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DIVISION OF COMMERCIAL FISHERIES
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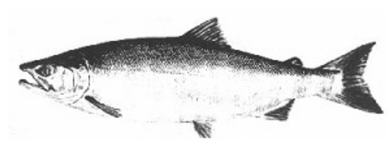

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2012 PRINCE WILLIAM SOUND AND COPPER RIVER SALMON FORECAST

Forecast Area: Prince William Sound

Species: Pink Salmon (natural run only)

Preliminary Forecast of the 2012 Run

Natural Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Prince William Sound General Districts		
Total Run	4,400	2,800–7,900
Escapement Goal [a]	1,190	
All Harvests [b]	3,210	1,610–6,710

[a] The escapement goal of 1.19 million pink salmon is the sum of the median values of the sustainable escapement goals (SEG) for all districts in Prince William Sound. The escapement goals were changed in 2011 from a single SEG to district and brood line specific SEG goals (first implementation in 2012). The sum of the district specific SEG ranges for the even years brood line is now 0.793 to 1.701 million pink salmon.

[b] This total includes the harvests from commercial, subsistence, and sport fisheries.

FORECAST METHODS

The total natural run by year was estimated as the total natural (non-hatchery) contribution to commercial harvests combined with the stream escapement index. The stream escapement index is calculated as the area under the curve of weekly aerial escapement surveys adjusted for estimates of stream life. No adjustments to the escapement index were made for aerial observer efficiency, the proportion of the total escapement represented by the index streams, or the number of hatchery strays in streams. The natural pink salmon contributions to the Commercial Common Property Fishery (CPF) were estimated by subtracting hatchery contributions from the CPF total. Hatchery contributions were determined by thermal marked otolith recoveries (1997–2011), coded wire tag recoveries (1985–1996), or average fry-to-adult survival estimates multiplied by fry release numbers and estimated exploitation rates. The 2012 forecast differs from the 2011 forecast that used exponential smoothing, the 2010 and 2008 method that used averages of previous even brood year total runs, and the 1997–1999 method that used linear regressions of adult production versus brood year escapement index. Prior to 1997, forecast methods employed surveys of pre-emergent fry; however, these surveys ended in 1995. The forecast model for 2012 was selected by comparing the mean absolute percentage error (MAPE) and the standard deviation of the MAPE among the models examined. The total run forecast range was calculated by multiplying the forecast and the upper and lower values of the percent error of forecasts generated using the same method for 2004–2010.

FORECAST DISCUSSION

The predicted natural total run of pink salmon in 2012 is a naïve forecast that uses the 2010 run estimate as the forecast of the 2012 total run. Beginning in 2004, the department stopped producing hatchery pink salmon forecasts because the hatchery operators were already producing forecasts for their releases. Forecast methods examined for the 2012 natural run included: 1) the previous even-brood-year total run (most naïve forecast method), 2) total run averages with 2–10 years of data (even brood years), and 3) linear regression of log-transformed total Prince William Sound (PWS) escapement versus log-transformed total PWS return by brood line, 4) exponential smoothing models using all years or just even brood years, 5) exponential smoothing forecasts corrected with juvenile survey catch per unit effort (CPUE) 6) juvenile survey CPUE vs. total run, and 7) the inclusion of Pacific Decadal Oscillation (PDO; http://jisao.washington.edu/pdo/) and GAK1 water temperature data (http://www.ims.uaf.edu/gak1/) in regression models. The 2012 forecast was estimated from the previous even year run size because the model forecasts had the lowest MAPE and the second lowest standard deviation of the MAPE. None of the models examined for natural pink salmon returning in even years produced forecasts with MAPE values below 100%.

