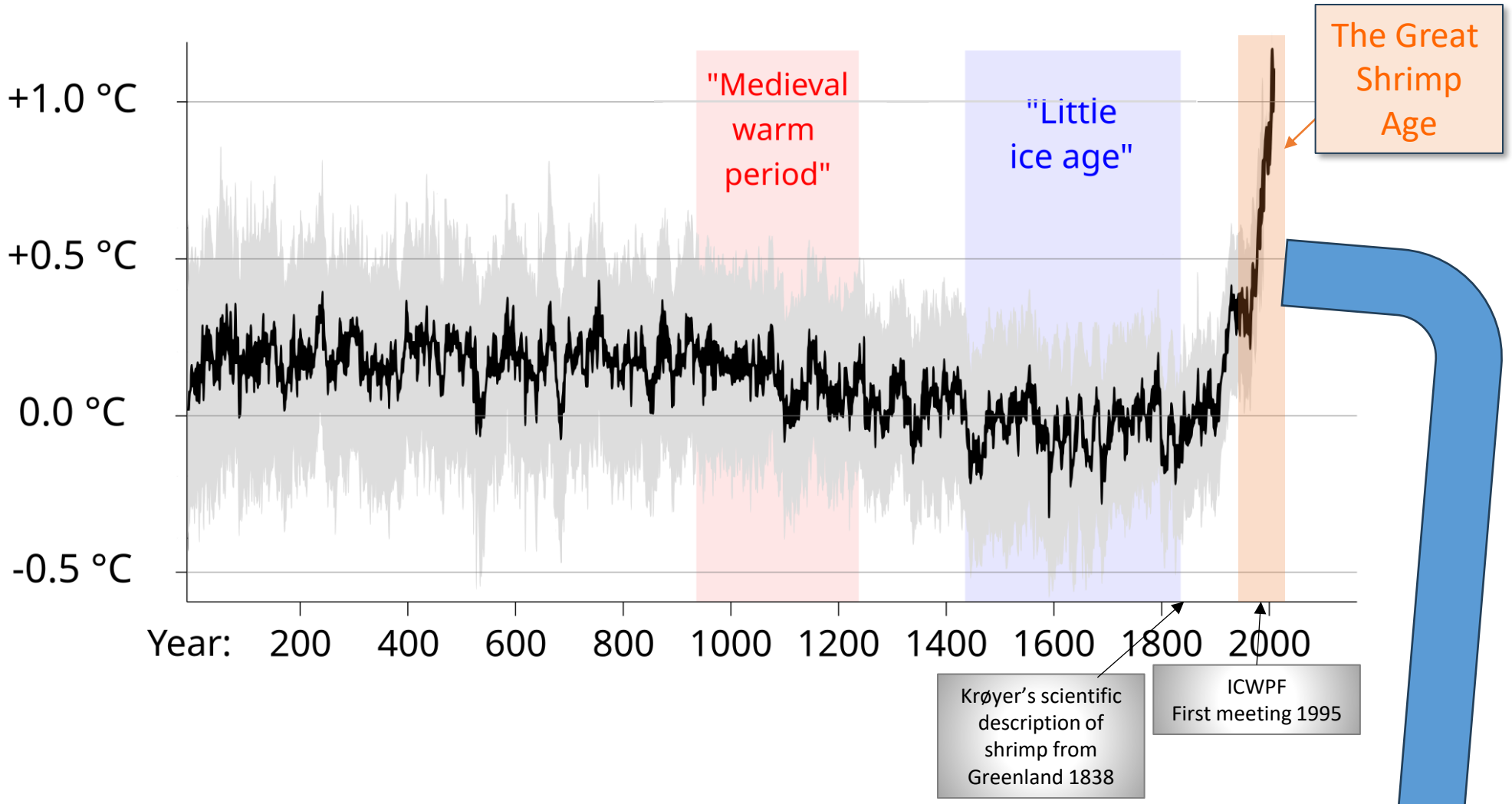
North Atlantic shrimp in a changing ocean

Risk and the reliability of future supply

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Carsten Hvingel
Head of Section for Marine Living Resources
DTU Aqua, Denmark

Temperature changes after Christ

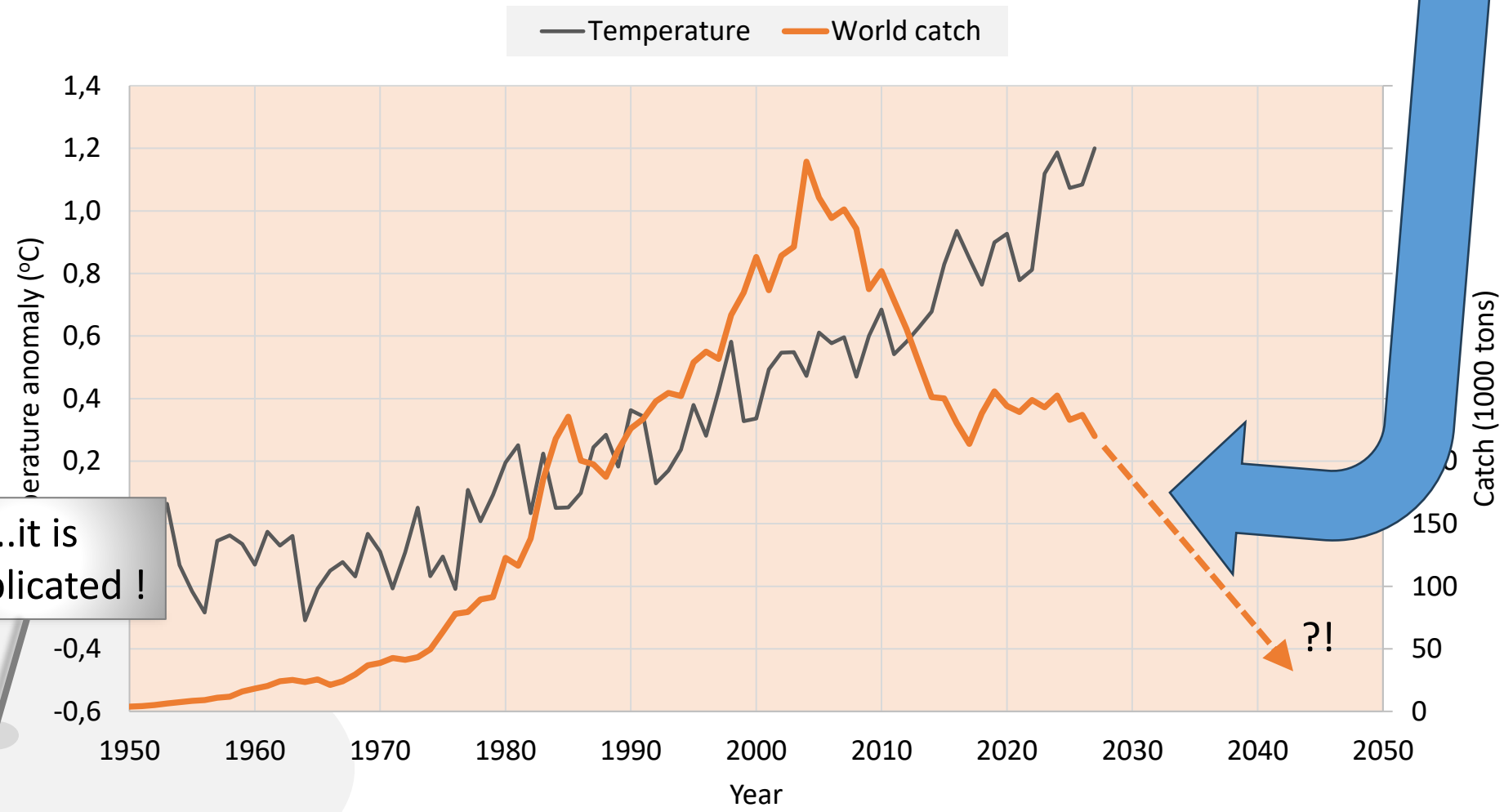


The Great Shrimp age

..no obvious relation between global warming and fishing success….

..risk that the end of the Great shrimp age is near?….

….it is complicated !



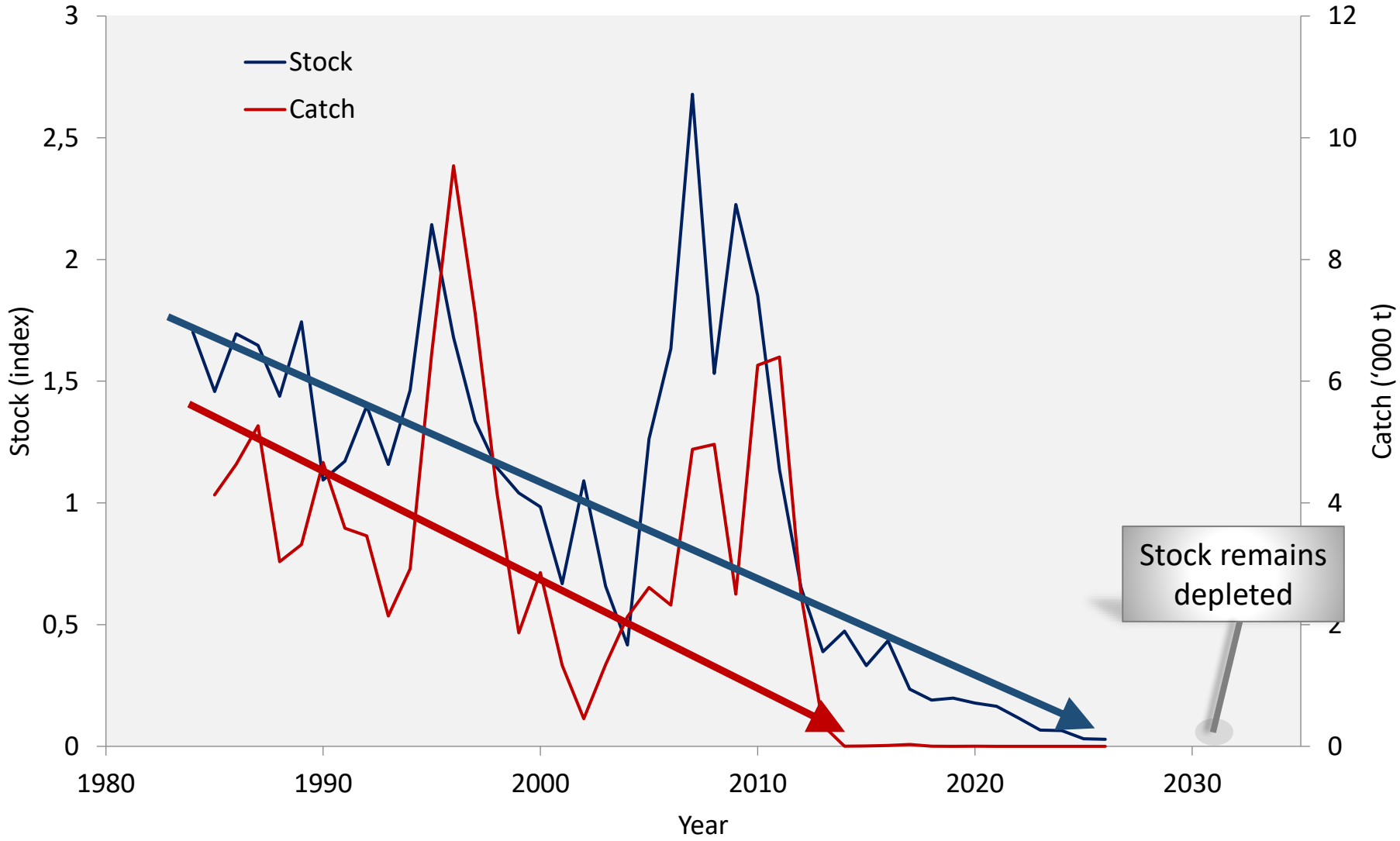
Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves



