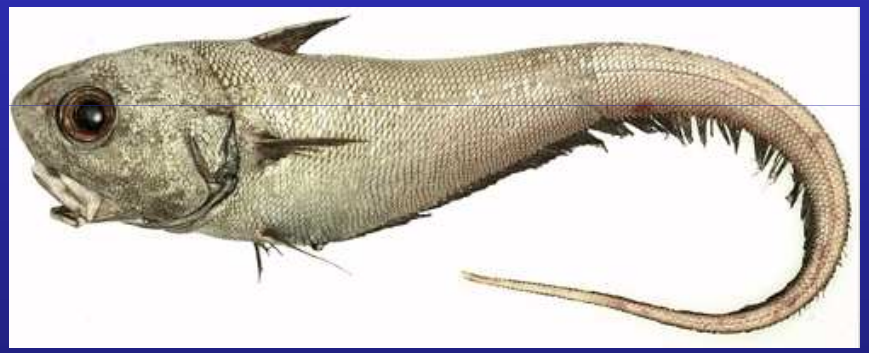
Analytical Assessment of roundnose grenadier in ICES division Vb, subdivisions VI, VII



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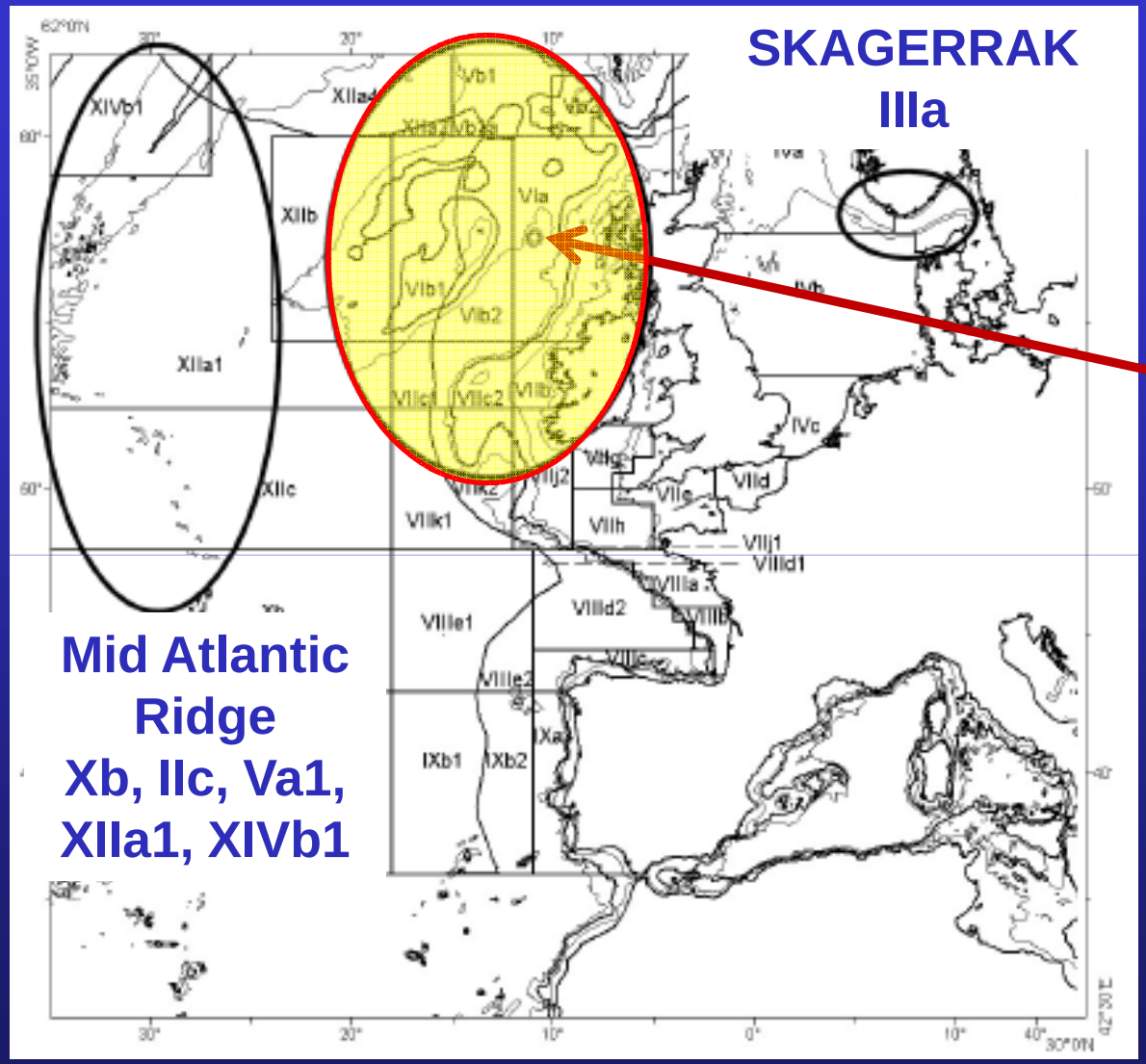
Overview