The brood year 2010 escapement index (1.9 million) was within the sustainable escapement goal (SEG) range (1.25 million to 2.75 million) and ranked 5th of the observed even-year escapements since 1960. If the 2012 total run forecast (4.4 million) is realized, it will be the 13th largest among the 26 even brood year returns since 1960. Environmental factors, which likely play a role in determining pink salmon returns in PWS, have been quite dynamic during the past 4–5 years. A warm regime, coinciding with generally high productivity of salmon, began in approximately 1977. Beginning in 2007, ocean temperatures at GAK1 along the Seward line were well below average (http://www.ims.uaf.edu/gak1/). The last few years have also been one of the longest periods of cold conditions, as measured by PDO index values, since the 1970s (http://jisao.washington.edu/pdo/). However, an El Nino event that spanned 2009–2010 corresponded to a period of positive PDO index values (http://www.elnino.noaa.gov/index.html) and the pink salmon returning to PWS in 2010 spent much of their ocean lives in warmer El Nino conditions. With the passing of the 2009–2010 El Nino, PDO values again became negative in June of 2010 and remain negative through November 2011. The ongoing La Nina event (http://www.elnino.noaa.gov/lanina.html) will likely keep ocean temperatures colder than normal in the northern Pacific through at least the spring of 2012. Pink salmon returning in 2012 entered the ocean in increasingly negative PDO conditions. Through November, the 2011 average PDO index rank as the 6th most negative (coldest) in the last 100 years. Because cold ocean conditions are generally associated with lower salmon productivity, the pink salmon run in 2012 may be smaller than projected. It will not be known for several more years if the recent period of relatively cold ocean conditions signals the beginning of a new cold regime.

Forecast Area: Prince William Sound

Species: Chum Salmon (wild only)

Preliminary Forecast of the 2012 Run

Natural Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Prince William Sound General Districts		
Total Run	236	101–382
Escapement Goal [a]	200	
Harvest Estimate [b]	36	0–182

[a] ADF&G intends to manage each district with an existing lower-bound sustainable escapement goal for the long-term average escapement to the district (total of 200,000 chum salmon for the Eastern, Northern, Coghill, Northwestern, and Southeastern districts combined). The sum of the lower-bound sustainable escapement goals for all districts with escapement goals is 91,000.

[b] Includes the harvests from commercial, subsistence, and sport fisheries.

FORECAST METHODS

We evaluated several naïve methods for the 2012 PWS wild chum salmon forecast, including average run size for the previous 2, 3, 4, 5 and 10 years and total run size from the previous year. From these models, total run size from the previous year had the lowest mean absolute percent error (MAPE) and was chosen as the forecasting method for 2012. The total natural run by year was estimated as the total commercial harvest contribution combined with the escapement index. The escapement index is calculated as the area under the curve of weekly aerial escapement surveys adjusted for estimates of stream life. No adjustments to the escapement index were made for aerial observer efficiency, the proportion of the total escapement represented by the index streams, or the number of hatchery strays in streams. The CPF harvest contributions of natural stock chum salmon were estimated using pre-hatchery average wild runs (2002 and 2003) or thermally marked otolith estimates (2004–2011) for each district in PWS. The range for the total run forecast was calculated by multiplying the forecast with the upper and lower values of the maximum prediction error of the actual runs from published forecast runs (1990 through 2011):

$$\pm \hat{y}_{t+1} \times (\hat{y}_{t+1} / (\sigma_m - 1))$$

with

$$\sigma_i = (y_i - \hat{y}_i) / y_i$$

Where $\hat{y}_{t+1}$ is the forecast for the following year based on the previous year's total run size, σ_i is the proportional forecast error for individual previous years, σ_m is the minimum and maximum proportional errors from all previous forecasts (largest and smallest σ_i) and y_i and $\hat{y}_i$ are the actual and forecast total run sizes for individual previous years, respectively.

FORECAST DISCUSSION

Beginning in 2004, the department stopped producing hatchery chum salmon forecasts because the hatchery operators were already producing forecasts for their releases. Our ability to accurately forecast natural chum salmon stocks is limited by the small amount of data available. Estimates of natural stock contributions to CPF were unavailable prior to 2003. From 2003–2011 natural chum salmon contribution estimates based on thermally marked otoliths were available for the Coghill and Montague districts. Contribution estimates from thermal marked otoliths in other districts have been available since 2004. Historical chum salmon age data from escapements and CPF harvests are unavailable for most districts of PWS. If the 2012 wild chum salmon forecast of 235,500 is realized, it would be the 2nd smallest since 1970. For comparison, the estimated total run size was well over 1.3 million from 1981–1988, but has not surpassed 1 million since 1988.

The cold ocean temperatures and negative PDO index values discussed previously for pink salmon may also negatively affect the run of chum salmon in 2012.

