**Snow Crab Survey Standardization**

**Survey protocol and catch standardization:**

**Issues with the survey time series**

* Survey design has changed multiple times:
  + Survey area has expanded through time.
  + Switch from 10’x10’ grids to square grids from 2012 onwards.
  + Number of sampling stations has increased.
  + Five different survey vessels (e.g. increasing horsepower, tonnage).
  + Switch from side to stern trawling early in the time series.
* Survey stations have been either fixed or relocated inconsistently.
* Scale differences between the 2018 and 2019 surveys:
  + Length-frequency data for females and males 2018 versus 2019 (global).
  + However, comparative survey indicated no such issues (local).
  + Protocol adjustments and passive trawling phase update for 2020.
  + Length-frequency data for females and males 2018, 2019 and 2020 (global).

**All Is Not Lost:**

* These issues are common to most surveys, because of the difficulty of maintaining constancy of protocols through time, shifting objectives and difficulties in the practical implementation of the protocol.
* The quality and quantity of the snow crab survey data allows for some capacity for self-diagnosis and possibly even correct some types of bias among those issues outlined above.

1. History of survey station relocations.
2. Year-over-year catch comparisons for snow crab and by-catches.
3. Population models
   1. Provides a synthesis of fishery and biological processes and models their interaction.
   2. Can provide inferences on trawl size-selectivity, natural and fishery mortality, survey catchability, growth and molting, recruitment, etc…
   3. Modelling of these processes can yield improved predictions of population dynamics.
   4. Time series standardization.
   5. If useful, it may be relied more and more in future assessments.

**However, this is unsettling, especially for the sGSL snow crab stock (move to end of time):**

* Reference points are defined using the index.
* Quotas set according to the biomass index.
* Changing of the index may require a review of set reference points.