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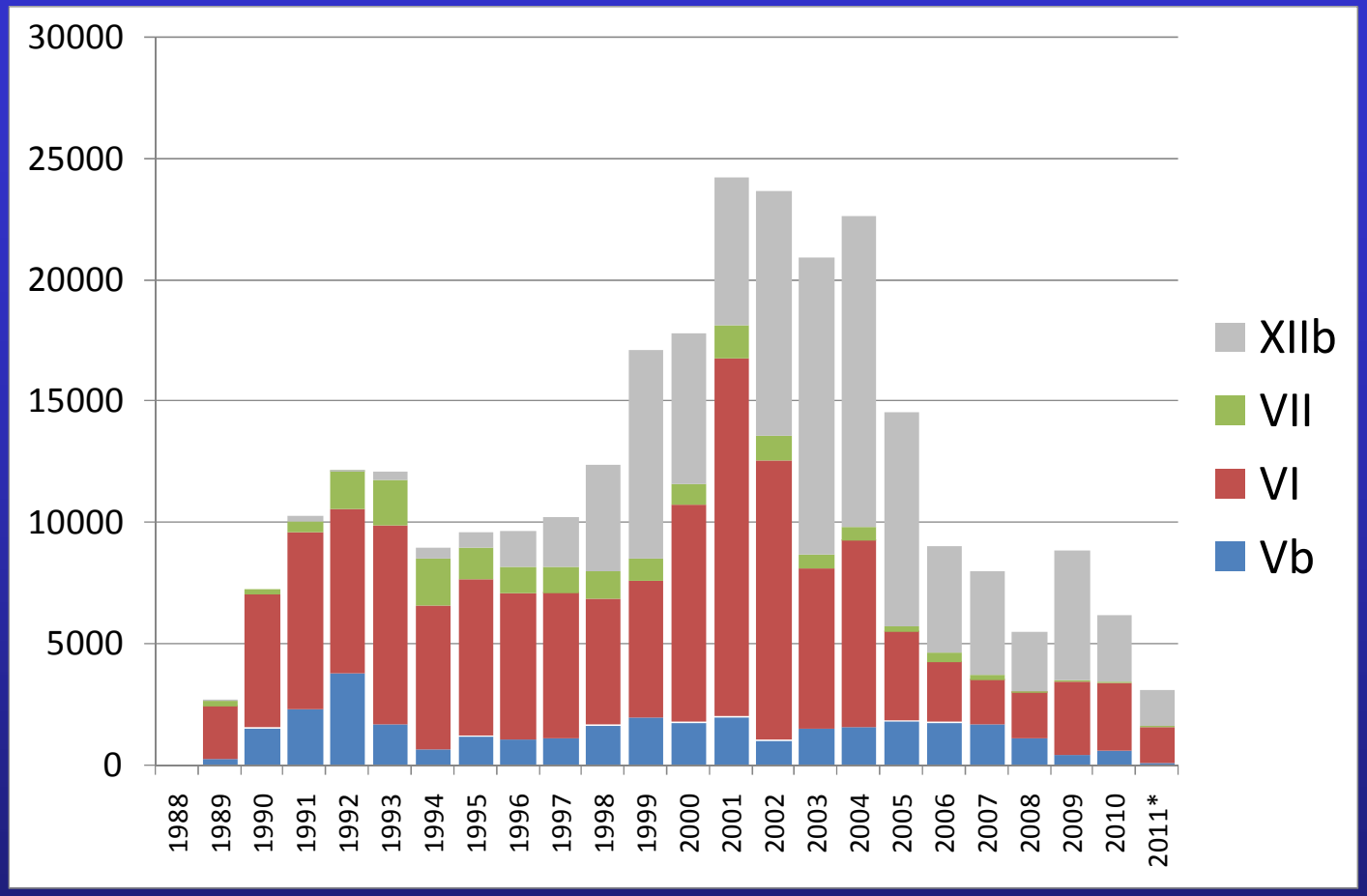
Overview



-Expansion then decline (intl landings/8, intl effort/4 since 2003).

