Fiskeri, økosystemer og havets biodiversitet:

Fra tab af biodiversitet til tab af økosystemservices

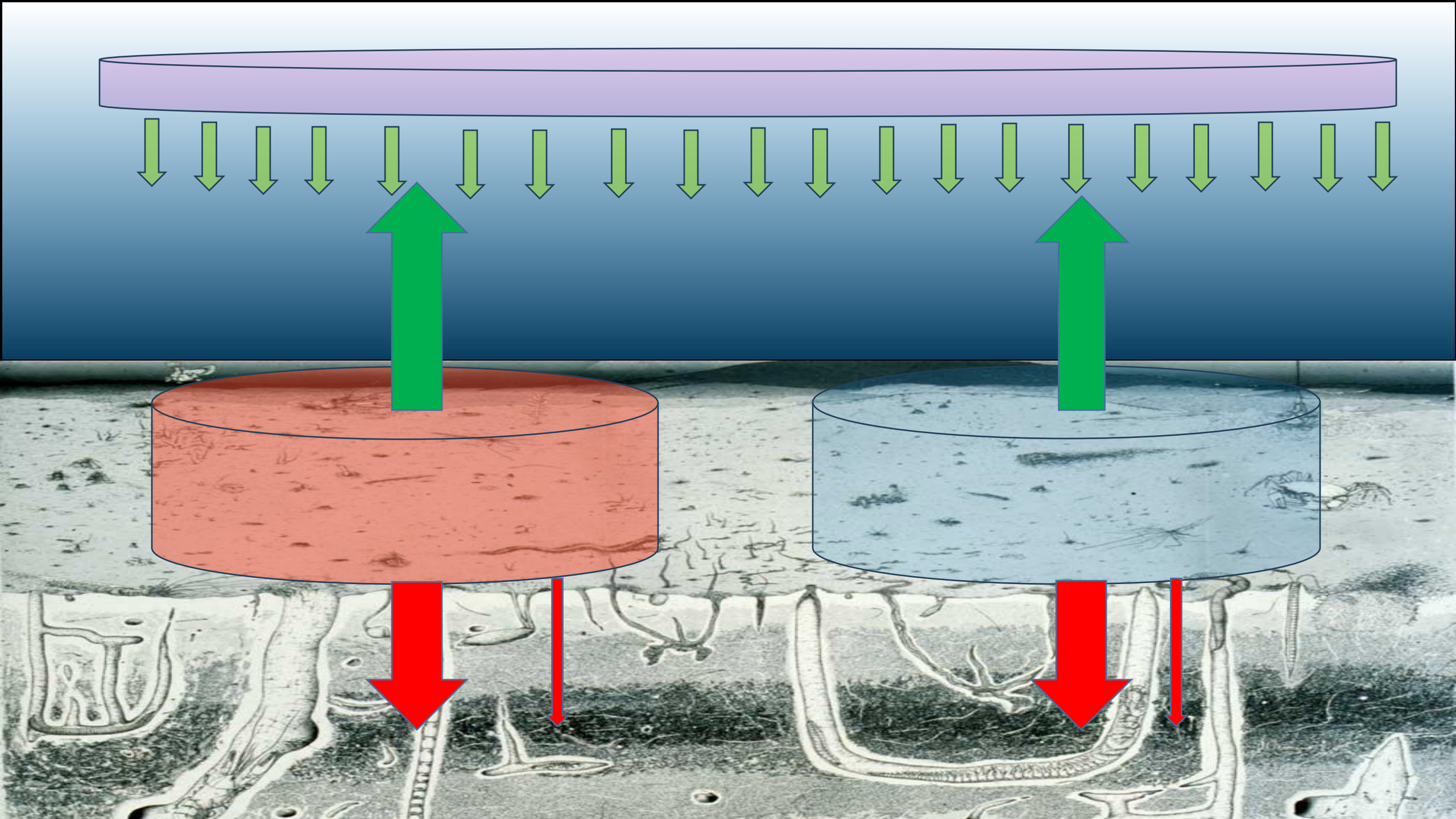
Jørgen L. S. Hansen, Ecoscience , AU

