

Should we fish younger or older cod?

Arni Magnusson, Jacob Kasper, Cecilia Pinto, Paris Vasilakopoulos,
Alejandro Yáñez, Knut Korsbrekke, David Miller

Fisheries stock assessment and management advice mainly focuses on the overall fishing pressure and annual catches in tonnes. Much less attention is paid to selectivity, whether it would be advisable to shift the fishery towards younger or older fish. In this study, we look at the main Atlantic cod stocks in European and North American waters ($n = 15$) and evaluate the likely effects of shifting the selectivity towards younger or older fish. The analytical approach incorporates the life history, stock size, and average catch composition from each fishery in recent years. The majority of cod fished in the North Sea and Celtic Seas tend to be at age 1 and 2, while ages 5 and 6 are most common in the catches of Northeast Arctic and Icelandic cod, with the other cod stocks somewhere in between. The stocks that are fished at the youngest ages are also the stocks with the fastest somatic growth rate. Essentially all the Atlantic cod fisheries would benefit from shifting the selectivity to older fish, with a predicted increase in both the annual yield and spawning biomass in the long term. A similar analytical approach could be used to evaluate the likely effects of shifting the selectivity of other fish species sharing habitat with the cod.

Keywords: selectivity, fisheries management, life history, age composition

Contact author: Arni Magnusson, ICES Secretariat, arni.magnusson@ices.dk

Should we fish younger or older cod?

Arni Magnusson, Jacob Kasper, Cecilia Pinto, Paris Vasilakopoulos,
Alejandro Yáñez, Knut Korsbrekke, David Miller

(ICES Methods Working Group)

Intro

Some Atlantic cod fisheries mainly catch young fish (ages 1-2)
but others target older fish (5-6)

How does this affect the long-term sustainable catch in tonnes?