-Regulated fishery by EC since 2003

- Mixed deepwater trawler fisheries including blackscabbard fish, blue ling

- Assessment used to be considered by ICES as exploratory prior 2012

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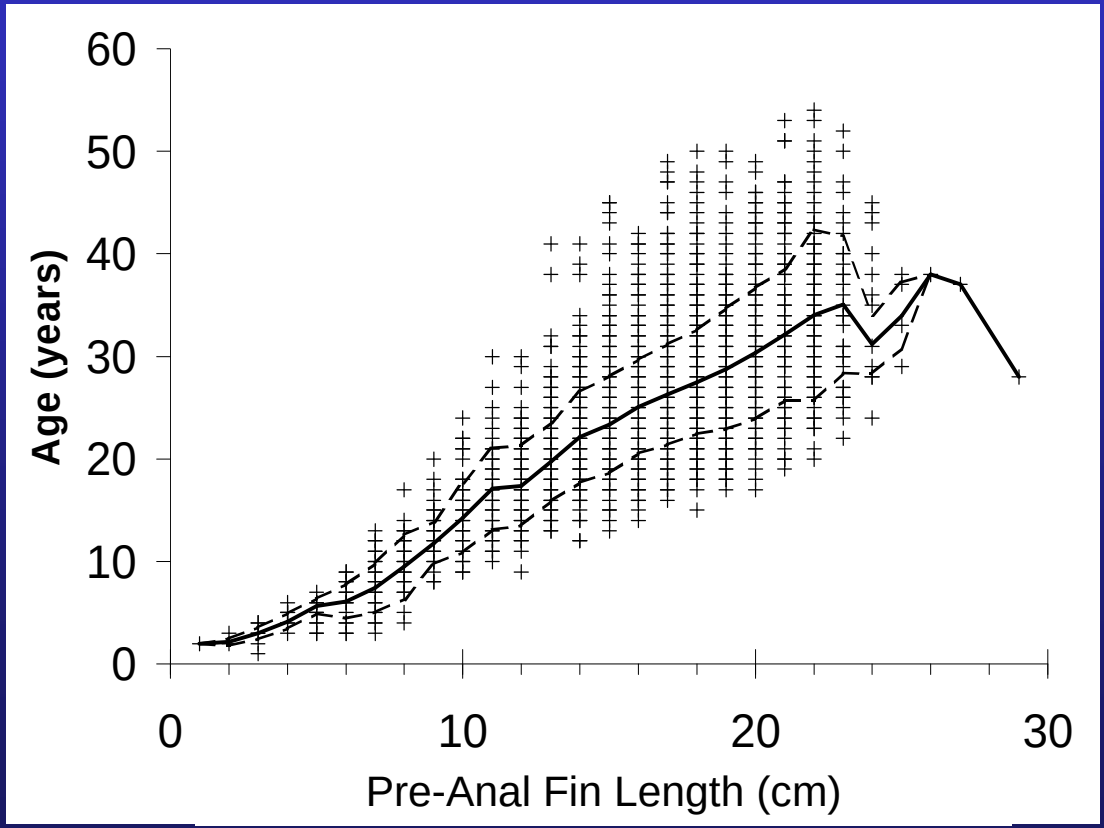
Why the « classical » age structured models do not work for RNG ?

→ *Exploratory VPA at ICES WGDEEP before 2010*

Issue #1 : Difficult cohort tracking (wide age range for a given length)

Issue #2 : Limited age data (specific training, limited sampling)



