	45,889	202,857	0	-	4,366	88,011	342,019	519	-	0	0	-
1974	-	-	-	-	-	225	161,583	240,153	257	-	17,756	837,021	216,580	457	-	611	-	-
1975	-	-	-	-	-	2,938	349,684	281,376	-	-	17,309	1,549,928	1,007,865	0	-	2,051	0	-
1976	-	0	0	-	-	-	228,954	630,688	-	-	35,046	1,777,140	504,895	0	-	17,444	6,434	-
1977	-	0	1,257	-	-	1,544	610,280	397,108	1,478	-	255	359,615	1,537,578	-	-	1,979	1,726	-
1978	-	-	0	0	-	1,029	253,899	715,809	5,084	-	1,832	564,689	676,509	25,170	-	3,618	9,172	-
1979	-	0	-	-	-	4,277	456,699	393,360	0	-	11,804	1,103,750	850,378	2,647	-	0	3,690	-
1980	-	0	0	-	-	4,429	1,013,493	1,630,147	0	-	4,423	1,539,430	880,690	-	0	7,439	0	-
1981	-	-	4,313	-	-	393	788,791	4,461,321	-	-	-	1,950,161	1,547,266	-	-	4,586	0	-
1982	-	-	0	-	-	8,951	490,174	2,456,928	24,292	-	9,731	145,844	1,520,144	4,744	-	-	-	-
1983	-	-	0	-	-	803	1,389,279	949,602	74,909	-	5,950	631,141	242,959	10,680	-	0	2,941	-
1984	-	-	0	0	-	4,917	1,059,833	1,322,934	2,206	-	17,349	761,179	704,090	1,394	-	958	1,493	-
1985	-	-	0	-	-	5,079	770,379	1,629,612	5,030	-	5,842	1,341,149	463,047	0	-	6,049	0	-
1986	-	-	0	-	-	0	163,761	2,359,153	11,979	-	-	592,347	859,933	0	-	0	1,498	-
1987	0	0	0	0	-	241	176,012	926,020	18,479	-	7,647	221,369	928,049	1,477	-	0	-	-
1988	-	0	0	0	-	2,051	504,531	547,077	27,213	-	30,073	344,686	469,143	4,335	-	0	0	-
1989	-	0	1,481	0	-	7,133	802,849	802,905	5,761	684	29,205	1,525,063	370,620	7,450	0	0	0	-
1990	-	2,601	5,477	3,654	-	0	1,820,705	3,232,301	11,970	-	2,362	1,576,311	1,508,076	0	-	0	0	-
1991	-	0	14,558	0	-	-	366,144	6,641,769	54,457	-	2,429	1,209,214	1,398,709	1,420	-	0	0	-
1992	-	0	0	3,047	-	1,174	351,616	1,237,224	437,077	-	31,289	611,602	2,469,231	37,784	-	0	8,610	-
1993	-	-	0	-	-	0	356,238	1,105,709	117,645	709	4,340	769,987	3,105,993	41,218	-	0	0	-
1994	-	2,135	0	0	-	10,015	624,332	795,431	18,312	-	48,018	1,333,842	692,581	10,933	-	0	0	-
1995	-	0	0	0	-	-	427,160	869,546	0	-	2,276	1,448,355	513,440	3,191	-	2,404	0	-
1996	-	-	5,579	0	-	119	157,494	3,509,444	4,968	-	474	137,991	813,436	0	-	0	0	-
1997	-	0	0	0	-	4,898	349,586	746,815	62,276	-	14,293	280,285	421,595	16,030	1,600	0	0	-
1998	-	-	0	-	-	8,512	497,096	1,110,393	11,801	-	16,689	424,747	261,958	1,437	-	3,486	0	-
1999	-	-	-	-	-	1,324	2,373,542	745,786	23,595	-	480	715,250	748,754	0	-	0	0	-
2000	-	-	-	268	-	-	334,193	3,074,289	1,607	-	-	114,668	367,018	-	-	0	0	-
2001	-	-	1,260	-	-	1,008	94,944	5,453,703	67,471	0	6,804	48,123	167,592	2,656	-	0	0	-
2002	-	243	-	-	-	-	583,437	878,522	105,202	-	1,476	803,235	370,295	3,283	0	851	243	-
2003	-	-	-	-	-	2,952	693,625	1,895,432	14,909	0	7,508	538,146	1,554,577	2,617	-	4,247	0	-
2004	-	-	301	-	-	-	1,175,274	1,357,184	17,590	-	0	688,479	727,396	2,112	-	0	0	135
2005	-	-	331	-	-	48,389	475,095	6,650,001	14,515	-	10,531	439,966	899,604	0	-	0	0	-
2006	-	-	0	1,492	-	8,998	1,691,664	3,425,105	93,073	-	1,843	478,834	539,376	1,108	-	2,055	1,108	-
2007	-	-	-	-	-	-	4,066,808	4,136,648	55,151	-	0	278,282	901,823	0	-	0	0	-
2008	-	-	0	0	-	36,689	941,940	7,723,581	87,654	3,169	3,328	243,366	209,666	0	-	0	0	-
2009	-	-	-	-	-	50,379	1,231,247	1,416,406	256,748	-	10,562	913,012	537,622	20,557	-	1,600	-	-
2010	-	-	0	0	-	17,531	1,601,297	2,213,378	15,928	-	18,811	744,102	654,532	4,967	-	0	-	-
2011	-	-	0	0	-	22,966	1,760,600	1,758,457	23,298	-	14,250	668,709	859,728	1,381	-	0	0	-

Table 2d: Egegik River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	-	-	-	-	50,461	62,982	-	-	2,487	1,064,196	706,516	-	-	89,606	15,612	-
1964	-	0	-	-	-	-	213,842	155,085	88	-	397	1,246,563	290,239	-	-	28,637	77,749	-
1965	-	-	0	-	-	0	47,269	340,500	782	-	0	4,134,128	635,809	-	-	10,515	1,946	-
1966	-	-	0	-	-	-	3,547	104,164	0	-	405	383,656	2,347,789	130	-	43,857	20,304	-
1967	-	-	1,025	-	-	229	2,667	19,755	0	-	2,264	716,891	916,276	-	-	27,632	38,324	-
1968	-	-	0	-	-	0	61,058	85,597	0	-	5,946	513,647	309,637	0	-	27,596	8,496	-
1969	-	0	-	-	-	-	24,284	36,450	0	-	24,472	1,534,887	298,367	-	-	82,831	15,425	-
1970	-	-	177	-	-	-	145,854	10,867	-	-	105	1,485,854	222,304	-	-	72,732	7,475	-
1971	-	0	1,901	0	-	-	56,673	550,528	1,594	-	470	563,055	811,266	-	-	6,338	4,276	-
1972	-	-	1,006	0	-	0	20,399	188,696	1,040	-	-	748,745	781,194	1,013	-	9,642	22,797	-
1973	-	-	0	-	-	0	8,738	46,666	0	-	3,358	90,534	630,902	-	-	669	6,675	-
1974	-	-	-	-	-	0	106,127	103,338	0	-	0	1,090,569	200,828	1,833	-	0	1,542	-
1975	-	-	-	-	-	0	21,238	81,045	-	-	3,282	565,760	1,178,715	8,546	-	371,010	9,076	-
1976	-	0	0	-	-	-	0	0	-	-	0	1,289,361	0	0	-	415,534	0	-
1977	-	1,443	0	-	-	-	35,038	72,018	-	-	438	1,532,500	1,266,965	-	-	55,646	34,119	-
1978	-	-	0	0	-	-	49,638	75,611	186	-	12,430	585,165	1,234,294	0	-	56,930	64,037	-
1979	-	148	-	-	-	0	55,085	88,787	0	-	7,279	1,666,319	724,246	-	-	23,869	13,973	147
1980	-	0	0	-	-	2,322	381,107	151,116	0	-	53,443	2,234,183	561,290	-	0	58,939	7,319	-
1981	-	-	0	-	-	-	823,006	452,344	-	-	1,846	2,772,401	580,804	-	-	8,921	2,462	-
1982	-	-	0	-	-	2,849	387,998	1,935,491	586	-	6,741	628,139	820,445	1,090	-	-	1,690	-
1983	-	-	0	-	-	4,870	657,110	422,635	11,696	-	2,251	6,590,350	698,975	0	-	58,420	0	-
1984	-	-	23,353	6,465	-	-	706,929	219,731	860	-	22,072	1,973,576	2,484,585	-	-	13,141	7,714	-
1985	-	-	0	-	-	1,760	593,701	2,450,675	0	-	45,162	4,057,646	1,176,405	0	364	0	8,594	-
1986	-	-	897	-	-	2,415	1,215,776	432,117	4,963	-	11,571	2,884,091	948,962	1,571	-	4,766	-	-
1987	0	0	0	0	-	484	1,282,101	1,931,668	3,248	-	7,320	1,691,663	1,471,877	0	-	6,296	-	-
1988	-	437	1,314	3	-	437	398,897	2,555,258	6,506	-	85,897	3,488,493	1,558,433	0	-	22,309	7,620	-
1989	-	0	144	0	-	1,429	427,083	639,629	6,403	0	34,431	5,260,591	3,448,747	0	1,922	13,745	1,032	-
1990	-	1,256	2,040	-	-	0	2,423,619	783,057	5,628	-	10,940	4,033,588	5,138,764	16,762	-	213,884	8,377	-
1991	-	0	2,372	0	-	1,182	700,407	3,251,084	2,772	-	69,644	4,069,668	1,104,000	8,683	-	4,127	37,133	-
1992	-	0	2,320	0	-	-	296,386	4,226,110	68,379	-	106,453	8,875,890	4,211,869	0	5,644	95,138	10,934	-
1993	-	-	0	-	-	0	199,358	1,050,429	134,575	-	37,847	11,128,647	11,467,511	56,104	-	154,958	39,003	-
