The influence of climate variabilities on fisheries management performance – A Northeast Atlantic pelagic fisheries case study

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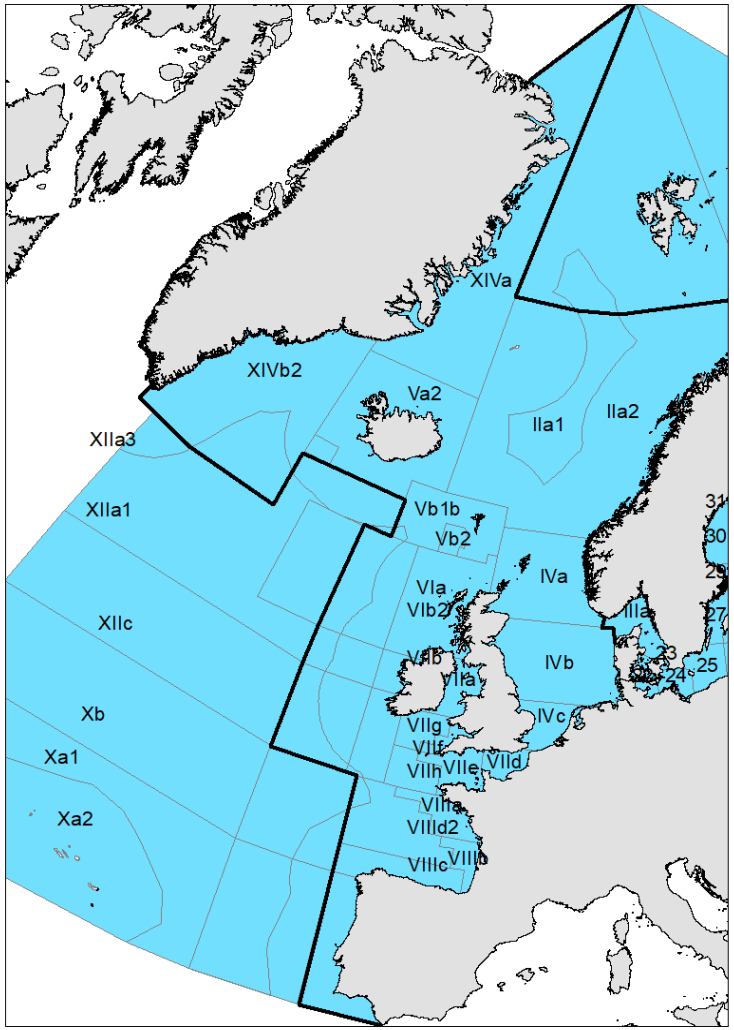
1) CERES – The Project

Climate change and European Aquatic RESources

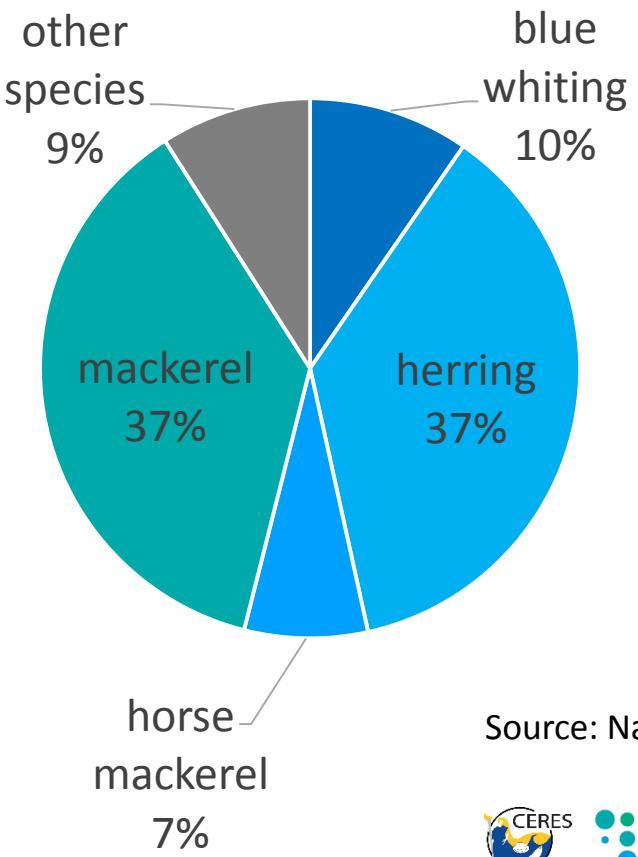
Source: CERES 2018 (https://ceresproject.eu)

2) Case studies



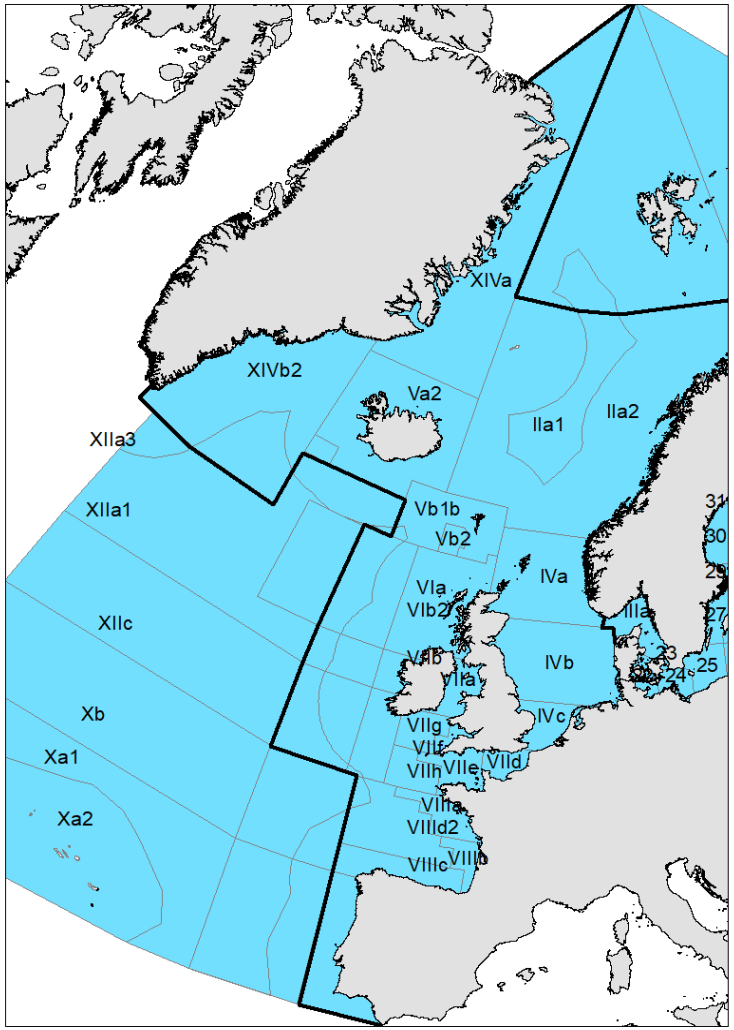
Landed weight from EU Waters

(annual av. 2012-2014)



Source: Napier 2016

2) Case studies



How might climate variabilities coupled with different future management strategies affect the NEA pelagic fishery fleet dynamics and their economy?

- Adaptations / Benefits?

3) The model - FishRent

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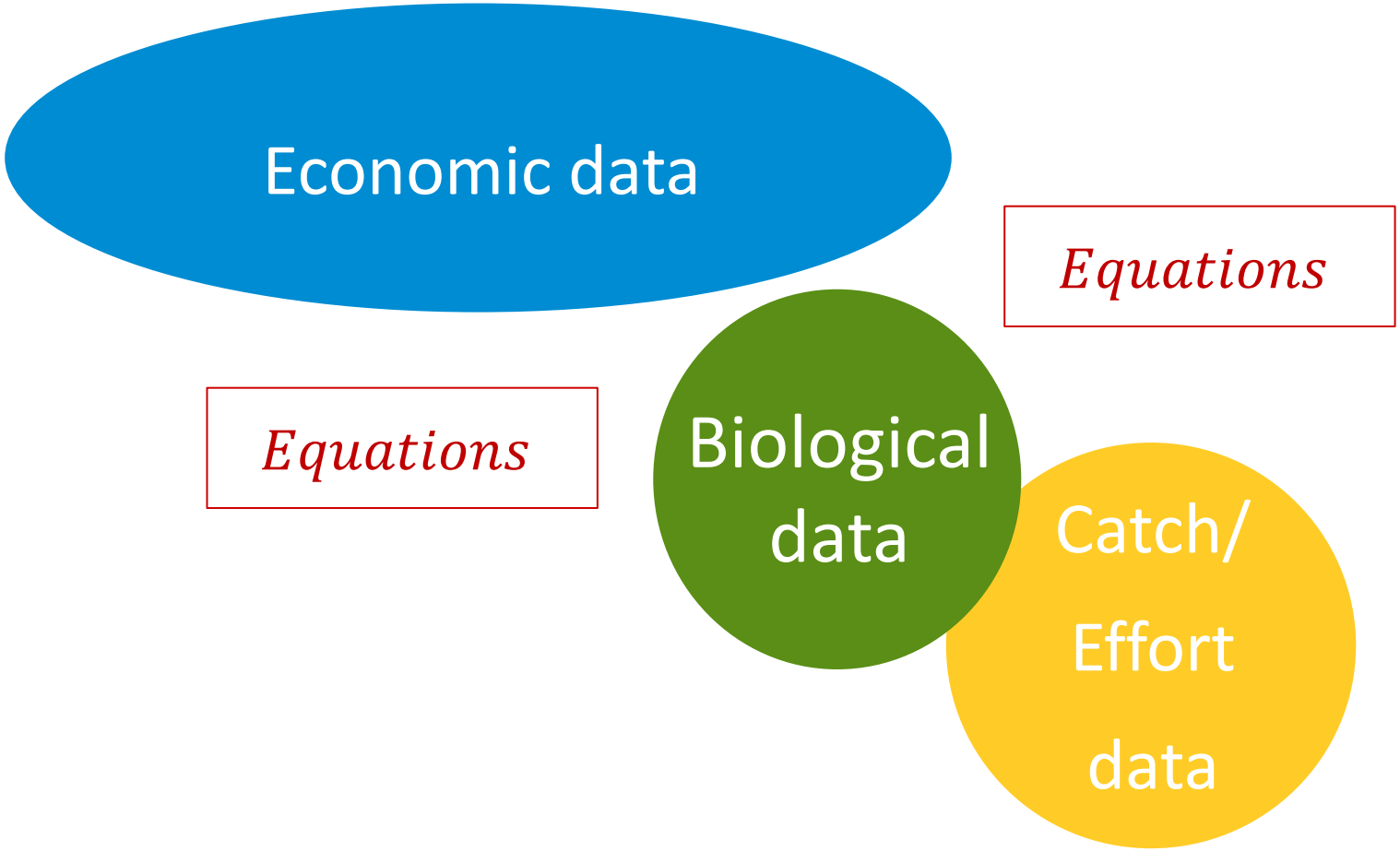
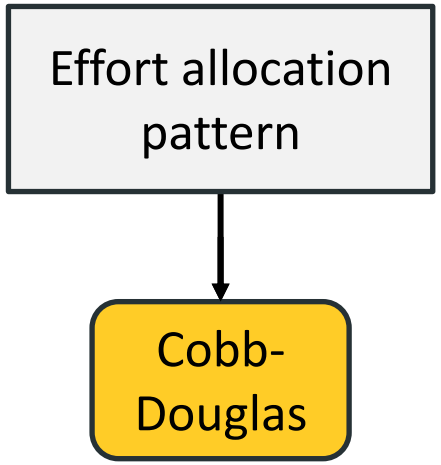