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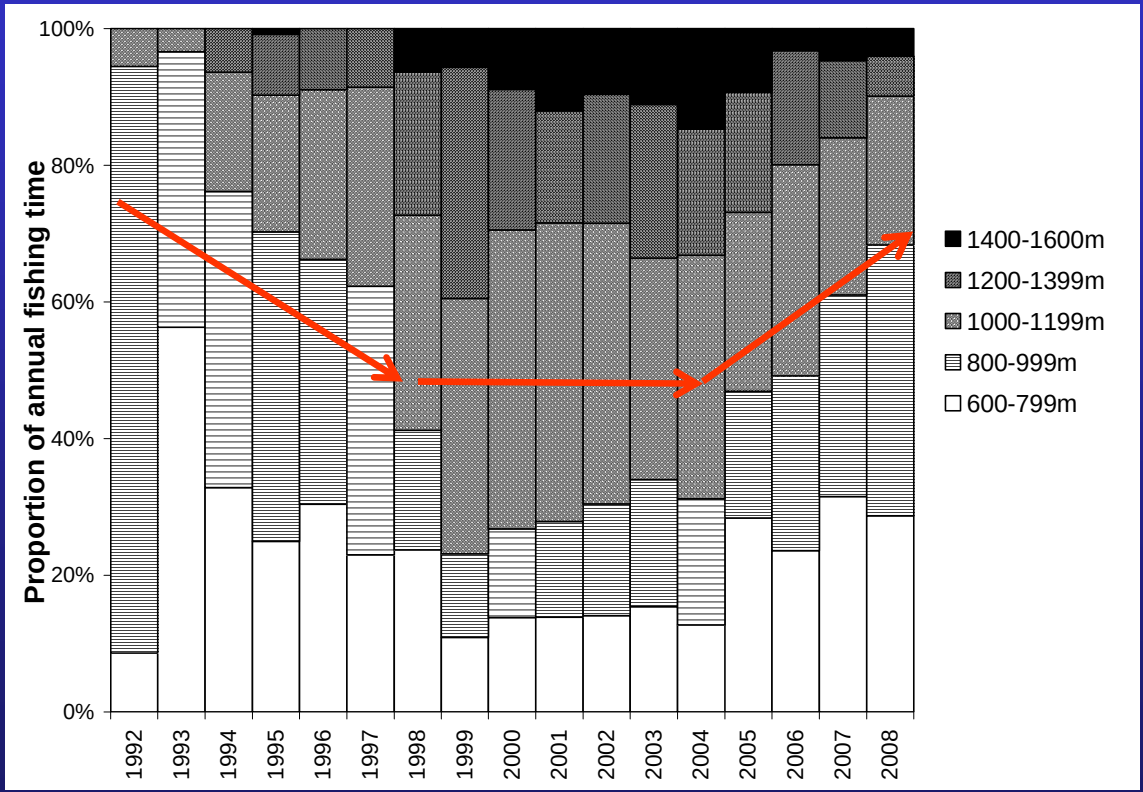
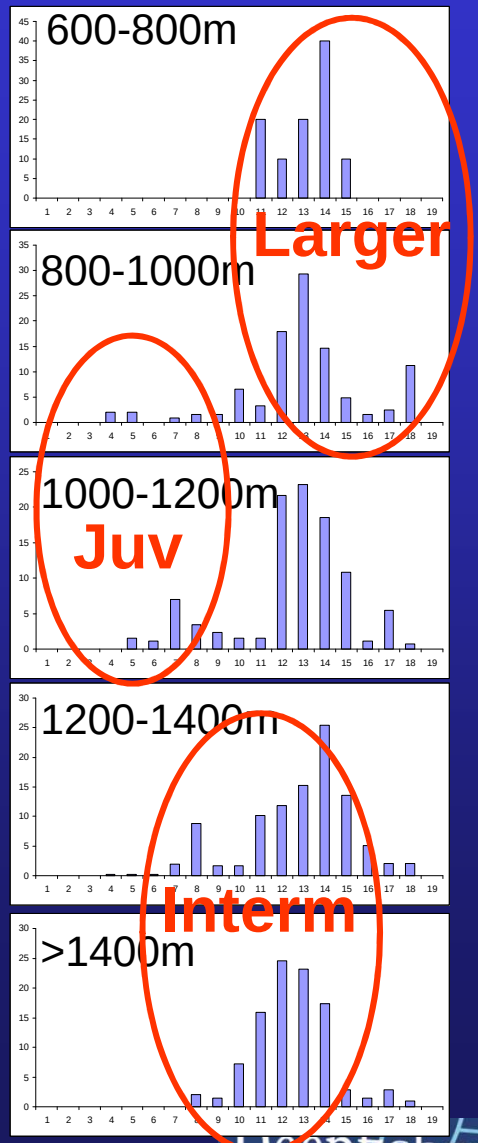
Why common age structured models do not work on RNG stocks ?