1994	973	4,455	0	0	-	1,478	396,193	251,553	5,754	-	74,425	5,203,932	6,468,032	44,152	2,168	258,258	66,152	-
1995	-	1,242	742	0	-	65	1,212,942	730,898	4,117	-	19,243	8,837,133	4,249,920	3,865	3,001	190,062	162,944	-
1996	-	-	10,947	312	-	0	240,059	2,876,328	5,087	-	39,134	3,225,540	5,984,620	436	-	13,136	28,421	-
1997	-	131	0	1,620	-	7,738	117,645	531,833	25,216	-	30,559	4,580,933	2,574,044	32,458	2,399	9,063	19,351	-
1998	-	-	0	-	-	3,568	249,901	329,685	2,780	-	67,695	801,758	3,194,004	136	-	38,979	7,970	-
1999	-	-	-	-	-	367	1,500,682	494,915	1	-	3,072	3,817,731	654,747	9,436	-	1,218	19,352	-
2000	-	-	-	0	-	-	412,770	2,697,814	2	-	3,505	1,728,403	3,301,571	-	-	26,840	3,878	-
2001	-	-	1	-	-	1	17,156	1,386,030	18,705	0	18,771	542,746	1,540,145	21,873	2,450	11,318	7,829	-
2002	-	0	-	-	-	-	20,244	177,699	21,928	-	12,649	3,493,279	1,749,105	13,866	9,876	30,409	14,791	-
2003	-	-	-	-	-	542	162,160	75,987	12	0	171,815	490,651	2,069,036	3,087	89	233,787	9,140	-
2004	-	-	0	-	-	-	1,303,938	396,161	2	-	25,313	9,216,012	654,417	2,144	-	15,146	40,681	0
2005	-	-	0	-	-	27,683	292,693	2,432,023	205	-	47,730	3,547,120	3,036,121	954	-	18,606	56	-
2006	-	-	246	1,677	-	19,116	1,474,478	811,140	32,474	-	45,941	1,592,534	4,601,497	2,298	-	18,938	10,957	-
2007	-	-	-	-	-	23,592	2,102,688	2,376,879	24	-	41,425	1,137,703	2,157,264	22,681	-	953	8,209	-
2008	-	-	0	0	-	4,342	2,783,108	2,616,815	3	0	39,793	1,921,231	526,236	0	-	547	518	-
2009	-	-	-	-	-	7,767	505,400	3,847,253	28,087	-	36,681	6,212,797	2,368,749	333	2,255	5,013	-	-
2010	-	-	0	0	-	8,763	153,695	214,446	0	-	121,107	2,862,199	1,761,770	5,182	739	26,572	2,019	-
2011	-	-	0	0	-	318	56,843	256,668	77	-	71,973	1,604,779	2,471,900	359	318	32,837	7,358	-

Table 2e: Ugashik River Return Table

Return Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4
1963	-	-	-	-	-	867	27,692	165,552	997	-	3,694	440,004	40,843	-	-	0	0	-
1964	-	0	-	-	-	68	937,286	60,777	-	-	5,926	248,741	53,021	-	-	0	0	-
1965	-	-	10,770	-	-	241	329,872	391,312	649	-	1,262	1,997,877	152,271	-	-	0	0	-
1966	-	-	699	-	-	-	77,487	484,229	962	-	754	273,290	531,780	0	-	1,452	3,087	-
1967	-	-	0	-	-	134	10,884	149,928	1,166	-	49	158,144	119,789	-	-	0	0	-
1968	-	-	102	-	-	0	18,938	21,608	79	-	10,590	77,497	20,233	266	-	0	43	-
1969	-	373	-	-	-	101	47,512	8,226	2,126	-	2,815	220,163	20,578	-	-	0	0	-
1970	-	-	407	-	-	-	772,416	51,187	-	-	-	212,640	16,285	-	-	0	0	-
1971	-	0	0	117	-	-	98,166	1,554,969	549	-	0	42,250	76,458	-	-	1,794	294	-
1972	-	-	0	0	-	111	16,985	54,844	228	-	-	42,254	17,326	0	-	0	0	-
1973	-	-	0	-	-	0	4,548	10,063	0	-	319	13,508	34,932	-	-	42	0	-
1974	-	-	-	-	-	0	3,709	5,661	0	-	206	52,668	4,394	114	-	0	-	-
1975	-	-	-	-	-	0	193,376	2,799	-	-	-	303,316	24,458	138	-	1,479	0	-
1976	-	0	0	-	-	-	0	0	-	-	0	573,773	0	0	-	44,928	0	-
1977	-	0	4,467	-	-	-	26,045	87,271	-	-	-	145,198	165,880	-	-	85	751	-
1978	-	-	0	0	-	1,088	9,986	6,764	0	-	14,010	21,377	39,458	1,723	-	1,744	966	-
1979	-	1,672	-	-	-	0	1,565,299	8,385	322	-	5,169	660,052	37,294	-	-	6,039	2,499	-
1980	-	0	0	-	-	792	2,328,527	578,240	0	-	61,272	1,608,268	65,474	-	0	0	0	-
1981	-	-	11,008	-	-	-	642,643	1,705,028	-	-	-	1,352,579	365,466	-	-	1,513	0	-
1982	-	-	7,170	-	-	22,988	245,524	1,822,598	8,660	-	3,163	230,133	341,624	790	-	-	-	-
1983	-	-	0	-	-	1,117	3,310,049	336,577	5,813	-	10,427	343,912	138,885	0	-	0	1,667	-
1984	-	241	5,236	0	-	862	1,405,682	786,900	4,513	-	35,830	1,672,861	253,589	1,279	-	0	0	-
1985	-	-	4,923	-	-	4,612	1,742,848	2,168,620	23,149	-	6,623	3,340,378	649,600	0	-	0	0	-
1986	-	-	4,886	-	-	0	325,144	3,026,316	14,429	-	266	2,261,027	1,090,174	4,903	-	118	-	-
1987	271	1,456	11,993	1,156	-	74	733,445	680,769	3,536	-	3,616	543,063	928,975	1,322	-	176	-	-
1988	-	1,890	9,752	728	-	446	479,070	252,188	8,558	-	50,449	562,322	788,766	840	-	0	0	-
1989	-	5,097	8,788	0	-	555	646,672	605,045	2,966	0	1,021	3,868,234	221,150	2,660	0	683	0	-
1990	-	5,013	48,360	-	-	97	459,133	807,662	12,416	-	791	878,033	500,562	0	-	0	0	-
1991	-	569	7,801	47	-	1,792	856,287	2,678,224	2,117	-	11,200	1,927,760	470,692	0	-	0	2,285	-
1992	-	3,611	7,709	0	-	5,841	470,674	1,811,272	77,767	-	33,262	1,998,161	1,925,184	5,839	-	1,780	0	-
1993	-	-	8,149	-	-	973	928,095	795,859	13,745	-	13,860	2,017,127	2,421,039	17,548	-	0	0	-
1994	-	443	10,683	0	-	6,839	374,148	407,094	19,276	-	12,544	2,510,021	2,182,730	39,037	-	6,050	441	-
1995	-	4,730	264	1,407	-	6,373	2,062,760	787,736	10,738	-	420	2,004,254	1,024,234	1,267	-	0	8,074	-
1996	-	1,082	59,369	0	-	1,969	322,814	3,857,895	2,495	-	9,210	452,463	662,351	872	-	0	0	-
1997	-	0	2,503	1,048	-	19,401	408,154	839,634	19,160	-	5,034	935,931	276,451	1,553	-	0	0	-
1998	-	2,857	1,013	-	-	10,259	260,810	391,193	691	-	7,829	273,268	940,403	3,835	-	0	0	-
1999	-	-	-	-	-	-	3,802,898	521,884	29,347	-	0	596,037	244,609	27,504	-	0	1,345	-
2000	-	-	-	0	-	-	260,720	1,732,446	8,351	-	-	130,252	168,483	-	-	0	417	-
2001	-	-	1	-	-	1,238	283,854	1,052,662	31,441	97	2,867	31,822	63,083	2,368	-	0	96	-
2002	-	0	-	-	-	3,671	179,230	648,117	1,086	-	21	1,657,938	9,139	784	0	1	0	-
2003	-	-	-	-	-	2,249	1,255,334	303,091	11,954	140	24,648	524,932	419,619	346	-	5	0	-
2004	-	-	0	-	-	629	1,866,458	908,027	4,403	-	397	1,185,693	235,098	2,117	-	465	0	0
2005	-	-	0	-	-	7,745	399,404	2,344,874	4,849	-	2,010	44,468	289,650	0	-	0	0	-
2006	-	17,191	7,592	419	-	10,960	2,070,087	1,426,191	25,678	-	242	131,676	76,025	3,134	-	2	1	-
2007	-	-	-	-	-	12,621	4,843,226	2,123,295	53,711	-	0	257,067	118,875	0	-	0	0	-
2008	-	-	483	559	-	664	1,250,399	1,397,088	9,790	335	374	37,722	24,481	373	-	13	0	-
2009	-	-	-	-	-	67,054	839,102	1,461,936	11,712	-	1,960	1,171,779	51,471	0	-	0	-	-
2010	-	-	2,976	927	-	41,832	1,059,585	2,295,455	2,888	-	21,803	1,168,235	359,826	0	-	0	-	-
2011	-	-	0	356	-	7,971	1,274,071	1,081,722	6,203	-	13,582	957,471	930,654	0	-	1,476	0	-

Table 3: Reconstructed brood tables for western Bristol Bay river systems, including high seas and South Peninsula catches, Igushik River set net catches, and Wood River Special Harvest Area catches.

