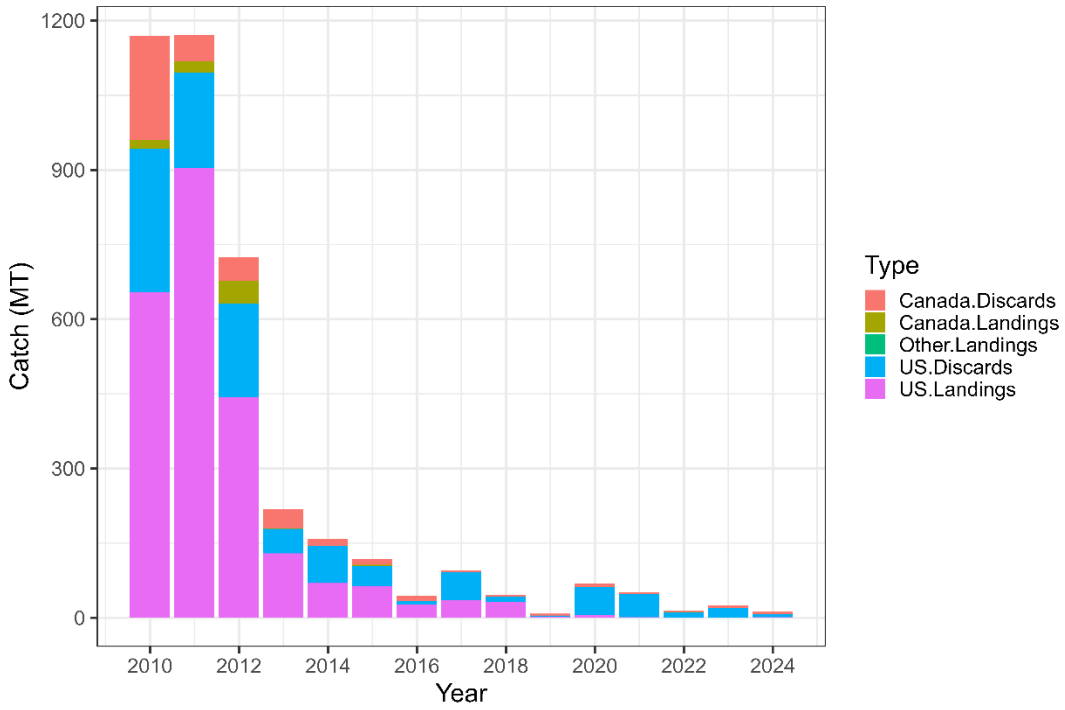

Figure S1: Plot showing recent catch by disposition for Georges Bank yellowtail flounder.

Summary of Model Selection Procedure for GB Yellowtail Flounder Research Track

- An initial model consisted of a run without random effects. The model and all subsequent runs had six age classes (1-6+), an aggregate commercial fleet (US and Canada), and three survey indices (NEFCS spring, fall and DFO). The models ran from 1973-2022.
- Model selection used a common set of diagnostics to inform if complexity should be added to the model. These common diagnostics included: AIC, retrospective patterns, self-tests, jitter, and plausibility. Model fitting was not linear but in general followed the order below. Bold text indicates setup in optimal model:
    - Fleet selectivity – **age-based**
    - Survey selectivity - **logistic**
    - Age-comps – **logistic-normal-pool0**
    - Recruitment – **Beverton-Holt stock recruit relationship**
    - Time varying selectivity - **AR1_Y**
    - Time varying survival - **IID**
    - Environmental covariates – **Bottom water temperature on recruitment**
    - Natural mortality – **age based**
    - Surveys – **No time varying components**
- Logistic-normal age composition distributions led to improved retrospective patters and residual patterns. Additionally, this distribution is self-weighting.
- Initial runs exploring just process error on recruitment or selectivity did not support including process error. However, process error on selectivity was revisited at the end of model fitting and

was included (AR1_Y) in the optimal model because it improved age composition residual patterns.

- Different diagnostics (retrospective patterns, AIC, self-test) supported different process errors on numbers at age (NAA). All three process errors (IDD, AR1_Y coupled, AR1_Y decoupled) were carried forward in model fitting.
- Bottom temperature and the Atlantic Multi-decadal Oscillation (AMO) were recommended to be explored on recruitment and natural mortality. A lot of work was done to explore these covariates.
- For recruitment, the inclusion of either covariate was robust to assumption of process error on numbers at age. Bottom temperature was chosen as the covariate because the covariate is stock specific and more biologically relevant. AIC, residual patterns and retrospective patterns supported a Beverton-Holt stock recruit relationship with deviations informed by bottom temperature.
- Runs with covariates on natural mortality or where natural mortality was freely estimated struggled to converge. Thus, a constant natural mortality estimate (0.04) was recommended that is based on life history.
- Runs exploring breaking the NEFSC surveys to account for vessel change and including process error on surveys did not improve diagnostics.
- The optimal model met all diagnostic criteria. However, there were residual patterns in the aggregate fit to the DFO survey in recent years.
- Based on peer review panel feedback an additional run was conducted that used age-based natural mortality.