Issue #3 : Change of fishing depth through time vs depth structured life cycle
→ change of length structure





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Why common age structured models do not work on RNG stocks ?

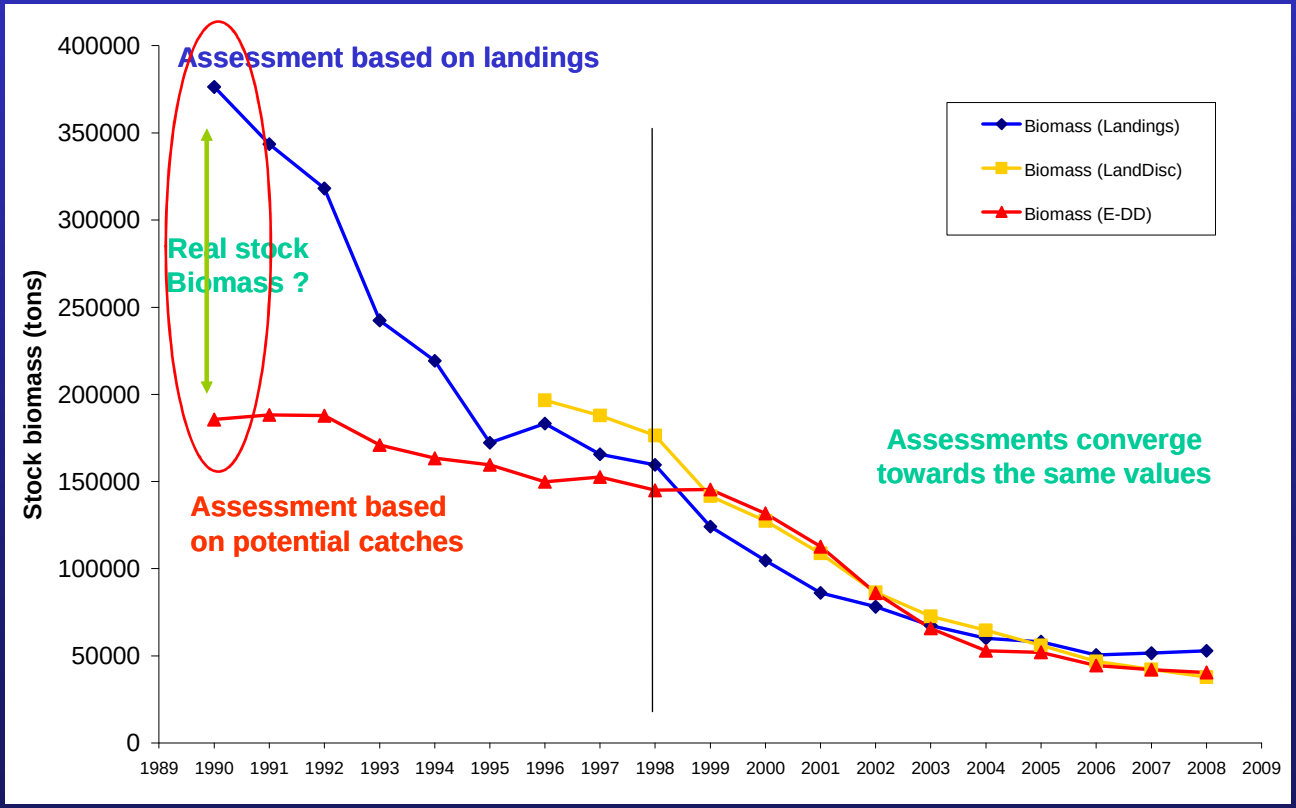
Additional problems:

too many age classes for the model
no proper biological reference points
Wide range of estimates of virgin biomass

→ Not usable for Advice / Management

↓

Precautionary approach
No catch option



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Getting rid of age/length data: Surplus Bayesian Production Model

→ **Schaeffer-Pella-Tomlinson Model**

Stock biomass

$$B_y = B_{y-1} + r \cdot B_{y-1} \cdot \left(1 - \frac{B_{y-1}}{K}\right) - C_{y-1}$$

Intrinsic growth rate

"Virgin biomass"

Catch

Harvest rate

$$H_y = \frac{C_y}{B_y}$$

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Additional indicators: Maximum Sustainable Yield