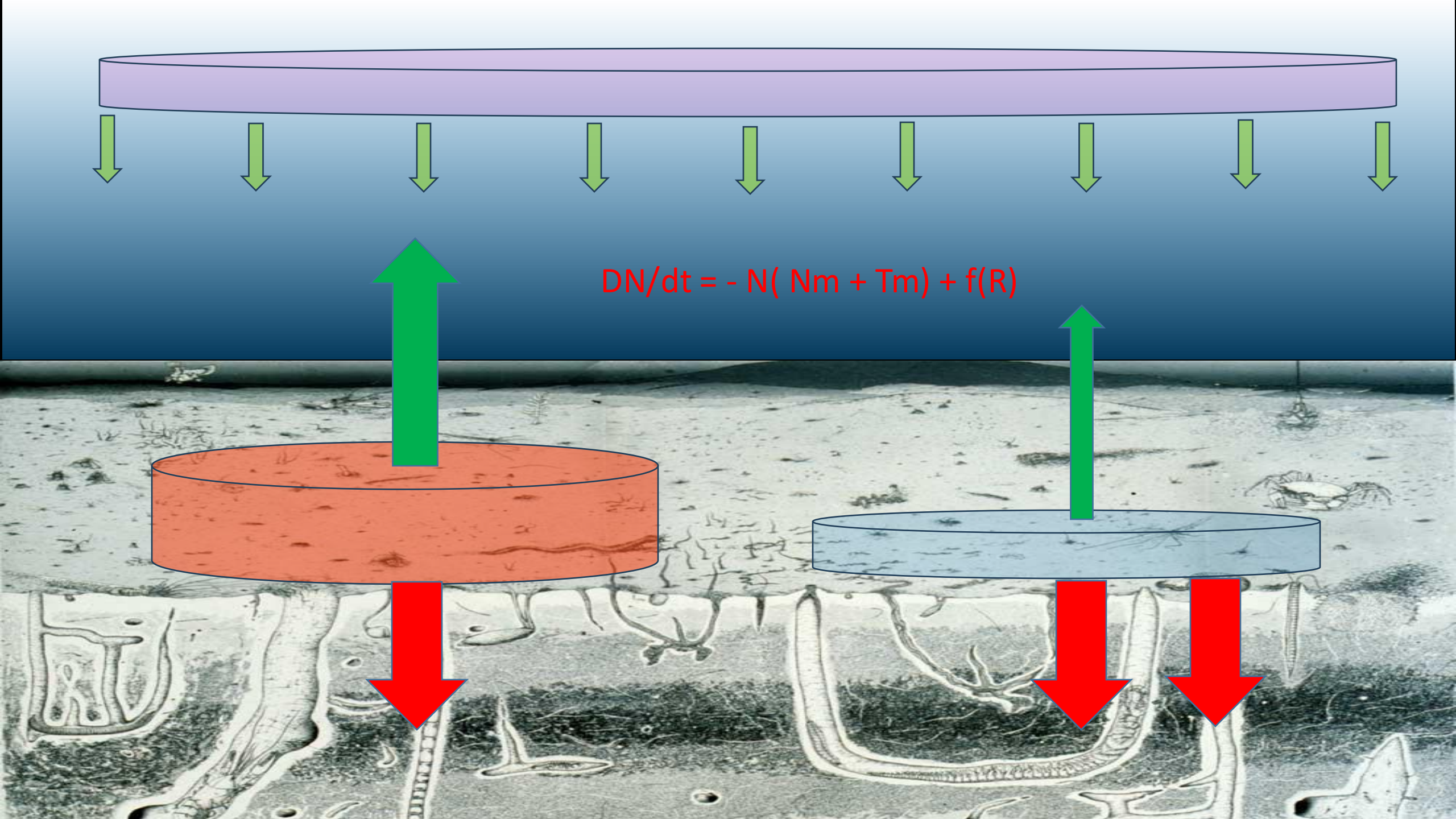
"Når bundtrawling påvirker områder der ikke trawles "

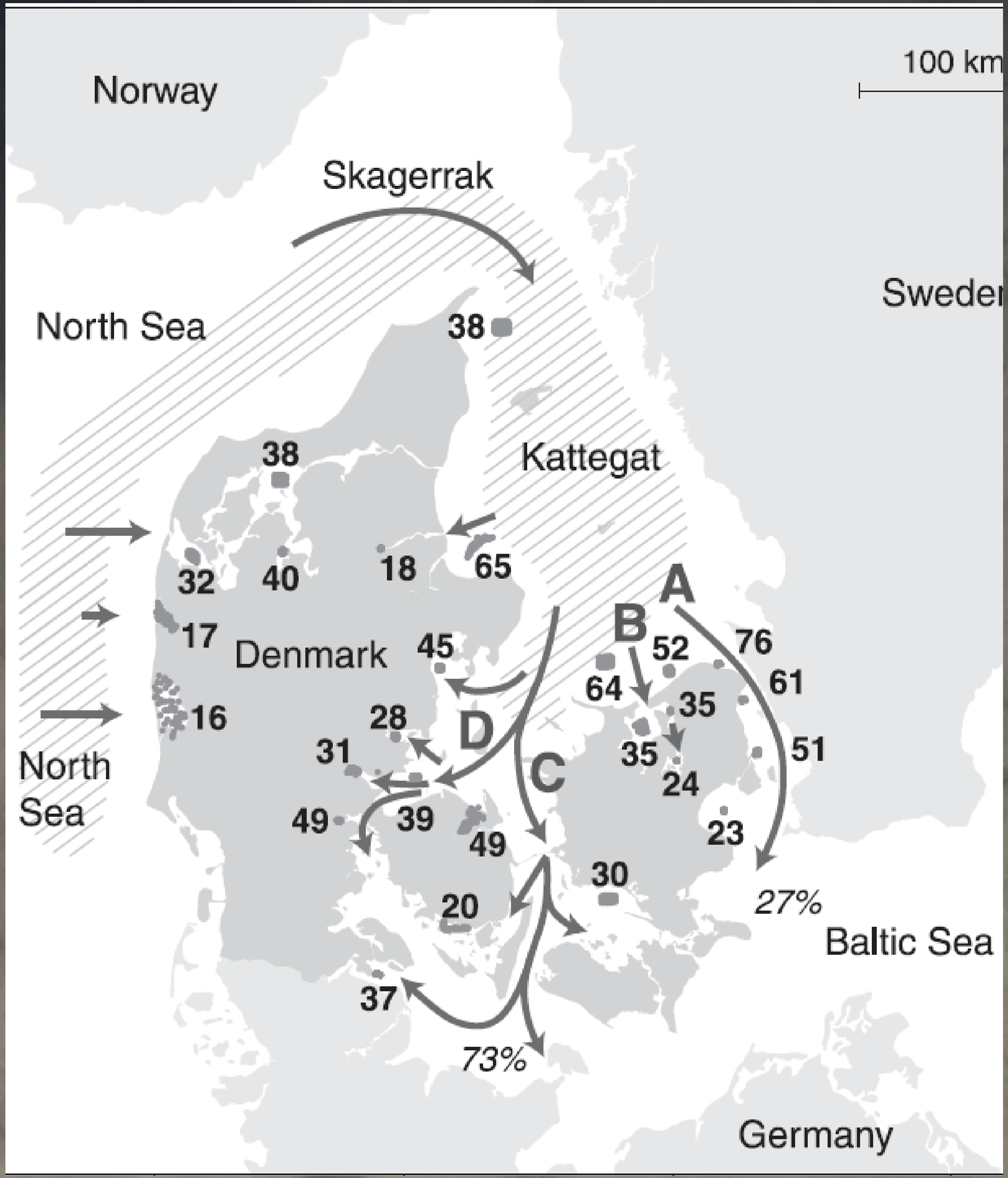
Biodiversitetssymposium Aarhus 25-26 september 2024