3) The model - FishRent

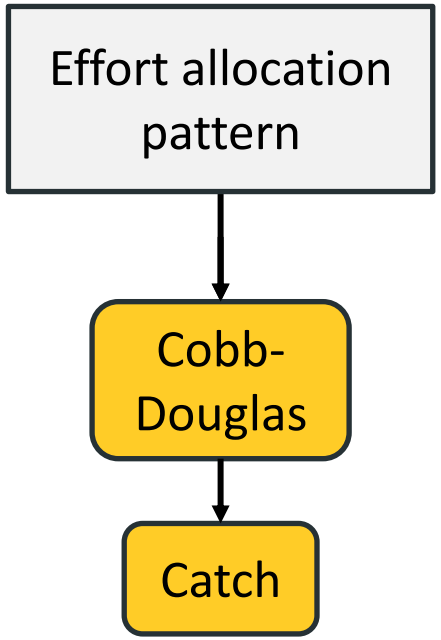
Effort allocation pattern

3) The model - FishRent



3) The model - FishRent

Calculation of next time step



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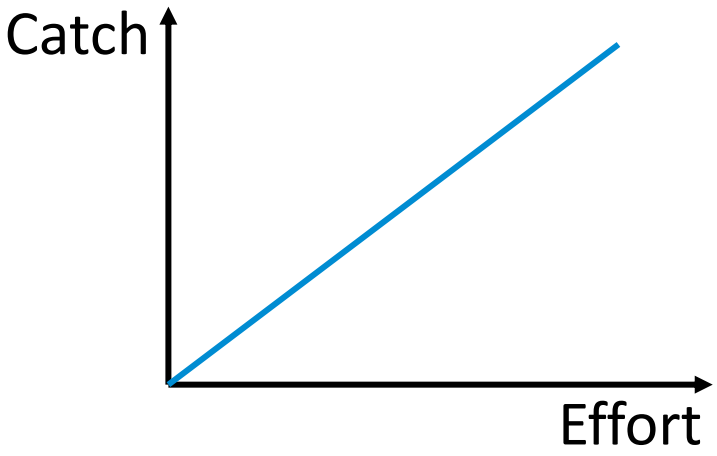

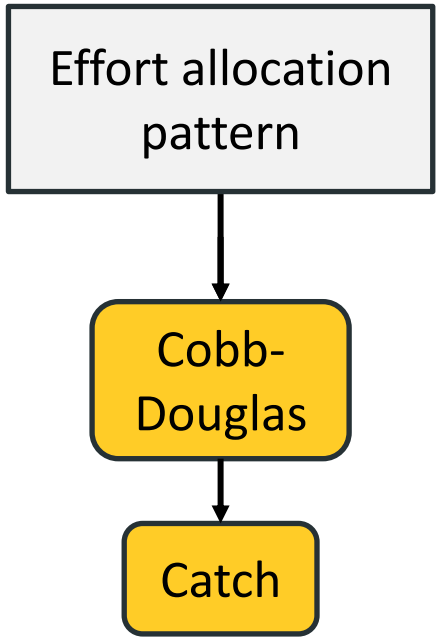

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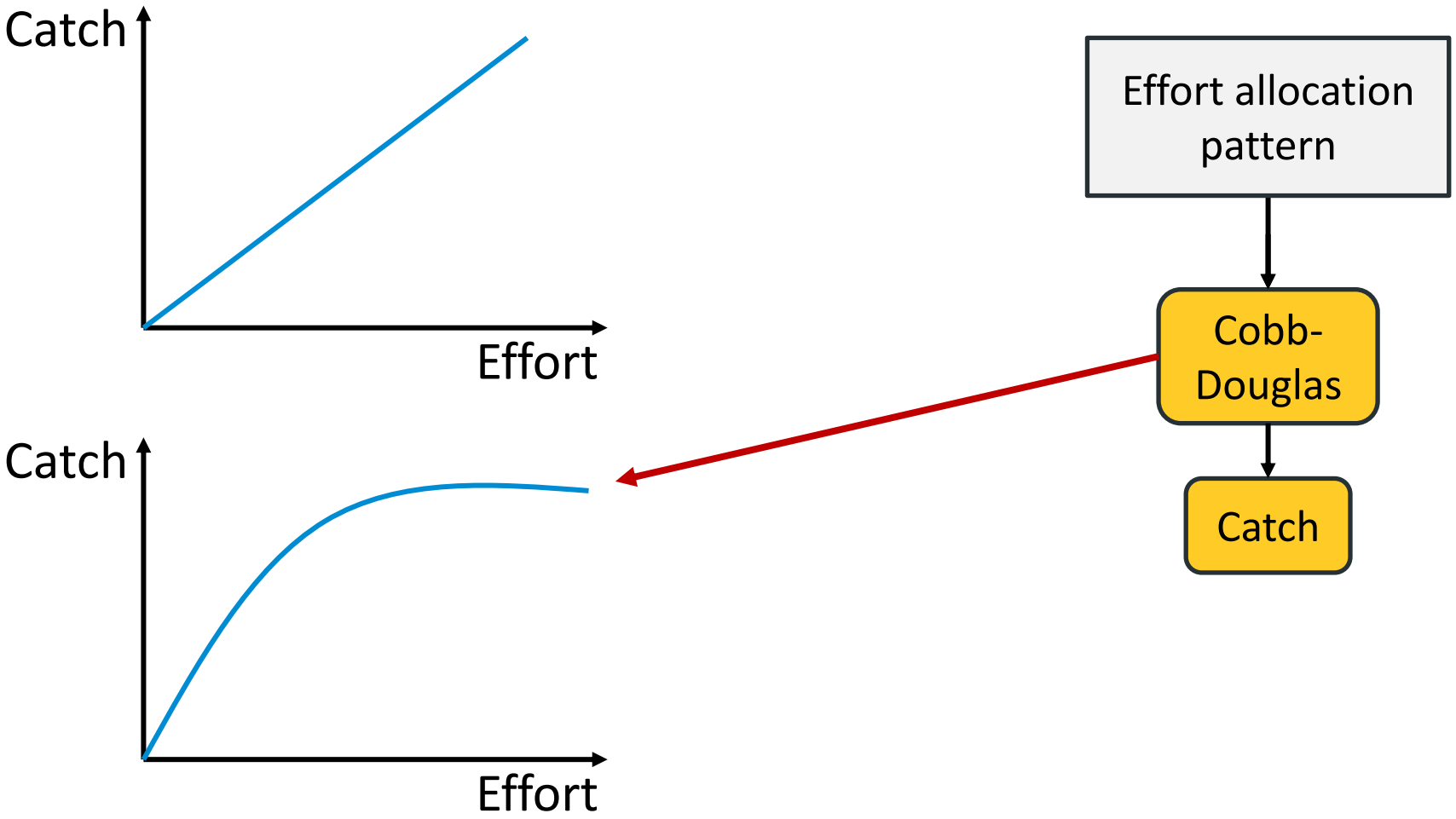
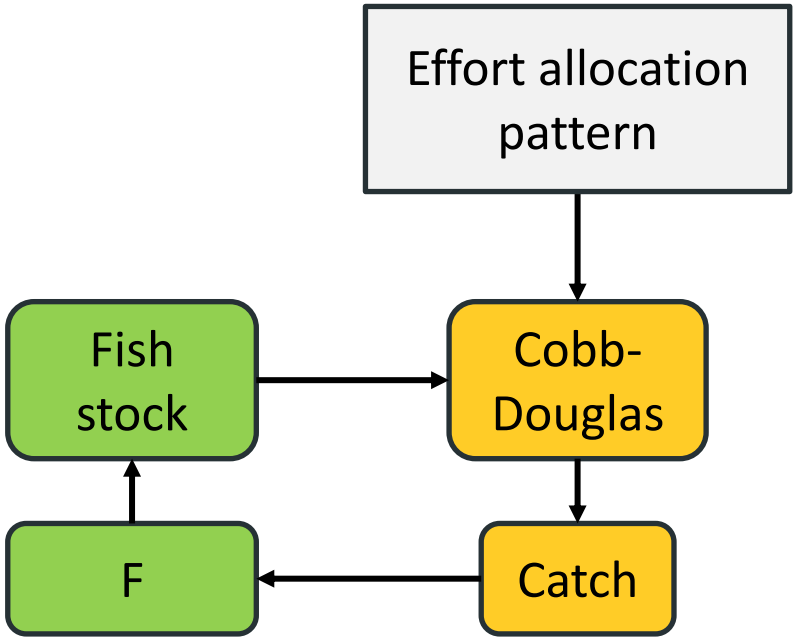