Bmsy	*Hmsy*	*Cmsy*
Stock size at MSY	"proxy of Fmsy"	MSY Catch level

$$B_{msy} = \frac{K}{2} \quad \text{x} \quad H_{msy} = \frac{r}{2} \quad \rightarrow \quad C_{msy} = \frac{r.k}{4}$$

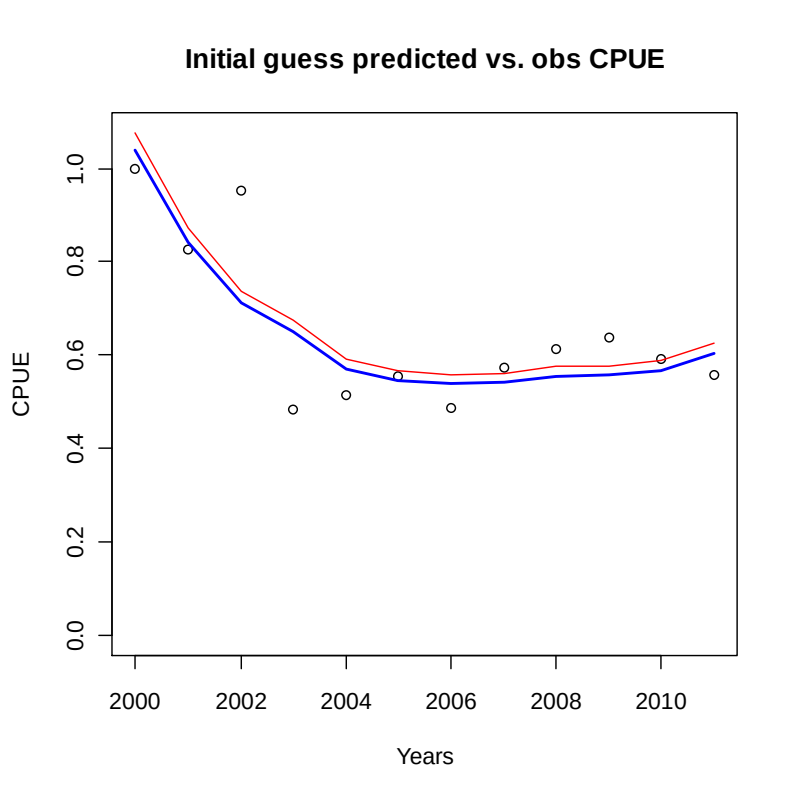
Bayesian framework ➔ probabilities of being above/below MSY

3 parameters required r, K, and q (log catchability coefficient)

Estimating r,K,q

- r: by solving the Euler-Lotka equation (Fisher, 1930) using
  - assumed distribution of "maximal age"
  - assumed distribution of maturity at age

- K,q: by fitting the production model to time series of abundance based on French tallybook database (30000 hauls) and international landings