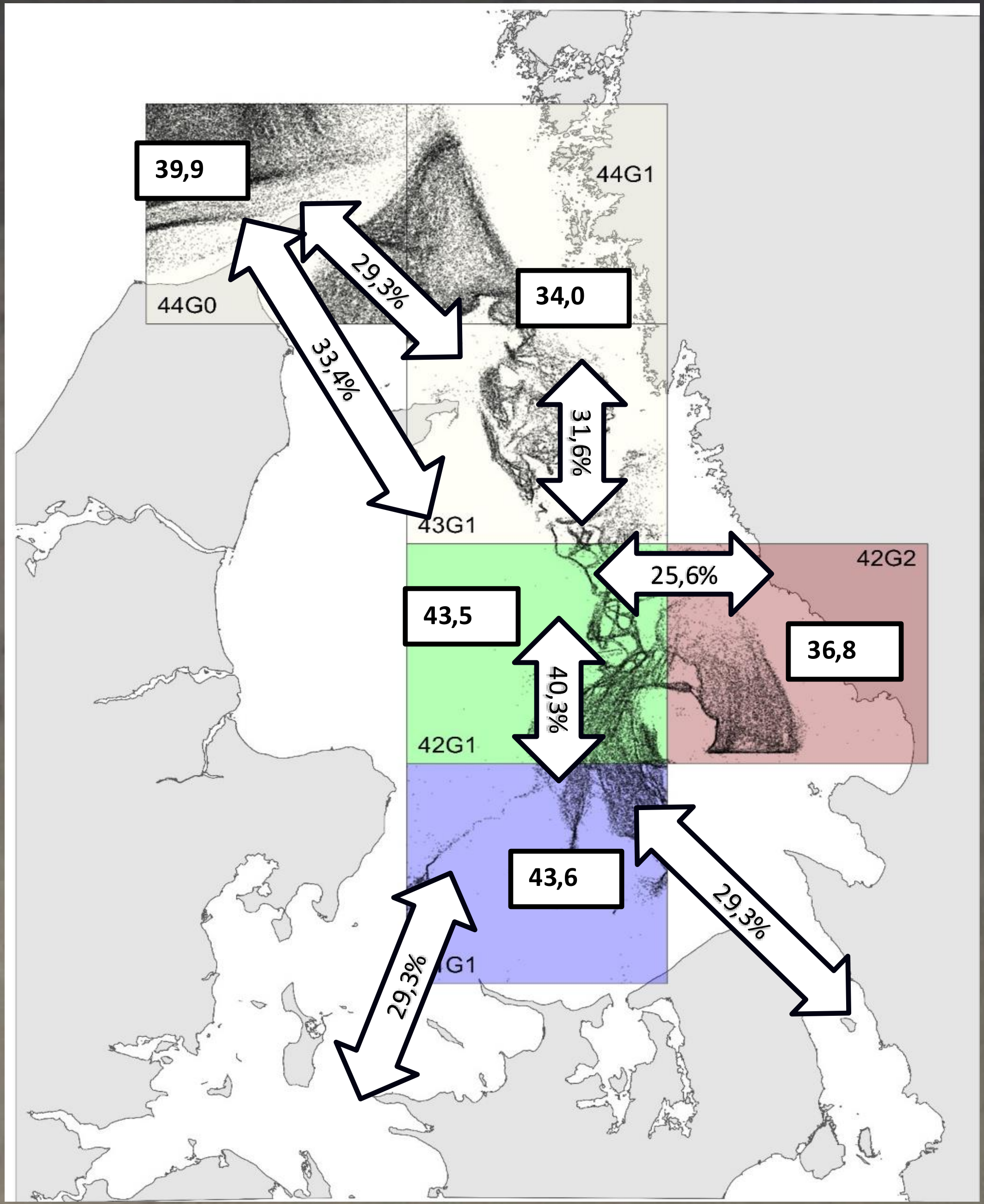
- Bundfaunaens artsdiversitet afspejler miljøtilstanden og dermed presfaktorer i det omgivende lokale miljø.

