

## Temporal Patterns for Odd- and Even-Year Pink Salmon Conservation Units in British Columbia and Puget Sound (Washington State)

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Keywords: conservation unit, pink salmon, escapement, Fraser River, Puget Sound

We assembled pink salmon escapement data for Conservation Units (CUs) in British Columbia (1953-2011) and Puget Sound (1959-2009), identified those streams with data for two-thirds or more of the years, and imputed values for missing years of data. We accounted for fish in the remaining streams by multiplying annual reconstructed estimates for each CU by a scaling factor that assumed relative abundance within the CU remained stable across years. In general, these data-limited streams were low production systems containing few pink salmon. We assessed escapement trends for each CU using the entire time series as well as the most recent 20 years. There were significant positive trends for many of the odd-year returning CUs, but only rarely for even-year CUs. Odd-year CUs did better than even-year CUs in five of the eight areas containing both, even-year CUs did best in one area, and there was no difference between even and odd-year CUs in the remaining two areas. The generated time series of fishery exploitation for Fraser River pink salmon and other odd-year southern Canadian populations indicated that increases in spawner abundance were partly due to decreased fishery exploitation. Coinciding with increasing spawner numbers, we observed mean body sizes of returning pink salmon have been declining within the available datasets (Fraser River, 1959-2009; Puget Sound, 1973-2009). Fry abundance indices for the Fraser River and Puget Sound allowed us to estimate temporal patterns of freshwater (i.e., index of fry numbers produced per adult) and post-fry (i.e., primarily marine) productivity (i.e., adults produced per index of fry abundance). In both the Fraser River and Puget Sound, freshwater productivity has been declining as spawner abundance has been increasing (i.e., there is a negative anomaly from the average fry/adult ratio). Density dependence, as assumed in a Ricker model, explains negative anomalies at high spawner numbers and positive anomalies at low spawner numbers. Taking density dependence into account, we saw no further signs for increased freshwater productivity. We conclude pink salmon populations in the southern portion of their range in the eastern North Pacific are increasing, similar to populations further north and west, but the mechanisms responsible for these increases likely differ among areas. In the southeastern North Pacific, increasing pink salmon abundance is more likely a response to declining fishery exploitation than to enhancement, which is minimal. Increasing escapement apparently causes a density-dependent decline in freshwater productivity that suggests to us that fishing opportunities exist.