Declines in the mean body size of exploited fishes have been documented in a range of species and may negatively impact fisheries by decreasing yields (REF) and altering community dynamics (REF). Such declines may be linked to reduced individual growth due to unfavorable environmental conditions (e.g. altered prey community, increased competition) or fisheries that selectively remove larger individuals (REF). In the case of Pacific salmon, many populations have exhibited relatively strong temporal trends in size, as well as regionally coherent shifts in growth, age-at-maturity, and survival (REF), which suggest such ecological traits are moderated by large-scale environmental mechanisms occurring during marine residence. Identifying the processes that drive this variability is of considerable interest to management, both as a means of improving forecasts and by bounding expected levels of future productivity.

Both bottom-up and top-down drivers have the potential to regulate salmon growth during marine residence. For example, changes in sea surface temperature may alter metabolic rates (REF), as well as the quantity and quality of prey available to salmon. Salmon growth and survival is often associated with indices such as the Pacific Decadal Oscillation, North Pacific Gyre Oscillation, and ENSO, which integrate environmental conditions over relatively large spatial and temporal scales (REF). Although population-level responses to these temperature indices are regionally coherent, they vary across the species range with northern populations generally responding positively to temperature increases and southern populations the opposite. Wind stress indices, such as ALPI, may also be correlated with growth by moderating nutrient transport to surface layers (REF). Investigations into top-down effects have largely focused on changes in the abundance of potential competitors during marine residence. Increases in the biomass of both con- and heterospecifics may be correlated with density-dependent declines in growth or survival. In particular, increases in pink salmon abundance due to greater hatchery production have been linked to reduced productivity and size-at-maturity across a suite of Pacific salmon populations (REF).

Although previous investigations provide important clues as to how salmon populations are influenced by large scale environmental drivers, our understanding has largely been shaped by observations made over the previous 50-70 years. As a result, it is uncertain whether salmon populations will exhibit non-linear responses to conditions outside those recently observed. Put more simply, are Pacific salmon populations normally moderated by factors such as sea surface temperature and competition? Or have relatively dramatic changes in recent decades resulted in disproportionately large effects? We used age-structured length data collected during the first half of the 20th century to explore how Pacific salmon populations responded to abiotic and biotic drivers prior to widespread increases in sea surface temperature and hatchery development. These data originated from extensively sampled nearshore fisheries targeting Nass (northern British Columbia) and Rivers Inlet (central BC) sockeye salmon (*Oncorhynchus nerka*). Additionally we compare historical changes in Nass sockeye salmon body size to those observed in recent years using data collected during in-river sampling.

*Methods*

*Salmon data*

We used individual size data collected from two different sources. The first included data compiled Nass River and Rivers Inlet commercial gillnet fisheries operating between 1914 and 1946. These fisheries occurred in nearshore waters, with vessels returning at regular intervals (x). Returning adult sockeye salmon were sampled weekly and individual fork length (mm), weight (g), and sex were recorded. Although sampling occurred regularly from mid-June to late August in the majority of years, we excluded a subset of years due to insufficient sampling (Nass: 1915, 1920, 1922, 1924, 1938, 1945; Rivers Inlet: 1924, 1945). The second, contemporary dataset included data collected in the Nass Rivers fishwheel test fishery, operated by the Nisga’a First Nation between 1994 and 2017. Individuals were sampled daily and length and sex recorded. To account for differences in sampling location that would influence estimates of return timing, we assumed that individuals took seven days to travel from marine fishery locations to the fish wheel. This assumption is consistent with the Pacific Salmon Foundation’s Northern Boundary Sockeye Salmon run reconstruction model (REF).

Individual salmon were aged and scale annuli characteristics were used to distinguish between freshwater and marine residence using *x* nomenclature. For example, a 1.2 individuals return to spawn 4 years after their parents spawn, having spent one year in the gravel, one year as a fry in freshwater, and two years at sea. Although a relatively large number of age classes were recorded, we constrained our analysis to dominant ages, i.e. those that were observed in every year in the historical dataset. For the Nass this included 1.2, 1.3, 2.2, and 2.3 individuals, while for Rivers Inlet only 1.2 and 1.3 individuals. Historical age data were generated by *x*, while contemporary aging analyses were conducted by Fisheries and Oceans Canada (1994-2004) or Alaska Department of Fish and Game (2005-2017) schlerochronology lab.

*Environmental data*

Monthly sea surface temperature data were collected from *x*. For our analyses we used the mean from March-June of the return year since this should provide a proxy for conditions experienced during maximum growth (REF).