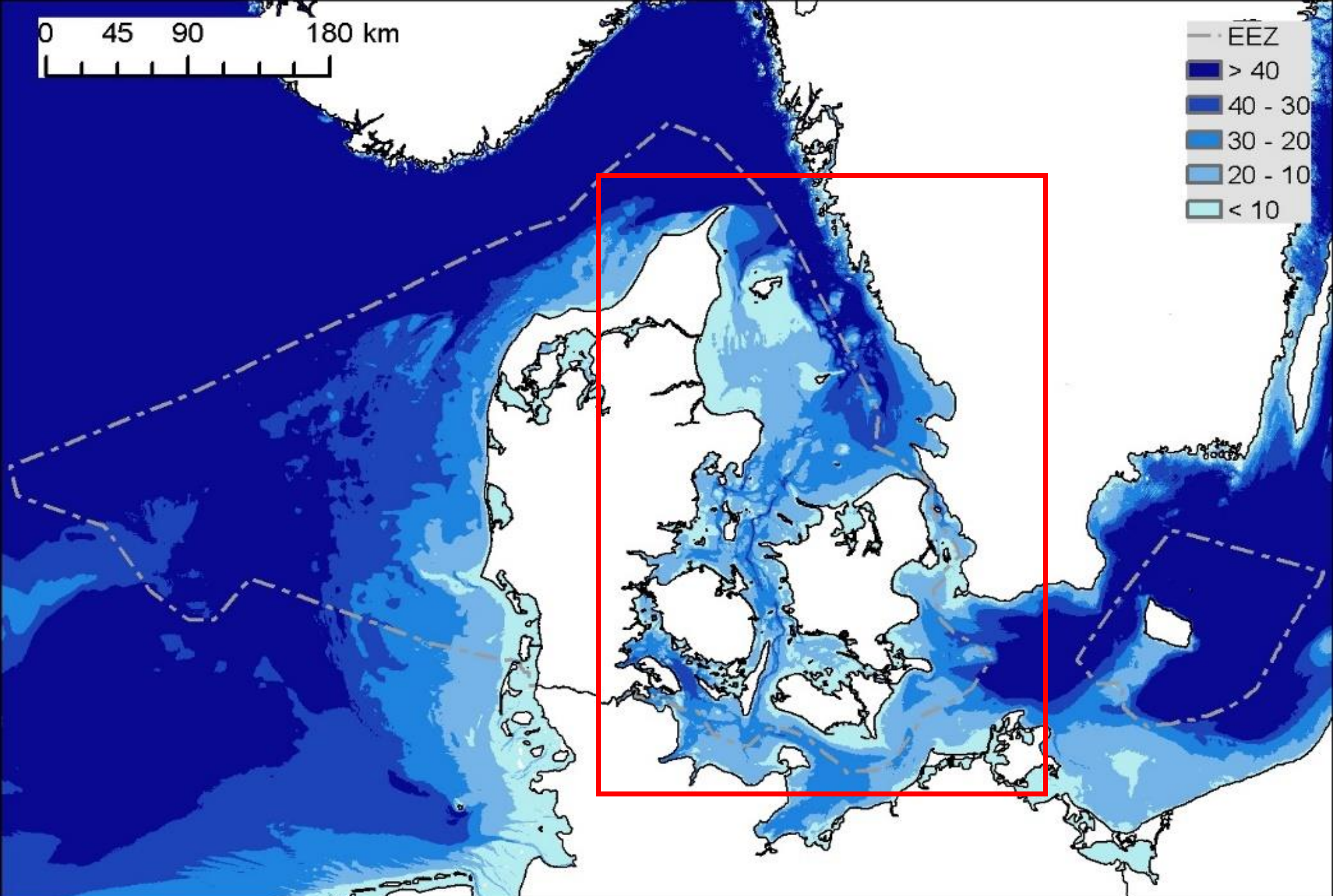
Dynamikken i bundfaunaens artdiversitet afspejler både lokale faktorer og den regionale rekruttering