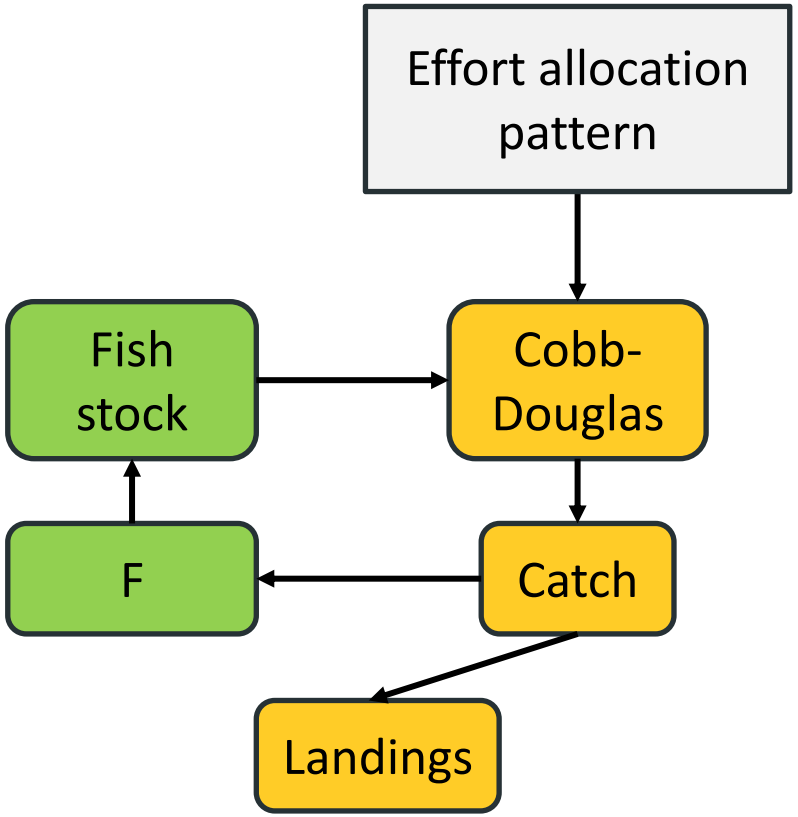
3) The model - FishRent

Calculation of next time step



3) The model - FishRent

Calculation of next time step



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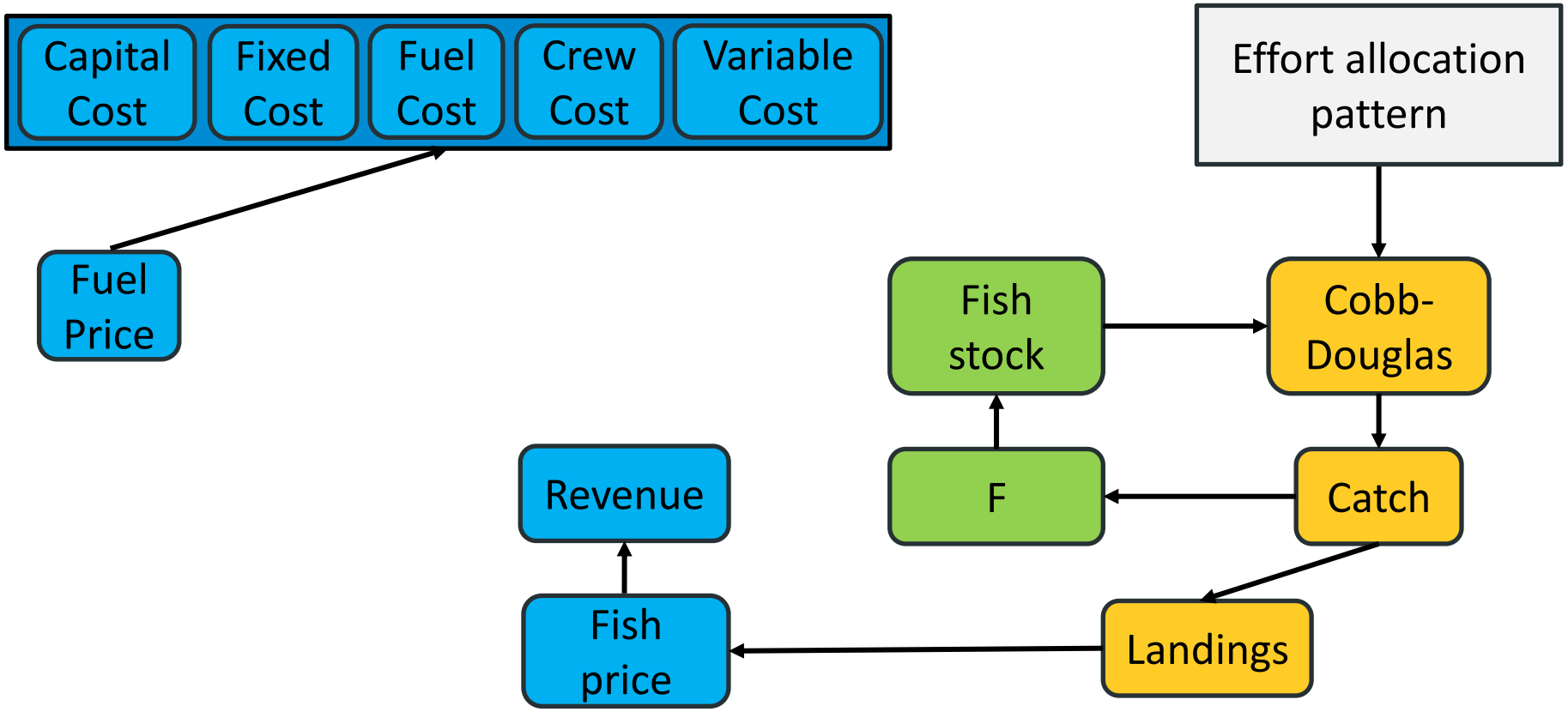

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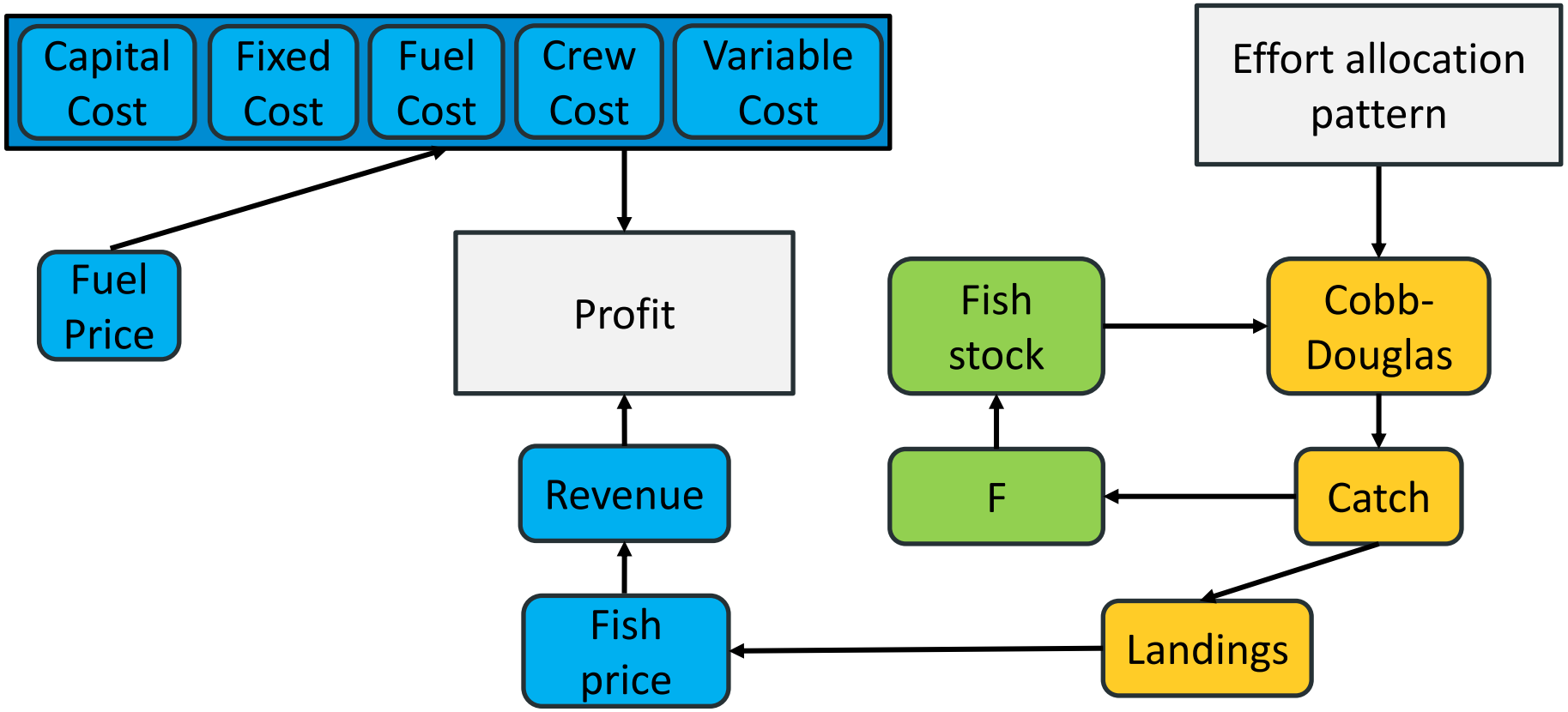

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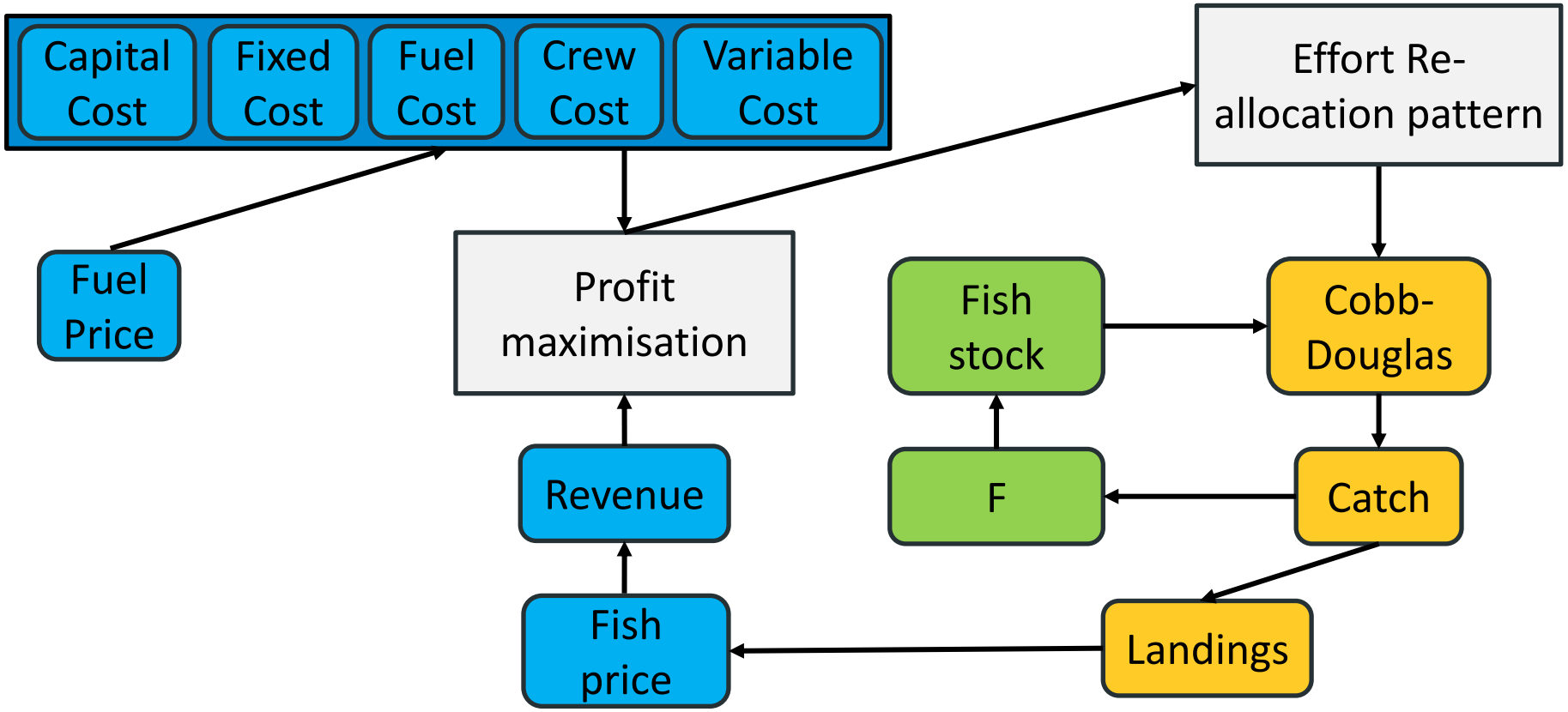