Forecast Area: Prince William Sound

Species: Sockeye Salmon (wild only)

Preliminary Forecast of the 2012 Run

Natural Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Prince William Sound, Coghill Lake		
Total Run	321	184–458
Escapement Goal [a]	30	
Harvest Estimate [b]	291	154–428
Prince William Sound, Eshamy Lake		
Total Run	53	29–77
Escapement Goal [c]	21	
Harvest Estimate [b]	33	9–57
Total Production		
Run Estimate	374	230–510
Escapement Goal	51	
Common Property Harvest [b, d]	324	180–460

[a] The escapement goal of 30,000 for Coghill Lake is the median of historical escapement estimates and the SEG range is 20,000–60,000. The upper end was increased in 2011 from 40,000 to 60,000.

[b] Includes the harvests from commercial, subsistence, and sport fisheries.

[c] The escapement goal of 20,500 for Eshamy Lake is the midpoint of the biological escapement goal (BEG) range (13,000–28,000).

[d] The total PWS harvest estimate does not include the average annual commercial harvest of approximately 6,600 sockeye salmon in Unakwik District.

FORECAST METHODS

The natural sockeye salmon run forecast to Coghill Lake is the total of estimates for 5 age classes. A linear regression model with natural log-transformed data was used to predict returns of age-1.3 sockeye salmon. This linear regression model was parameterized using the historical relationship between returns of age-1.3 sockeye salmon and returns of the age-1.2 fish one year previous (sibling model), which are from the same brood year. For example, the model to predict the return of age-1.3 sockeye salmon in 2012 used the return of age-1.2 fish in 2011 as the input parameter. We used a similar regression model to predict the total return of age-1.2 sockeye salmon returning to Coghill Lake. Predicted returns of age-1.1, -2.2, and -2.3 sockeye salmon were calculated as the 1974–2010 mean return of that age class. Harvest, escapement, and age composition data are available for Coghill Lake sockeye salmon runs since 1962; however, inclusion of escapements prior to the installation of a full weir in 1974 reduced forecast reliability. Therefore, only data collected since 1974 were used to estimate model parameters, calculate individual age class forecasts, and generate 80% prediction intervals. An approximate 80% prediction interval for the total run forecast was calculated using the squared deviations between the 2007–2011 forecasts and actual runs as the forecast variance:

$$\hat{y} \pm t_{\alpha/2,n-1} \times MSE,$$

where $\hat{y}$ is the forecast prediction from the linear regression model described above, t is the critical value, n is the sample size and MSE is the mean squared error. Historically, sibling model estimates of age-1.3 returns to Coghill Lake have a much lower MAPE (~34%) than the sibling model used to predict returns of age-1.2 fish (~92%).

The forecast of the natural sockeye run to Eshamy Lake has historically been based on the assumption that returns followed a 4-year cycle with leap years the strongest year. However, this apparent cycle has broken down in recent years and the 2012 forecast is simply the average annual returns since 1989. Eshamy Lake escapement has been enumerated at a weir since 1950, except 1987 and 1998. Commercial harvest data are available for the same period, but age composition data are available for only some years after 1962. Data collected since 1970, excluding 1987 and 1998, were used to calculate the forecast. The 80% prediction interval was calculated using the equation described for Coghill Lake wild sockeye.

PWS total run and common property harvest forecasts were calculated from the sum of Coghill and Eshamy lakes midpoint forecasts. The 80% prediction intervals were calculated as the sum of the point estimates plus/minus the square root of the sum of the squared differences between the individual point estimates and 80% prediction intervals for Coghill and Eshamy lakes.

FORECAST DISCUSSION

Beginning in 2004, the department stopped forecasting hatchery runs of sockeye salmon to Main Bay Hatchery (MBH) because hatchery operators were already producing forecasts. Coghill Lake has dynamic limnological characteristics that significantly impact the sockeye salmon population. Studies conducted in the mid-1980s and early 1990s indicated the lake may be zooplankton limited. As a result, the biological escapement goal (BEG) midpoint was lowered in 1992 (from 40,000 to 25,000) to allow zooplankton populations to recover. Fertilizers were added to the lake (1993–1996) in a cooperative project with the U.S. Forest Service to improve the forage base for rearing sockeye salmon juveniles. In 2005, current data were reviewed and the midpoint escapement goal remained unchanged while the goal type was changed from a BEG to an SEG. Also, in 2002 the department began collecting limnological data to monitor basic lake characteristics. In 2011, the upper end of the Coghill Lake SEG was increased from 40,000 to 60,000 (new range = 20,000 to 60,000). The department will manage for the long-term median of 30,000 beginning in 2012. The Coghill Lake natural run escapement has been within or above the escapement goal range every year since 1995. If achieved, the 2012 total run forecast midpoint (321,000) would be the largest run since 1988. The majority (298,000) of the overall Coghill Lake wild sockeye salmon forecast is predicted to come from age-1.3 fish from the 2007 brood year. This brood year has produced a record return of age-1.1 fish in 2010 and substantial numbers of age-1.2 fish (105,000) in 2011. Other factors that may influence the Coghill Lake wild sockeye salmon run in 2012 are the 2009–2010 El Nino event (http://www.elnino.noaa.gov/index.html) and the trend towards cooler ocean temperatures since 2007 (http://jisao.washington.edu/pdo/).

