

Using Bayesian Networks to Link Climate Variability, Ocean Processes, and Coho Salmon Marine Survival

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We used Bayesian networks, which are a class of graphical probabilistic models, to examine the effects of the marine environment on coho salmon survival in the northern California Current region. This novel method extends previous research by (1) explicitly accounting for uncertainties in the links between large-scale climate patterns and salmon survival, (2) explicitly and intuitively representing the ecological causal network that underlies variability in salmon survival, and (3) explicitly accounting for indirect effects of climate and ocean processes on salmon survival. Our results indicated that large-scale climate patterns, such as the Pacific Decadal Oscillation and North Pacific Gyre Oscillation, can have a strong influence on the physical and biological components of the ecosystem, however, the uncertainties tended to increase as you moved further down the casual chains within the network. In general, this propagation of uncertainties within the network dampened the effect of large-scale climate patterns on coho salmon survival in the northern California Current region.