Gulf of Maine

…unfavorable environmental conditions: temperature and predation



Northern shrimp in the North Atlantic

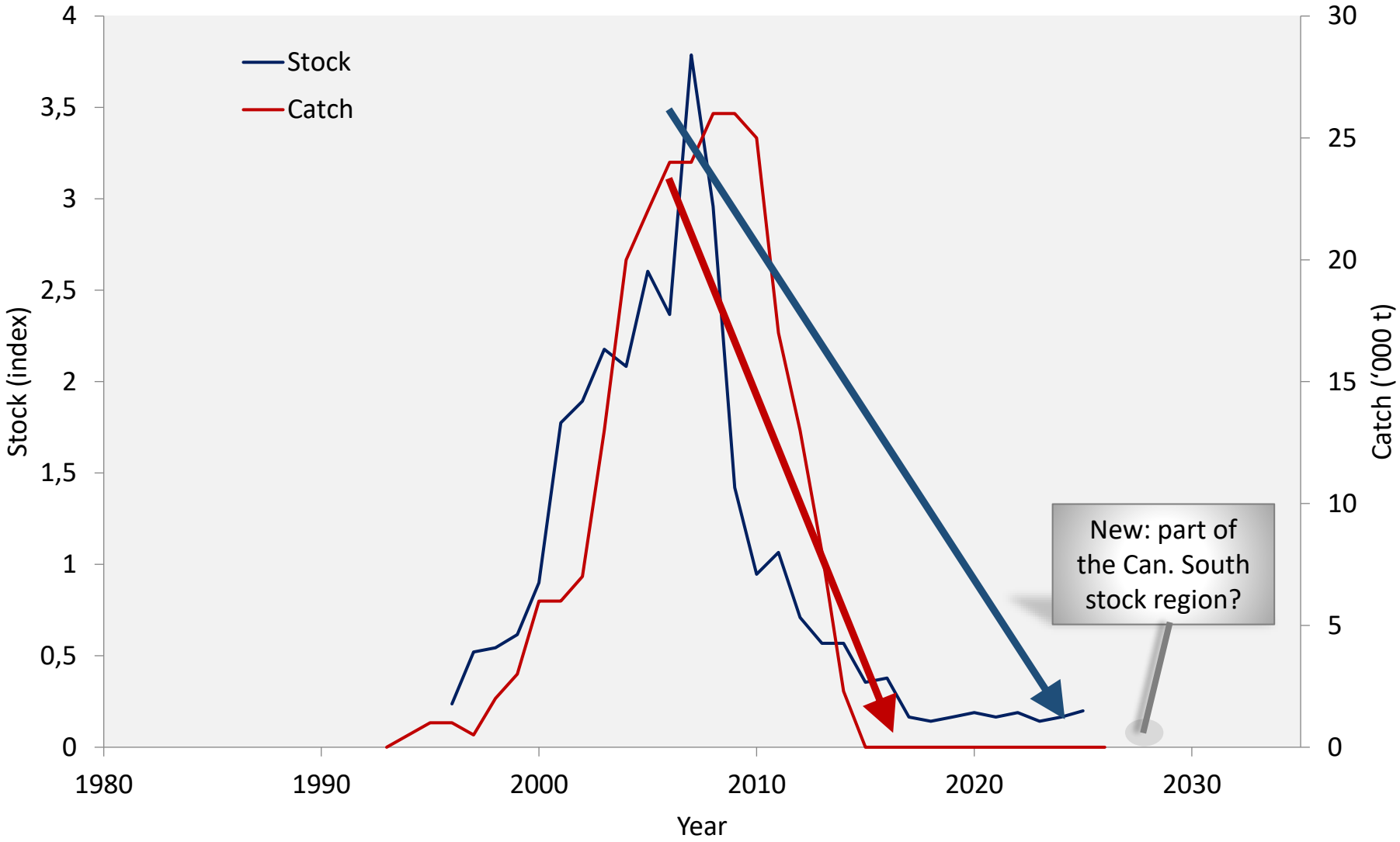
Pandalus borealis | Distribution across the North Atlantic shelves



Grand Bank

NAFO Div 3LNO

…unfavorable environmental conditions: temperature and predation



Northern shrimp in the North Atlantic

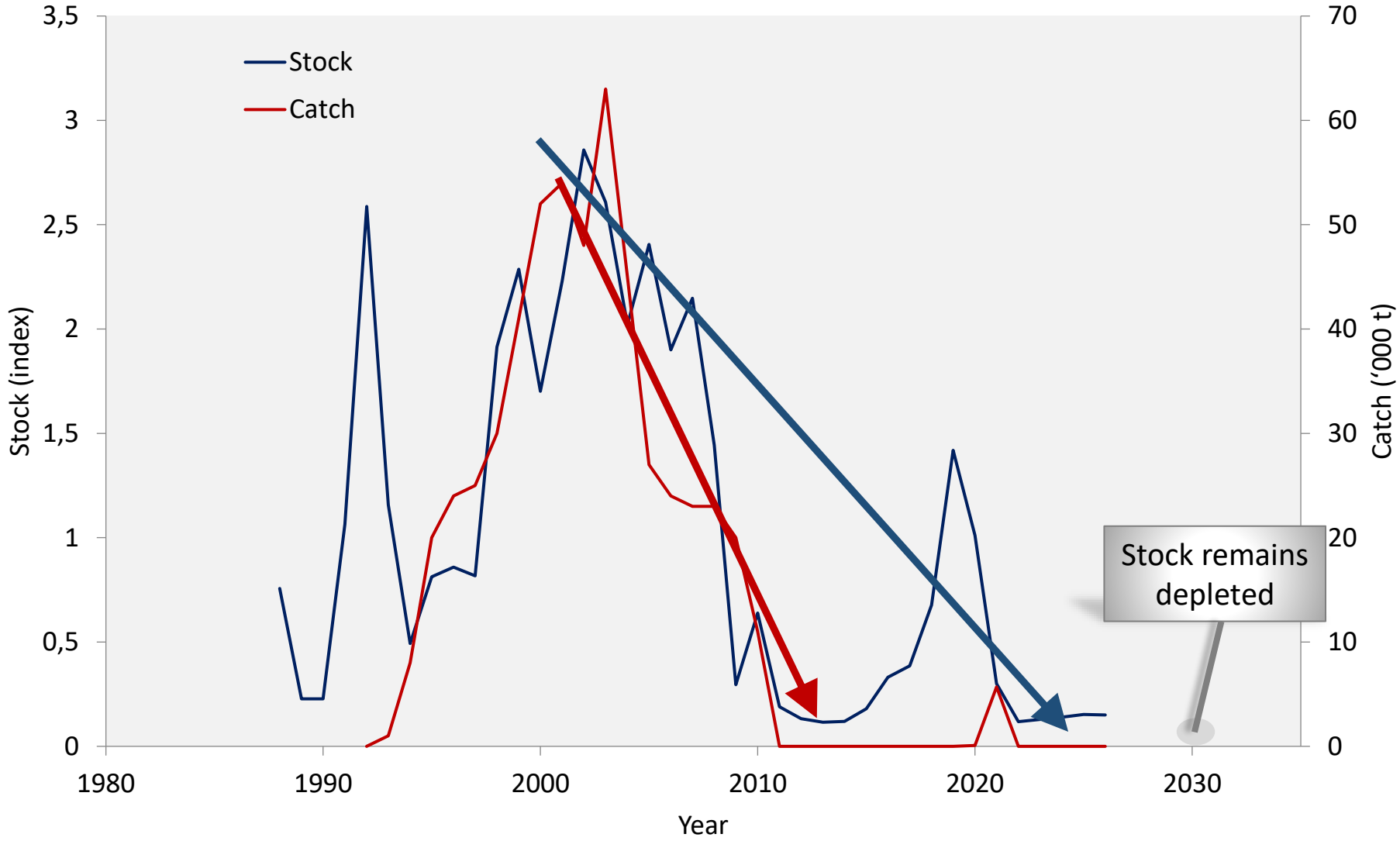
Pandalus borealis | Distribution across the North Atlantic shelves