Historically, the Eshamy Lake natural stock was the largest natural stock contributor to CPF harvests of sockeye salmon in PWS outside of the Coghill District, and contributed to a substantial incidental harvest by the purse seine fishery in the Southwestern District. Although escapements into Eshamy River have been counted at a weir for 50 years, only periodic collection of age, sex, and size data has occurred for the Eshamy and Southwestern districts CPF harvests because of inconsistent harvest and delivery locations outside of Cordova. Contributions to CPF harvests in western PWS of sockeye salmon produced by the MBH have been estimated by recovery of coded wire tags and thermally marked otoliths. However, not all harvests can be adequately sampled, increasing the uncertainty of total run estimates for all natural and enhanced sockeye salmon stocks in western PWS. Age composition data and weir counts were not collected in 1987 and 1998 because of budget reductions. The on-going Eshamy River weir operation and thermal otolith marking of MBH sockeye salmon should produce more accurate estimates of total Eshamy Lake natural runs.

The escapement goal for Eshamy Lake was reviewed in 2008 and the range was changed. The new BEG range is 13,000 to 28,000 (midpoint 20,500). The old range was 20,000 to 40,000.

Forecast Area: Copper River

Species: Chinook Salmon

Preliminary Forecast of the 2012 Run

Natural Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Total Run	54	33–87
Escapement Goal[a]	27	
Harvest Estimate[b]	27	6–60

[a] The Chinook salmon spawning escapement goal of 24,000 is a lower bound sustainable escapement goal. ADF&G intends to manage for the estimated long-term average escapement of 27,000 Chinook salmon.

[b] The harvest by all fisheries (subsistence, personal use, sport, and commercial) while still achieving the average spawning escapement. The projected commercial common property harvest is 19,800.

FORECAST METHODS

Forecast methods examined for the Chinook salmon forecast included: 1) a pseudo-sibling model using commercial harvest age data and inriver abundance estimated as the Miles Lake sonar count multiplied by the proportion of Chinook salmon in the Chitina Subdistrict personal use fishery (brood years 1977–2005), 2) a pseudo-sibling model using commercial harvest age data and inriver abundance data from the mark-recapture program (brood years 1993–2005), 3) the previous year's run size (most naïve method), and 4) mean total run size estimates (2, 3, 4, and 5 year averages). The first pseudo-sibling model using log transformed data produced reasonable model fits for age 1.2 to predict age 1.3 ($p < 0.01$), but marginal fits for the model using age 1.3 to predict age 1.4 ($p = 0.08$). Additionally, retrospective forecasts using the pseudo-sibling models had larger MAPE than mean run size models. Retrospective forecasts using the previous year's run size had a smaller MAPE (27%) and a smaller standard deviation of the MAPE (15%) than other mean run forecasts and was used as the forecast for 2012.

The range for the total run forecast was calculated as:

$$\pm \hat{y}_{t+1} \times (\hat{y}_{t+1} / (\sigma_m - 1))$$

with

$$\sigma_i = (y_i - \hat{y}_i) / y_i \, ,$$

where $\hat{y}_{t+1}$ is the forecast for the following year based on the previous year's total run size, σ_i is the proportional forecast error for individual previous years, σ_m is the minimum and maximum proportional errors from all previous forecasts (largest and smallest σ_i), and y_i and $\hat{y}_i$ are the actual and forecast total run sizes for individual previous years, respectively.

The harvest forecast is the total run estimate minus the average escapement of 27,000 since 1980 as determined from catch-age analysis and mark–recapture point estimates.

