FOCI Prediction (10/21/2000)

2000 Pollock year Class Prediction: Average Recruitment

BASIS: This forecast is based on five data sources: three physical properties and two biological data sets. The sources are: 1) observed 2000 Kodiak monthly precipitation, 2) wind mixing energy at [57N, 156W] estimated from 2000 sea-level pressure analyses, 3) advection of ocean water in the vicinity of Shelikof Strait inferred from drogued drifters deployed during the spring of 2000, 4) rough counts of pollock larvae from a survey conducted in May 2000, and 5) estimates of age 2 pollock abundance from this years assessment.

ANALYSIS: Precipitation at Kodiak was below the 30-year average (1962-1991) for January, May, and June (31%, 35%, and 91%, respectively, of the mean monthly precipitation), and above average for February through April (111%, 135%, and 166%, respectively). FOCI believes that Kodiak precipitation is a valid proxy for fresh-water runoff that contributes to the density contrast between coastal and Alaska Coastal Current water in Shelikof Strait. The greater the contrast, the more likely that eddies and other instabilities will form. Such secondary circulations have attributes that make them beneficial to survival of larval pollock. The low precipitation of January and May offset the benefits of high February through April precipitation toward production of fresh water runoff with its connection to enhanced potential for ocean eddies, thought conducive to pollock larvae survival. Based on this information, the forecast element for Kodiak rainfall has a score of 2.13. This is "average" on the continuum from 1 (weak) to 3 (strong).

For the third year in a row, monthly averaged wind mixing at the exit area of Shelikof Strait at [57N, 156W] was less than average for each of the first six months of the year (48%, 36%, 56%, 27%, 29%, and 54%, January through June). Strong winds in winter help mix nutrients into the upper ocean layer to provide a basis for the spring phytoplankton bloom. Weak winter winds this year did not aid concentration of nutrients in the photic zone. Weak spring winds, as experienced especially during April and May, are thought to better enable first feeding pollock larvae to locate and capture food. The spring effect dominated the winter one in 2000, so the prediction is for stronger than average recruitment. The wind mixing score for this year is 2.46, which equates to "average to strong."

Data based on analysis of regional wind stress (correlated with transport in Shelikof Strait) for spring 2000 in the Gulf of Alaska and inferred from satellite tracked drifters indicate that advection was weak and circulation was sluggish, a sign of good recruitment. Advection was given a score of 2.34.

The larval index, based on late larval biological survey rough counts, look high; higher than last year. The larval index, which is based on rough counts in the range of 200-400 larvae/m^2, was scored as average-to-strong with a numerical score of 2.3.

The time series of recruitment from this year's assessment was analyzed in the context of a probabilistic transition. The data set consisted of estimates of age 2 abundance from 1964-00, representing the 1962-98 year classes (see Table 1.9). There were a total of 37 recruitment data points. The 33% and 66% percentile cutoff points were calculated from the full time series

(33%=0.4352 billion, 66%=0.5921 billion) and used to define the three recruitment states of weak, average and strong. The lower third of the data points were called weak, the middle third average and the upper third strong. Using these definitions, nine transition probabilities were then calculated

Probability of a weak year class following a weak
Probability of a weak year class following an average
Probability of a weak year class following a strong

Probability of an average year class following a weak
Probability of an average year class following an average
Probability of an average year class following a strong

Probability of a strong year class following a weak
Probability of a strong year class following an average
Probability of a strong year class following a strong

The probabilities were calculated with a time lag of two years so that the 2000 year class could be predicted from the size of the 1998 year class. The 1998 year class was estimated to be 0.23 billion and was classified as weak. The probabilities of other recruitment states following a weak year class for a lag of 2 years (n=37) are given below

00YC		**98YC**	**Probability**	**n**
Weak	follows	Weak	0.2000	7
Average	follows	Weak	0.0571	2
Strong	follows	Weak	0.0286	1

The probability of a weak year class following a weak year class was the highest of the three so the prediction element from this data source was classified as weak and given a score of 1.0.

Each of the data elements was weighted equally. The larval index was used but was weighted equally with the other elements cause average-to-high larval numbers are promising of good recruitment but not necessarily so.

CONCLUSION: Based on these five elements and the weights assigned in the table below, the FOCI forecast of the 2000 year class is average.

Element	**Weight**	**Score**	**Total**
Time Sequence of R	0.2	1.00	0.200
Rain	0.2	2.13	0.426
Wind Mixing	0.2	2.46	0.492
Advection	0.2	2.34	0.468
Larval Index-abundance	0.2	2.30	0.468
Total	*1.0*		*2.054 = Average*