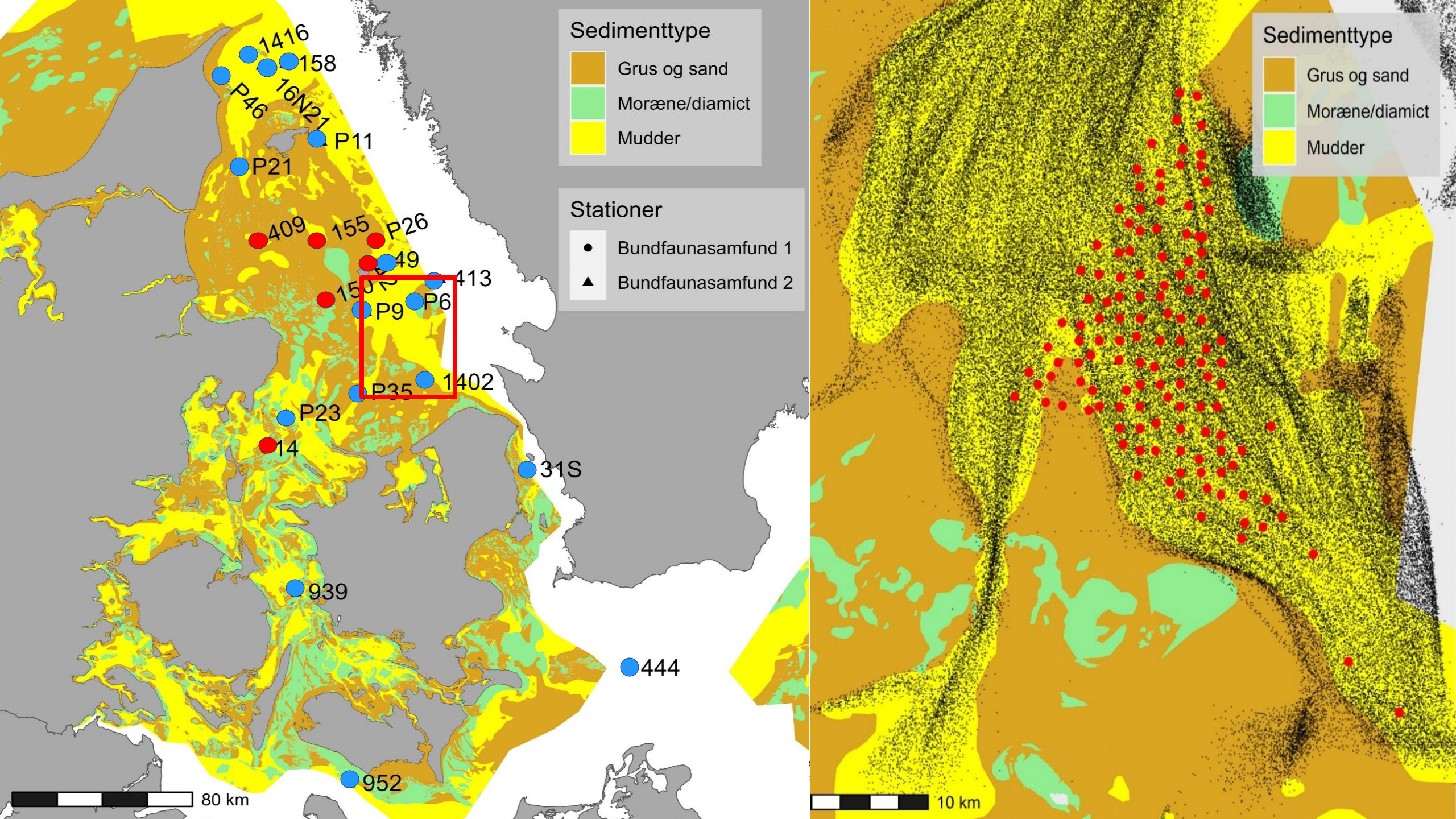


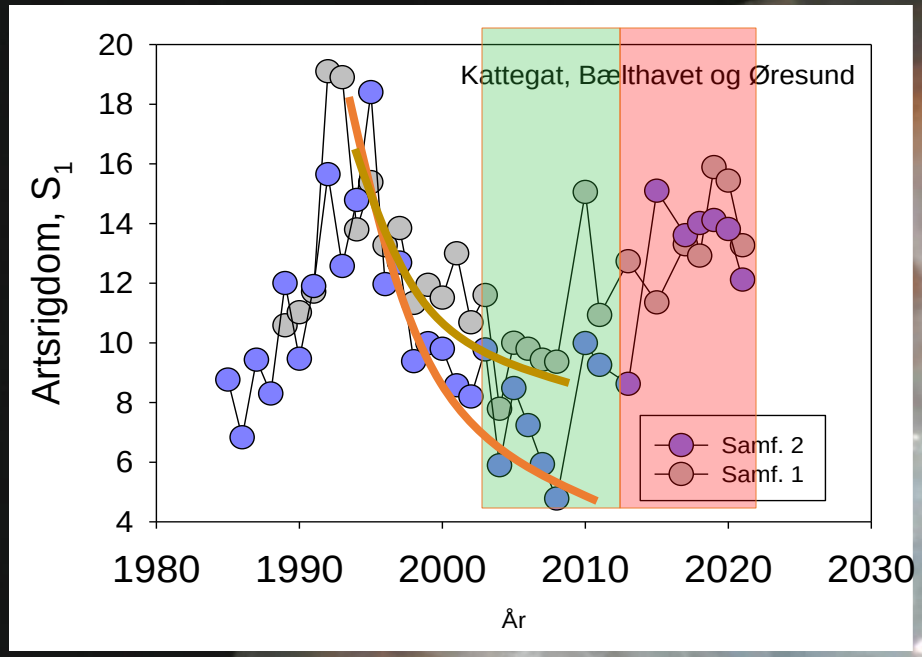

DN/dt = - N(Nm + Tm) + f(R)