Table 3a: Igushik River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	
1956	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	-	NA	NA	-	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	-	-	NA	NA	9,213	-	NA	-	-	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	37,357	-	-	NA	14,002	13,488	-	-	-	-	-	NA	NA	NA
1959	NA	NA	0	0	-	NA	75,779	90,589	-	-	0	45,064	16,194	-	-	-	-	-	NA	NA	NA
1960	NA	-	264	-	-	0	41,542	225,973	0	-	106	26,635	29,630	-	-	0	-	-	NA	NA	NA
1961	-	0	78	-	-	-	28,373	253,124	211	-	-	9,653	9,303	-	-	-	-	-	NA	NA	NA
1962	-	-	860	0	-	-	16,811	200,762	0	-	-	5,144	5,541	-	-	-	0	-	NA	NA	NA
1963	-	-	292	0	-	-	196,558	137,346	-	-	-	22,418	11,591	-	-	-	-	-	92,184	368,205	3.99
1964	-	105	507	-	-	-	124,313	325,005	-	-	261	103,991	28,877	-	-	-	-	-	128,532	583,060	4.54
1965	-	0	0	-	-	299	319,406	270,050	0	-	0	168,321	52,842	-	-	-	-	-	180,840	810,920	4.48
1966	-	0	0	0	-	0	54,401	232,637	122	0	0	5,392	8,482	0	-	-	61	-	206,360	301,093	1.46
1967	-	356	430	-	0	-	43,479	59,861	59	-	0	10,884	10,676	-	-	-	-	-	281,772	125,745	0.45
1968	-	452	167	31	-	-	48,450	101,707	888	-	-	513	6,715	-	-	-	-	-	194,508	158,923	0.82
1969	-	-	88	-	-	-	830	107,254	1,387	-	-	278,332	88,831	-	-	-	-	-	512,328	476,722	0.93
1970	-	-	321	-	-	-	36,788	144,568	0	-	299	62,987	42,459	12	-	-	-	-	370,920	287,436	0.77
1971	-	0	1,291	-	-	-	58,279	131,521	197	-	-	39,333	28,794	-	-	-	-	-	210,960	259,415	1.23
1972	-	93	913	61	0	-	93,771	117,097	4,097	-	-	5,306	10,712	-	-	-	-	-	60,018	232,049	3.87
1973	-	0	1,279	866	-	-	17,241	399,007	0	-	-	14,681	18,927	-	-	0	-	-	59,508	452,000	7.60
1974	-	49	1,356	-	-	-	412,983	589,285	1,192	-	1,370	240,733	20,162	-	-	-	-	-	358,752	1,267,130	3.53
1975	-	134	0	-	-	0	543,521	1,835,022	1,199	-	-	119,242	311,785	-	-	-	-	-	241,086	2,810,903	11.66
1976	-	0	0	-	0	-	412,828	741,008	8,897	-	4,261	106,555	80,921	196	-	-	-	-	186,120	1,354,667	7.28
1977	-	-	2,917	0	-	773	174,667	585,308	46,621	-	0	5,600	14,540	-	-	0	-	-	95,970	830,426	8.65
1978	-	-	0	0	-	-	36,011	368,460	73	-	-	146,031	11,700	-	-	-	-	-	536,154	562,275	1.05
1979	-	0	196	0	-	0	611,312	263,565	0	-	-	10,184	11,078	-	-	140	-	-	859,560	896,476	1.04
1980	-	0	0	0	-	-	14,270	353,924	0	-	-	34,537	41,072	-	-	-	-	-	1,987,530	443,803	0.22
1981	-	0	0	0	-	-	243,467	502,783	51,416	-	-	6,742	34,236	-	-	-	-	-	591,144	838,645	1.42
1982	-	0	6,544	0	-	-	50,848	272,741	1,045	-	-	7,067	8,363	-	-	-	-	-	423,768	346,608	0.82
1983	-	1,151	0	27	-	-	105,984	247,075	1,685	-	-	6,211	28,971	-	-	-	-	-	180,438	391,104	2.17
1984	0	0	232	0	-	-	30,298	419,161	3,267	-	-	52,282	16,033	1,680	-	-	-	-	184,872	522,953	2.83
1985	-	0	6,293	0	-	-	395,498	639,188	5,889	-	-	50,116	41,160	809	-	-	-	-	212,454	1,138,951	5.36
1986	-	2,705	8,615	2,213	-	-	157,348	1,497,275	7,475	-	-	9,445	15,520	-	-	-	-	-	307,728	1,700,597	5.53
1987	-	1,607	12,589	0	-	-	75,588	338,281	5,679	-	-	2,145	9,626	0	-	-	-	-	169,236	445,515	2.63
1988	-	0	0	91	-	-	105,973	479,542	1,659	-	-	5,734	21,898	-	-	-	-	-	170,454	614,898	3.61
1989	-	145	2,991	0	-	-	213,200	693,503	5,198	-	-	48,454	28,293	-	-	-	-	-	461,610	991,784	2.15
1990	-	46	3,116	0	-	166	138,198	883,941	2,186	0	-	95,135	106,710	0	-	-	0	-	365,802	1,229,498	3.36
1991	-	0	905	0	-	-	170,953	798,731	2,464	-	-	2,065	8,821	0	-	-	-	-	756,126	983,939	1.30
1992	-	0	2,985	0	-	-	30,018	91,714	323	-	-	5,335	9,187	0	-	0	-	-	304,920	139,561	0.46
1993	-	0	0	0	-	-	100,426	239,151	0	-	-	13,737	4,862	-	-	-	-	-	405,564	358,174	0.88
1994	-	-	0	-	-	-	163,637	435,419	1,001	-	0	42,976	16,920	-	-	-	-	-	445,920	659,953	1.48
1995	-	0	-	-	-	0	376,062	881,256	5,961	-	-	6,531	8,446	-	-	-	-	-	473,382	1,278,256	2.70
1996	-	-	-	-	-	-	77,032	800,393	2,787	-	-	807	5,344	63	-	-	-	-	400,746	886,426	2.21
1997	-	-	1,199	-	-	-	1,927	51,668	1,857	0	-	9,522	33,171	0	-	-	0	-	127,704	99,345	0.78
1998	-	-	-	-	-	0	130,362	393,266	2,298	-	0	2,907	7,521	0	-	-	-	-	215,904	536,354	2.48
1999	-	-	-	-	-	-	60,852	146,840	0	-	67	58,392	96,336	-	-	-	-	0	445,536	362,488	0.81
2000	-	-	-	-	-	0	53,303	660,546	3,360	0	-	12,377	38,294	0	-	-	-	-	413,316	767,881	1.86
2001	-	-	-	366	-	-	31,827	444,415	2,298	-	-	7,838	3,462	-	0	-	-	-	409,596	490,207	1.20
2002	-	-	0	-	-	0	236,714	161,990	4,868	-	-	34,264	10,368	-	-	-	-	-	123,156	448,204	3.64
2003	-	0	-	0	-	0	654,572	1,121,889	423	-	-	1,843	20,330	-	-	-	-	-	194,088	1,799,058	9.27
2004	-	-	0	-	-	0	546,429	646,647	1,186	-	-	12,172	20,819	-	-	-	-	NA	109,650	NA	NA
2005	-	0	-	0	-	0	236,271	1,290,181	2,816	NA	-	29,949	62,822	NA	574	432	NA	NA	365,712	NA	NA
2006	-	-	1,232	-	NA	0	196,855	1,000,434	NA	NA	-	23,181	NA	NA	-	NA	NA	NA	305,268	NA	NA
2007	-	0	0	NA	NA	-	208,047	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	415,452	NA	NA
2008	-	0	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,054,704	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	514,188	NA	NA

Table 3b: Wood River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	-	NA	NA	-	-	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	-	-	NA	NA	45,045	-	NA	-	-	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	451,856	-	-	NA	172,395	26,803	-	-	-	-	-	NA	NA	NA
1959	NA	NA	0	239	-	NA	907,852	458,540	-	-	15,166	316,785	39,543	-	-	-	-	-	NA	NA	NA
1960	NA	-	263	-	-	5,684	1,610,958	942,241	4,277	-	69	96,536	88,896	-	-	0	-	-	NA	NA	NA
1961	-	148	2,736	-	-	-	218,861	1,422,998	871	-	-	13,440	25,286	684	-	-	-	-	NA	NA	NA
1962	-	851	0	504	-	1,739	970,915	422,690	4,124	-	95	109,138	40,572	-	-	-	243	-	NA	NA	NA
1963	-	-	0	0	-	-	591,145	947,041	-	-	659	53,835	39,341	814	-	-	-	-	721,404	1,632,836	2.26
1964	-	0	5,167	-	-	117	492,966	320,746	-	-	910	386,106	80,891	-	-	-	-	-	1,076,112	1,286,903	1.20
1965	-	2,071	2,100	-	-	595	597,032	1,024,258	4,897	-	134	171,819	218,813	-	-	-	-	-	675,156	2,021,719	2.99
1966	-	0	0	0	-	5,584	959,032	1,205,631	5,650	316	223	50,018	64,076	248	-	-	-	-	1,208,682	2,290,780	1.90
1967	-	-	7,435	328	39	1,499	575,431	289,067	653	-	527	81,500	97,783	-	-	-	-	-	515,772	1,054,264	2.04
1968	-	-	5,656	0	-	909	552,272	565,465	4,462	-	-	3,926	21,677	-	-	-	-	-	649,344	1,154,367	1.78
1969	-	-	1,899	-	-	-	60,777	438,024	10,313	-	-	383,878	94,957	-	-	-	-	-	604,338	989,848	1.64
1970	-	-	0	-	-	3,952	1,387,915	1,022,201	0	-	4,459	179,643	49,931	-	-	-	-	-	1,161,964	2,648,102	2.28
1971	-	2,468	19,061	-	-	1,697	444,270	643,532	0	-	-	202,945	111,167	-	-	-	-	-	851,202	1,425,140	1.67
1972	-	1,695	11,223	0	0	1,707	802,386	422,945	34,889	-	-	41,828	22,008	-	-	-	-	-	430,602	1,338,679	3.11
1973	-	645	1,261	0	-	1,245	233,282	1,154,123	0	-	-	44,714	24,991	-	-	0	-	-	330,474	1,460,260	4.42
1974	-	0	12,417	-	-	2,409	3,403,445	1,924,881	8,334	-	4,257	437,456	100,230	-	-	-	-	-	1,708,836	5,893,430	3.45
1975	-	0	0	-	-	30,667	1,796,332	2,809,724	7,864	-	-	548,783	1,097,316	-	-	-	-	-	1,270,116	6,290,687	4.95
1976	-	0	0	-	0	1,967	2,652,958	3,010,833	9,227	-	4,013	617,473	290,716	3,349	-	-	-	-	817,008	6,590,536	8.07
1977	-	-	0	0	-	19,300	1,275,546	2,444,584	0	-	0	55,898	27,016	-	-	1,968	-	-	561,828	3,824,313	6.81
1978	-	-	0	0	-	-	1,274,166	688,659	13,288	-	2,794	1,025,110	113,191	-	-	-	-	-	2,267,238	3,117,207	1.37
1979	-	0	0	10,445	-	16,286	2,360,529	1,708,953	1,419	-	-	31,620	25,417	-	-	-	-	-	1,706,352	4,154,669	2.43
1980	-	0	0	0	-	-	472,216	810,844	1,486	-	-	72,534	114,712	-	-	-	-	-	2,969,040	1,471,792	0.50
1981	-	0	0	2,310	-	-	613,922	1,383,072	0	-	-	69,787	162,822	-	-	-	-	-	1,233,318	2,231,913	1.81
1982	-	0	0	0	-	3,628	533,178	1,388,423	12,821	-	-	125,734	21,586	-	-	-	-	-	976,470	2,085,371	2.14
1983	-	0	1,041	0	-	1,359	1,839,383	1,353,389	2,818	-	-	15,114	113,650	-	-	-	-	-	1,360,968	3,326,753	2.44
1984	155	0	0	1,241	-	382	586,695	1,499,000	16,112	-	-	80,679	34,558	-	-	-	-	-	1,002,792	2,218,822	2.21
1985	-	8,941	16,157	563	-	1,455	1,380,822	1,822,594	3,605	-	-	44,470	24,716	843	-	-	-	-	939,000	3,304,167	3.52
1986	-	3,188	31,947	1,261	-	2,187	1,225,884	2,760,108	20,885	-	-	52,691	78,155	-	-	-	-	-	818,652	4,176,305	5.10