Flemish Cap

NAFO Div 3M

…unfavorable environmental conditions: temperature, and predation



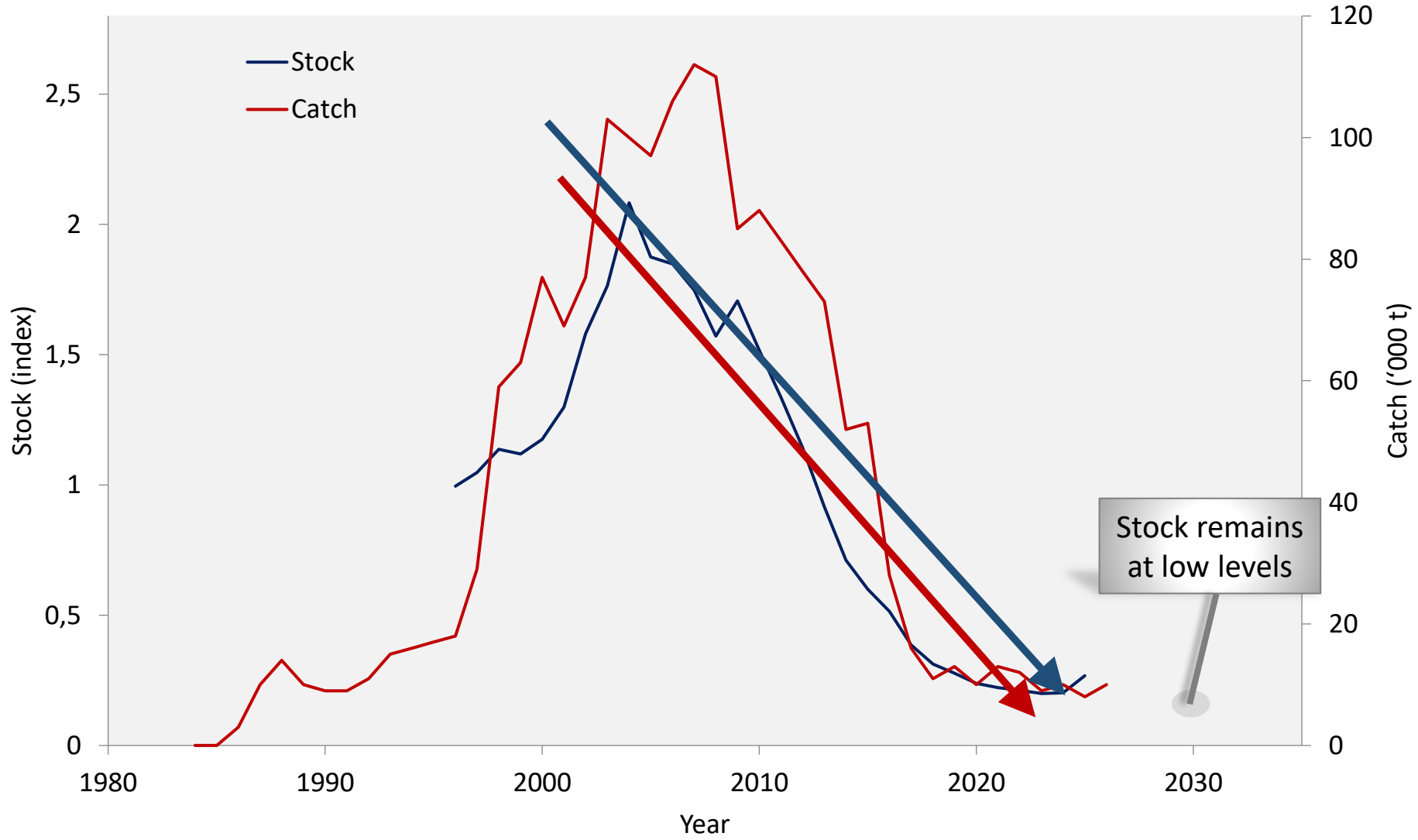
Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves



Canada south stock assessment area

…unfavorable environmental conditions: predation



Northern shrimp in the North Atlantic

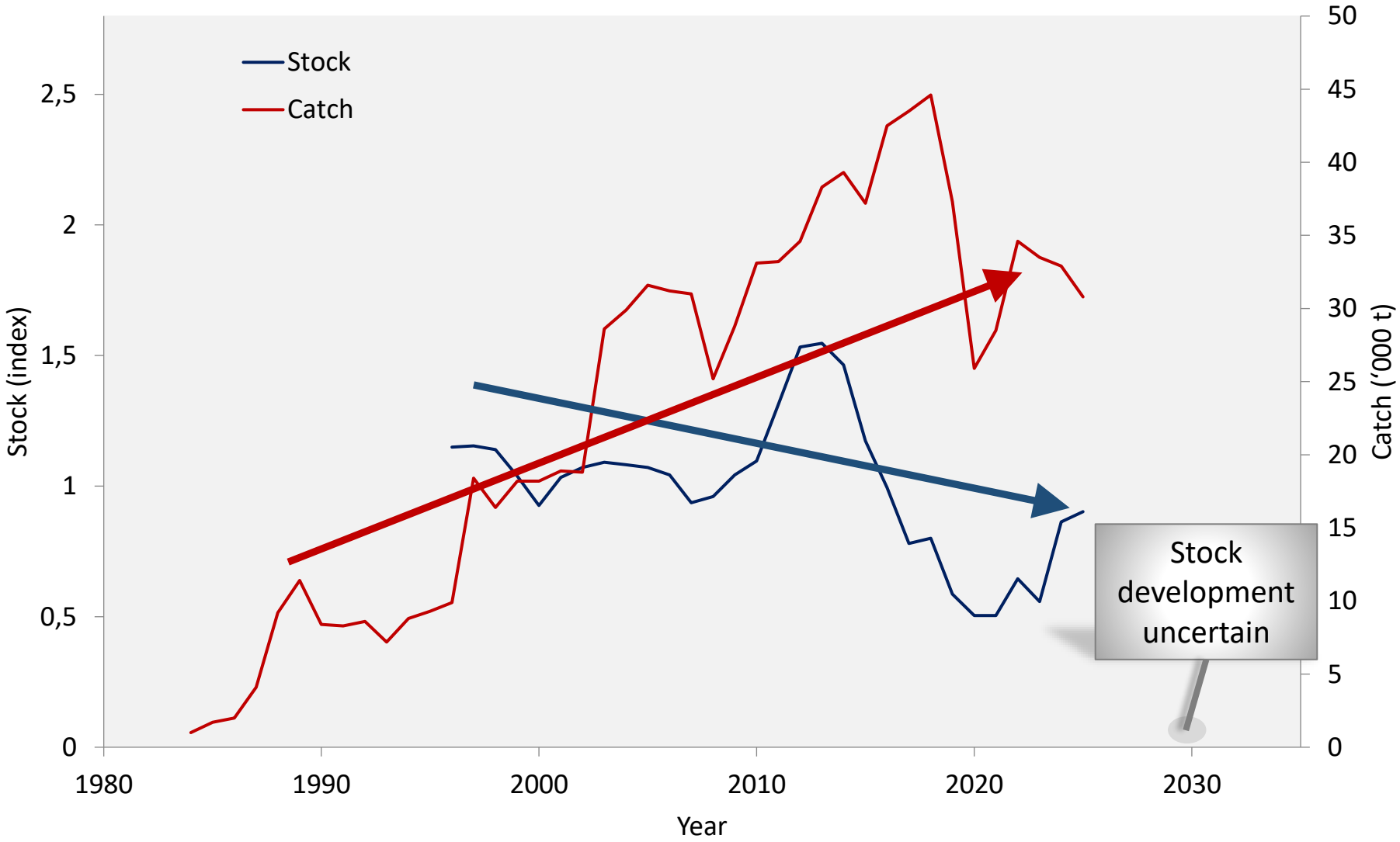
Pandalus borealis | Distribution across the North Atlantic shelves



Canada north stock assessment area

…Ecosystem changing?

…risk of overfishing?



Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves

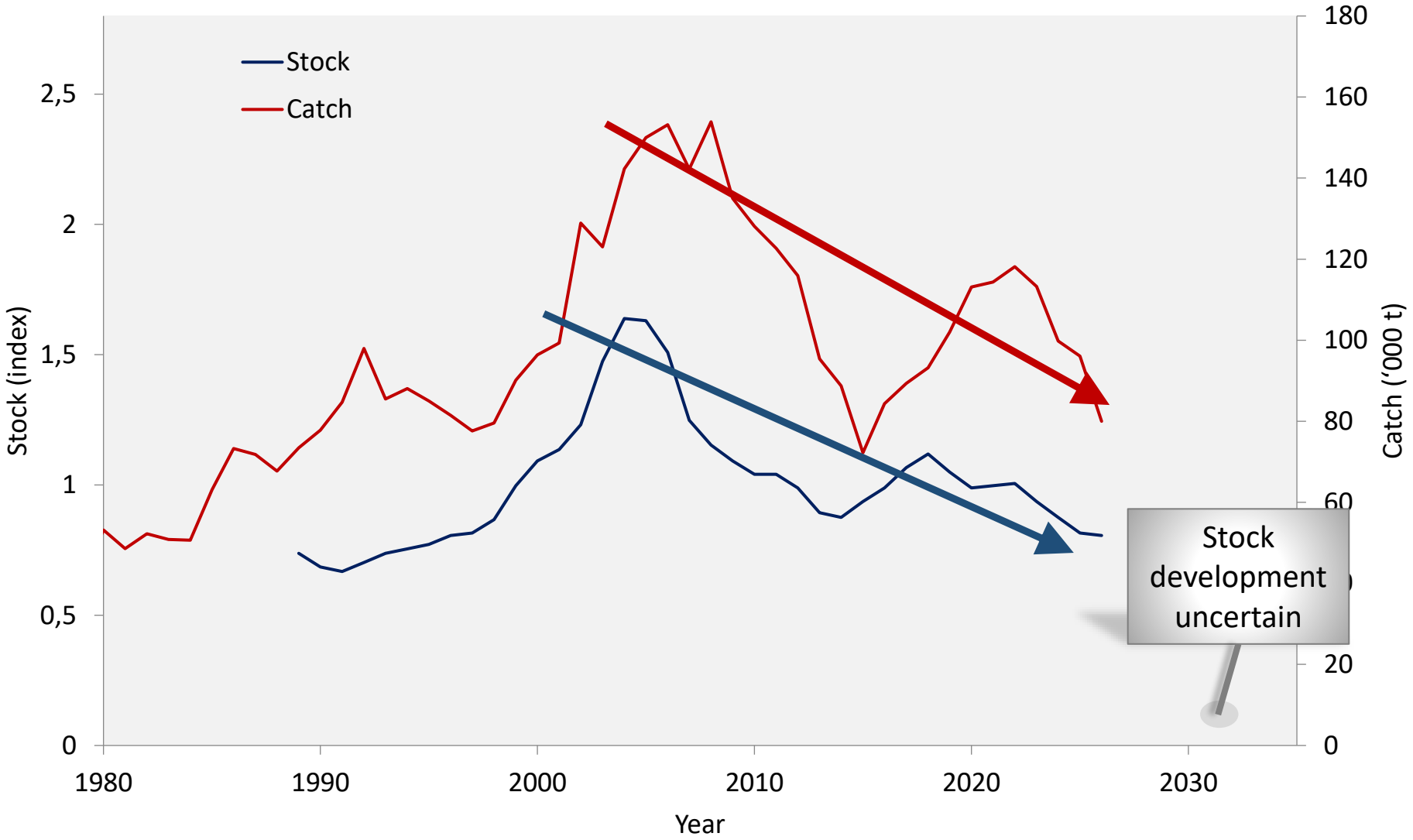


West Greenland

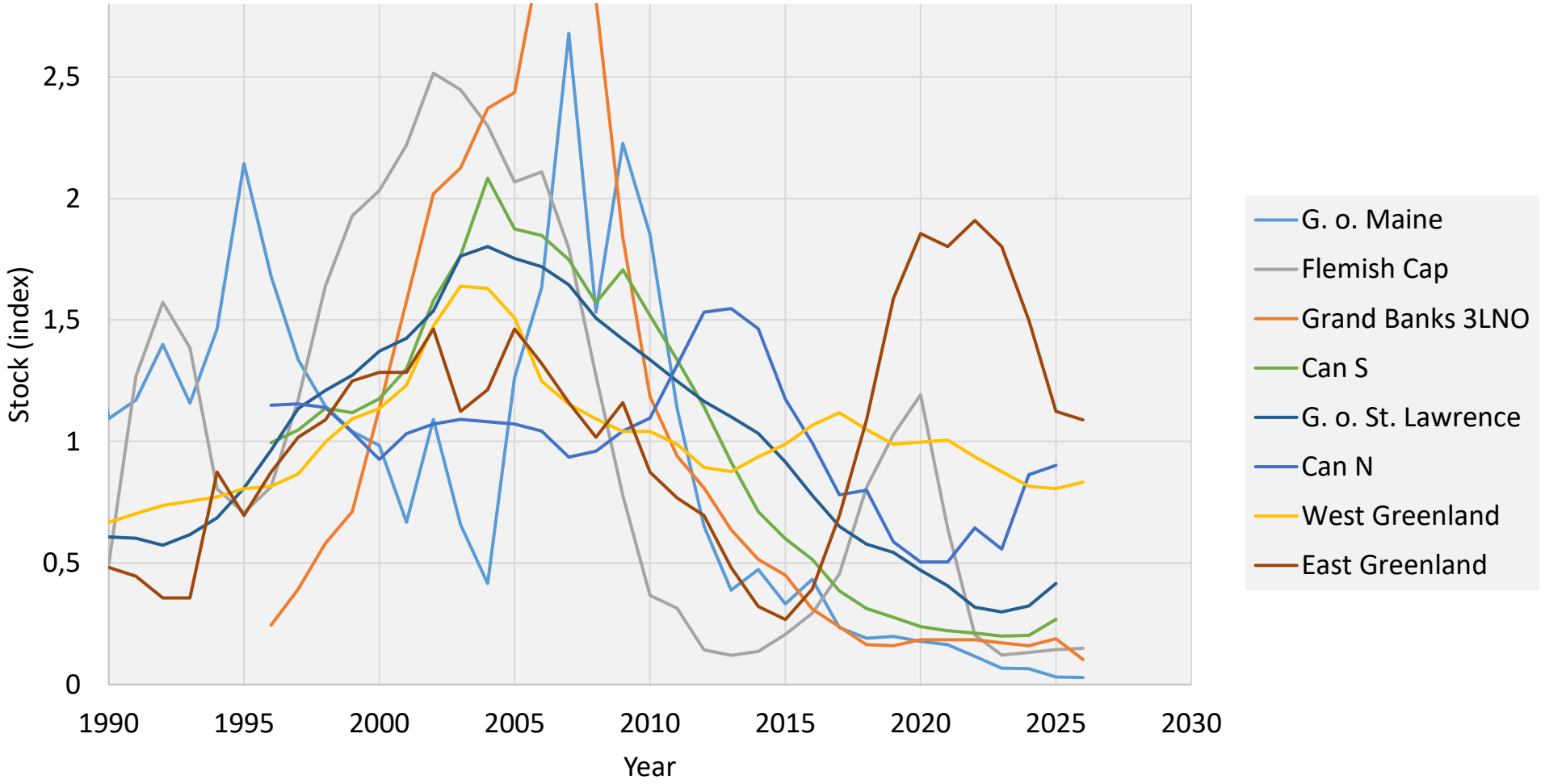
…environmental conditions have been changing

…cod stock is increasing…

…will new shrimp grounds in the far north compensate?



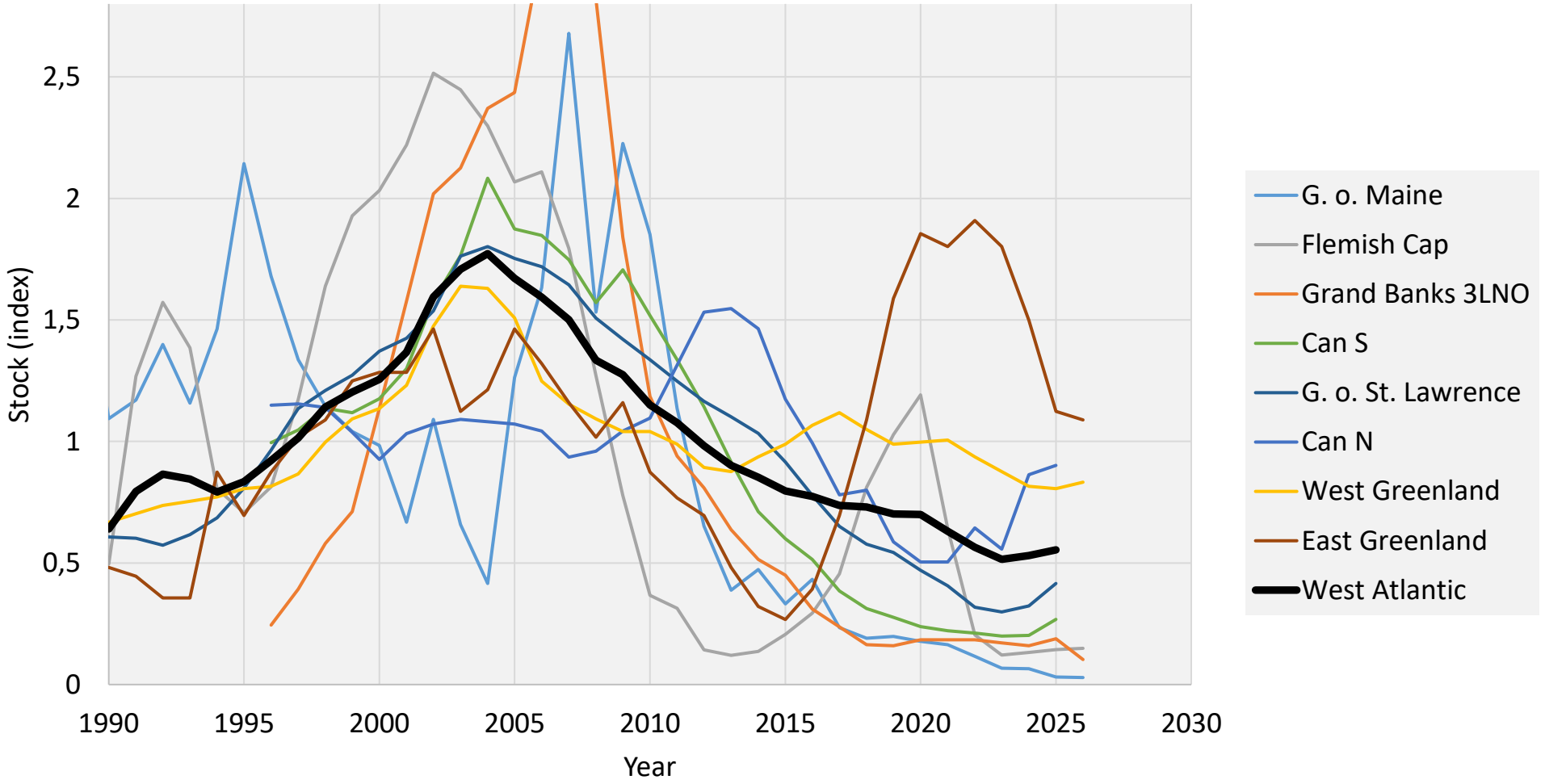
Shrimp stock dynamics, West Atlantic, recent trends



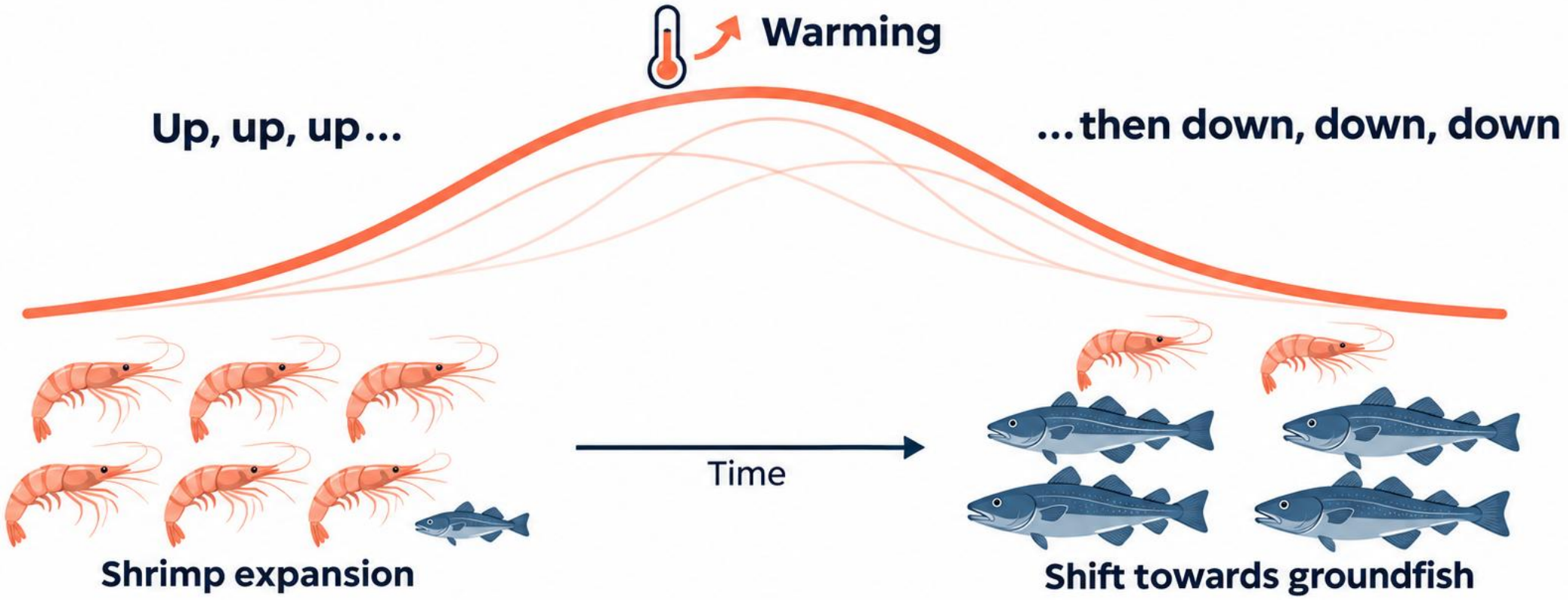
Shrimp stock dynamics, West Atlantic, recent trends

The stocks has largely followed a similar trend:
up, up, up →
down, down, down

…but, timing differ among stocks…



Shrimp stock dynamics, West Atlantic, recent trends



Warming → **Conditions less favourable for shrimp**
More favourable for predators → **Potential ecosystem regime shift**

Likely shared drivers; timing and importance differ among stocks.