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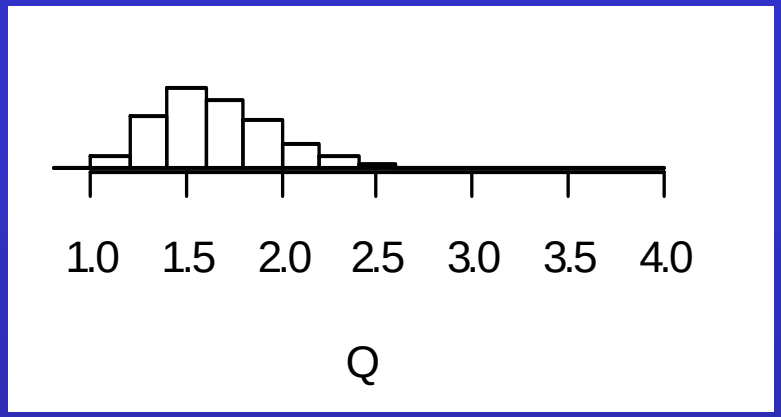
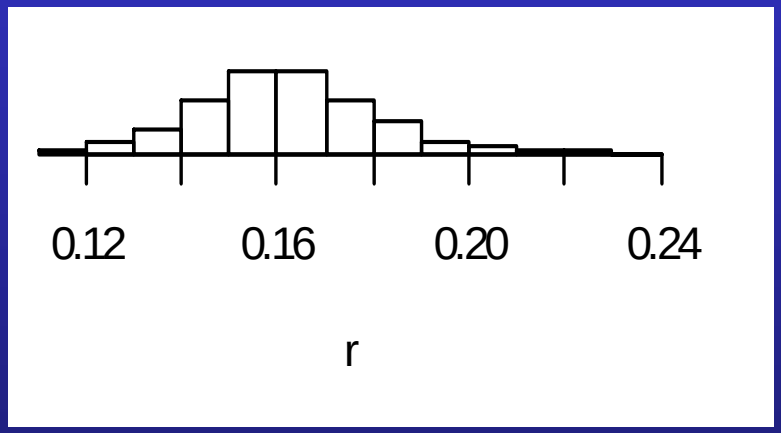
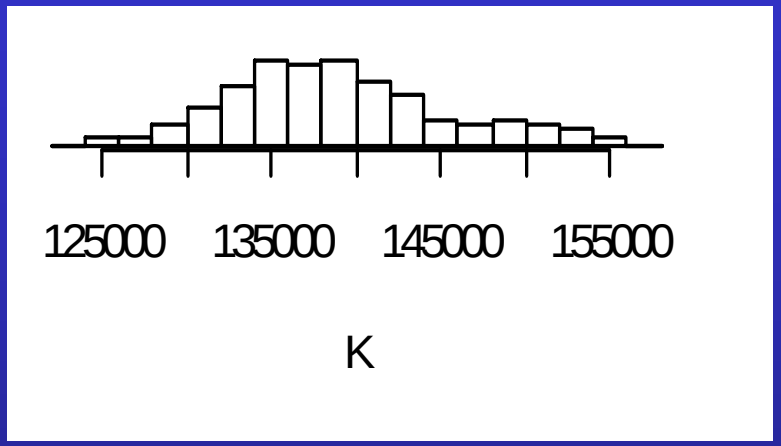
Estimating r,K,q