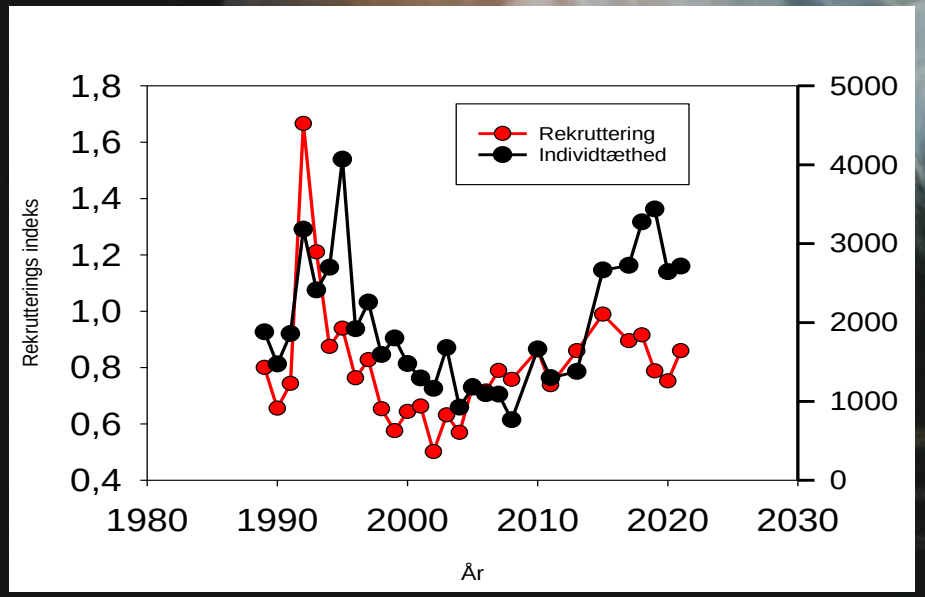

100 km
Norway
Skagerrak
Sweden
North Sea
38
Kattegat
38
32
40
18
65
17
Denmark
45
A
B
52
76
64
61
35
16
28
D
31
35
51
C
24
North
Sea
49
39
49
23
30
27%
20
Baltic Sea
37
73%
Germany


39,9
44G1
29,3%
34,0
44G0
33,4%
31,6%
43G1
25,6%
42G2
43,5
36,8
40,3%
42G1
43,6
29,3%
29,3%


0 45 90 180 km
EEZ
> 40
40 - 30
30 - 20
20 - 10
< 10


Sedimenttype
Grus og sand
Moræne/diamict
Mudder
Stationer
Bundfaunasamfund 1
Bundfaunasamfund 2
1416
158
P46
16N21
P11
P21
409
155
P26
49
413
P9
P6
1402
P23
14
31S
939
444
952
80 km
Sedimenttype
Grus og sand
Moræne/diamict
Mudder
10 km





