

Study: Pacific Ocean Helps Predict Salmon Returns to Columbia River

Local News

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Washington State - A team of scientists from NOAA and Oregon State University have found that a wide range of biological indicators from the Pacific ocean are better predictors of adult salmon returns to the Columbia River than local or regional physical indicators. The accuracy of such predictions is invaluable to state and federal fishery managers in setting harvest limits and allocations, and for tracking recovery of endangered or threatened salmon runs. Pacific salmon abundance has been highly variable over the last few decades and most forecasting models have been inadequate. The scientists combined 31 indicators — ranging from sea-surface temperatures to the amount of salmon prey — collected over 11 years to help predict adult spring Chinook salmon returns to the Columbia last year and then assessed the accuracy of that prediction. Although some indicators were more important than others, the team said certain trends were clear. For example, the best predictors of spring Chinook returns were indicators like the abundance of food or the presence of prey in the ocean. So-called local physical indicators like water temperature or coastal upwelling were not as important.

The scientists' computer model accurately predicted that 221,000 fish would return in 2011. The model came up just shy in 2012, predicting almost 180,000 fish would return; the actual number was 203,000 returning results. Results suggest that managing Pacific salmon effectively requires many types of information and no single indicator can represent the complexities of a salmon's life when it first enters the ocean. Moreover, the indicators that best describe one stock or species may differ from those that best describe another stock or species. For example, the researchers found that the importance of indicators in May of a Chinook's first year in the ocean were quite different from those just a month later in June. "The ocean has historically been viewed as a 'black box' in the life of a salmon," said NOAA scientist Brian Burke, the study's lead author, "but this study opens that box just a little and shines an important scientific light on its contents." He said managers can take advantage of this information in forecasting the size and timing of Chinook returns to the Columbia River basin, a particularly challenging task because harvest limits are typically set some months before the season starts. The study, "Multivariate Models of Adult Pacific Salmon Returns," was published online in PLoS ONE <http://dx.plos.org/10.1371/journal.pone.0054134>.