1000 estimates of r,K,q + goodness of fit for each parameter

1000 separate runs of the model

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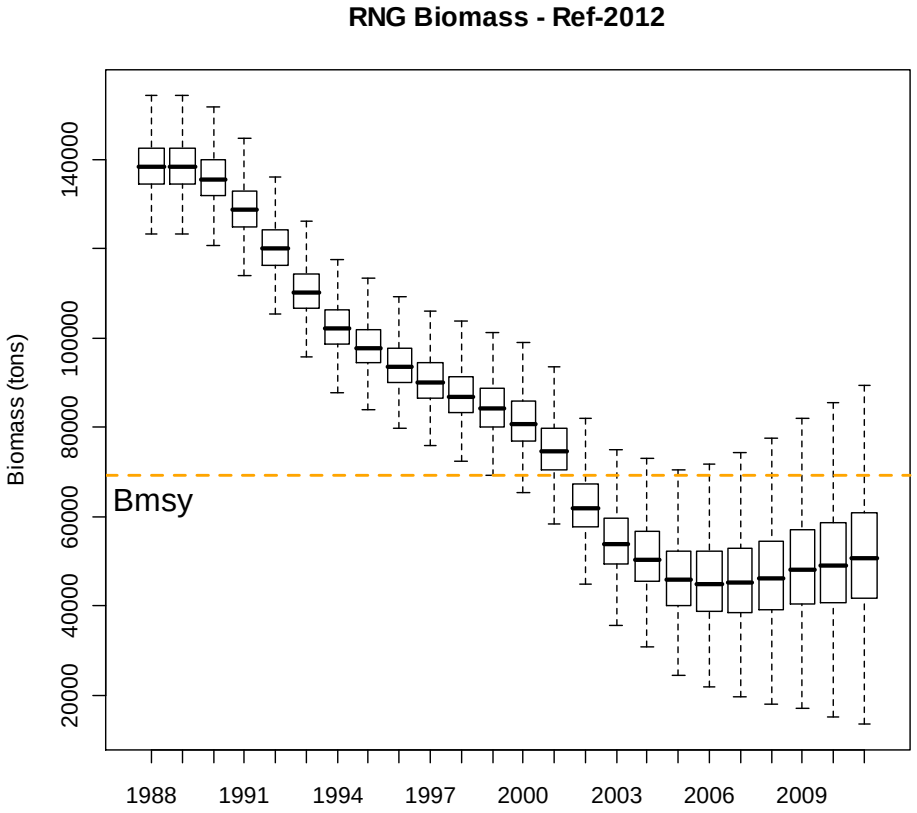
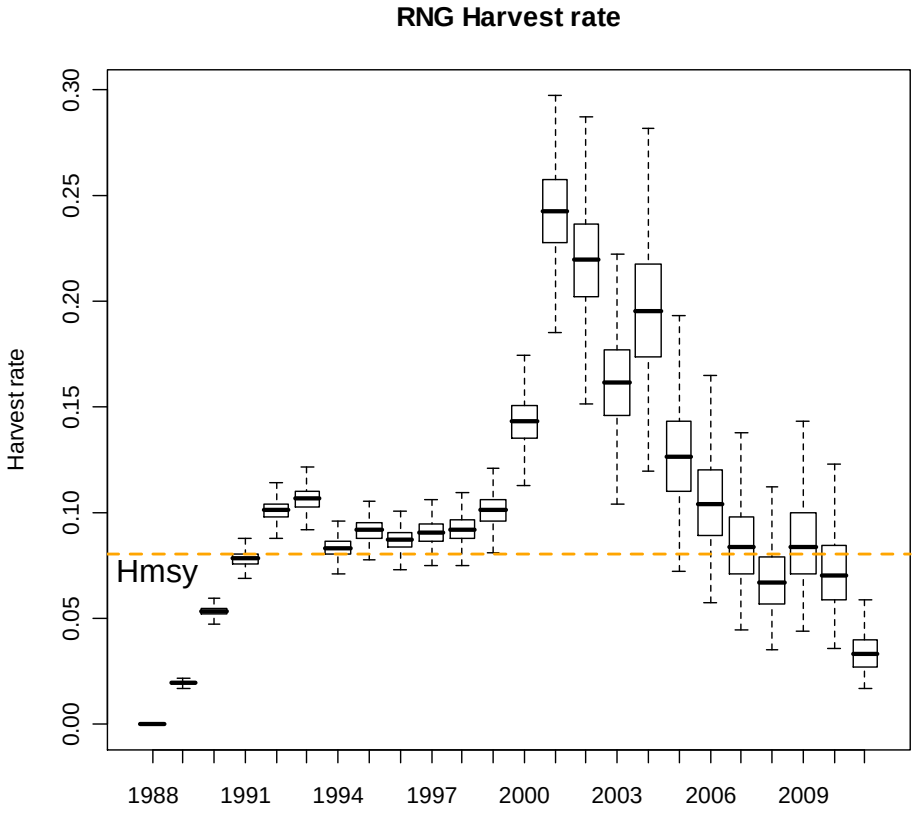
Stock assessment





→ Stock slowly recovering since 2006 (p(B>Bmsy) = 8%)

→ strong reduction in fishing effort (now below Hmsy)

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Providing management options

Applying various scenarios of TAC each year

Probability of being above Bmsy

Areas V,VI,VII	2012	2013	2014	2015	2016	2017	2018	2019	2020
Status Quo 2546t	8%	11%	15%	20%	25%	32%	39%	46%	52%
TACy=85% prev. TAC	8%	11%	17%	23%	31%	41%	52%	61%	71%
TACy=Cmsy*By-1/Bmsy	8%	10%	11%	13%	15%	17%	19%	21%	23%
TAC=0t	8%	14%	22%	34%	46%	58%	69%	79%	87%
TAC=500t	8%	14%	21%	31%	42%	54%	64%	73%	81%
TAC=1000t	8%	13%	19%	28%	38%	48%	58%	67%	75%
TAC=2000t	8%	12%	17%	22%	29%	38%	46%	54%	61%
TAC=3000t	8%	11%	14%	18%	22%	28%	33%	39%	45%
TAC=4000t	8%	10%	12%	14%	17%	20%	23%	26%	30%
TAC=5000t	8%	9%	10%	11%	12%	13%	14%	15%	17%

→ In all cases, the stock is rebuilding slowly.

→ Median biomass would reach Bmsy level at the earliest

- in 2017 if fishery is closed,
- in 2020 if status quo TAC (2550t)

Work still to be done

- Integration of discards
  - Unknown before mid 90 but different sorting habits
  - around 33% of catch for 1990-2005 period
  - 10% in 2011

- Inclusion of XIIb data
  - unreliable dataset for the time being
  (misreporting, poor monitoring of activity)

Thank you !