1987	-	18,995	74,929	16,959	-	-	1,579,965	991,109	6,777	-	148	87,905	121,126	0	-	-	-	-	1,337,172	2,897,914	2.17
1988	-	7,723	18,868	4,368	-	1,124	1,850,506	1,935,323	12,680	-	-	90,117	57,212	949	-	-	-	-	866,778	3,978,870	4.59
1989	-	2,349	19,841	0	-	4,110	2,563,487	2,443,447	2,447	-	-	23,864	46,747	-	-	-	-	-	1,186,410	5,106,291	4.30
1990	-	5,651	23,365	5,426	-	1,442	1,122,283	1,824,009	4,644	911	1,436	301,351	264,540	0	-	-	619	-	1,069,440	3,555,678	3.32
1991	-	0	8,271	0	-	12,307	2,739,167	3,167,633	65,018	-	-	51,077	66,660	132	-	-	-	-	1,159,920	6,110,265	5.27
1992	-	8,953	77,658	6,088	-	1,295	2,380,886	1,931,609	0	-	-	85,259	45,424	1,182	-	770	-	-	1,286,250	4,539,123	3.53
1993	-	13,405	1,681	4,109	-	-	1,710,296	1,233,241	2,588	-	-	138,581	163,437	-	-	-	-	-	1,176,126	3,267,339	2.78
1994	-	-	0	-	-	10,892	2,990,517	2,383,374	2,874	-	489	400,066	99,116	-	-	-	-	-	1,471,890	5,887,328	4.00
1995	-	419	-	-	-	7,336	4,452,435	3,217,087	9,319	-	-	117,398	40,742	-	-	-	-	-	1,482,162	7,844,736	5.29
1996	-	-	-	-	-	-	3,104,643	4,383,745	21,333	-	-	2,900	17,323	-	-	-	-	-	1,649,598	7,529,945	4.56
1997	-	-	-	-	-	-	204,615	584,427	25,529	0	-	194,836	227,699	181	-	-	29	-	1,512,396	1,237,317	0.82
1998	-	-	749	-	-	2,776	3,038,334	3,535,682	5,315	-	900	148,017	134,874	314	-	-	-	-	1,755,768	6,866,961	3.91
1999	-	1,095	-	-	-	725	2,291,700	2,609,475	8,219	-	448	399,867	309,514	-	-	-	-	35	1,512,426	5,621,078	3.72
2000	-	-	-	-	-	4,297	3,280,676	3,230,094	46,358	0	-	112,748	540,380	0	-	-	-	-	1,300,026	7,214,553	5.55
2001	-	-	-	0	-	-	2,176,259	5,092,621	13,504	-	-	561,580	62,794	-	1,356	-	-	-	1,458,732	7,908,115	5.42
2002	-	-	18,986	-	-	44,386	5,920,956	2,140,999	0	-	-	242,412	46,759	-	-	-	-	-	1,283,682	8,414,497	6.55
2003	-	0	-	0	-	4,138	5,460,152	3,280,112	73,578	-	-	38,275	114,808	-	-	-	-	-	1,459,782	8,971,062	6.15
2004	-	-	0	-	-	10,784	4,001,428	4,737,761	29,830	-	-	119,736	137,805	-	-	-	-	NA	1,543,392	NA	NA
2005	-	0	-	3,315	-	0	2,659,363	3,888,578	9,582	NA	-	235,506	87,671	NA	-	-	NA	NA	1,496,550	NA	NA
2006	-	-	1,566	2,347	NA	40,677	4,545,217	3,009,281	NA	NA	2,334	180,699	NA	NA	-	NA	NA	NA	4,008,102	NA	NA
2007	-	742	0	NA	NA	2,506	1,421,241	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	1,528,086	NA	NA
2008	-	678	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,724,676	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,319,232	NA	NA

Table 3c: Nushagak River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	-	NA	NA	-	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	0	-	NA	NA	0	-	NA	-	-	-	NA	NA	NA
1958	NA	NA	NA	0	-	NA	NA	311,993	0	-	NA	65,872	38,995	-	-	-	-	-	NA	NA	NA
1959	NA	NA	39,870	3	-	NA	0	0	602	-	0	169,011	41,625	-	-	-	-	-	NA	NA	NA
1960	NA	0	51,366	3,589	-	34,663	0	213,741	2,225	-	-	47,670	188,107	-	-	12,801	-	-	NA	NA	NA
1961	-	6,980	51,759	0	-	0	210,436	22,240	0	-	-	166,547	8,210	-	-	-	-	-	NA	NA	NA
1962	-	11,314	19,634	10,665	-	1,451	31	0	22,925	-	-	66,348	20,282	-	-	-	0	-	NA	NA	NA
1963	-	0	40,442	38,789	-	0	0	0	226	-	-	124,685	10,698	-	-	-	-	-	234,821	214,841	0.91
1964	-	13,964	9,661	1,351	-	0	0	51,330	-	-	-	15,074	1,963	-	-	-	-	-	134,853	93,342	0.69
1965	-	2,117	13,934	-	-	0	86,140	672,474	0	-	0	5,089	0	-	-	-	-	-	255,794	779,754	3.05
1966	-	4,968	83,443	1,061	-	670	91,353	520,071	0	0	0	0	0	0	-	-	-	-	233,578	701,566	3.00
1967	-	9,148	26,640	-	0	2,290	118,677	47,474	4,048	-	7,843	4,510	6,403	-	-	-	-	-	74,003	227,033	3.07
1968	-	0	0	7,854	-	0	35,190	293,845	2,760	-	-	0	4,530	-	-	-	-	-	142,360	344,179	2.42
1969	-	-	97,507	5,026	-	-	4,815	66,889	4,045	-	-	36,821	278,589	-	-	-	-	-	95,805	493,692	5.15
1970	-	2,654	3,370	0	-	-	127,285	12,169	3,442	-	486	745,793	93,565	-	-	-	-	-	452,892	988,764	2.18
1971	-	1,211	9,601	-	-	3,816	1	807,916	2,596	-	1	28,355	157,501	-	-	-	-	-	312,699	1,010,999	3.23
1972	-	3,598	75,229	887	128	0	71,034	863,255	0	-	-	46,130	87,718	-	-	-	-	-	39,851	1,147,980	28.81
1973	-	4,046	25,302	1,816	-	-	0	1,231,778	12,062	-	-	61,562	43,019	-	-	605	-	-	210,601	1,380,189	6.55
1974	-	1,112	0	0	-	-	0	70	0	-	0	347,528	34,914	-	-	-	-	-	204,190	383,623	1.88
1975	-	15,231	16,604	13,548	-	33,598	622,880	4,934,293	95,363	-	-	154,757	108,875	-	-	-	-	-	832,093	5,995,149	7.20
1976	-	6,033	62,381	0	2,596	-	190,047	3,422,923	57,970	-	0	203,260	406,715	0	-	-	-	-	520,303	4,351,924	8.36
1977	-	-	16,136	63,770	-	0	21,274	3,028,330	92,537	-	7,964	0	6,077	-	-	0	-	-	611,588	3,236,089	5.29
1978	-	0	345,825	133,718	-	-	89,106	933,192	0	-	-	11,883	0	-	-	-	-	-	734,040	1,513,725	2.06
1979	-	72,863	529,084	0	-	0	430,997	767,683	45,526	-	-	0	0	-	-	-	-	-	551,272	1,846,153	3.35
1980	-	22,436	523,065	34,504	-	-	19,768	312,947	8,820	-	-	167,393	121,331	0	-	-	-	-	3,669,136	1,210,266	0.33
1981	-	30,304	101,602	8,931	-	-	250,006	1,576,925	5,804	-	-	2,612	0	573	-	-	-	-	1,118,873	1,976,757	1.77
1982	-	82,470	420,279	34,031	-	1,195	125,109	594,091	71,345	-	-	0	6,628	-	-	-	-	-	664,580	1,335,148	2.01
1983	-	115,055	502,453	111,520	-	276	233,673	543,194	17,210	-	-	5,890	19,467	-	-	-	-	-	446,845	1,548,738	3.47
1984	0	10,147	218,564	26,533	-	0	46,771	432,523	20,858	-	-	3,962	1,890	-	-	-	-	-	655,739	761,247	1.16
1985	-	85,591	533,285	63,475	-	-	63,478	638,819	18,464	-	-	2,858	10,900	0	-	-	-	-	551,319	1,416,870	2.57
1986	-	94,281	803,990	54,040	-	-	98,020	791,155	200,174	-	-	0	50,092	820	-	-	-	-	1,095,241	2,092,574	1.91
1987	-	174,615	667,893	217,691	-	-	32,994	660,535	122,522	-	-	15,735	11,517	1,955	-	-	-	-	429,182	1,905,456	4.44
1988	-	53,520	450,950	110,430	-	-	206,199	1,651,453	72,229	-	-	5,343	7,214	-	-	-	-	-	534,460	2,557,339	4.78
1989	-	87,497	463,980	19,981	-	-	105,904	693,606	22,475	-	-	1,126	3,920	-	-	232	-	-	567,863	1,398,722	2.46
1990	-	108,080	588,590	113,335	-	-	37,828	292,042	8,433	0	-	13,239	21,791	5,910	-	-	0	-	752,513	1,189,247	1.58
1991	-	13,534	138,116	4,627	-	401	124,515	1,073,215	124,084	-	189	2,430	10,371	0	-	-	-	-	544,748	1,491,482	2.74
1992	-	102,933	340,638	1,047	-	-	130,535	567,660	56,242	-	-	9,027	4,493	0	-	0	-	-	768,816	1,212,574	1.58
1993	-	41,501	49,450	0	-	-	48,386	828,615	102,422	-	-	773	3,132	-	-	-	-	-	790,927	1,074,278	1.36
1994	-	1,504	28,616	-	-	207	70,182	277,738	7,774	-	0	5,625	34,269	-	-	-	-	-	563,334	425,915	0.76
1995	-	2,076	-	-	-	563	62,891	925,449	186,962	-	-	13,338	7,199	-	-	-	-	-	311,136	1,198,477	3.85
1996	-	-	-	-	-	-	363,788	1,857,241	99,273	-	-	4,811	10,398	-	-	-	-	-	557,057	2,335,512	4.19
1997	-	-	-	-	-	-	37,572	423,105	27,112	3,142	-	4,075	49,296	0	-	-	0	-	412,591	544,302	1.32
1998	-	-	-	-	-	0	154,934	2,237,869	207,961	-	0	7,352	57,380	0	-	-	-	-	507,532	2,665,496	5.25
1999	-	-	-	-	-	-	88,031	1,540,403	77,948	-	0	13,098	34,236	-	-	-	-	0	344,972	1,753,716	5.08
2000	-	-	-	-	-	0	240,485	3,299,220	389,773	1,084	-	5,167	16,590	4,222	-	-	-	-	446,286	3,956,541	8.87
2001	-	-	-	6,429	-	-	256,405	2,525,696	258,150	363	-	5,094	24,507	-	0	-	-	-	897,112	3,076,644	3.43
2002	-	-	38,496	-	-	0	192,085	1,783,792	68,193	-	-	30,928	7,787	-	-	-	-	-	349,155	2,121,281	6.08
2003	-	8,269	-	18,884	-	0	396,387	1,230,046	192,828	-	-	0	16,901	-	-	-	-	-	642,093	1,863,316	2.90
2004	-	-	55,992	-	-	0	160,719	1,156,550	72,574	-	-	4,828	13,032	-	-	-	-	NA	543,872	NA	NA
2005	-	4,273	-	8,550	-	2,387	303,869	826,261	36,706	NA	-	7,976	19,987	NA	-	-	NA	NA	1,106,703	NA	NA
2006	-	-	6,070	1,429	NA	0	95,890	976,883	NA	NA	-	5,166	NA	NA	-	NA	NA	NA	548,410	NA	NA
2007	-	4,215	51,951	NA	NA	1,034	30,183	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	518,041	NA	NA
2008	-	0	NA	NA	NA	1,273	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	492,546	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	484,149	NA	NA

Table 4: Reconstructed brood tables for eastern Bristol Bay river systems, including high seas and South Peninsula catches, Kvichak River set net catches, Alagnak River Special Harvest Area catches, and Naknek River Special Harvest Area catches.