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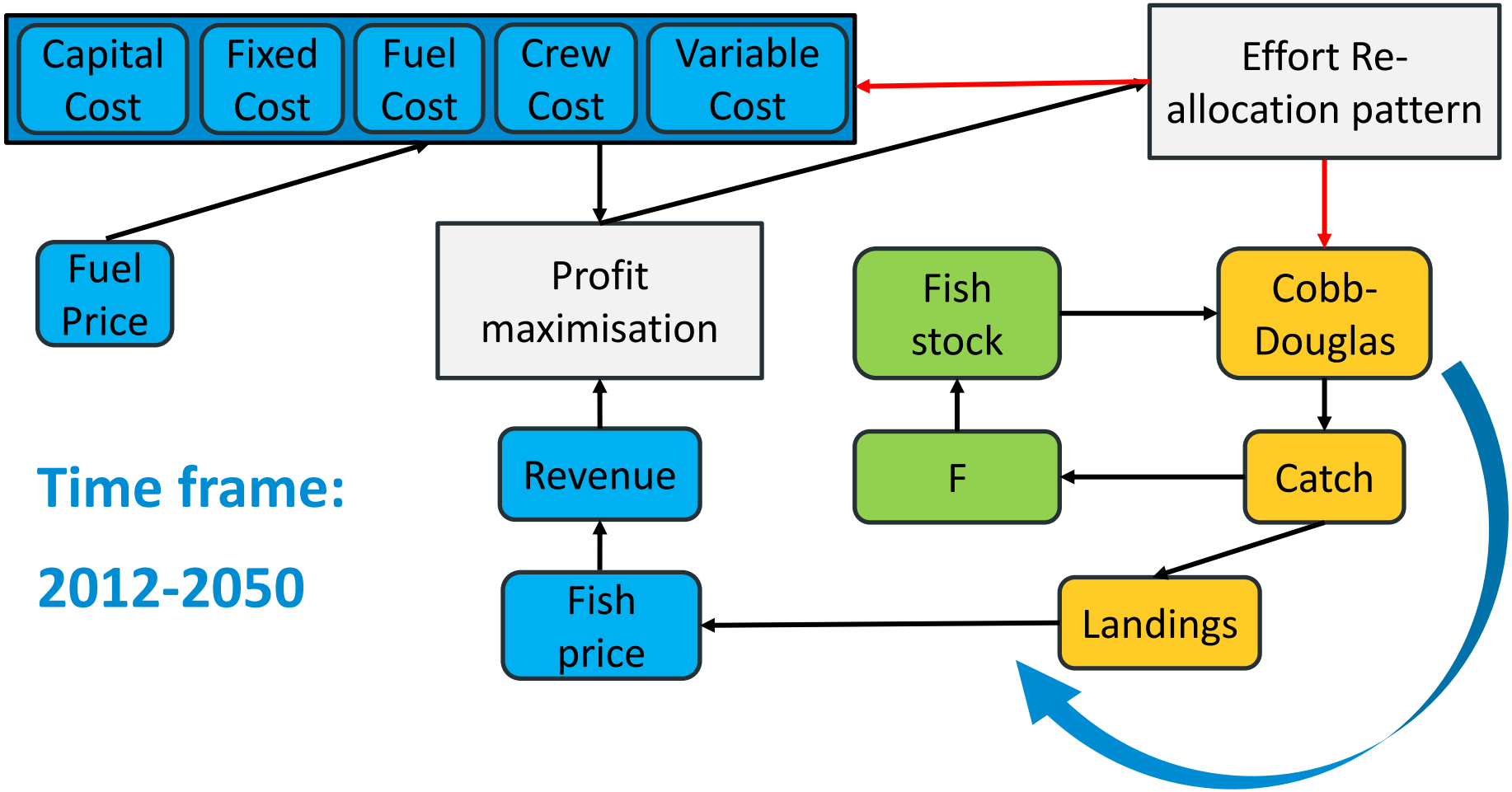
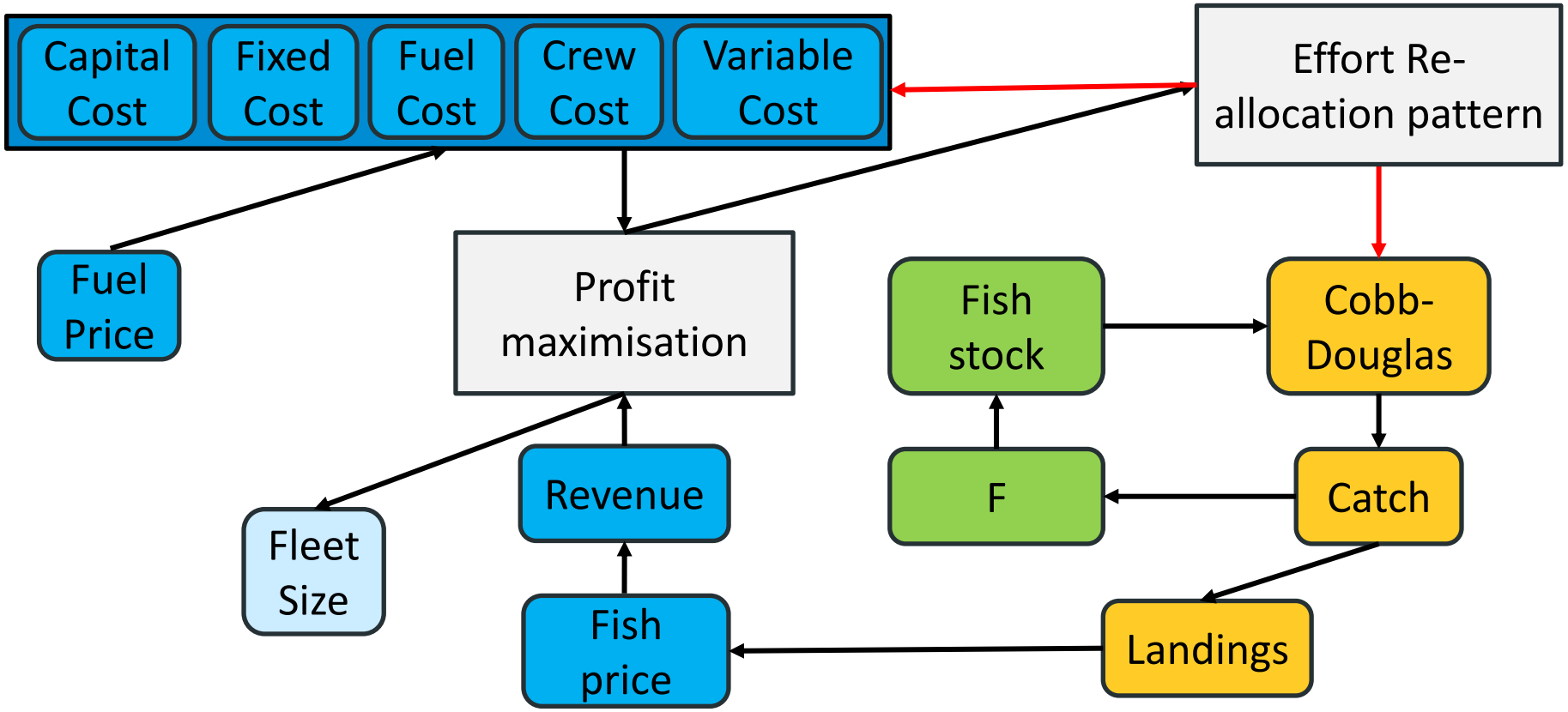


Time frame:

2012-2050

3) The model - FishRent



Source: according to Simons et al. 2015

4) Management Scenarios

Global Sustainability

„All for one and one for all“

World Market

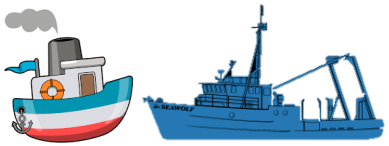
„Money, money, money“

Sources: CERES 2018; IPCC 2015; O’Neill et al. 2013

5) Policy Framework

	Global Sustainability	World Market
Resource access	Open	Open
Landing obligation	✓	X
TAC	**Lower** than ICES advice	**Higher** than ICES advice

5) Policy Framework

	Global Sustainability	World Market
F	↓	↑
Fleet composition		
Area closures	↑	→

6) Economic Framework

	Global Sustainability	World Market
Fuel costs	→	↑
Fish price	↑	↓

7) Biological Framework

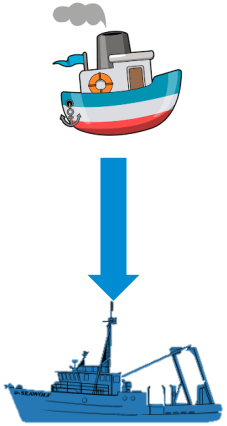
	Global Sustainability RCP 4.5	World Market RCP 8.5
Temperature	↗	↑
Recruit/larvae survival	↘	↓
Spatial distribution	**less** pronounced shifts	**Very** pronounced shifts

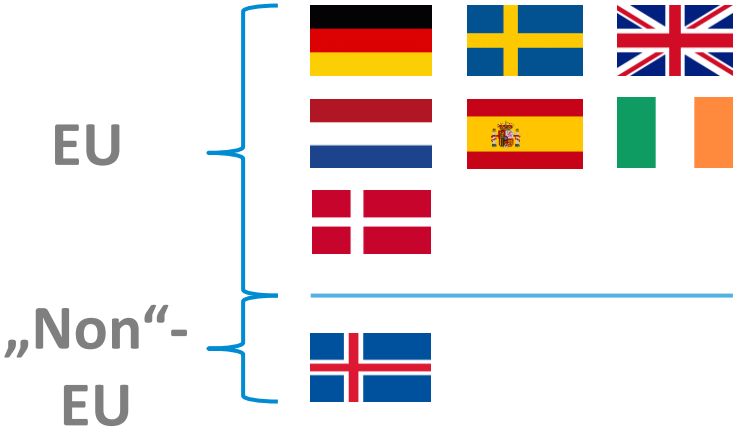
Sources: CERES 2018; IPCC 2015; O'Neill et al. 2013; Astthorsson et al. 2012; Gröger et al. 2010

8) Segments

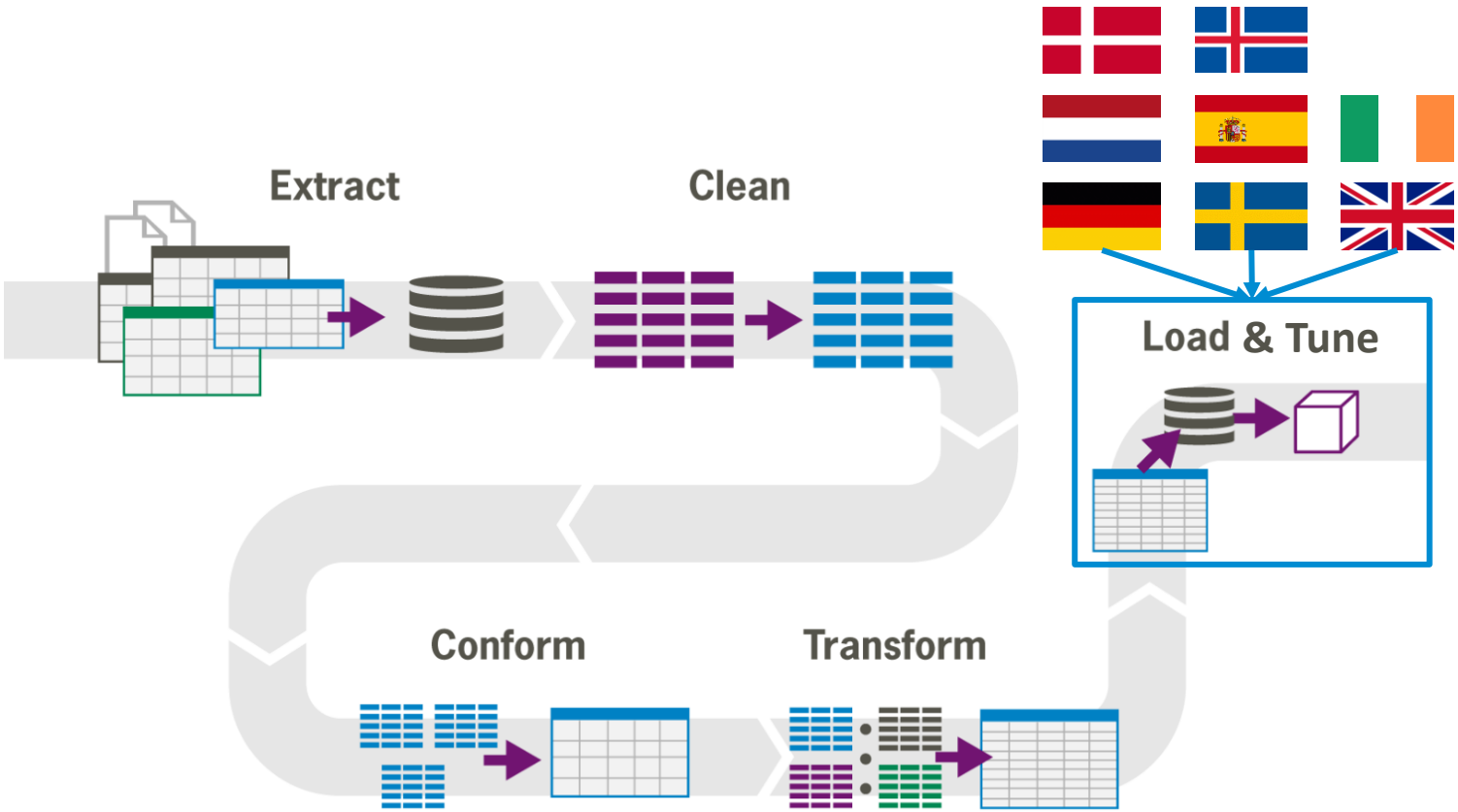
- Gear Types
  - Lines & Hooks
  - Pelagic Trawler
  - Purse Seiners

