Baleen is a remarkable structure. In addition to being a highly adaptive filter feeding apparatus, it is an accreting, metabolically inert matrix holding a myriad of compounds that reflect a whale’s physiological state at the time of tissue formation. Our research team is measuring biogeochemical compounds - including stable isotopes (δ13C, δ15N, compound specific) and hormones (reproductive, glucocorticoid, metabolic) – to build retrospective endocrine and ecological histories of North Atlantic right whales using necropsied baleen (currently n=30 individuals collected between 1975-2020). The goals of this study are to reconstruct patterns and individual variability in (1) parameters of reproductive cycles including gestation period, interbirth interval, reproductive rate, male seasonality, and sexual maturity; (2) incidences and severity of natural and anthropogenic stressors; (3) migration behavior, foraging ecology, and nutritional responses; and (4) long-term shifts in the aforementioned factors due to climate change. Measured biogeochemical profiles will be chronologically matched with data on whale life-history, visual health and field observations to provide insights into long-term trends. Here, we report preliminary endocrine data from five individuals that died in Canadian waters during the 2019 Unusual Mortality Event. Adult females (Eg1281, *Punctuation* and Eg3450, *Clipper*) exhibited prolonged elevations in progesterone with brief increases in cortisol, indicating pregnancy events. Adult males (Eg1514, *Comet* and Eg3421) exhibited prominent, multi-year cyclical, seasonal patterns in testosterone across their baleen record. In two males (Eg3421 and Eg4023, *Wolverine*), testosterone production showed significant increases by age 8 and 7, respectively, younger than available estimates of male age at sexual maturity for this species. Thus far, elevations in cortisol in these samples can be linked to stress events (i.e., pregnancy or breeding season), lowered visual health scores, or potential periods of food limitation (indicated by elevated thyroid hormones). Future work includes high resolution sampling of baleen plates in pursuit of the project objectives.