Table 4a: Kvichak River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA		-	NA	NA	NA	-	NA	NA	0	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	1,413	-	NA	NA	203,661	-	NA	0	0	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	32,838	6,053	-	NA	139,962	59,115	-	-	0	0	-	NA	NA	NA
1959	NA	NA	-	-	-	NA	236,514	0	0	-	951	208,489	5,451	0	-	2,236	0	-	NA	NA	NA
1960	NA	-	-	-	-	-	1,017,277	456,190	3,128	-	889,149	47,748,183	6,282,092	-	-	11,625	4,061	-	NA	NA	NA
1961	-	1,602	0	-	-	-	415,245	201,593	0	-	0	2,307,309	647,560	0	-	5,316	2,311	-	NA	NA	NA
1962	-	-	0	-	-	0	107,817	133,173	0	-	1,970	4,720,118	534,851	-	-	8,963	0	-	NA	NA	NA
1963	-	-	606	-	-	-	31,231	80,023	0	-	113	925,528	336,813	-	-	0	13,902	-	338,760	1,388,216	4.10
1964	-	-	0	-	-	3,244	2,288,423	288,371	3,941	-	111,882	2,613,881	446,099	-	-	6,606	1,068	-	957,120	5,763,515	6.02
1965	-	-	-	-	-	23,983	10,321,864	299,793	0	-	485,629	33,528,681	1,159,447	0	-	1,292	0	-	24,325,926	45,820,689	1.88
1966	-	4,763	0	0	-	3,429	524,322	885,878	0	-	16,342	4,568,771	517,436	1,122	-	0	0	-	3,755,185	6,522,062	1.74
1967	-	-	14,745	968	-	-	342,819	321,956	65	-	2,299	991,239	109,957	-	-	0	-	-	3,216,208	1,784,048	0.55
1968	-	1,788	0	-	-	-	300,687	38,561	4,514	-	-	104,011	176,512	0	-	7,305	1,946	-	2,557,440	635,324	0.25
1969	-	-	748	-	-	0	149,287	321,597	-	-	6,124	4,476,992	546,728	0	-	12,149	0	-	8,394,204	5,513,626	0.66
1970	-	-	-	-	-	611	45,471	40,280	-	-	28,962	15,247,973	0	-	-	0	575	-	13,935,306	15,363,872	1.10
1971	-	-	-	-	-	0	321,013	653,575	-	-	45,182	919,844	95,529	0	-	1,142	0	-	2,387,392	2,036,285	0.85
1972	-	-	0	-	-	4,360	1,971,913	142,305	10,886	-	0	886,252	232,955	-	-	0	0	-	1,009,962	3,248,671	3.22
1973	-	0	1,204	0	-	-	531,509	1,048,800	0	-	2,634	252,857	351,748	-	-	14,490	0	-	226,554	2,203,241	9.73
1974	-	0	0	-	-	14,322	6,047,999	1,845,015	0	-	319,232	16,927,229	616,516	-	-	14,093	0	-	4,433,844	25,784,407	5.82
1975	-	-	-	-	-	6,365	5,468,931	1,305,049	-	-	314,282	29,958,382	382,348	0	0	3,654	-	-	13,140,450	37,439,011	2.85
1976	-	0	16,621	-	-	5,347	5,940,228	675,758	3,355	-	37,502	3,806,686	230,826	0	-	-	0	-	1,965,282	10,716,323	5.45
1977	-	6,590	4,899	-	-	36,699	2,024,758	718,010	0	-	2,130	174,744	121,674	-	-	0	0	-	1,341,144	3,089,502	2.30
1978	-	-	0	-	-	1,122	1,613,301	1,063,136	0	-	15,273	1,372,783	987,655	0	-	0	1,957	-	4,149,288	5,055,228	1.22
1979	-	2,381	0	0	-	53,985	18,868,217	2,470,065	0	-	69,687	17,920,528	3,664,847	0	-	0	-	-	11,218,434	43,049,711	3.84
1980	-	-	0	-	-	1,374	2,539,067	1,385,016	2,963	-	13,603	8,290,979	364,127	0	-	0	-	-	22,505,268	12,597,129	0.56
1981	-	-	5,260	-	-	-	745,192	188,993	0	-	0	962,156	147,129	0	-	0	0	-	1,754,358	2,048,731	1.17
1982	-	-	0	0	-	0	492,711	385,798	4,844	0	531	514,154	111,109	0	-	0	0	-	1,134,840	1,509,147	1.33
1983	-	-	0	0	-	909	9,266,210	2,994,862	4,091	-	2,975	1,110,949	386,091	8,088	-	0	0	-	3,569,982	13,774,175	3.86
1984	-	0	1,184	0	-	0	2,578,404	1,438,287	0	-	46,565	17,556,989	1,662,891	0	0	0	0	-	10,490,670	23,284,320	2.22
1985	969	3,827	6,640	-	-	7,558	1,051,189	958,922	3,134	-	36,957	14,848,955	1,382,720	8,513	-	1,295	1,079	-	7,211,046	18,311,756	2.54
1986	-	1,587	22,024	371	-	0	652,824	868,041	22,539	-	0	1,539,168	1,007,382	0	-	0	0	-	1,179,322	4,113,937	3.49
1987	-	28,969	55,108	6,575	-	7,292	4,714,523	2,193,713	3,167	-	32,602	4,275,758	329,014	0	-	0	0	-	6,065,880	11,646,723	1.92
1988	-	8,516	23,767	981	-	6,196	3,035,544	1,958,030	1,920	-	17,855	3,697,594	453,823	0	-	0	0	-	4,065,216	9,204,227	2.26
1989	-	31,825	59,837	1,909	-	3,333	1,860,267	1,072,267	0	-	146,440	18,332,312	3,276,252	0	-	12,478	0	-	8,317,500	24,796,919	2.98
1990	-	5,137	7,655	0	-	2,740	1,635,341	890,663	0	-	82,331	22,043,353	1,626,522	1,146	-	0	0	-	6,970,020	26,294,888	3.77
1991	-	0	2,556	0	-	1,129	2,192,134	1,181,519	12,039	-	1,939	1,008,333	237,176	0	-	0	0	-	4,222,788	4,636,825	1.10
1992	-	3,449	3,727	0	-	-	651,475	300,919	0	-	2,137	752,668	162,197	0	-	0	0	-	4,725,864	1,876,573	0.40
1993	-	-	0	2,570	-	230	1,088,225	873,002	4,931	-	679	683,808	478,384	-	-	0	0	-	4,025,166	3,131,830	0.78
1994	-	0	0	-	-	1,849	2,023,264	1,062,178	119	0	47,942	3,920,081	249,058	111	-	0	0	-	8,355,936	7,304,603	0.87
1995	-	-	-	20	-	17,601	7,737,408	2,107,239	8,040	-	0	677,565	97,969	1,515	-	0	18	-	10,038,720	10,647,375	1.06
1996	-	-	-	-	-	-	548,460	1,687,279	9,756	0	-	24,701	30,144	79	-	63	0	10	1,450,578	2,300,492	1.59
1997	-	-	93	-	-	-	159,978	146,338	726	-	19	348,003	187,060	156	0	314	0	-	1,503,732	842,686	0.56
1998	-	-	-	-	-	74	379,112	439,050	18,322	-	638	348,018	95,634	0	-	0	0	-	2,296,074	1,280,847	0.56
1999	-	18	-	-	-	370	1,015,499	282,916	12,451	-	51,078	5,817,918	215,761	33	-	1,537	33	-	6,196,914	7,397,614	1.19
2000	-	-	22	-	-	20	1,888,515	1,310,018	1,300	-	0	746,171	331,310	0	-	52	0	-	1,827,780	4,277,407	2.34
2001	-	-	25	0	-	-	635,233	1,774,193	9,337	0	1,456	737,948	702,240	0	-	0	0	-	1,095,348	3,860,432	3.52
2002	-	-	0	-	-	3,394	2,351,273	983,112	645	-	2,380	119,114	10,541	0	-	0	-	-	703,884	3,470,460	4.93
2003	-	9,830	-	0	-	3,840	3,196,747	1,227,644	9,523	-	0	31,645	127,900	0	-	0	-	-	1,686,804	4,607,129	2.73
2004	-	-	0	-	-	-	4,857,596	2,876,962	0	-	0	2,615,328	573,679	0	-	0	0	NA	5,500,134	NA	NA
2005	-	-	-	0	-	4,311	1,267,168	2,085,082	9,034	NA	0	4,570,381	1,856,830	NA	-	0	NA	NA	2,320,332	NA	NA
2006	-	-	0	0	NA	2,912	3,702,072	2,849,294	NA	NA	0	1,246,886	NA	NA	-	NA	NA	NA	3,068,226	NA	NA
2007	-	-	1,141	NA	NA	0	1,600,069	NA	NA	NA	24,401	NA	NA	NA	NA	NA	NA	NA	2,810,208	NA	NA
2008	-	-	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,757,912	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,266,140	NA	NA

Table 4b: Alagnak River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA		-	NA	NA	NA	-	NA	NA	0	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	-	-	NA	NA	13,499	-	NA	0	0	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	13,120	-	-	NA	20,219	8,577	-	-	0	0	-	NA	NA	NA
1959	NA	NA	-	-	-	NA	331,300	338,122	0	-	0	286,854	50,739	0	-	773	1,312	-	NA	NA	NA
1960	NA	-	-	-	-	-	121,361	116,448	0	-	0	166,915	43,429	-	-	0	0	-	NA	NA	NA
1961	-	0	727	-	-	4,469	50,293	232,931	0	-	0	6,139	0	0	-	0	0	-	NA	NA	NA
1962	-	-	0	-	-	11,965	110,266	104,885	0	-	-	1,626	22,573	-	-	813	0	-	NA	NA	NA
1963	-	-	0	-	-	-	231,002	151,684	0	-	415	30,953	819	-	-	0	0	-	203,304	414,873	2.04
1964	-	-	0	-	-	6,377	97,650	90,731	-	-	1,880	112,243	73,018	-	-	0	0	-	248,700	381,900	1.54
1965	-	-	-	-	-	8,480	110,323	88,348	5,497	-	510	29,040	17,531	0	-	0	0	-	175,020	259,729	1.48
1966	-	0	0	0	-	9,662	304,544	229,248	0	-	-	13,317	8,812	-	-	0	0	-	174,336	565,584	3.24
1967	-	-	461	0	-	5,830	260,360	52,163	0	-	2,325	59,200	9,010	-	-	0	-	-	202,626	389,349	1.92
1968	-	411	0	-	-	8,143	182,414	52,504	2,130	-	-	685	2,904	0	-	0	0	-	193,872	249,192	1.29
1969	-	-	0	-	-	0	1,354	54,757	-	-	-	108,529	15,545	0	-	0	0	-	182,490	180,185	0.99
1970	-	-	-	-	-	0	78,027	58,491	-	-	0	8,320	803	-	-	0	0	-	177,060	145,642	0.82
1971	-	-	-	-	-	1,233	28,838	56,204	-	-	-	30,123	207,343	0	-	0	1,012	-	187,302	324,752	1.73
