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Surplus Production of Georges Bank Yellowtail Flounder Estimated from 2013 VPA Model Results

Loretta O'Brien
NEFSC, Woods Hole, Ma

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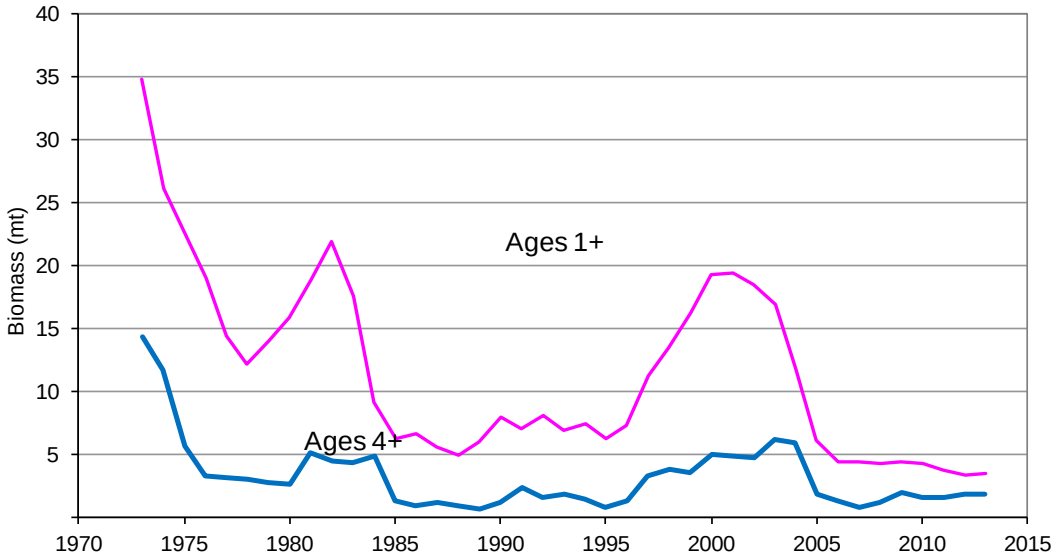
Canada

Introduction

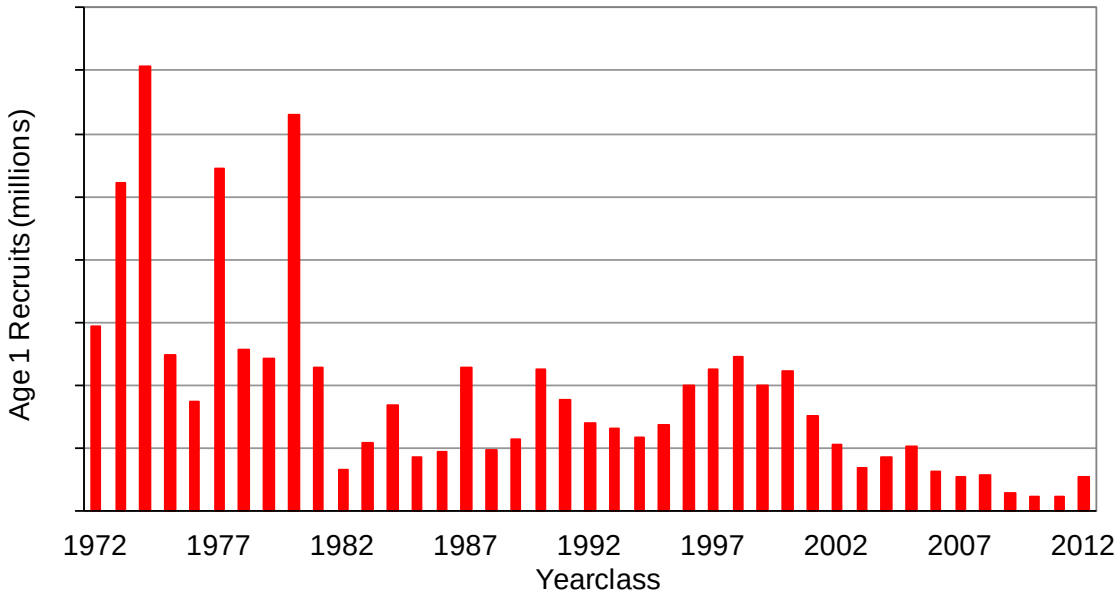
- Surplus production defined as
  SP = (Yield + recruitment + growth) – natural mortality

- Estimate trends in SP for GB YT during 1973-2012
- Apply methods of Rivard (1980) using cohort analysis
- Input data from results of the 2013 VPA for YT (Legault 2013)
- Method does not require assumption of 'equilibrium' state ;
  Calculations refer to transient state