- Vessel length
  - VL1012
  - VL1218
  - VL1824
  - VL2440
  - VL40XX

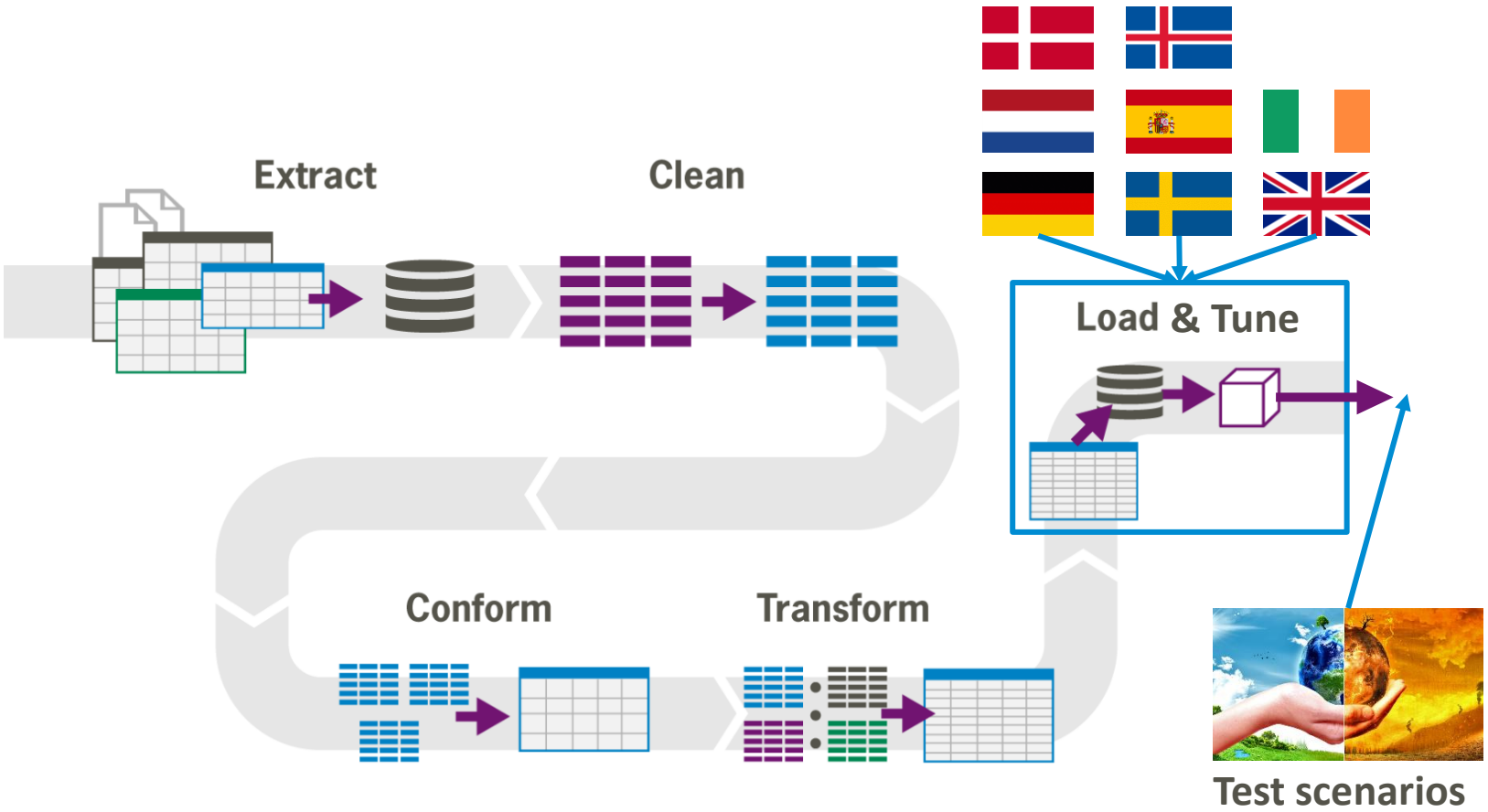




9) Current status



9) Next steps



Thank you for your attention!

Any Questions / More information?

- Come see me!

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Acknowledgements:

- DE: TI-SF
- DK: DTU Aqua, Statistics Denmark
- UK: MMO, Seafish
- IR: Marine Institute, BIM
- SE: Swedish Agency for Marine and Water Management
- NL: WUR
- ES: MAPAMA
- IS: MFRI

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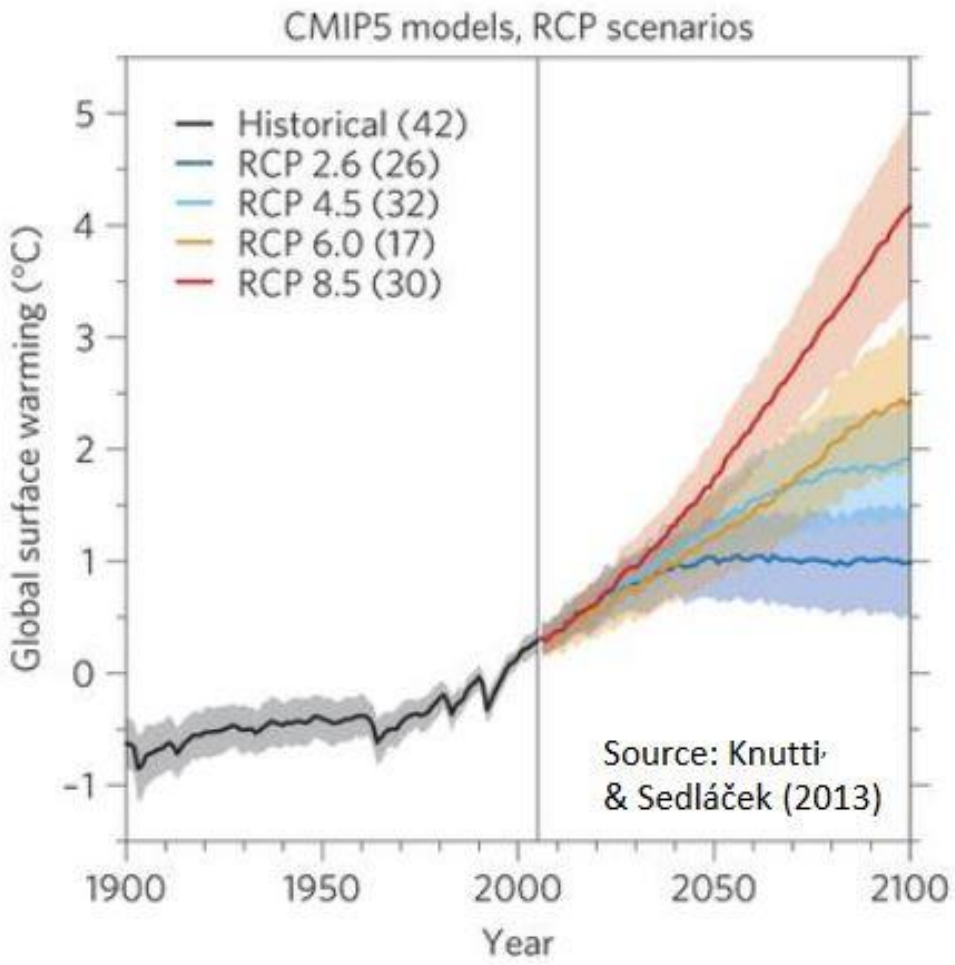
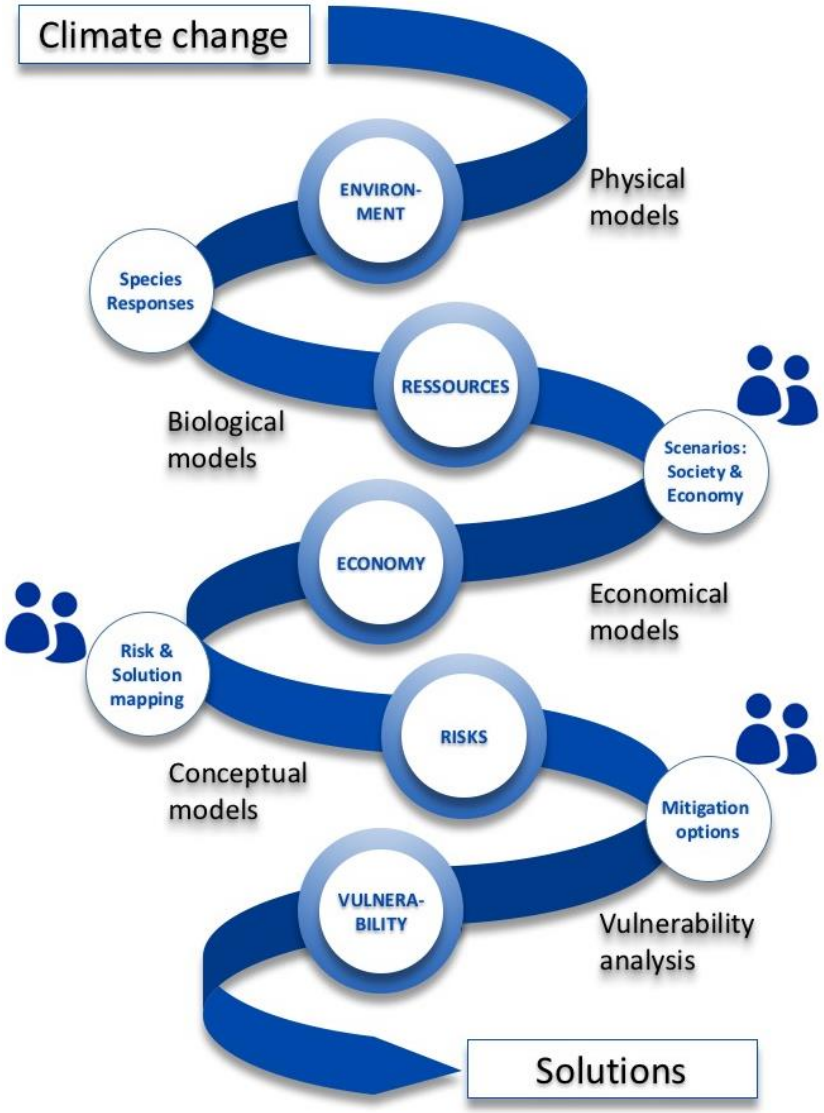
IPCC / RCP


CMIP5 models, RCP scenarios
Historical (42)
RCP 2.6 (26)
RCP 4.5 (32)
RCP 6.0 (17)
RCP 8.5 (30)
Global surface warming (°C)
5
4
3
2
1
0
-1
1900
1950
2000
2050
2100
Year
Source: Knutti & Sedláček (2013)

1) CERES – The Project



Source: CERES 2018

(https://ceresproject.eu)

4) Management Scenarios

Global Sustainability

World Market

4) Management Scenarios

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„All for one and one for all“