1972	-	-	0	-	-	1,462	70,320	27,572	0	-	0	0	0	-	-	24,814	0	-	151,188	124,168	0.82
1973	-	0	0	3,099	-	-	0	6,687	1,378	-	-	350,600	0	-	-	67,512	83,665	-	35,280	512,940	14.54
1974	-	0	1,911	-	-	-	722,581	0	1,867	-	0	1,551,297	0	-	-	0	13,252	-	214,848	2,290,909	10.66
1975	-	-	-	-	-	-	0	467,275	-	-	0	0	492,798	0	62,201	0	-	-	100,480	1,022,274	10.17
1976	-	0	77,257	-	-	0	0	157,897	0	-	1	0	94,649	14,903	-	-	0	-	81,822	344,709	4.21
1977	-	0	3,287	-	-	163,394	0	689,175	0	-	-	0	145,046	-	-	0	1,758	-	108,911	1,002,659	9.21
1978	-	-	0	-	-	-	561,752	1,026,219	15,371	-	-	512,955	0	15,971	-	42,750	0	-	584,970	2,175,018	3.72
1979	-	-	1,045	0	-	-	947,783	81,155	13,760	-	16,623	1,047,577	870	131	-	0	0	-	750,210	2,108,944	2.81
1980	-	-	4,640	0	-	-	0	380,424	17	-	0	264,177	203	0	-	0	0	-	759,645	649,461	0.85
1981	-	-	0	0	-	-	177,314	1,008,499	251	-	0	141	3,045	0	-	0	0	-	209,636	1,189,250	5.67
1982	-	-	5,982	0	-	23	1,625	770,664	214	0	0	2,115	2,592	0	-	0	0	-	610,215	783,215	1.28
1983	-	-	11,675	0	-	6,471	24,378	463,089	738	-	0	1,800	10,040	0	-	0	1,807	-	245,361	519,999	2.12
1984	-	511	6,138	1,460	-	80	398,295	1,274,378	23,391	-	0	6,222	678,490	4,144	0	0	2,745	-	549,194	2,395,855	4.36
1985	0	0	33,827	0	-	6,277	146,430	907,093	416	-	0	7,232	680,531	0	-	0	832	-	300,977	1,782,638	5.92
1986	-	0	0	2,282	-	236	83,362	1,003,372	221	-	0	3,509	1,028,274	0	-	0	8,374	-	586,959	2,129,631	3.63
1987	-	0	0	0	-	274	40,450	436,526	486	-	0	1,860	362,273	0	-	1,327	0	-	393,236	843,196	2.14
1988	-	0	0	0	-	133	21,438	733,351	18,698	-	0	590,636	12,581	0	-	0	0	-	496,307	1,376,837	2.77
1989	-	0	0	1,216	-	70	726,501	1,447,044	12,093	-	0	594,430	13,298	1,719	-	0	0	-	501,738	2,796,371	5.57
1990	-	-	2,798	218	-	89,462	100,715	1,321,478	4,327	-	0	9,235	2,517	0	-	0	1,584	-	430,338	1,532,335	3.56
1991	-	0	0	0	-	17,582	982,041	2,344,664	68	-	0	1,748	54,253	0	-	2,585	0	-	707,852	3,402,940	4.81
1992	-	0	34,889	824	-	350	20,150	167,329	190	-	0	572	2,300	0	-	0	0	-	577,940	226,603	0.39
1993	-	-	10,418	0	-	66	8,046	968,778	76	-	0	217,647	318,454	0	-	0	0	-	887,336	1,523,485	1.72
1994	-	0	1,553	-	-	578,975	18,414	702,957	11,092	0	0	2,172	262,268	130	-	7,930	0	-	618,464	1,585,492	2.56
1995	-	-	-	23	-	60	2,079,632	1,895,548	1,954	-	0	5,235	7,217	85	-	0	21	-	550,068	3,989,777	7.25
1996	-	-	0	0	-	-	59,440	1,267,106	206,075	0	0	2,630	14,186	92	-	74	0	274	782,213	1,549,878	1.98
1997	-	-	109	-	-	5,837	7,671	641,113	41,820	-	22	102,505	658,290	10,235	0	369	0	-	556,193	1,467,972	2.64
1998	-	-	-	-	-	11,523	19,420	2,468,197	167	-	8,081	281,313	62,440	0	-	0	0	-	643,110	2,851,140	4.43
1999	-	21	-	-	-	0	816,823	1,229,261	544	-	92	657,881	1,076,097	9,407	-	0	63	-	1,182,180	3,790,191	3.21
2000	-	-	26	288	-	2,061	5,601,880	4,139,039	23,113	-	0	45,160	104,315	0	-	100	0	-	1,150,815	9,915,981	8.62
2001	-	-	321	0	-	40,207	134,552	1,158,282	9,690	0	35	40,378	81,492	0	-	0	0	-	680,850	1,464,957	2.15
2002	-	-	5,510	-	-	29	1,617,936	1,509,339	3,996	-	0	60,266	37,101	0	-	0	-	-	766,962	3,234,177	4.22
2003	-	-	-	0	-	0	2,529,847	3,707,507	122,281	-	0	5,779	21,763	0	-	0	-	-	3,676,146	6,387,177	1.74
2004	-	-	0	-	-	1,837	870,940	1,395,698	15,411	-	0	111,642	152,569	0	-	0	0	NA	5,396,592	NA	NA
2005	-	-	-	0	-	0	758,941	1,840,684	7,543	NA	0	163,695	128,197	NA	-	0	NA	NA	4,218,990	NA	NA
2006	-	-	0	0	NA	1,341	683,084	1,619,461	NA	NA	0	62,057	NA	NA	-	NA	NA	NA	1,773,966	NA	NA
2007	-	-	0	NA	NA	1,621	515,085	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	2,466,414	NA	NA
2008	-	-	NA	NA	NA	826	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,180,502	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	970,818	NA	NA

Table 4c: Naknek River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	225	NA	NA	0	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	452	-	NA	NA	563,156	-	NA	813	0	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	140,335	98	-	NA	597,028	101,204	-	-	1,666	2,793	-	NA	NA	NA
1959	NA	NA	-	-	-	NA	486,708	230,913	0	-	7,813	532,280	266,999	0	-	0	0	-	NA	NA	NA
1960	NA	-	113	-	-	-	1,072,773	286,245	0	-	4,347	549,353	1,443,356	1,605	-	2,522	0	-	NA	NA	NA
1961	-	0	0	-	-	-	112,176	971,787	7,771	-	4,331	330,857	721,523	0	-	0	3,444	-	NA	NA	NA
1962	-	-	0	-	-	170	130,455	262,141	1,575	-	5,809	396,108	303,501	-	-	6,576	0	-	NA	NA	NA
1963	-	-	0	-	-	-	141,944	416,187	0	-	23,215	700,970	418,190	-	-	6,330	0	-	905,358	1,706,836	1.89
1964	-	-	0	-	-	743	342,531	256,174	-	-	34,421	1,275,540	309,692	-	-	4,430	0	-	1,349,604	2,223,531	1.65
1965	-	-	-	-	-	12,877	634,432	600,345	0	-	37,064	854,535	515,515	0	-	0	0	-	717,798	2,654,768	3.70
1966	-	0	0	0	-	13,371	918,493	2,573,070	3,000	-	2,025	209,618	485,528	519	-	0	0	-	1,016,445	4,205,622	4.14
1967	-	-	0	0	-	-	352,459	522,757	0	-	3,787	330,689	342,019	457	-	0	-	-	755,640	1,552,168	2.05
1968	-	0	0	-	-	3,585	126,410	202,857	257	-	-	88,011	216,580	0	-	611	0	-	1,023,222	638,312	0.62
1969	-	-	0	-	-	0	45,889	240,153	-	-	4,366	837,021	1,007,865	0	-	2,051	6,434	-	1,331,202	2,143,778	1.61
1970	-	-	-	-	-	597	161,583	281,376	-	-	17,756	1,549,928	504,895	-	-	17,444	1,726	-	732,502	2,535,306	3.46
1971	-	-	-	-	-	225	349,684	630,688	1,478	-	17,309	1,777,140	1,537,578	25,170	-	1,979	9,172	-	935,754	4,350,422	4.65
1972	-	-	0	-	-	2,938	228,954	397,108	5,084	-	35,046	359,615	676,509	2,647	-	3,618	3,690	-	586,518	1,715,207	2.92
1973	-	0	1,257	0	-	-	610,280	715,809	0	-	255	564,689	850,378	-	-	0	0	-	356,676	2,742,669	7.69
1974	-	0	0	-	-	1,544	253,899	393,360	0	-	1,832	1,103,750	880,690	-	-	7,439	0	-	1,241,058	2,642,513	2.13
1975	-	-	-	-	-	1,029	456,699	1,630,147	-	-	11,804	1,539,430	1,547,266	4,744	0	4,586	-	-	2,026,686	5,195,705	2.56
1976	-	0	0	-	-	4,277	1,013,493	4,461,321	24,292	-	4,423	1,950,161	1,520,144	10,680	-	-	2,941	-	1,320,750	8,991,732	6.81
1977	-	0	4,313	-	-	4,429	788,791	2,456,928	74,909	-	-	145,844	242,959	1,394	-	0	1,493	-	1,085,856	3,721,059	3.43
1978	-	-	0	-	-	393	490,174	949,602	2,206	-	9,731	631,141	704,090	0	-	958	0	-	813,378	2,788,295	3.43
1979	-	-	0	0	-	8,951	1,389,279	1,322,934	5,030	-	5,950	761,179	463,047	0	-	6,049	1,498	-	925,362	3,963,916	4.28
1980	-	-	0	-	-	803	1,059,833	1,629,612	11,979	-	17,349	1,341,149	859,933	1,477	-	0	-	-	2,644,698	4,922,134	1.86
1981	-	-	0	-	-	4,917	770,379	2,359,153	18,479	-	5,842	592,347	928,049	4,335	-	0	0	-	1,796,220	4,683,500	2.61
1982	-	-	0	0	-	5,079	163,761	926,020	27,213	684	-	221,369	469,143	7,450	-	0	0	-	1,155,552	1,820,719	1.58
1983	-	-	0	0	-	0	176,012	547,077	5,761	-	7,647	344,686	370,620	0	-	0	0	-	888,294	1,451,803	1.63
1984	-	0	0	0	-	241	504,531	802,905	11,970	-	30,073	1,525,063	1,508,076	1,420	0	0	0	-	1,242,474	4,384,278	3.53
1985	0	0	1,481	3,654	-	2,051	802,849	3,232,301	54,457	-	29,205	1,576,311	1,398,709	37,784	-	0	8,610	-	1,849,938	7,147,411	3.86
1986	-	0	5,477	0	-	7,133	1,820,705	6,641,769	437,077	709	2,362	1,209,214	2,469,231	41,218	-	0	0	-	1,977,645	12,634,896	6.39
1987	-	2,601	14,558	3,047	-	0	366,144	1,237,224	117,645	-	2,429	611,602	3,105,993	10,933	-	0	0	-	1,061,806	5,472,177	5.15