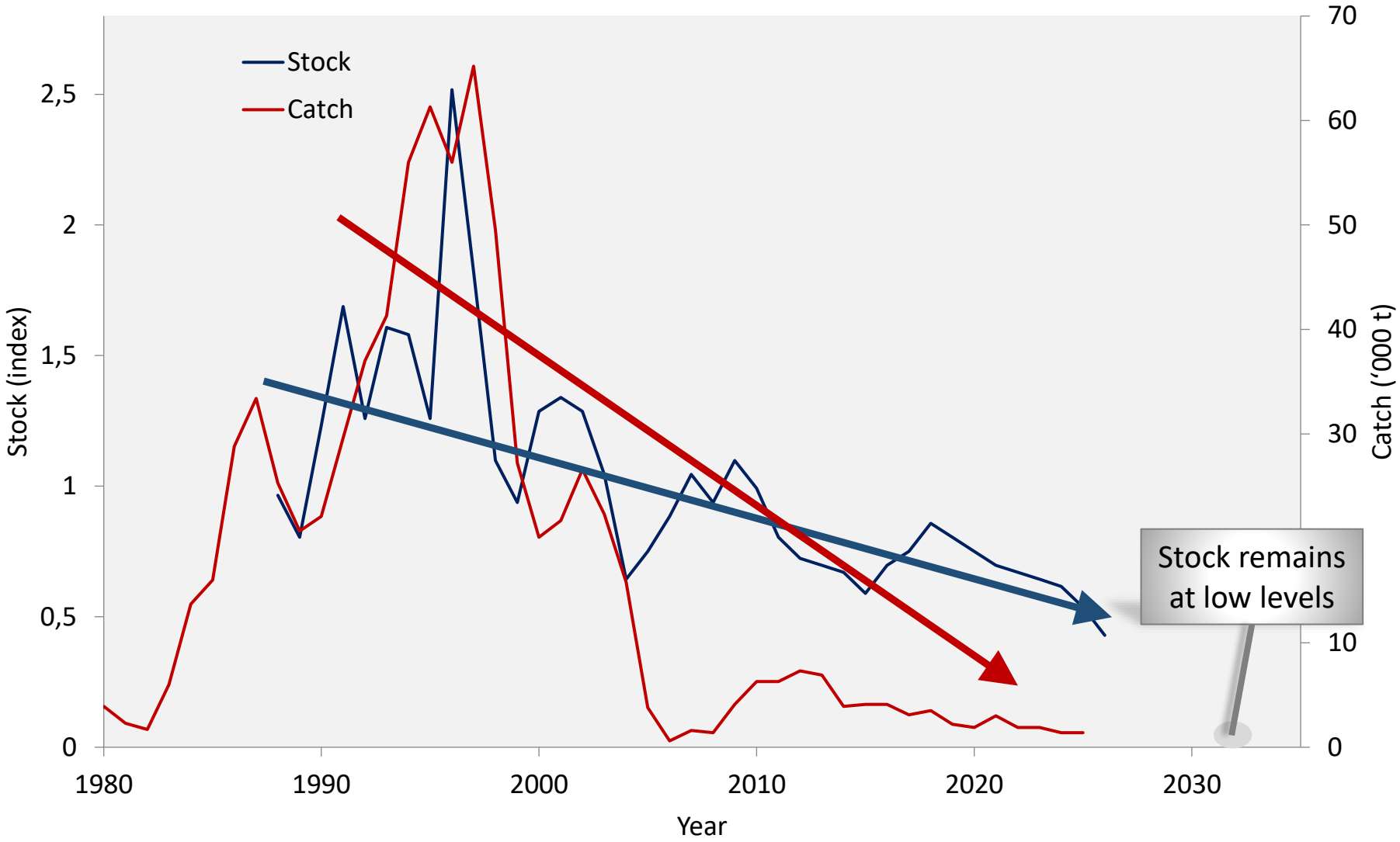
Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves



Iceland, offshore

…environmental conditions have been changing…



Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves

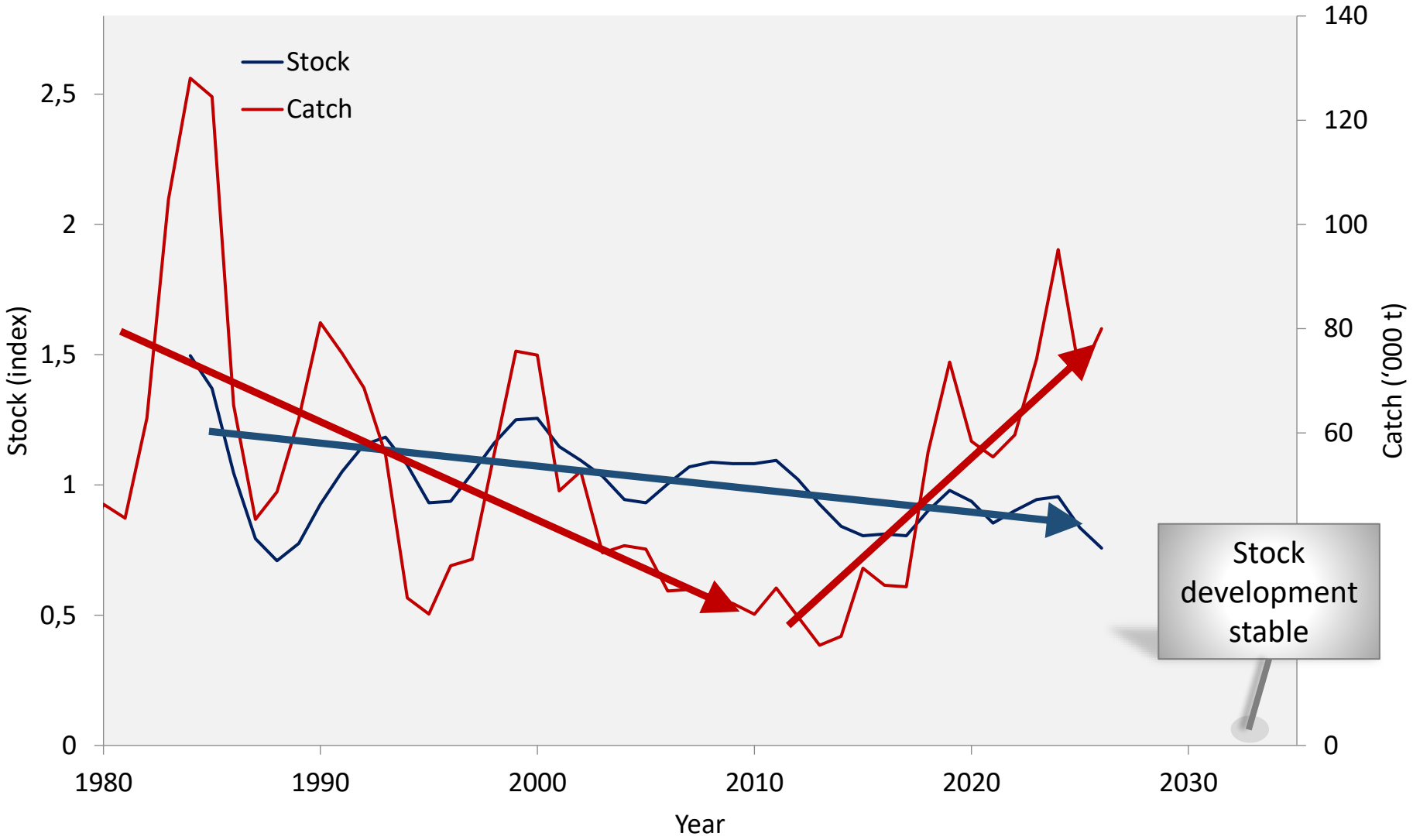


Barents Sea

…environmental conditions have been changing…

…but, stock has not responded as seen in the West Atlantic…

…catches are now near maximum sustainable levels…



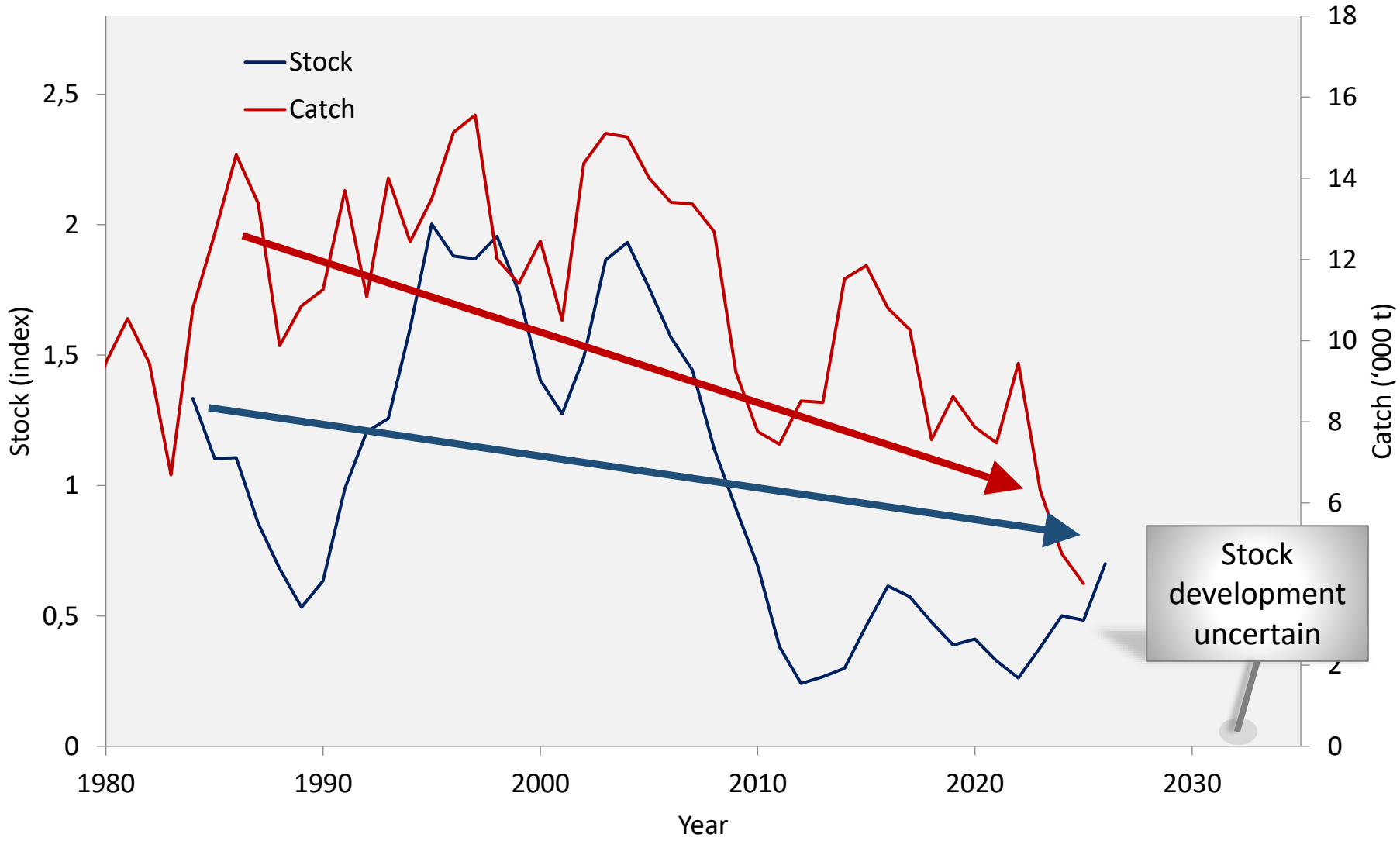
Northern shrimp in the North Atlantic

Pandalus borealis | Distribution across the North Atlantic shelves



North Sea, Skagerrak, Norwegian deep

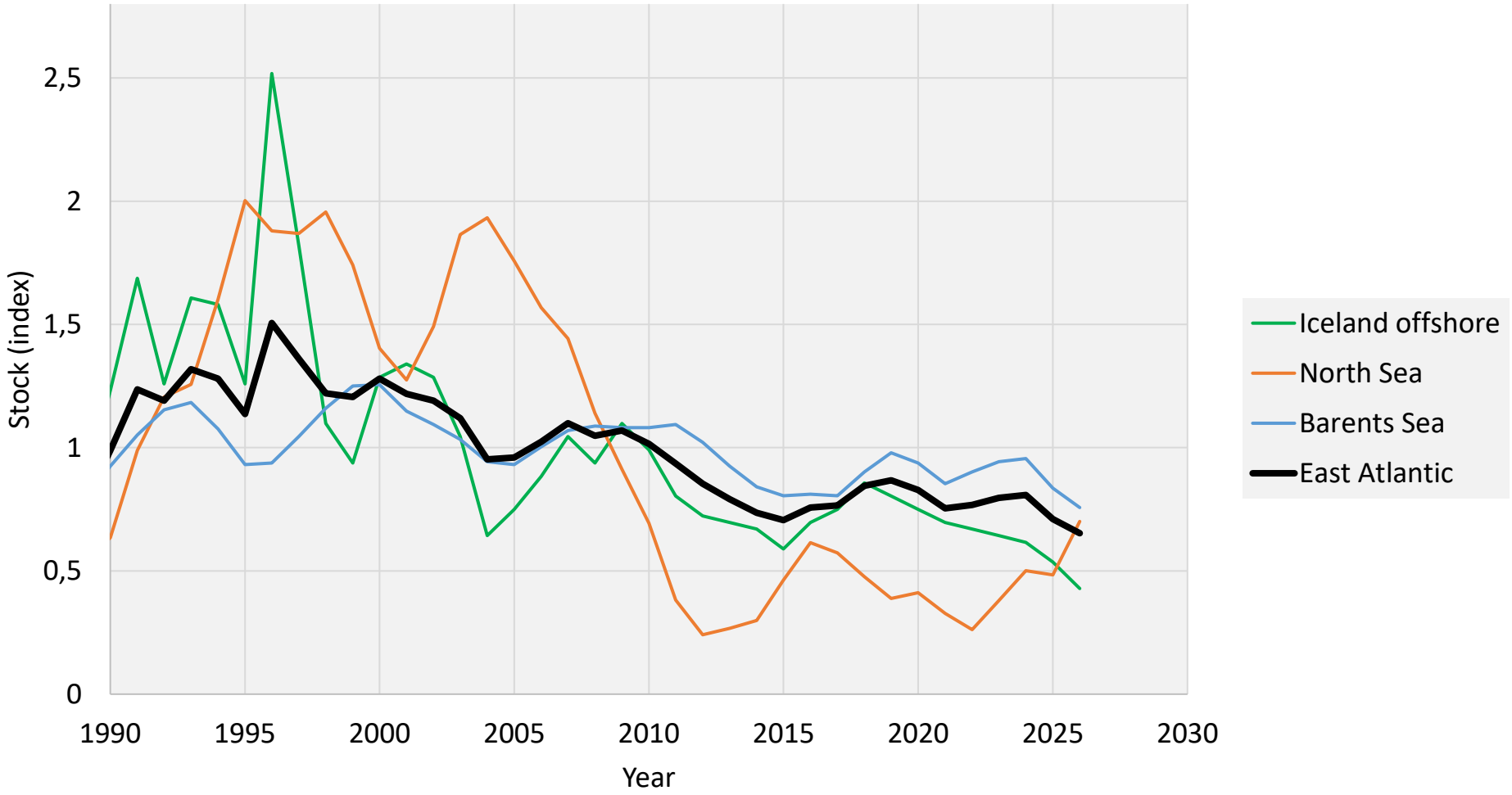
…environmental conditions have been changing…



Shrimp stock dynamics, East Atlantic, recent trends

East Atlantic is not that different from west overall: Iceland and North Sea is down..

…but Barents Sea stands out, still well above Bmsy ….



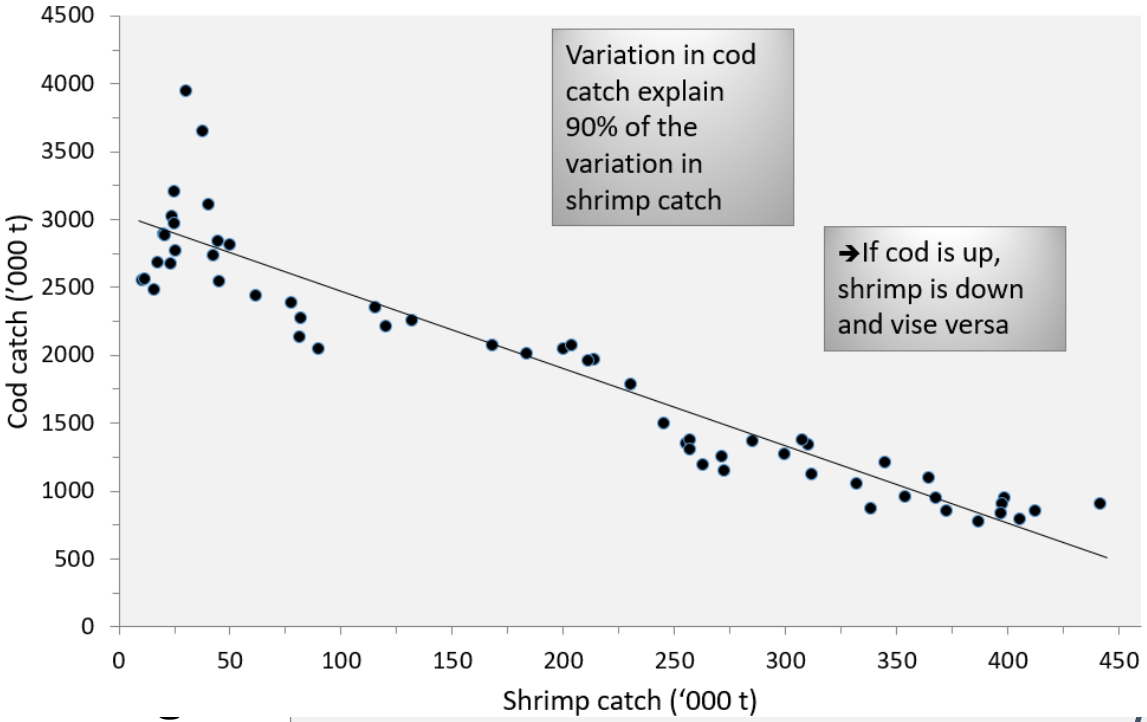
ion from 2022….