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Global Sustainability

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4) Management Scenarios

Global Sustainability
RCP 4.5

2.4°C

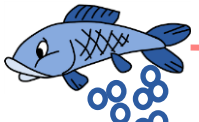
World Market
RCP 8.5

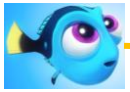
4.3°C

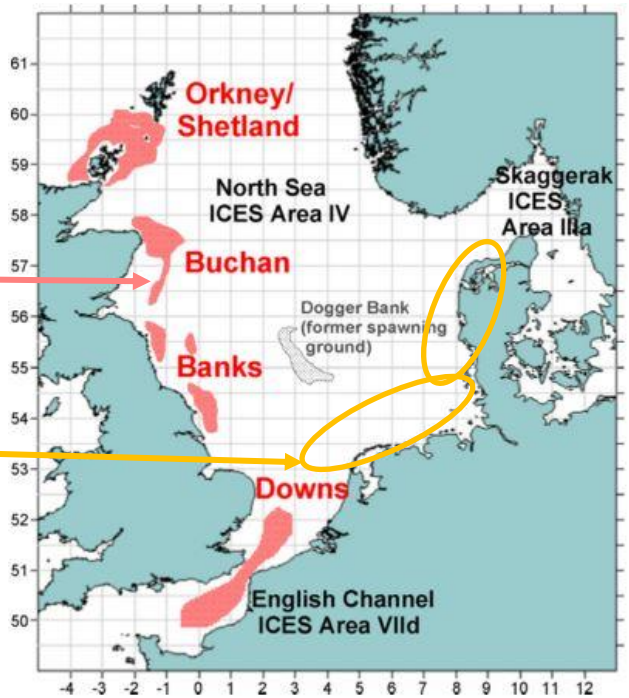
4) Management Scenarios

Global Sustainability

Area closures





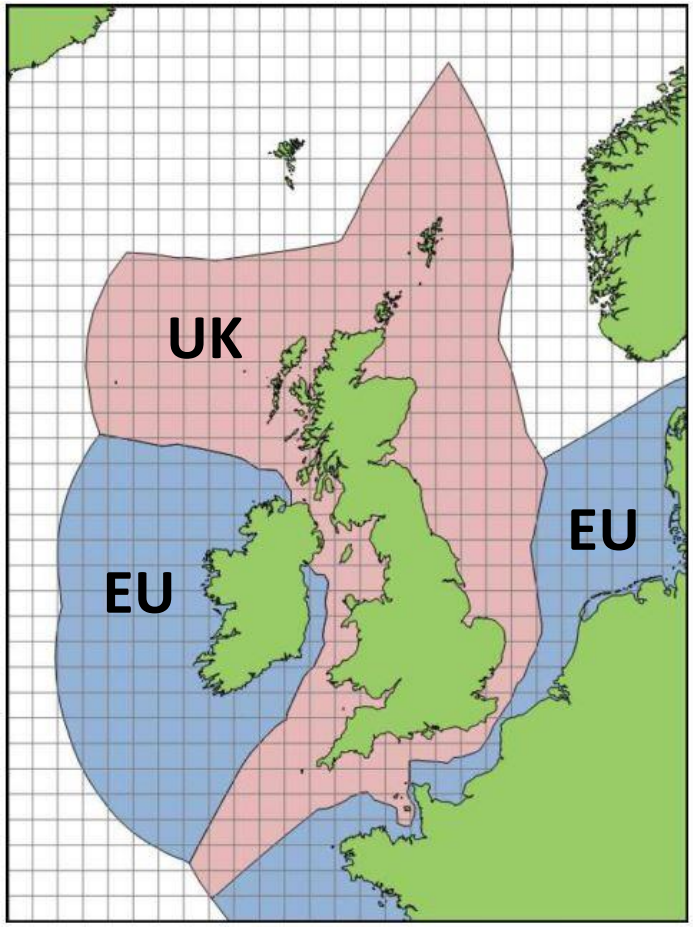


Source: Nash et al. 2009

5) Policy Framework - Brexit

Landed value of pelagic fish from UK EEZ

(Napier 2016)



Source: Napier 2016

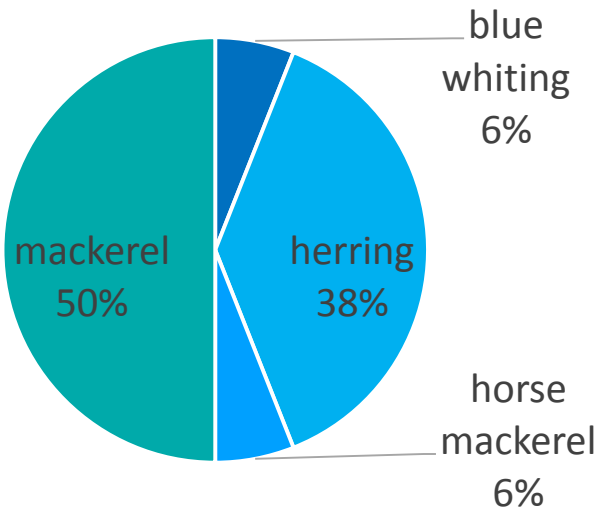
EU (no UK) 52%

UK 48%

5) Policy Framework

Landed value of pelagic fish from UK EEZ (annual av. 2011-2015)

(Napier 2016)



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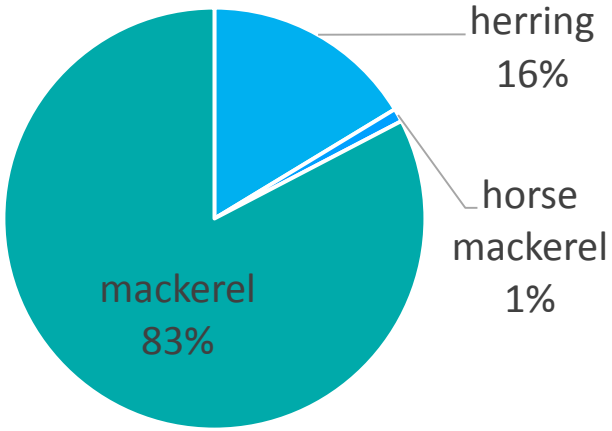
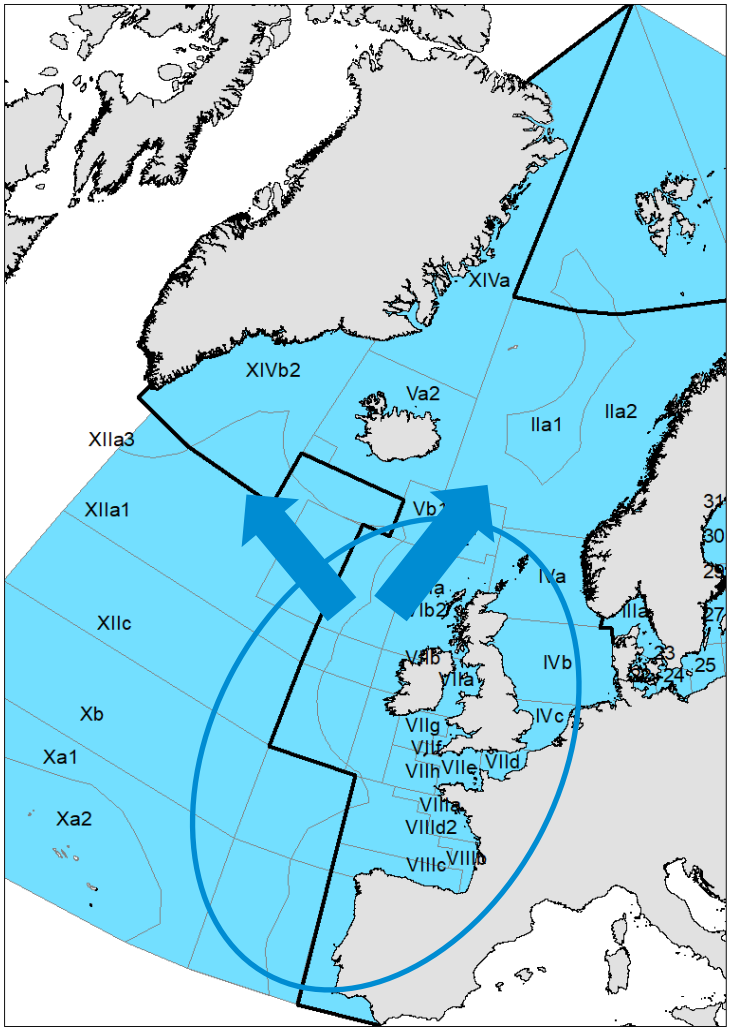