1988	-	0	0	-	-	-	351,616	1,105,709	18,312	-	31,289	769,987	692,581	3,191	-	0	0	-	1,037,862	2,972,686	2.86
1989	-	0	0	0	-	1,174	356,238	795,431	0	-	4,340	1,333,842	513,440	0	-	2,404	0	-	1,161,984	3,006,870	2.59
1990	-	-	0	0	-	0	624,332	869,546	4,968	-	48,018	1,448,355	813,436	16,030	-	0	0	-	2,092,578	3,824,685	1.83
1991	-	2,135	0	0	-	10,015	427,160	3,509,444	62,276	-	2,276	137,991	421,595	1,437	-	0	0	-	3,578,508	4,574,329	1.28
1992	-	0	5,579	0	-	-	157,494	746,815	11,801	-	474	280,285	261,958	0	1,600	3,486	0	-	1,606,650	1,469,491	0.91
1993	-	-	0	-	-	119	349,586	1,110,393	23,595	-	14,293	424,747	748,754	-	-	0	0	-	1,535,658	2,671,487	1.74
1994	-	0	0	-	-	4,898	497,096	745,786	1,607	0	16,689	715,250	367,018	2,656	-	0	0	-	990,810	2,351,000	2.37
1995	-	-	-	268	-	8,512	2,373,542	3,074,289	67,471	-	480	114,668	167,592	3,283	-	0	243	-	1,111,140	5,810,346	5.23
1996	-	-	-	-	-	1,324	334,193	5,453,703	105,202	0	-	48,123	370,295	2,617	-	851	0	135	1,078,098	6,316,443	5.86
1997	-	-	1,260	-	-	-	94,944	878,522	14,909	-	6,804	803,235	1,554,577	2,112	0	4,247	0	-	1,025,664	3,360,610	3.28
1998	-	-	-	-	-	1,008	583,437	1,895,432	17,590	-	1,476	538,146	727,396	0	-	0	0	-	1,202,172	3,764,484	3.13
1999	-	243	-	-	-	-	693,625	1,357,184	14,515	-	7,508	688,479	899,604	1,108	-	0	1,108	-	1,625,364	3,663,375	2.25
2000	-	-	301	-	-	2,952	1,175,274	6,650,001	93,073	-	0	439,966	539,376	0	-	2,055	0	-	1,375,488	8,902,997	6.47
2001	-	-	331	1,492	-	-	475,095	3,425,105	55,151	3,169	10,531	478,834	901,823	0	-	0	0	-	1,830,360	5,351,531	2.92
2002	-	-	0	-	-	48,389	1,691,664	4,136,648	87,654	-	1,843	278,282	209,666	20,557	-	0	-	-	1,263,918	6,474,702	5.12
2003	-	-	-	0	-	8,998	4,066,808	7,723,581	256,748	-	0	243,366	537,622	4,967	-	1,600	-	-	1,831,170	12,843,690	7.01
2004	-	-	0	-	-	-	941,940	1,416,406	15,928	-	3,328	913,012	654,532	1,381	-	0	0	NA	1,939,674	NA	NA
2005	-	-	-	0	-	36,689	1,231,247	2,213,378	23,298	NA	10,562	744,102	859,728	NA	-	0	NA	NA	2,744,622	NA	NA
2006	-	-	0	0	NA	50,379	1,601,297	1,758,457	NA	NA	18,811	668,709	NA	NA	-	NA	NA	NA	1,953,228	NA	NA
2007	-	-	0	NA	NA	17,531	1,760,600	NA	NA	NA	14,250	NA	NA	NA	NA	NA	NA	NA	2,945,304	NA	NA
2008	-	-	NA	NA	NA	22,966	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,472,690	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,169,466	NA	NA

Table 4d: Egegik River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	-	NA	NA	15,612	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	-	-	NA	NA	706,516	-	NA	89,606	77,749	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	62,982	88	-	NA	1,064,196	290,239	-	-	28,637	1,946	-	NA	NA	NA
1959	NA	NA	-	-	-	NA	50,461	155,085	782	-	2,487	1,246,563	635,809	130	-	10,515	20,304	-	NA	NA	NA
1960	NA	-	-	-	-	-	213,842	340,500	0	-	397	4,134,128	2,347,789	-	-	43,857	38,324	-	NA	NA	NA
1961	-	0	0	-	-	-	47,269	104,164	0	-	0	383,656	916,276	0	-	27,632	8,496	-	NA	NA	NA
1962	-	-	0	-	-	0	3,547	19,755	0	-	405	716,891	309,637	-	-	27,596	15,425	-	NA	NA	NA
1963	-	-	1,025	-	-	-	2,667	85,597	0	-	2,264	513,647	298,367	-	-	82,831	7,475	-	997,602	993,872	1.00
1964	-	-	0	-	-	229	61,058	36,450	-	-	5,946	1,534,887	222,304	-	-	72,732	4,276	-	849,576	1,937,882	2.28
1965	-	-	-	-	-	0	24,284	10,867	1,594	-	24,472	1,485,854	811,266	1,013	-	6,338	22,797	-	1,444,608	2,388,485	1.65
1966	-	0	177	0	-	-	145,854	550,528	1,040	-	105	563,055	781,194	-	-	9,642	6,675	-	804,246	2,058,271	2.56
1967	-	-	1,901	0	-	-	56,673	188,696	0	-	470	748,745	630,902	1,833	-	669	1,542	-	636,864	1,631,431	2.56
1968	-	0	1,006	-	-	-	20,399	46,666	0	-	-	90,534	200,828	8,546	-	0	9,076	-	338,654	377,056	1.11
1969	-	-	0	-	-	0	8,738	103,338	-	-	3,358	1,090,569	1,178,715	0	-	371,010	0	-	1,015,554	2,755,728	2.71
1970	-	-	-	-	-	0	106,127	81,045	-	-	0	565,760	0	-	-	415,534	34,119	-	919,734	1,202,584	1.31
1971	-	-	-	-	-	0	21,238	0	-	-	3,282	1,289,361	1,266,965	0	-	55,646	64,037	147	634,014	2,700,676	4.26
1972	-	-	0	-	-	0	0	72,018	186	-	0	1,532,500	1,234,294	-	-	56,930	13,973	-	546,402	2,909,902	5.33
1973	-	0	0	0	-	-	35,038	75,611	0	-	438	585,165	724,246	-	-	23,869	7,319	-	328,842	1,451,686	4.41
1974	-	1,443	0	-	-	-	49,638	88,787	0	-	12,430	1,666,319	561,290	-	-	58,939	2,462	-	1,275,630	2,441,308	1.91
1975	-	-	-	-	-	-	55,085	151,116	-	-	7,279	2,234,183	580,804	1,090	0	8,921	1,690	-	1,173,840	3,040,169	2.59
1976	-	148	0	-	-	0	381,107	452,344	586	-	53,443	2,772,401	820,445	0	-	-	0	-	509,160	4,480,475	8.80
1977	-	0	0	-	-	2,322	823,006	1,935,491	11,696	-	1,846	628,139	698,975	-	-	58,420	7,714	-	692,514	4,167,610	6.02
1978	-	-	0	-	-	-	387,998	422,635	860	-	6,741	6,590,350	2,484,585	0	-	13,141	8,594	-	895,698	9,914,904	11.07
1979	-	-	0	6,465	-	2,849	657,110	219,731	0	-	2,251	1,973,576	1,176,405	1,571	-	0	-	-	1,032,042	4,039,957	3.91
1980	-	-	23,353	-	-	4,870	706,929	2,450,675	4,963	-	22,072	4,057,646	948,962	0	364	4,766	-	-	1,060,860	8,224,600	7.75
1981	-	-	0	-	-	-	593,701	432,117	3,248	-	45,162	2,884,091	1,471,877	0	-	6,296	7,620	-	694,680	5,444,111	7.84
1982	-	-	897	0	-	1,760	1,215,776	1,931,668	6,506	0	11,571	1,691,663	1,558,433	0	-	22,309	1,032	-	1,034,628	6,441,614	6.23
1983	-	-	0	3	-	2,415	1,282,101	2,555,258	6,403	-	7,320	3,488,493	3,448,747	16,762	-	13,745	8,377	-	792,282	10,829,622	13.67
1984	-	0	1,314	0	-	484	398,897	639,629	5,628	-	85,897	5,260,591	5,138,764	8,683	1,922	213,884	37,133	-	1,165,345	11,792,825	10.12
1985	0	437	144	-	-	437	427,083	783,057	2,772	-	34,431	4,033,588	1,104,000	0	-	4,127	10,934	-	1,095,192	6,401,009	5.84
1986	-	0	2,040	0	-	1,429	2,423,619	3,251,084	68,379	-	10,940	4,069,668	4,211,869	56,104	-	95,138	39,003	-	1,152,180	14,229,272	12.35
1987	-	1,256	2,372	0	-	0	700,407	4,226,110	134,575	-	69,644	8,875,890	11,467,511	44,152	5,644	154,958	66,152	-	1,273,553	25,748,671	20.22
1988	-	0	2,320	-	-	1,182	296,386	1,050,429	5,754	-	106,453	11,128,647	6,468,032	3,865	-	258,258	162,944	-	1,612,745	19,484,271	12.08
1989	-	0	0	0	-	-	199,358	251,553	4,117	-	37,847	5,203,932	4,249,920	436	2,168	190,062	28,421	-	1,611,566	10,167,814	6.31
1990	-	-	0	0	-	0	396,193	730,898	5,087	-	74,425	8,837,133	5,984,620	32,458	3,001	13,136	19,351	-	2,191,582	16,096,303	7.34
1991	-	4,455	742	312	-	1,478	1,212,942	2,876,328	25,216	-	19,243	3,225,540	2,574,044	136	-	9,063	7,970	-	2,786,925	9,957,467	3.57
1992	973	1,242	10,947	1,620	-	65	240,059	531,833	2,780	-	39,134	4,580,933	3,194,004	9,436	2,399	38,979	19,352	-	1,945,632	8,673,758	4.46
1993	-	-	0	-	-	0	117,645	329,685	1	-	30,559	801,758	654,747	-	-	1,218	3,878	-	1,517,000	1,939,491	1.28
1994	-	131	0	-	-	7,738	249,901	494,915	2	0	67,695	3,817,731	3,301,571	21,873	-	26,840	7,829	-	1,897,977	7,996,226	4.21
1995	-	-	-	0	-	3,568	1,500,682	2,697,814	18,705	-	3,072	1,728,403	1,540,145	13,866	-	11,318	14,791	-	1,266,692	7,532,365	5.95
1996	-	-	-	-	-	367	412,770	1,386,030	21,928	0	3,505	542,746	1,749,105	3,087	2,450	30,409	9,140	0	1,076,460	4,161,538	3.87
1997	-	-	1	-	-	-	17,156	177,699	12	-	18,771	3,493,279	2,069,036	2,144	9,876	233,787	40,681	-	1,104,004	6,062,442	5.49