Biomass and Recruitment Time Series

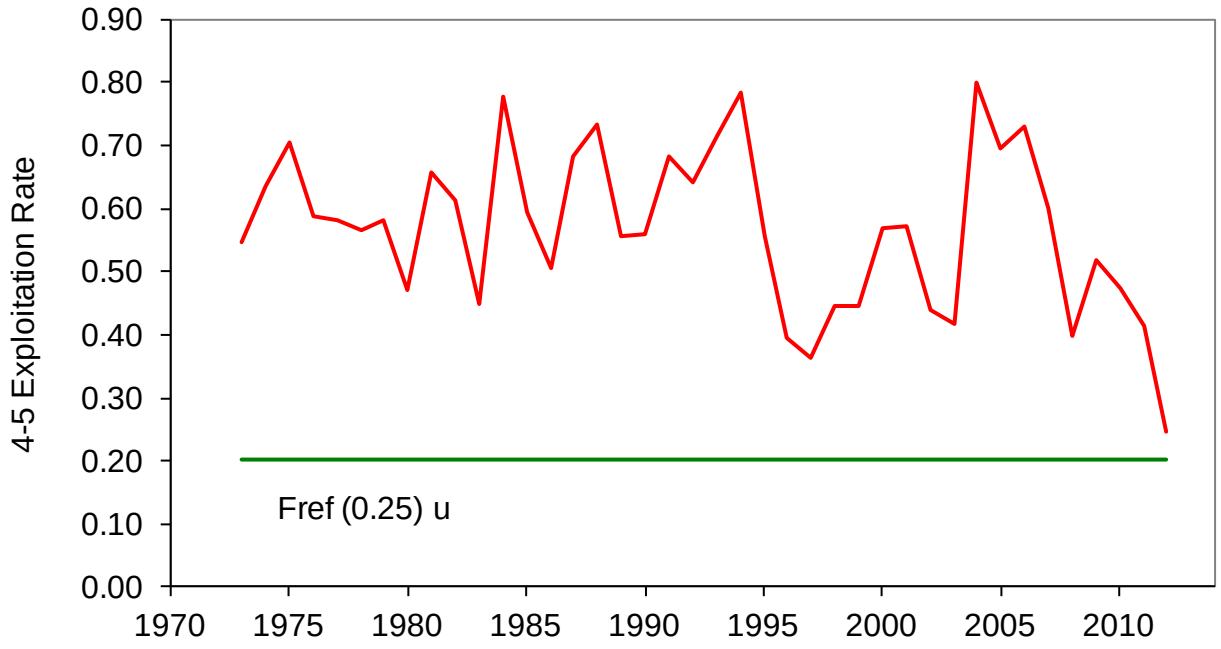


Biomass
age 1+ and age 4+



Recruitment - age 1 fish

Exploitation rate, Ages 4-5 and Fref = 0.25



Equations and Calculations

Age 2 recruitment = B_y (age2)

delta B = change in biomass = $[y_t, a_t – y_{t-1}, a_{t-1}]$

M(biomass) $_y$ = $N_{y,a}$* Mean $wt_{y,a}$ *$(M_{y,a}/Z_{y,a})$ *$(1 – \exp(Z_{y,a}))$

F(2+ biomass) $_y$=Yield = $N_{y,a}$* Mean $wt_{y,a}$ *$(F_{y,a}/Z_{y,a})$*$(1 – \exp(Z_{y,a}))$

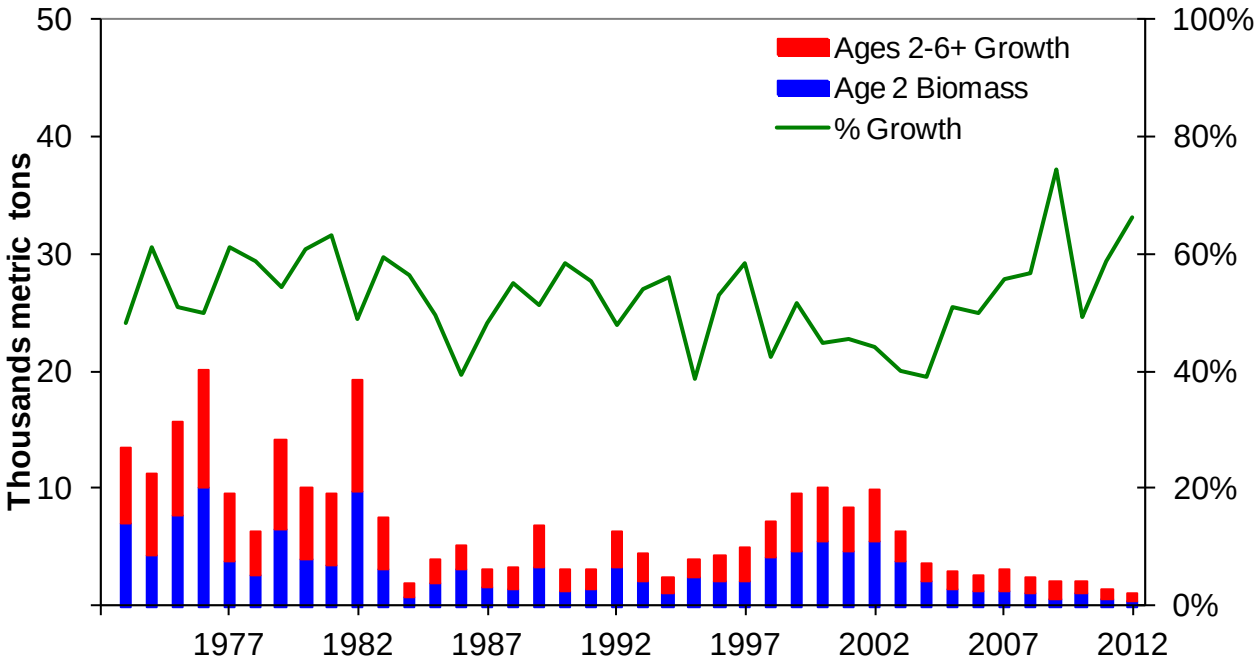
Production = P_y = delta $B_{y,a}$ + $F_{y,a}$ (biomass) + $M_{y,a}$ (biomass)