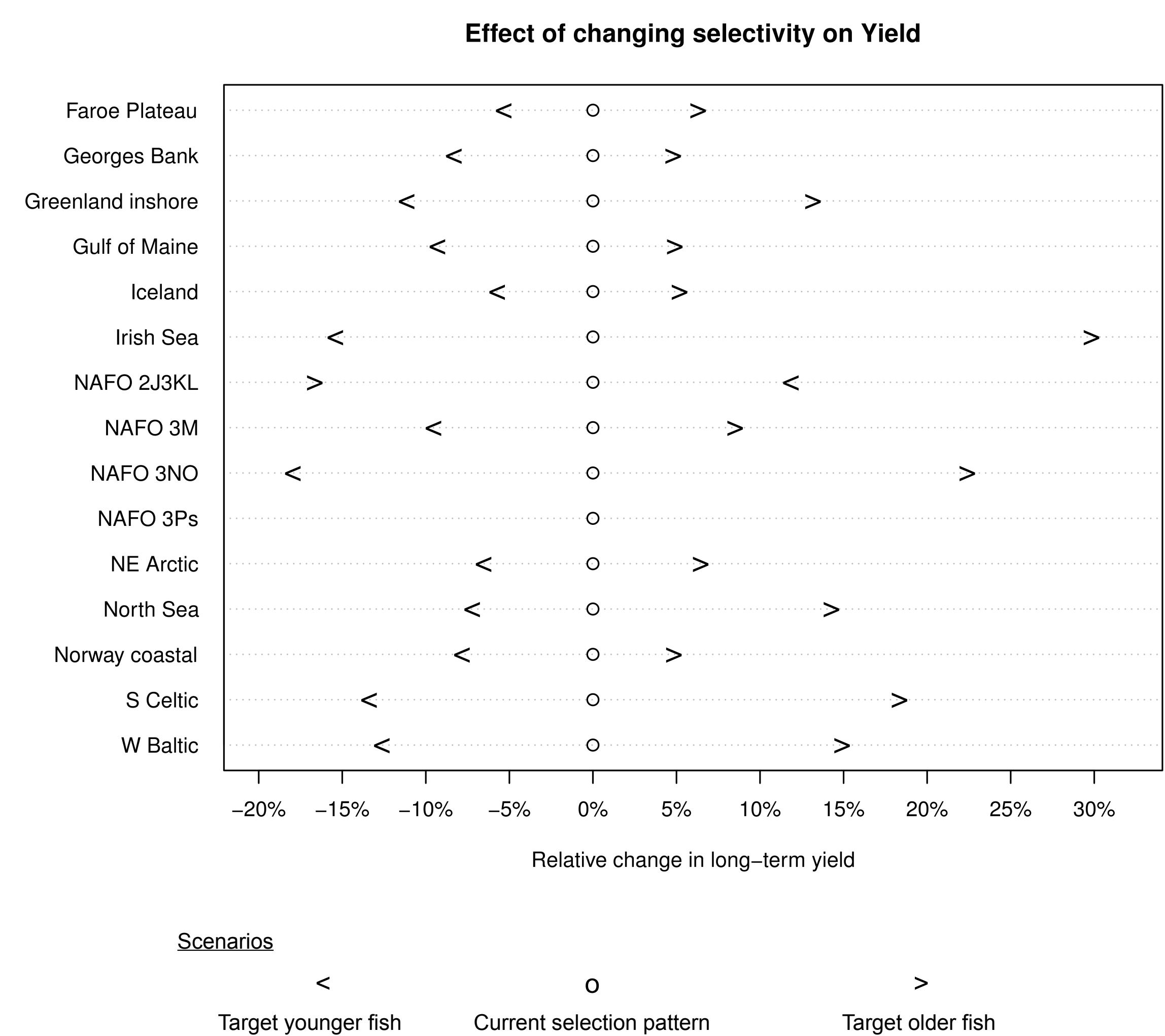
Methods

Stock	Catch (t)	Age at 50% Selectivity	Age at 50% Maturity	Weight at age 5 (kg)
Faroe Plateau	7 600	4.1	2.7	3.3
Georges Bank	5 900	3.0	2.3	3.8
Greenland inshore	17 100	4.3	4.3	1.6
Gulf of Maine	6 400	3.6	2.5	3.6
Iceland	204 000	5.4	6.4	2.5
Irish Sea	500	1.6	1.7	7.9
NAFO 2J3KL	3 700	6.3	5.3	1.6
NAFO 3M	9 300	4.6	4.0	2.2
NAFO 3NO	800	2.4	5.5	1.2
NAFO 3Ps	7 700	—	5.2	1.4
Northeast Arctic	758 000	6.5	7.0	1.7
North Sea	33 900	1.7	2.5	6.0
Norway coastal	44 400	4.7	5.2	3.3
Southern Celtic	4 200	1.6	2.2	9.3
Western Baltic	15 100	2.4	1.7	3.0

Data from the main 15 Atlantic cod stocks

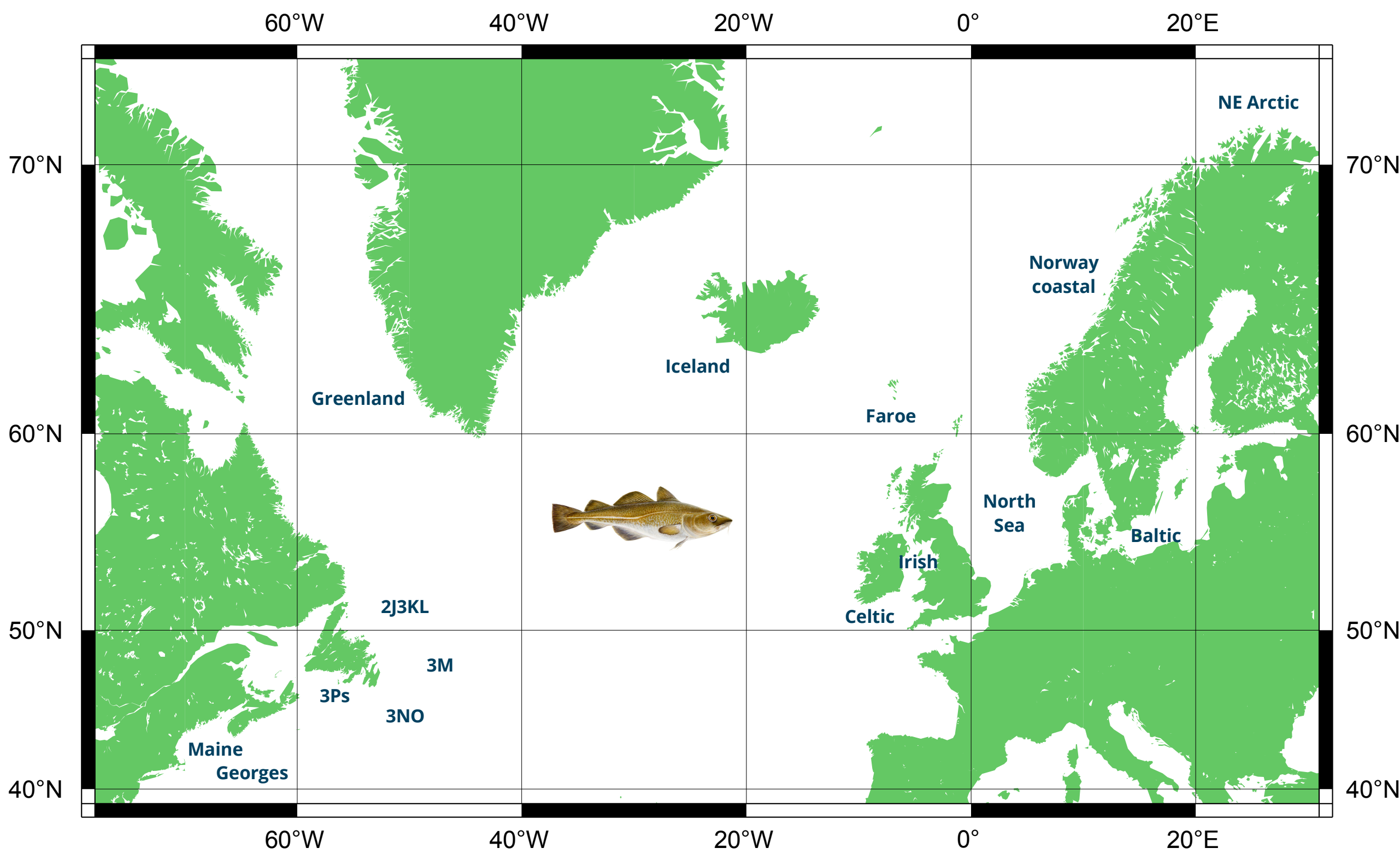
Use basic population model $N_{t+1} = N_t \exp(-Z_t)$
with $F_{0.1}$ to test alternative selectivity patterns

Results



Discussion

A similar approach can be used to analyze other species
sharing habitat with the cod



Fishing cod at an **older** age
would lead to **increased**
long-term **catches** and
stock size



Take a picture to visit
the project **homepage**

- read the abstract
- see more figures
- browse the data & code
- contact the Methods WG