FORECAST DISCUSSION

The department did not generate a formal Chinook salmon total run forecast between 1998 and 2007 because of inadequate number of inriver abundance or spawning escapement estimates. Forecasts made prior to 1998 used aerial survey indices adjusted to approximate the total escapement. These forecasts performed poorly, especially after the number of aerial surveys was significantly reduced in 1994. In 1999 the Sport Fish Division of the Alaska Department of Fish and Game began a mark-recapture program to estimate the inriver abundance of Chinook salmon. The Native Village of Eyak became a collaborator on the project and eventually took the lead in its operation. There are currently 13 years (1999–2011) of inriver abundance estimates.

The 2012 total run forecast point estimate of 54,000 is ~18,000 fish below the 13-year average (1999–2011 average = 72 thousand). The age-6 component of this forecast could be reduced from two significant flood events in August and October of 2006 and the generally cooler ocean conditions measured in the North Pacific since 2007. If realized, the 2012 forecast total run would be the 26th largest since 1980.

Forecast Area: Copper River

Species: Sockeye Salmon

Preliminary Forecast of the 2012 Run

Natural Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Total Run	1,810	1,060–2,560
Escapement Goal[a]		
Upper Copper River	450	
Copper River Delta	169	
Common Property Harvest[b]	1,190	520–1,860
Hatchery and Supplemental Production		
PWSAC - Gulkana Hatchery		
Hatchery Run	330	200–470
Broodstock Needs	20	
Supplemental Escapement[c]	80	
Common Property Harvest[b]	230	100–370
Total Production		
Run Estimate	2,150	1,250–3,040
Natural Escapement Goal	619	
Broodstock Needs	20	
Supplemental Escapement[c]	80	
Upper Copper River Inriver Goal[d]	676	
Common Property Harvest[e]	1,430	730–2,120

[a] The upper Copper River escapement goal of 450,000 sockeye salmon is the historical average spawning escapement. The new sustainable escapement goal (SEG) adopted in 2011 is 360,000–750,000). The Copper River delta escapement goal is the average aerial survey peak count (84,500) multiplied by 2 to adjust for proportion of the total number of fish observed by aerial observers (SEG = 55,000 to 130,000).

[b] Includes the harvests from commercial, subsistence, personal use, and sport fisheries.

[c] Hatchery production that will not be harvested to ensure that natural escapement to the upper Copper River is achieved, because natural stocks cannot sustain the higher exploitation rates of hatchery stocks.

[d] The upper Copper River inriver goal categories include spawning escapement (sockeye and other salmon); sport, subsistence, and personal use fishery harvests; and hatchery broodstock and supplemental escapement (5 AAC 24.360 (b)). The inriver goal estimate is preliminary until upriver harvest estimates for 2011 are available.

[e] The commercial common property harvest midpoint estimate is 1,230,000 sockeye salmon and the 80% PI is 530,000 to 1,930,000. The point estimate for all harvests combined is calculated as the total run estimate minus the sockeye salmon portion of the inriver goal and the Copper River Delta escapement goal.

FORECAST METHODS

Forecast methods for 2012 are similar to those used since 1998. The forecast of natural sockeye salmon to the Copper River is the total of estimates for 6 age classes. Linear regression models with log-transformed data were used to predict returns for age-1.2, -1.3, and -2.2 sockeye salmon. These 3 age classes were predicted from the relationship between returns of that age class and returns of the age class one year younger from the same brood year (sibling model). The predicted return of age-1.1, -0.3, and -2.3 sockeye salmon were calculated as the 5-year (2007–2011) mean return of those age classes. The total common property harvest forecast was calculated by subtracting the Gulkana Hatchery broodstock, hatchery surplus, and wild stock escapement goal needs (upriver and delta) from the total run forecast. The commercial common property estimate was calculated by subtracting from the total run a preliminary estimate of the inriver goal categories (5 AAC 24.360(b)) and the Copper River Delta spawning escapement goal. The 80% prediction bounds for the total run and harvest forecast were calculated using the method described previously for Coghill Lake sockeye salmon except only the years 1983–2010 were used in the calculation of mean squared error.