UK 48%

Source: Napier 2016

4) Management Scenarios



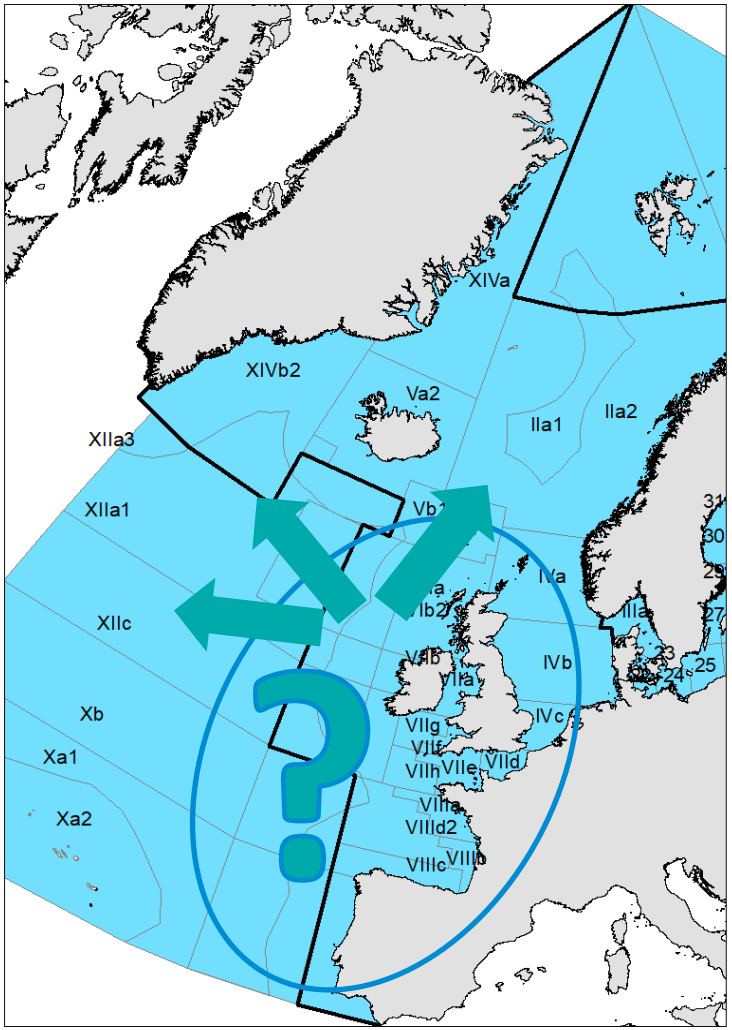
Temperature

Habitat availability

Food availability

4) Management Scenarios

RCP 4.5 – 2.4 °C



Temperature

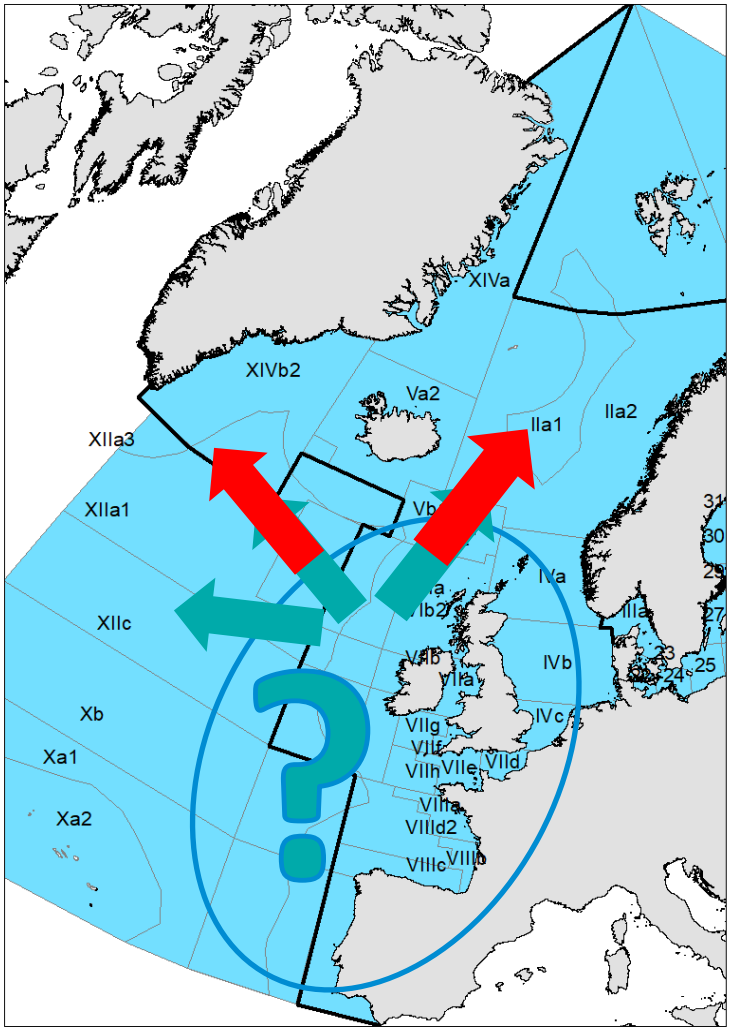
Habitat availability

Food availability

4) Management Scenarios

RCP 4.5 – 2.4 °C

RCP 8.5 – 4.3 °C

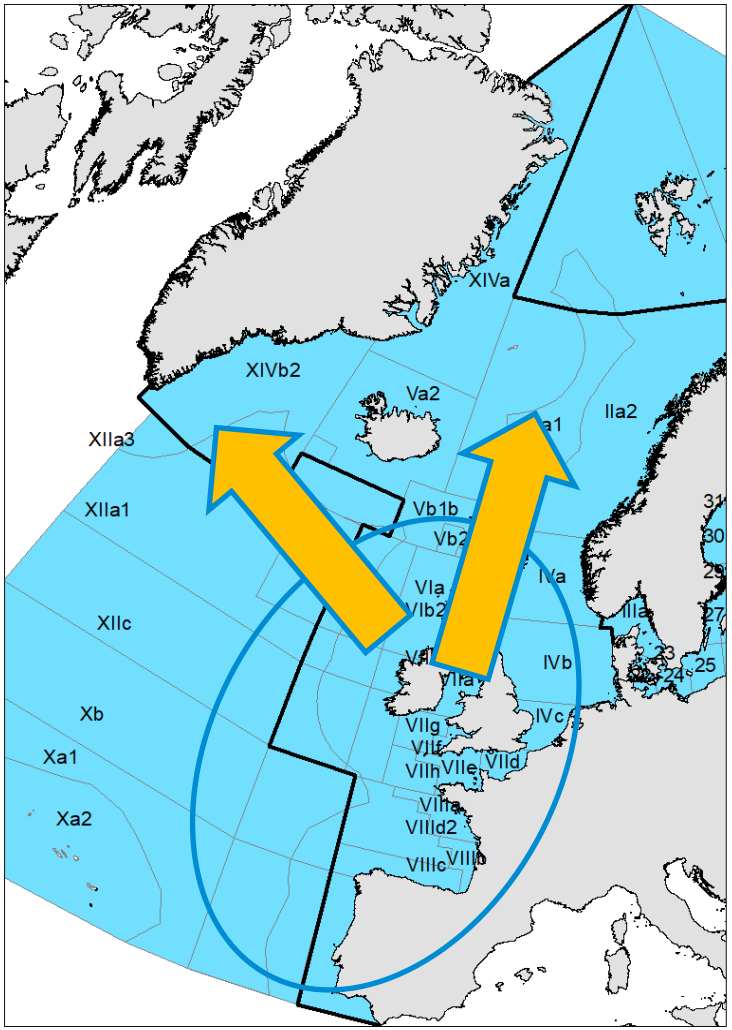


Temperature

Habitat availability

Food availability

2.c) Scenarios

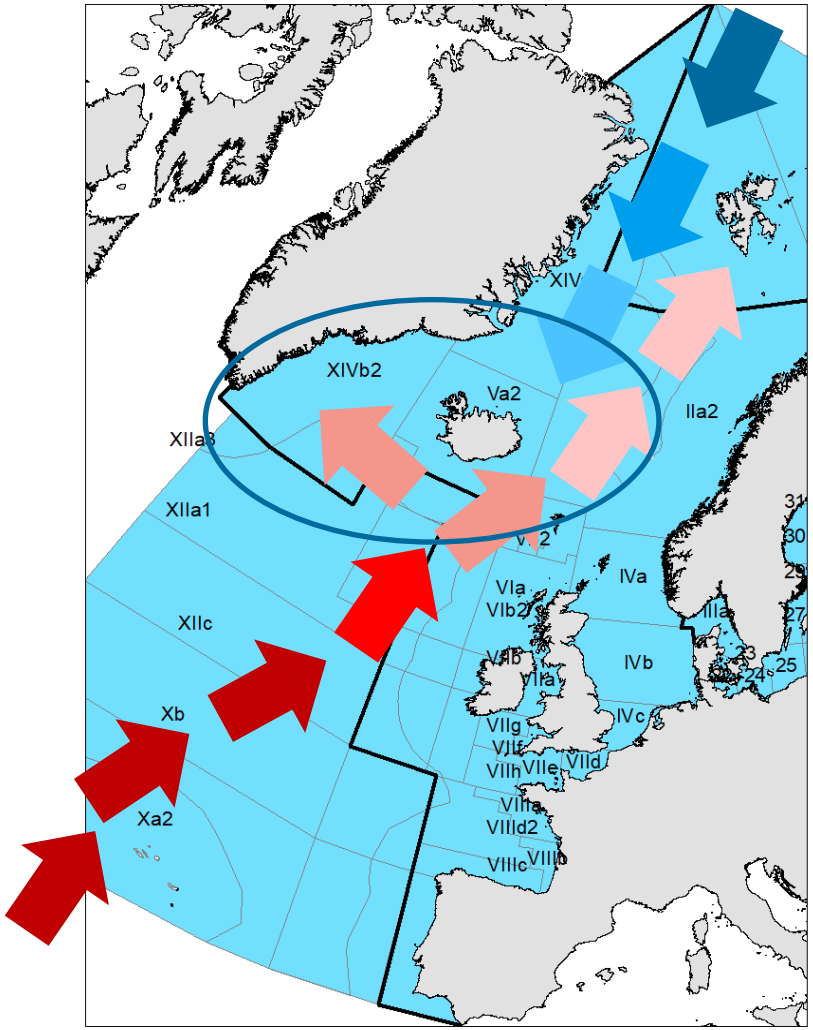


Temperature

Habitat availability

Food availability

2.c) Scenarios



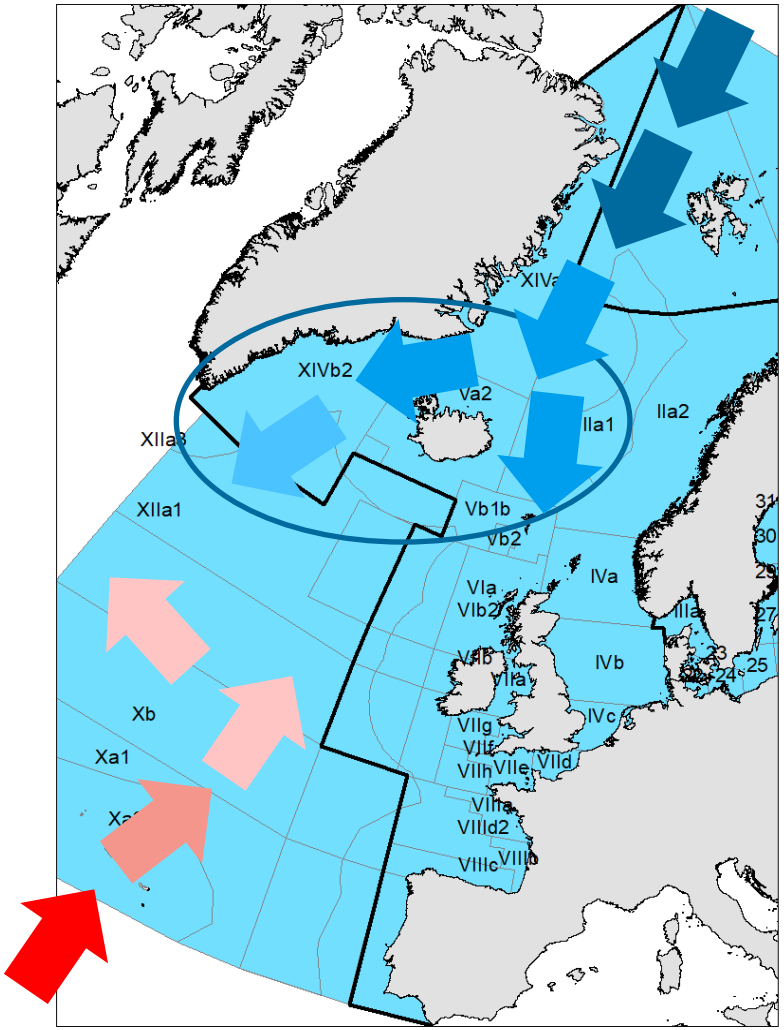
RCP 4.5

Temperature

Habitat availability

Food availability

2.c) Scenarios



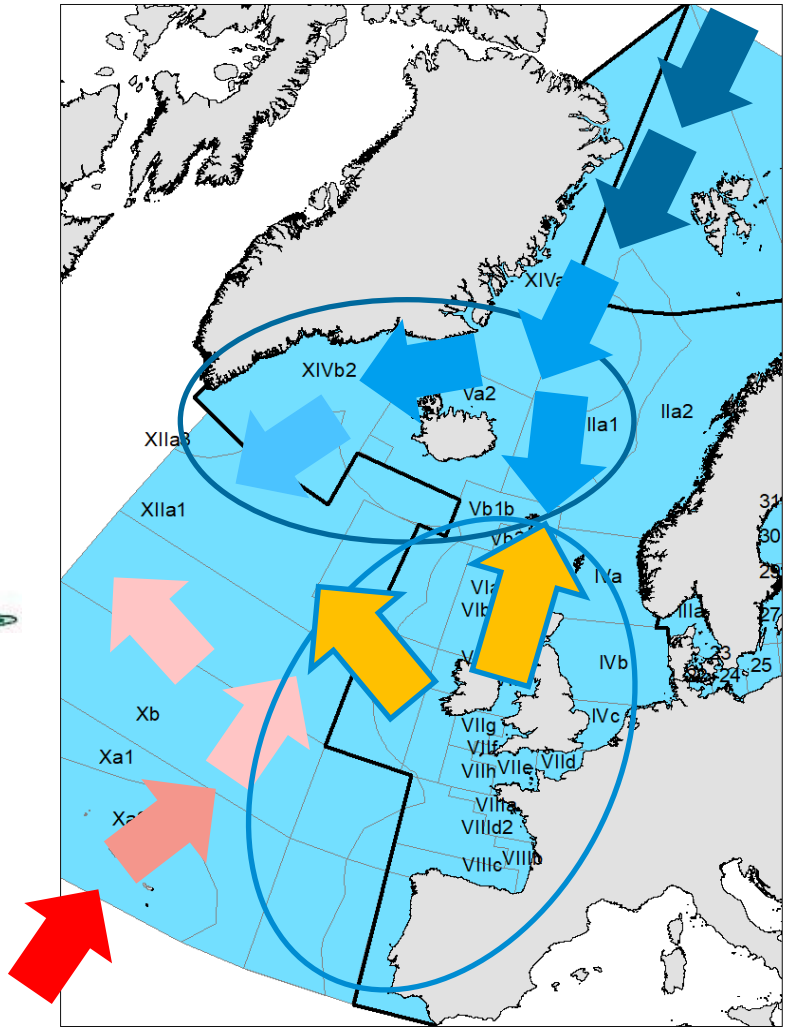
RCP 4.5

Temperature

Habitat availability

Food availability

2.c) Scenarios



RCP 4.5

Temperature

Habitat availability

Food availability

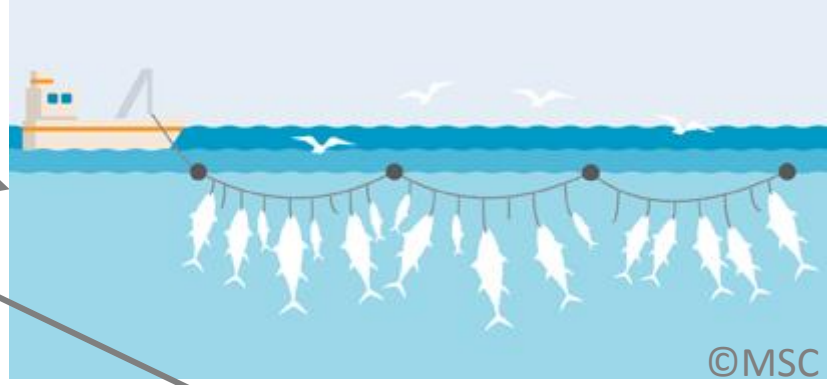
2.d) Storylines 19 and 21 - Data

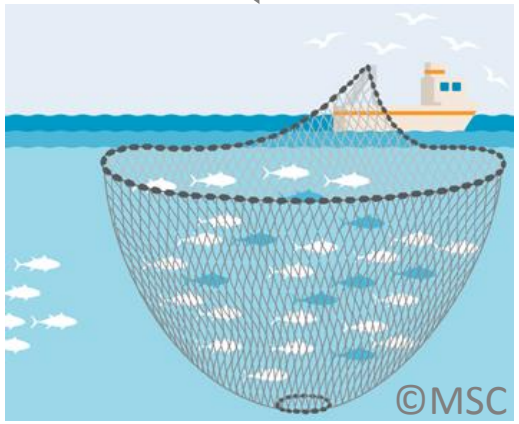
Biological data

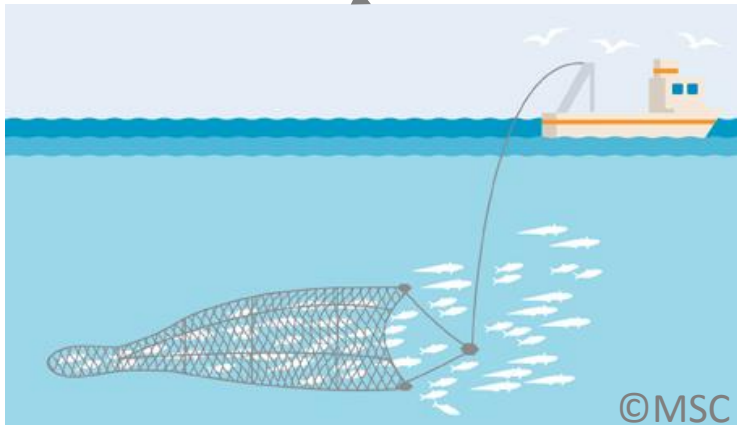
- Age classes (mackerel: 12; herring: 8)
- Biomass
- Weight
- Natural/ fishing mortality
- Maturity
- Survival rate
- Abundance