Total Production = B_y (age 2) + P_y

Surplus Production = P_y – M_y (biomass)

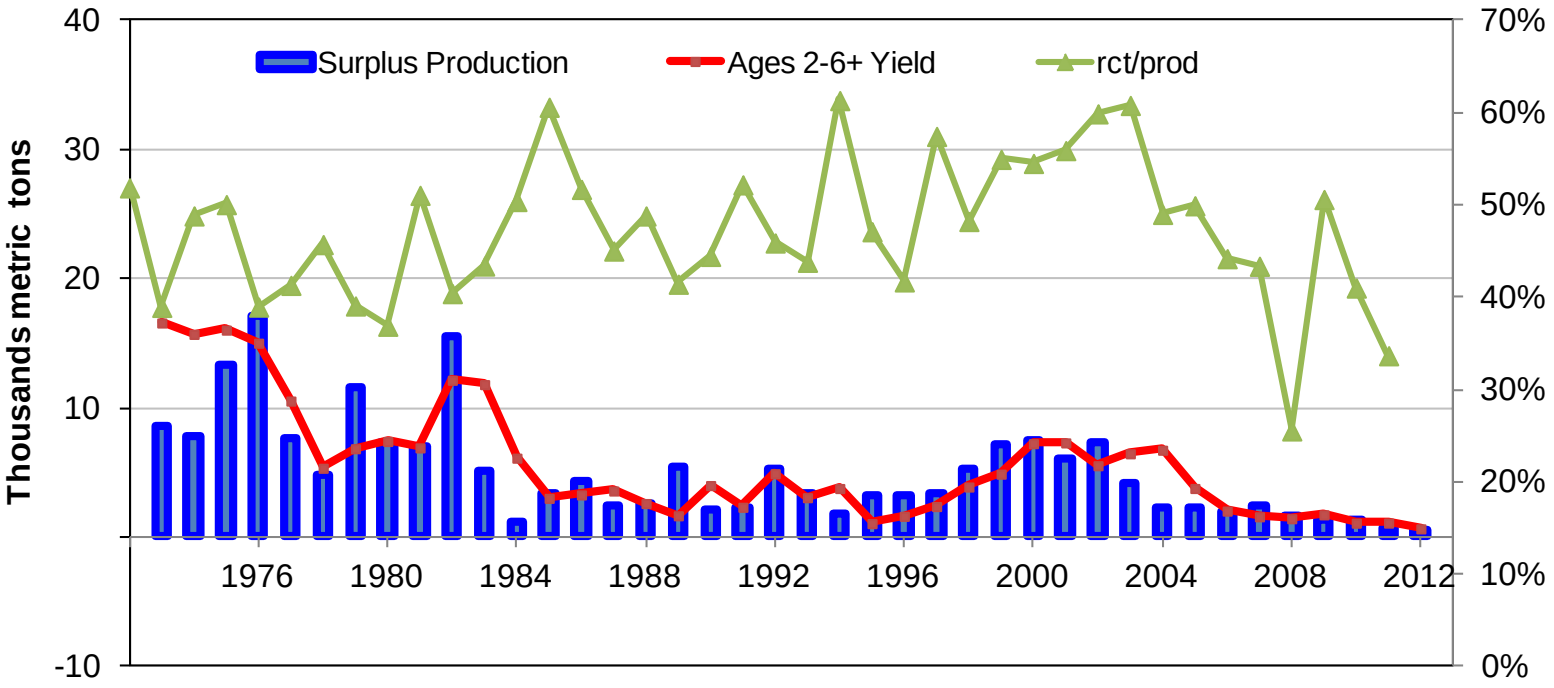
Net Production = SP_y – $Yield_y$

Results : Growth and Biomass



Percent growth of Age 2 fish represent > 50% of stock growth ~ 68% of years

Surplus Production



Rct/Prod – relative contribution of recruitment to total production

85% of years, recruitment accounted for > 40% of total Production

Positive Net production : 15/40 ~ 38% of 40 year time series

Literature Cited

Legault, C., L. Alade, W.E. Gross, and H.H. Stone 2013. Stock assessment of Georges Bank Yellowtail Flounder for 2013. TRAC Working Paper 2013/15

Rivard, D. 1980. Back-calculating production from cohort analysis, with discussion on surplus production for two redfish stocks. CAFSAC Res. Doc. 80/23