Supplemental production from Gulkana Hatchery remote releases to Crosswind and Summit lakes was predicted using age specific smolt-to-adult survival estimates from brood years 1995–1998. The survival estimates were calculated using coded wire tag recoveries in harvests and enumerated adult escapements. Supplemental production from Gulkana I and Gulkana II hatcheries was estimated from fry releases and a fry-to-adult survival of 1.5%. The run was apportioned to brood year using a maturity schedule of 13% age 4 and 87% age 5. An estimated exploitation rate of 70% was used to project the total harvest of Gulkana Hatchery stocks in 2012. The 80% prediction interval for the forecast of supplemental production was calculated using the mean square error estimate of the total run described above for Coghill Lake sockeye salmon.

FORECAST DISCUSSION

Forecasts prior to 1998 relied on the relationship between numbers of spawners and subsequent returns, using return-per-spawner values for parent year abundance similar to the dominant age class (age 5) of the forecast year. Because average return-per-spawner values do not reflect recent production trends, and because returns are still incomplete from the recent brood years, linear regressions of brood-year sibling returns were used for forecasts beginning in 1998. Additionally, more precise estimates of survival and contributions from hatchery production for brood years and release locations were available from coded wire tag recoveries in harvests and escapements for brood years 1995–1998.

Historical estimates of Gulkana Hatchery production prior to 1995 are considered imprecise. Improved contribution estimates for brood years 1995–1998 indicated large contributions from supplemental production and smolt-to-adult survival estimates for Crosswind Lake releases that averaged about 20%. Fish marked with strontium chloride (Sr) began returning in 2003 (age-4 fish) and the majority of the adult run (age-4 and age-5 fish) was marked beginning in 2004. Fish from all release locations (Gulkana I and Gulkana II hatchery sites and Crosswind and Summit lakes) are now marked, but all fish have the same mark. We can estimate the total contribution of enhanced fish from all Gulkana Hatchery releases, but unless different marks for individual releases can be developed, forecasts will soon be limited to using fry-to-adult survival estimates and estimated maturity schedules to forecast total enhanced production.

The spawning escapement goals for the upper Copper River and Copper River delta were reviewed in 2011. The upper Copper River spawning escapement goal was changed from and SEG of 300,000–500,000 to 360,000–750,000. This change was because of the conversion of Bendix sonar counts to DIDSON sonar equivalent counts and an update in the years used in the goal calculation. There was no change to the Copper River delta SEG of 55,000 to 130,000.

The 2012 run will be composed primarily of returns from brood years 2007 and 2008. Five-year-old fish (brood year 2007) are expected to predominate Copper River delta and upper Copper River runs. The Miles Lake cumulative sonar count for 2007 was above the cumulative objective by early June and exceeded the cumulative anticipated by 65,000 on 10 June. The 2008 Miles Lake cumulative count did not exceed the minimum anticipated until 4 July although the commercial fishery had 6 day and 18 day closures in June. By the season's end, the total counts exceeded the cumulative objective (2007: 919,600 actual vs. cumulative objective of 566,918 and 2008: 718,344 actual vs. cumulative objective of 601,125). The Copper River delta escapement indices for 2007 (88,285) and 2008 (67,950) were within the SEG range of 55,000 to 130,000.

The Gulkana Hatchery run will include fish from Crosswind Lake smolt migrations of more than 1 million fish in 2009 (1.1 million) and 2008 (1.7 million or 3rd largest). The brood year 1993–2008 average migration from Crosswind Lake is 1.3 million smolt. The run will also include 4-year-old fish from the 8th largest Summit Lake smolt outmigration (416,000) and 5-year-old fish from the 9th largest smolt outmigration (412,500).

The 2012 total run forecast (2.1 million) is about 0.10 million below the recent 10-year average (2.2 million). If realized, the 2012 forecast total run would be the 13th largest since 1980. The 1.81 million natural run would be below the recent 10-year average (1.90 million), and a 0.33 million Gulkana Hatchery run would be ~0.09 million above the 10-year average (0.25 million). The natural run forecast is driven by the large 4-year-old (age-1.2) fish estimate in 2011 (4th largest since 1965) and the subsequent prediction for 5-year-old (age-1.3) fish in 2012. There have only been 5 additional years with estimates of age-1.2 fish greater than ~400,000. The return of age-1.3 fish the following year has been significantly above the regression mean in 4 of the 5 years. The enhanced run forecast is driven by smolt outmigration numbers from both Crosswind and Summit lakes. The influence of environmental factors including the cooler ocean temperatures that have predominated since September 2007, and the warmer ocean temperature from the El Nino event (August 2009 to May 2010) are factors that increase the uncertainty in the 2012 run projection.