1998	-	-	-	-	-	1	20,244	75,987	2	-	12,649	490,651	654,417	954	89	15,146	56	-	1,110,938	1,270,197	1.14
1999	-	0	-	-	-	-	162,160	396,161	205	-	171,815	9,216,012	3,036,121	2,298	-	18,606	10,957	-	1,728,397	13,014,334	7.53
2000	-	-	0	-	-	542	1,303,938	2,432,023	32,474	-	25,313	3,547,120	4,601,497	22,681	-	18,938	8,209	-	1,032,138	11,992,735	11.62
2001	-	-	0	1,677	-	-	292,693	811,140	24	0	47,730	1,592,534	2,157,264	0	-	953	518	-	968,872	4,904,532	5.06
2002	-	-	246	-	-	27,683	1,474,478	2,376,879	3	-	45,941	1,137,703	526,236	333	-	547	-	-	1,036,092	5,590,048	5.40
2003	-	-	-	0	-	19,116	2,102,688	2,616,815	28,087	-	41,425	1,921,231	2,368,749	5,182	-	5,013	2,019	-	1,152,120	9,110,326	7.91
2004	-	-	0	-	-	23,592	2,783,108	3,847,253	0	-	39,793	6,212,797	1,761,770	359	2,255	26,572	7,358	NA	1,290,144	NA	NA
2005	-	-	-	0	-	4,342	505,400	214,446	77	NA	36,681	2,862,199	2,471,900	NA	739	32,837	NA	NA	1,621,734	NA	NA
2006	-	-	0	0	NA	7,767	153,695	256,668	NA	NA	121,107	1,604,779	NA	NA	318	NA	NA	NA	1,465,158	NA	NA
2007	-	-	0	NA	NA	8,763	56,843	NA	NA	NA	71,973	NA	NA	NA	NA	NA	NA	NA	1,432,500	NA	NA
2008	-	-	NA	NA	NA	318	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,259,568	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,146,276	NA	NA

Table 4e: Ugashik River Brood Table

Brood Year	0.1	0.2	0.3	0.4	0.5	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	Escapement	Recruits	R/S
1955	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA
1956	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	-	NA	NA	0	-	NA	NA	NA
1957	NA	NA	NA	NA	-	NA	NA	NA	997	-	NA	NA	40,843	-	NA	0	0	-	NA	NA	NA
1958	NA	NA	NA	-	-	NA	NA	165,552	-	-	NA	440,004	53,021	-	-	0	0	-	NA	NA	NA
1959	NA	NA	-	-	-	NA	27,692	60,777	649	-	3,694	248,741	152,271	0	-	0	3,087	-	NA	NA	NA
1960	NA	-	-	-	-	867	937,286	391,312	962	-	5,926	1,997,877	531,780	-	-	1,452	0	-	NA	NA	NA
1961	-	0	10,770	-	-	68	329,872	484,229	1,166	-	1,262	273,290	119,789	266	-	0	43	-	NA	NA	NA
1962	-	-	699	-	-	241	77,487	149,928	79	-	754	158,144	20,233	-	-	0	0	-	NA	NA	NA
1963	-	-	0	-	-	-	10,884	21,608	2,126	-	49	77,497	20,578	-	-	0	0	-	388,254	132,741	0.34
1964	-	-	102	-	-	134	18,938	8,226	-	-	10,590	220,163	16,285	-	-	0	294	-	472,770	274,733	0.58
1965	-	-	-	-	-	0	47,512	51,187	549	-	2,815	212,640	76,458	0	-	1,794	0	-	996,612	392,954	0.39
1966	-	373	407	117	-	101	772,416	1,554,969	228	-	-	42,250	17,326	-	-	0	0	-	704,436	2,388,187	3.39
1967	-	-	0	0	-	-	98,166	54,844	0	-	0	42,254	34,932	114	-	42	-	-	238,830	230,351	0.96
1968	-	0	0	-	-	-	16,985	10,063	0	-	-	13,508	4,394	138	-	0	0	-	70,896	45,088	0.64
1969	-	-	0	-	-	111	4,548	5,661	-	-	319	52,668	24,458	0	-	1,479	0	-	160,380	89,243	0.56
1970	-	-	-	-	-	0	3,709	2,799	-	-	206	303,316	0	-	-	44,928	751	-	735,024	355,709	0.48
1971	-	-	-	-	-	0	193,376	0	-	-	-	573,773	165,880	1,723	-	85	966	-	529,752	935,802	1.77
1972	-	-	0	-	-	0	0	87,271	0	-	0	145,198	39,458	-	-	1,744	2,499	-	79,428	276,170	3.48
1973	-	0	4,467	0	-	-	26,045	6,764	322	-	-	21,377	37,294	-	-	6,039	0	-	38,988	102,308	2.62
1974	-	0	0	-	-	-	9,986	8,385	0	-	14,010	660,052	65,474	-	-	0	0	-	61,854	757,907	12.25
1975	-	-	-	-	-	1,088	1,565,299	578,240	-	-	5,169	1,608,268	365,466	790	0	1,513	-	-	429,336	4,125,834	9.61
1976	-	1,672	0	-	-	0	2,328,527	1,705,028	8,660	-	61,272	1,352,579	341,624	0	-	-	1,667	-	356,308	5,801,029	16.28
1977	-	0	11,008	-	-	792	642,643	1,822,598	5,813	-	-	230,133	138,885	1,279	-	0	0	-	201,520	2,853,151	14.16
1978	-	-	7,170	-	-	-	245,524	336,577	4,513	-	3,163	343,912	253,589	0	-	0	0	-	82,435	1,194,448	14.49
1979	-	-	0	0	-	22,988	3,310,049	786,900	23,149	-	10,427	1,672,861	649,600	4,903	-	0	-	-	1,706,904	6,480,877	3.80
1980	-	-	5,236	-	-	1,117	1,405,682	2,168,620	14,429	-	35,830	3,340,378	1,090,174	1,322	-	118	-	-	3,335,284	8,062,907	2.42
1981	-	241	4,923	-	-	862	1,742,848	3,026,316	3,536	-	6,623	2,261,027	928,975	840	-	176	0	-	1,327,699	7,976,367	6.01
1982	-	-	4,886	1,156	-	4,612	325,144	680,769	8,558	0	266	543,063	788,766	2,660	-	0	0	-	1,185,551	2,359,880	1.99
1983	-	-	11,993	728	-	0	733,445	252,188	2,966	-	3,616	562,322	221,150	0	-	683	0	-	1,001,364	1,789,090	1.79
1984	-	1,456	9,752	0	-	74	479,070	605,045	12,416	-	50,449	3,868,234	500,562	0	0	0	2,285	-	1,270,318	5,529,343	4.35
1985	271	1,890	8,788	-	-	446	646,672	807,662	2,117	-	1,021	878,033	470,692	5,839	-	0	0	-	1,006,407	2,823,431	2.81
1986	-	5,097	48,360	47	-	555	459,133	2,678,224	77,767	-	791	1,927,760	1,925,184	17,548	-	1,780	0	-	1,015,582	7,142,245	7.03
1987	-	5,013	7,801	0	-	97	856,287	1,811,272	13,745	-	11,200	1,998,161	2,421,039	39,037	-	0	441	-	686,894	7,164,093	10.43
1988	-	569	7,709	-	-	1,792	470,674	795,859	19,276	-	33,262	2,017,127	2,182,730	1,267	-	6,050	8,074	-	654,412	5,544,390	8.47
1989	-	3,611	8,149	0	-	5,841	928,095	407,094	10,738	-	13,860	2,510,021	1,024,234	872	-	0	0	-	1,713,287	4,912,515	2.87
1990	-	-	10,683	1,407	-	973	374,148	787,736	2,495	-	12,544	2,004,254	662,351	1,553	-	0	0	-	749,478	3,858,144	5.15
1991	-	443	264	0	-	6,839	2,062,760	3,857,895	19,160	-	420	452,463	276,451	3,835	-	0	0	-	2,482,016	6,680,530	2.69
1992	-	4,730	59,369	1,048	-	6,373	322,814	839,634	691	-	9,210	935,931	940,403	27,504	-	0	1,345	-	2,194,927	3,149,052	1.43
1993	-	1,082	2,503	-	-	1,969	408,154	391,193	29,347	-	5,034	273,268	244,609	-	-	0	417	-	1,413,454	1,357,576	0.96
1994	-	0	1,013	-	-	19,401	260,810	521,884	8,351	97	7,829	596,037	168,483	2,368	-	0	96	-	1,095,068	1,586,369	1.45
1995	-	2,857	-	0	-	10,259	3,802,898	1,732,446	31,441	-	0	130,252	63,083	784	-	0	0	-	1,321,108	5,774,021	4.37
1996	-	-	-	-	-	-	260,720	1,052,662	1,086	140	-	31,822	9,139	346	-	1	0	0	692,167	1,355,916	1.96
1997	-	-	1	-	-	-	283,854	648,117	11,954	-	2,867	1,657,938	419,619	2,117	0	5	0	-	656,641	3,026,473	4.61
1998	-	-	-	-	-	1,238	179,230	303,091	4,403	-	21	524,932	235,098	0	-	465	0	-	924,853	1,248,478	1.35
1999	-	0	-	-	-	3,671	1,255,334	908,027	4,849	-	24,648	1,185,693	289,650	3,134	-	0	1	-	1,662,042	3,675,007	2.21
2000	-	-	0	-	-	2,249	1,866,458	2,344,874	25,678	-	397	44,468	76,025	0	-	2	0	-	638,420	4,360,152	6.83
2001	-	-	0	419	-	629	399,404	1,426,191	53,711	335	2,010	131,676	118,875	373	-	0	0	-	866,368	2,133,622	2.46
2002	-	-	7,592	-	-	7,745	2,070,087	2,123,295	9,790	-	242	257,067	24,481	0	-	13	-	-	905,584	4,500,313	4.97
2003	-	17,191	-	559	-	10,960	4,843,226	1,397,088	11,712	-	0	37,722	51,471	0	-	0	-	-	790,202	6,369,928	8.06
2004	-	-	483	-	-	12,621	1,250,399	1,461,936	2,888	-	374	1,171,779	359,826	0	-	0	0	NA	815,104	NA	NA
2005	-	-	-	927	-	664	839,102	2,295,455	6,203	NA	1,960	1,168,235	930,654	NA	-	1,476	NA	NA	799,612	NA	NA
2006	-	-	2,976	356	NA	67,054	1,059,585	1,081,722	NA	NA	21,803	957,471	NA	NA	-	NA	NA	NA	1,003,158	NA	NA
2007	-	-	0	NA	NA	41,832	1,274,071	NA	NA	NA	13,582	NA	NA	NA	NA	NA	NA	NA	2,599,186	NA	NA
2008	-	-	NA	NA	NA	7,971	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	596,332	NA	NA
2009	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,364,338	NA	NA