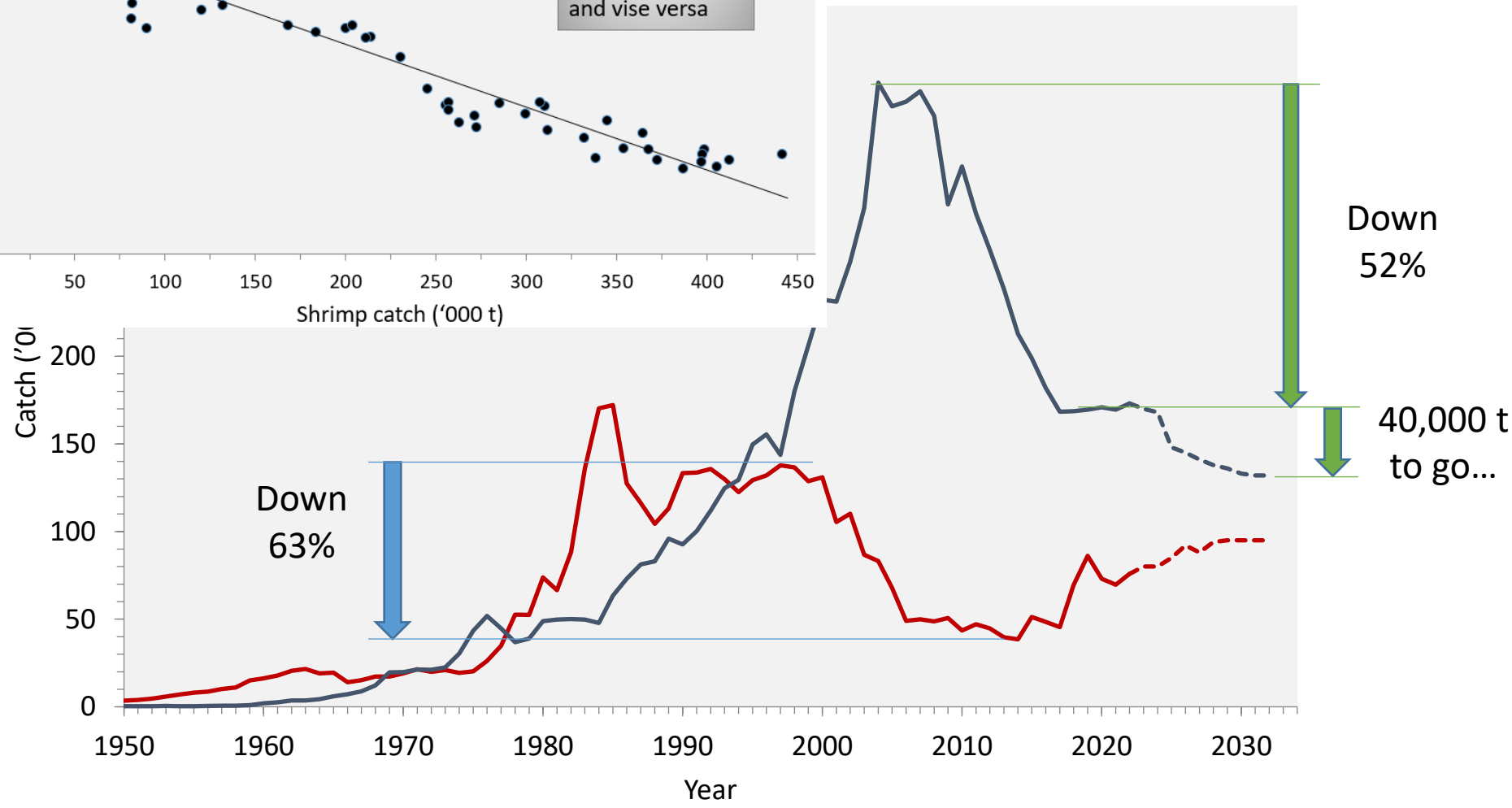
..Cod indicates decrease in West, but how much?..

.. When cod was increasing in East, shrimp went down 63%

If West parallels this, catches needs to come down by another 40,000 t.

Cod indicates increase in East: Barents Sea moved towards MSY of ~100 kt.





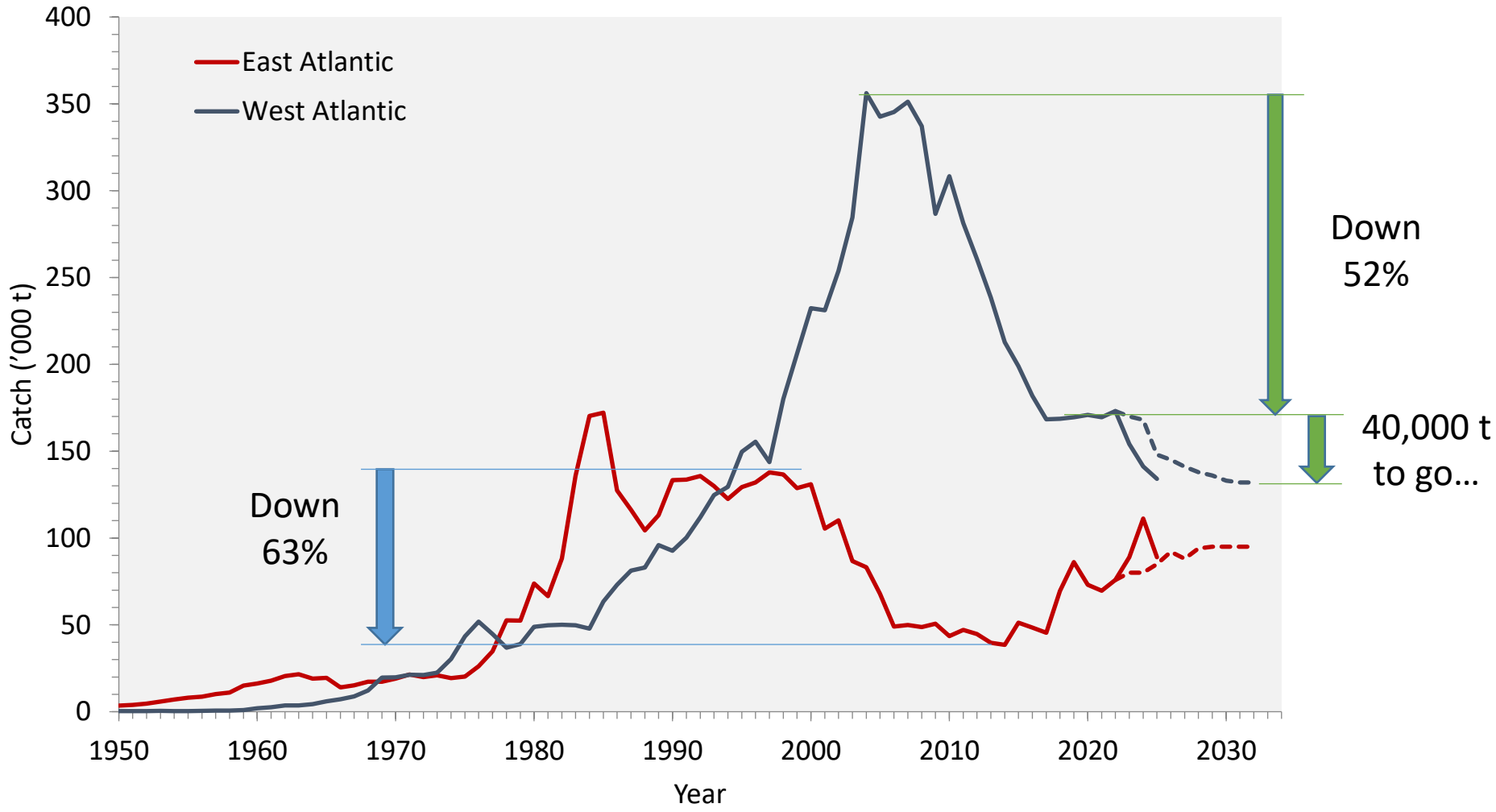
Shrimp catch, prediction from 2022….

..Cod indicates decrease in West, but how much?..

.. When cod was increasing in East, shrimp went down 63%

If West parallels this, catches needs to come down by another 40,000 t.

Cod indicates increase in East: Barents Sea moved towards MSY of ~100 kt.



Shrimp catch, prediction 2026….

..Cod indicates decrease in West, but how much?..

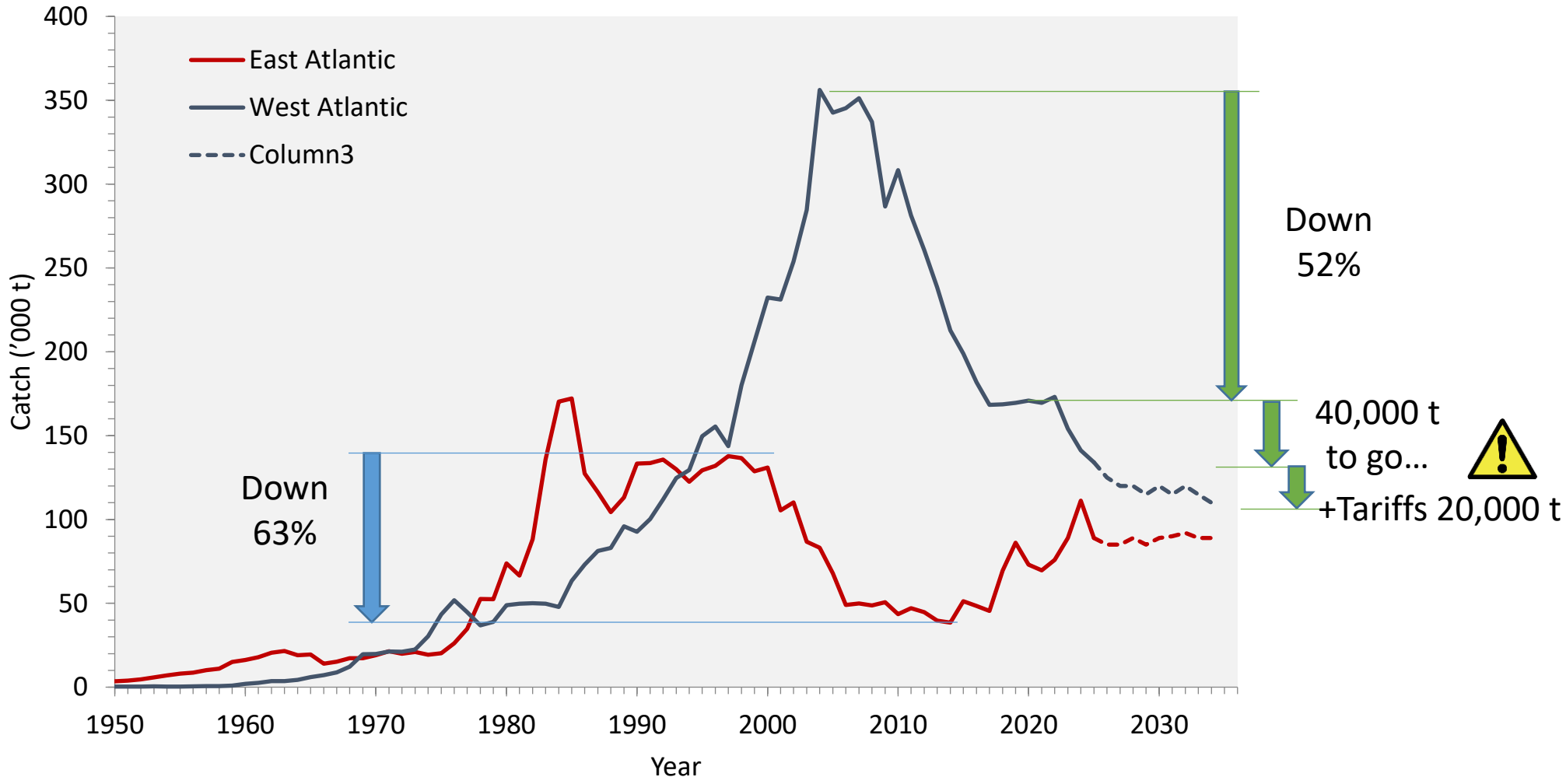
.. When cod was increasing in East, shrimp went down 63%

West will at least parallel this and continue downward trend..

