Stock-Specific Impacts of Marine Climate Change on B.C. Salmon

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We have surveyed the ocean distribution and growth of juvenile Pacific salmon along the coast of British Columbia and SE Alaska since 1995. These surveys show that juvenile salmon remain confined to the continental shelf while making long distance migrations to the Aleutian Islands. However, specific stocks of Pacific salmon appear to remain as long-term residents of southern B.C. coastal waters (West coast of Vancouver Island, Queen Charlotte Sound, and Hecate Strait). Prior to a large-scale climate shift in 1999 to cooler ocean temperatures, salmon growth and stored fat was much lower in these waters than in the northern survey region; following regional cooling associated with the large-scale climate shift in 1999, growth and fat storage rebounded, and ensuing adult returns to most regions of the coast improved, providing good evidence for a strong linkage between ocean climate and stock status. DNA analysis of the stock composition shows that British Columbia's stocks with the greatest conservation concerns (Rivers Inlet sockeye; Strait of Georgia coho; west coast Vancouver Island chinook) are all disproportionately abundant in the regions of poor growth and survival. Knowing the marine regions subject to good or bad ocean conditions and the stock groupings that move to these regions is therefore important for conservation of Pacific salmon stocks. Most seriously, the large flip-flop in Pacific salmon returns of individual stocks have occurred during a period when ocean temperatures varied by roughly 1ºC. As global warming models project regional warming of 2~4ºC within a few decades, there are serious reasons to question our ability to manage or conserve our rich complex of Pacific salmon stocks in the long term.