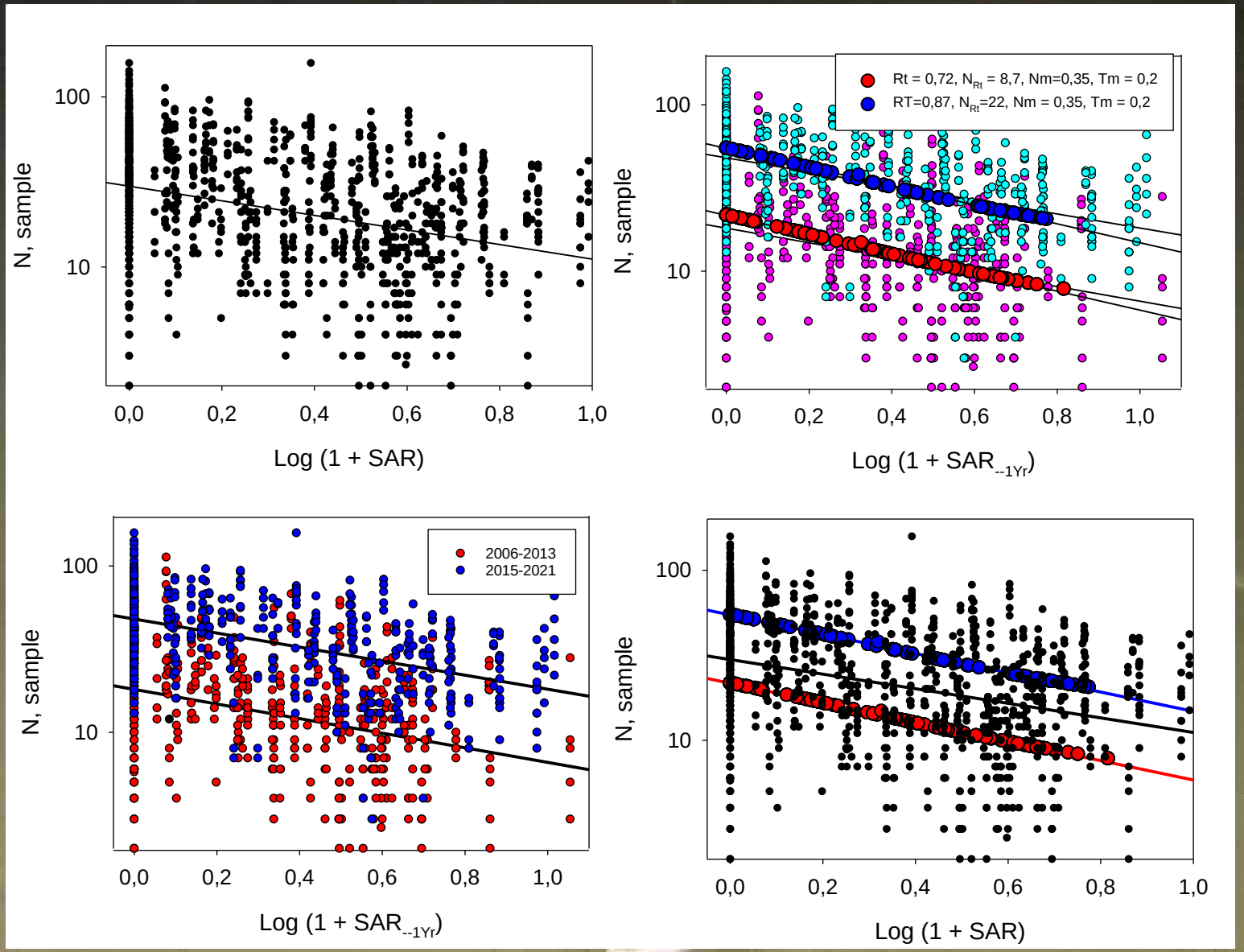
Synchronous decline in >300 species 1995-2008

Trawled areas declined with two times as fast as non-trawled areas

Local biodiversity depended more on regional development in the Kattegat area than on local environmental factors (sediment, salinity, depth etc.).

Peter Göransson ©

DN/dt = - N(Nm + Tm) + f(R)



