Yukon Salmon Sub-Committee

Your Voice in Salmon Management

Salmon stock productivity: What is it and how does it affect our salmon?

Stock productivity is the number of adult salmon returning from each adult spawner. This measure is often designated "R/S" or "Return/Spawner". Higher productivity means that each parent produces several adults, say 4 or more, and lower productivity means that each parent will produce 1 or less than 1 adult offspring. Periods of higher productivity result in an abundance of adult salmon that can be harvested, used for stock restoration activities, or allocated to increased spawning escapement. Periods of lower productivity result in fewer adult salmon and result in limited harvest opportunities and restoration activities, and possibly not meeting minimum numbers of spawning escapement goals. During prolonged periods of low productivity, if harvest is not carefully managed, less and less salmon will return each year.

So, what influences stock productivity? Productivity is influenced by environmental conditions, harvest, predation, and competition (Ruggerone & Connors 2015, and Manhard et al 2017). It is difficult to understand and study due to complex interactions (NRC 2004) over the range of habitats at different life stages (freshwater, coastal, and marine).

Stock productivity has been estimated for the broad Canadian-origin Yukon River Chinook since the 1970s (JTC 2017). Chinook productivity has ranged from a low of 0.93 in 2006 up to a high of 5.51 in 1991 with an average productivity of 2.35 (JTC 2020). However, recently Chinook have been in an extended period of low productivity (JTC 2020).

Yukon River fall chum (U.S. and Canadian-origin) estimated stock productivity has been variable over the years and has dipped well below 1 on several occasions (JTC 2020). Productivity has ranged from a low of 0.26 in 2005 up to an extremely high productivity of 8.88 with an average of 1.76 (JTC 2020). Recent productivity is indicating a downward trend (JTC 2020).

Klukshu Chinook stock productivity has been estimated since 1986 and has varied (Foos 2021). The average productivity is about 1.3 with a very low productivity of 0.25 in 2003 ranging up to 4.74 in 1990 (Foos 2021). Recent parent years (2009 to 2013) had very low productivity, averaging 0.7 (Foos 2021). The most recent year is trending upwards with parent year 2014 estimated at 1.8 (Foos 2021).

Productivity estimates for parent years (1976 to 2014) for Klukshu Sockeye are available and has been variable with an average of about 1.3 (Foos 2021). Stock productivity has ranged from an extreme low of 0.08 to 3.4 in parent years 2003 and 2005 (Foos 2021). The two most recent productivity estimates for parent years 2013 and 2014 is about 1.6 (Foos 2021).

References:

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