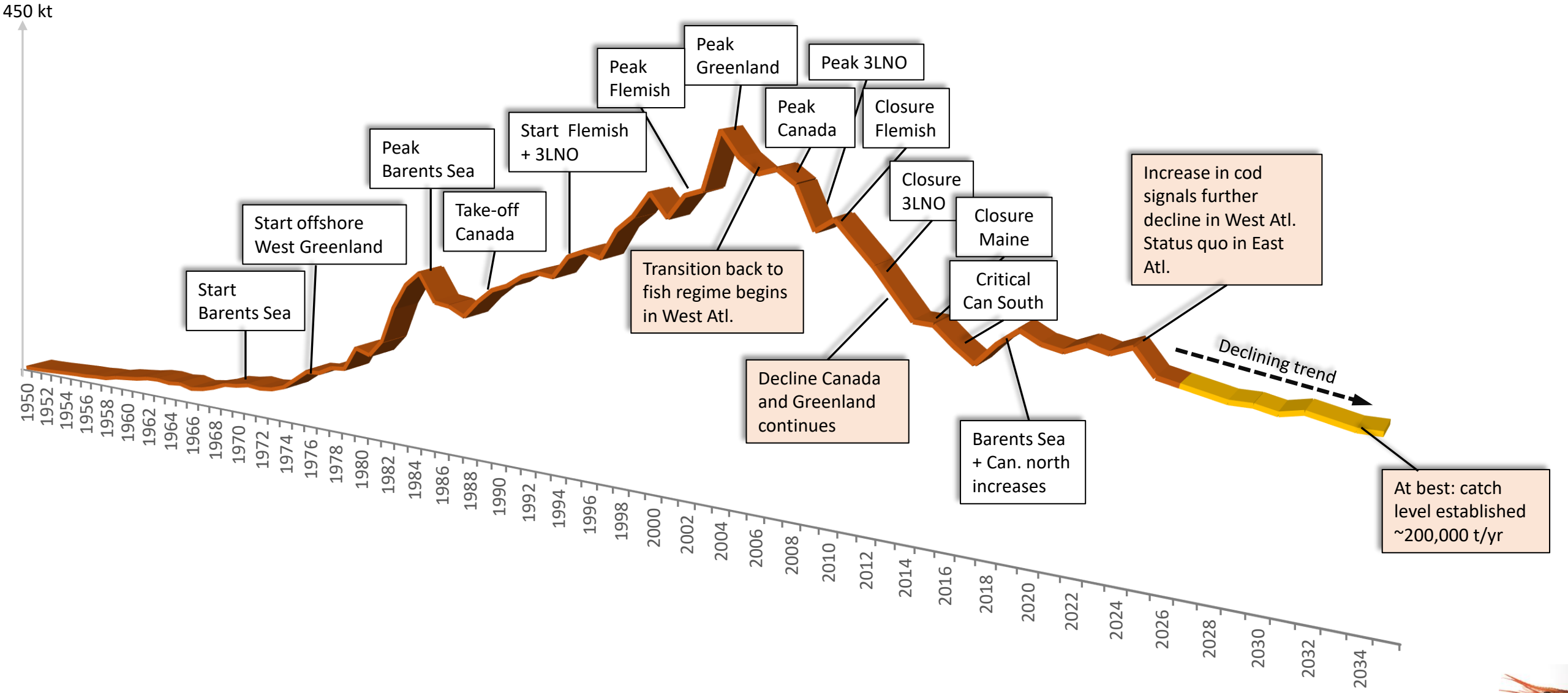
Risk: At tipping point?!

East: No imminent environmental changes in sight. Barents Sea can stay around harvest rule max of ~ kt. 85,000 t.

Risk: management failure?!

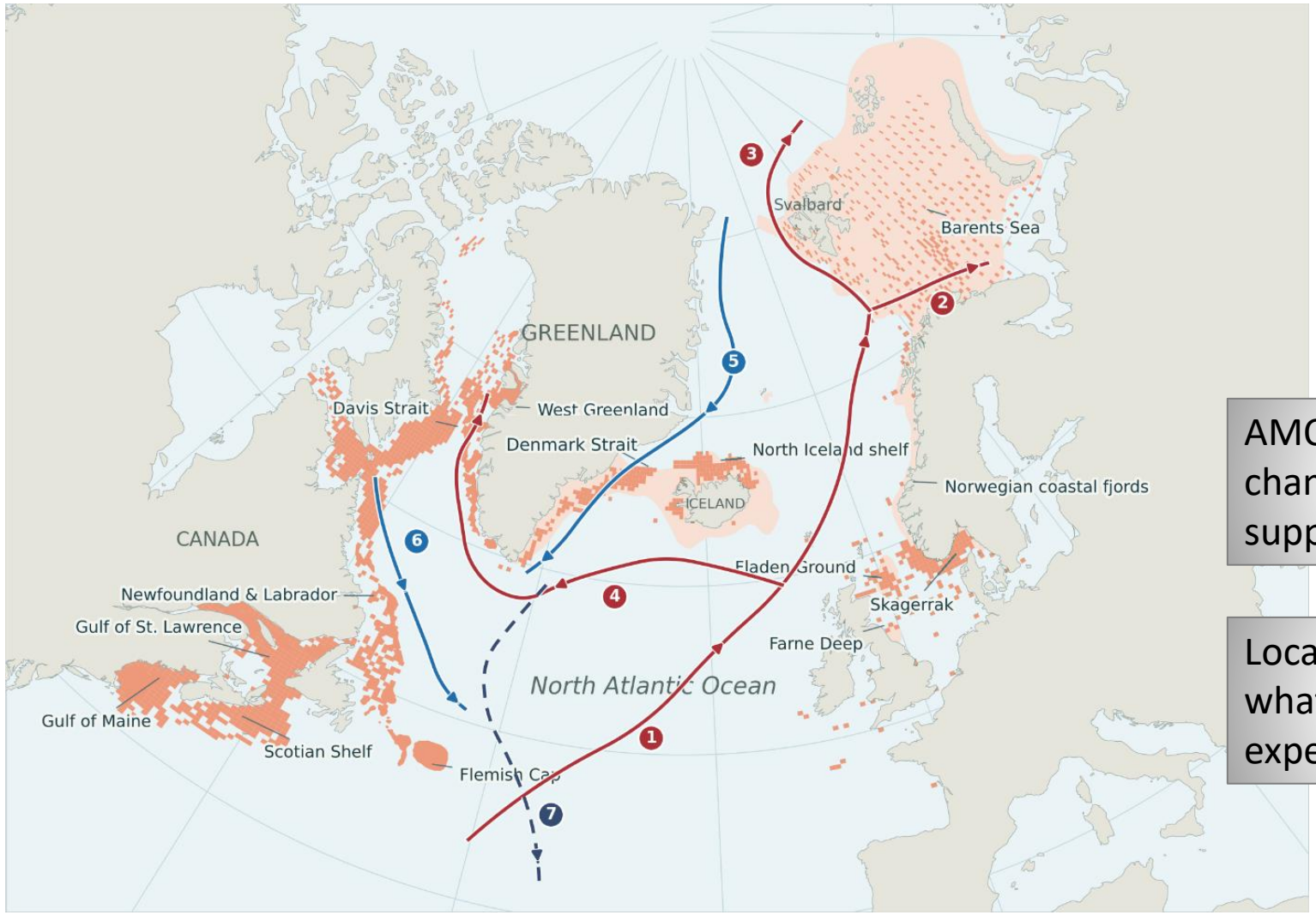


The shrimp future in the North Atlantic



AMOC running amok?

What changing Atlantic circulation could mean for northern shrimp



1–4 Atlantic-origin inflow

5–6 Cold upper currents

7 Deep southward return

Orange: shrimp records / range

AMOC weakening could change heat and food supply.

Local conditions decide what each stock experiences.

Different stocks, different outcomes

A weaker AMOC creates competing effects on shrimp production

Temperature

Cooling may relieve heat stress….

In colder areas, it can slow growth.

Food and recruitment

Changes in plankton and hatch timing may reduce survival.

Predation

Changes in overlap with cod and other predators may help or harm shrimp.

➔ Supply could shift between regions and become less reliable.

@Managers: Watch recruitment and local ocean conditions.
@industry: Keep fishing and supply plans flexible.



8-year projections, North Atlantic

- **Shrimp fishery outlook**
  - West: incremental downward trend continues.
  - East: Barents sea now stable at max; others stable at low levels.
  - Overall: declining catches to <50% of the peak levels 2004-2007.
- **Risks**
  - Inadequate fishery management on shrinking stocks.
  - The downturn seen for stocks in south-west ("smaller scale gradual ocean climate events"), will hit West Greenland and Canada north equally hard.
  - Larger climate events (AMOC, global warming), but probably longer-term effects.
- **Considerations**
  - Changes in stock distribution.
  - New fishing grounds further north.
  - Monitor ocean climate and recruitment.
- **Shrimp industry focus**
  - Product quality – think gourmet (more money pr shrimp).
  - Product Ethics – think green (emissions, gear technology, bottom impact, bycatch).





Thanks for your attention!

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carhv@aqua.dtu.dk

DTU AQUA

EB SHRIMP

Invitation to EB SHRIMP Workshop

Common Scientific Challenges in Ecosystem-Based Assessment, Management, and Rebuilding of Deep-Water Shrimp Stocks

Dates 25–27 November 2026
Location Copenhagen — primarily in person, with a limited online participation
Host DTU Aqua

Funded by the Nordic Council of Ministers