- Spatial distribution
- Spawning/feeding time and area

8) Segments

- Gear Types
  - Lines & Hooks
  - Pelagic Trawler
  - Purse Seiners



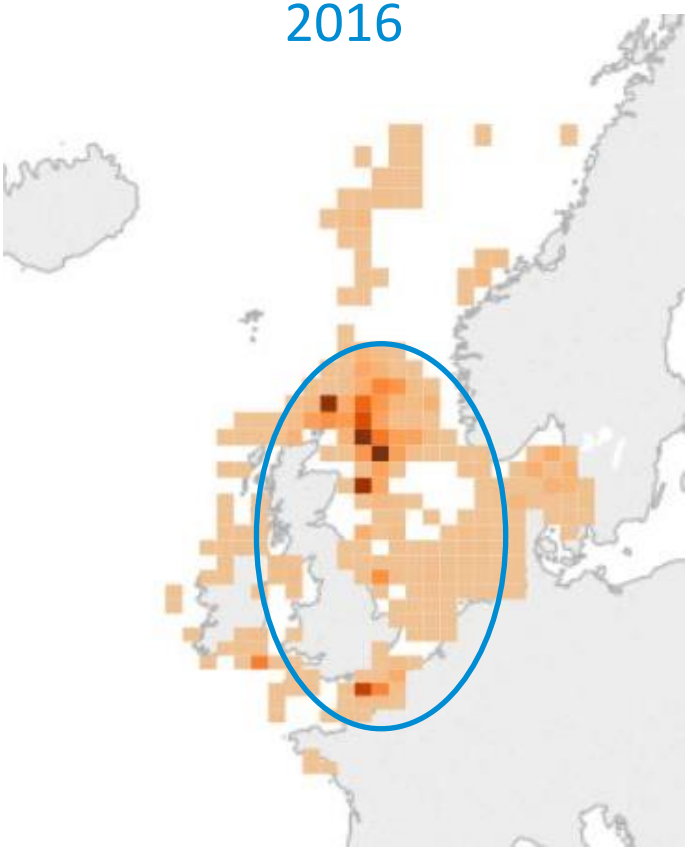




2.a) North Sea herring

- Commercially important
- Varying migration patterns

2016



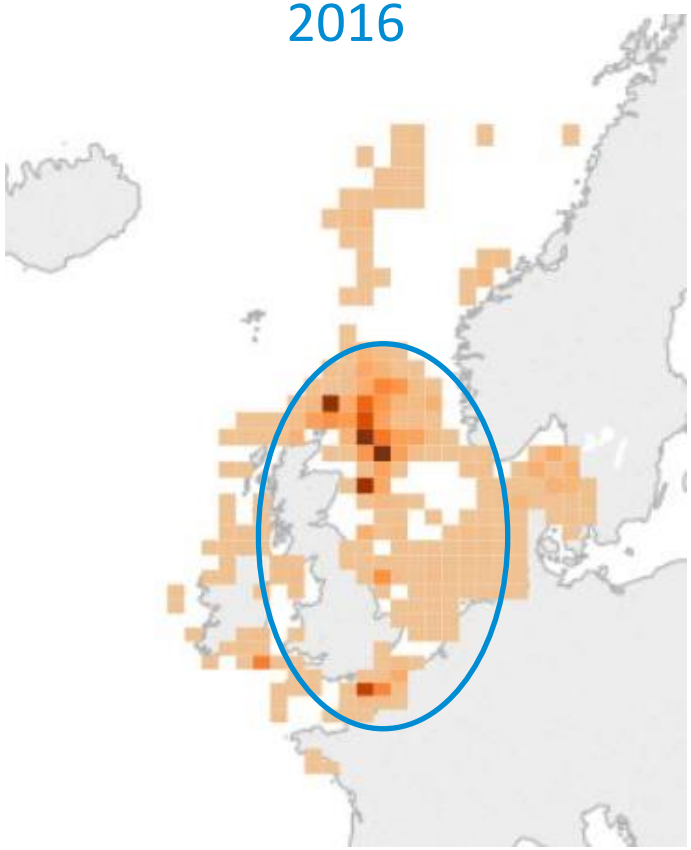
Source: STECF 2018 (EU landings (t))

2.a) North Sea herring

- Commercially important
- Varying migration patterns
- First-feeding larvae survival
  - Mismatches in spawning time and food availability

(Cushing 1969 & 1995; Wiltshire & Bryan 2004; Gröger et al. 2010)

2016

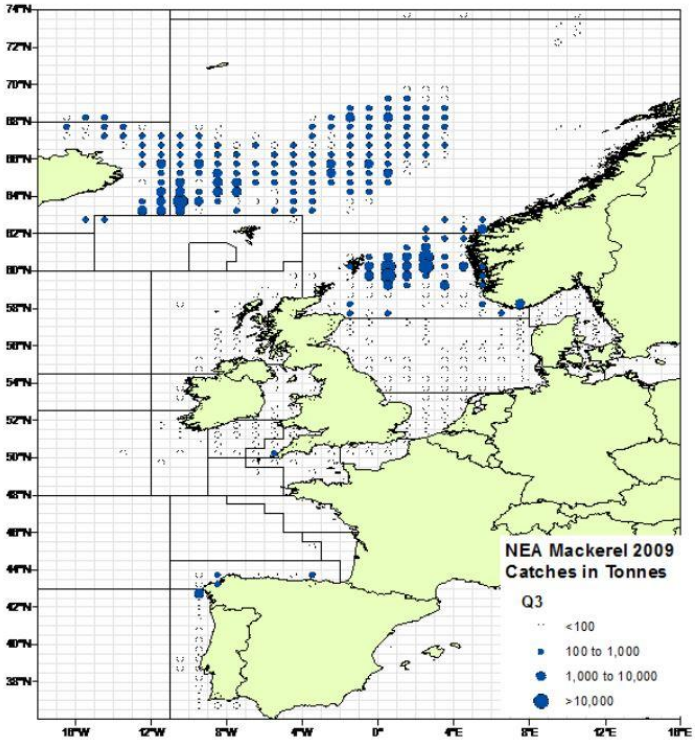


Source: STECF 2018 (EU landings (t))

2.b) Mackerel in the NE Atlantic

- Varying migration patterns
- Increased stock size
- NW distribution
- Increased catch
- (Asthorsson et al. 2012)

2009



Source: WGWIDE 2010 (commercial catch (t) in 2009, Q3)

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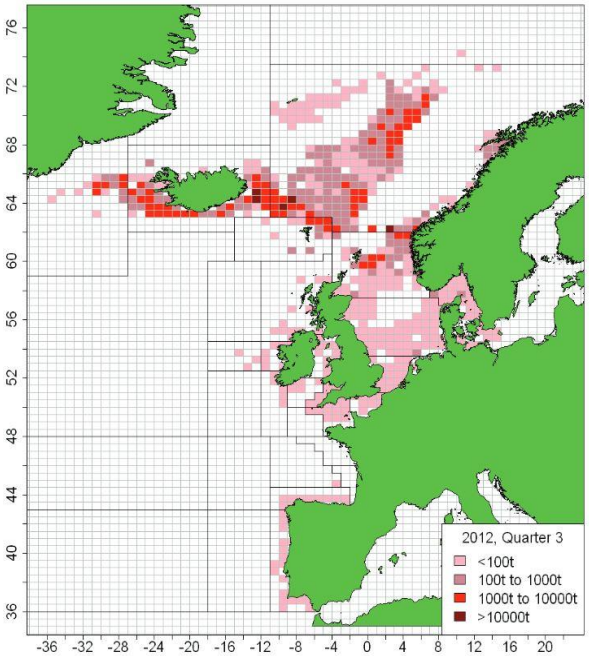
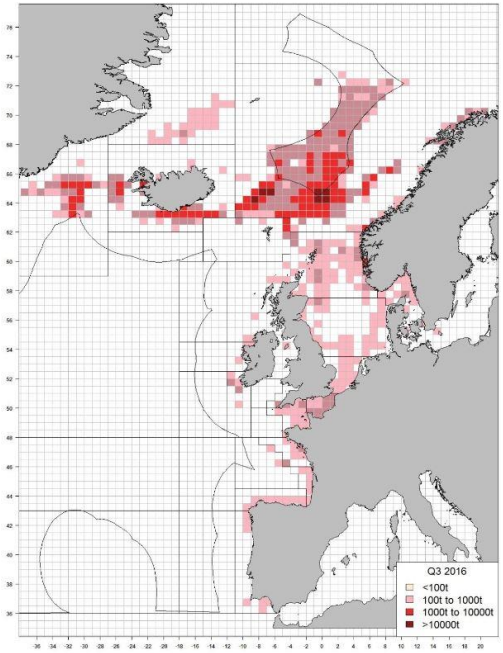
2012



2016



Sources: WGWIDE 2013/ 2017 (commercial catch (t) in 2012/ 2016, Q3)

2.b) Mackerel in the NE Atlantic

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