6%, 16%, 20%, 44%

SA/kg Nephrops = 12000 m2

Trawlet area: 9000 km2

Benthos 300 g /m2

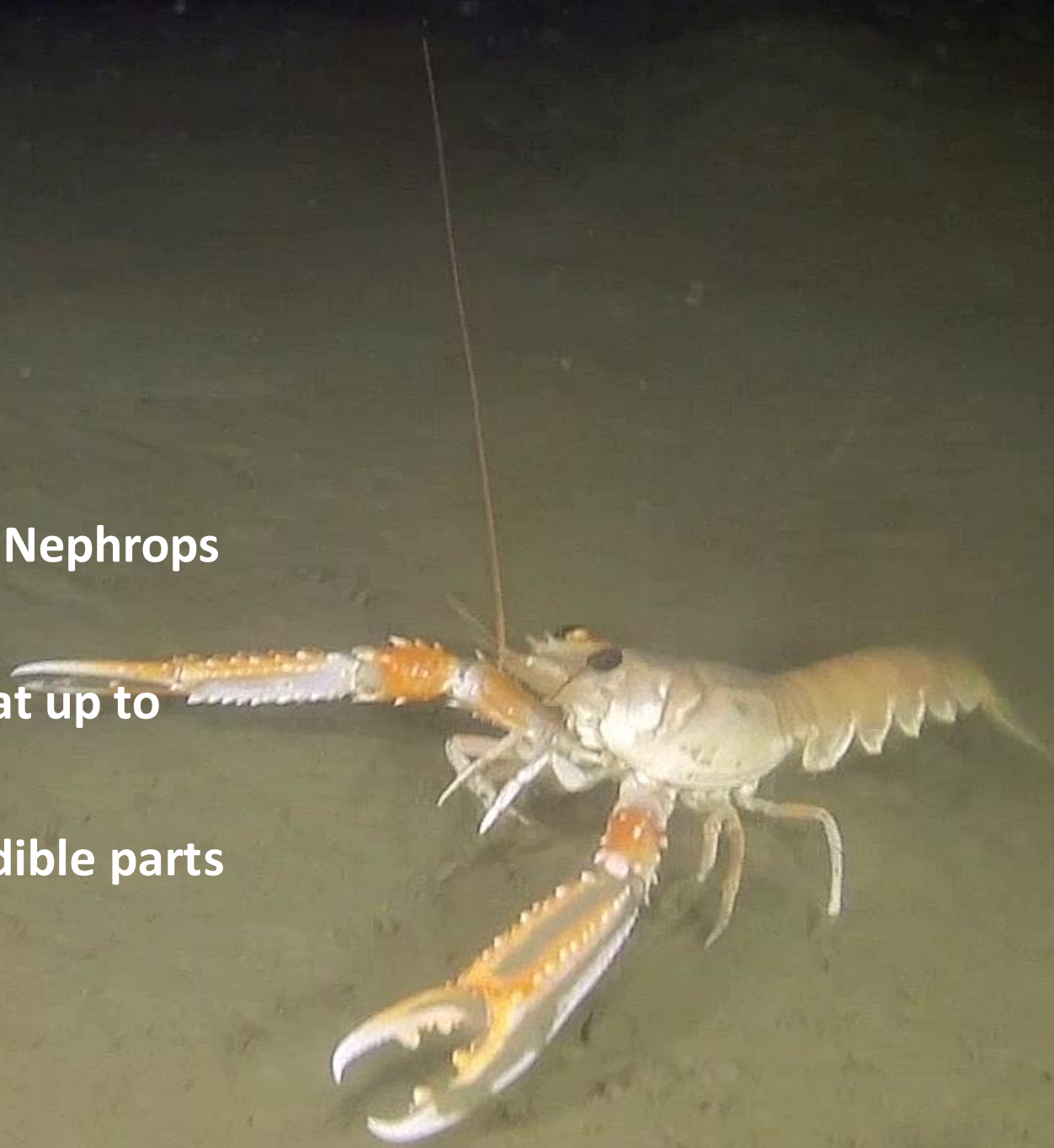
SAR = 3

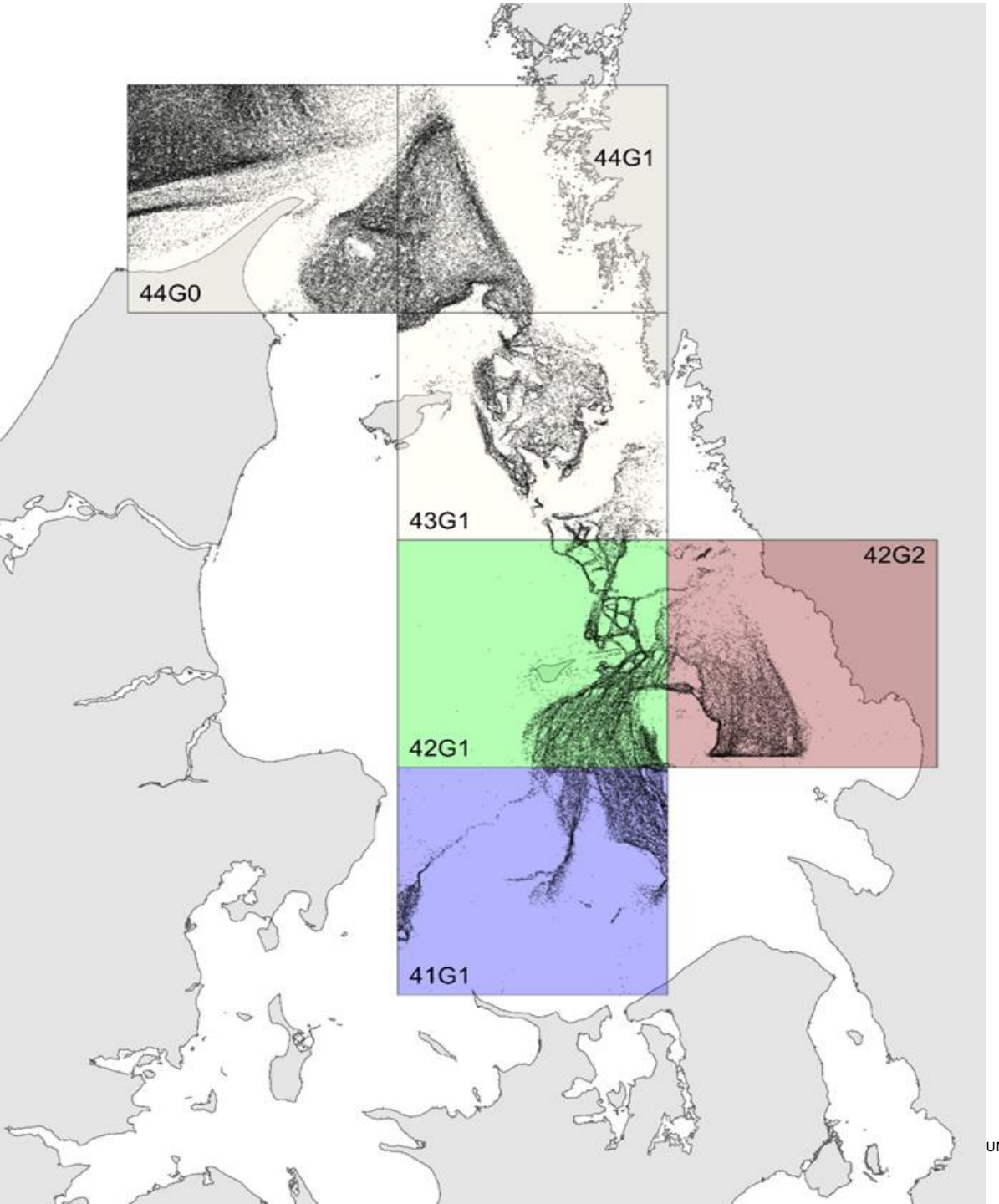
Loss of benthos biomass/kg Nephrops landet ~ 500 kg (720 kg)

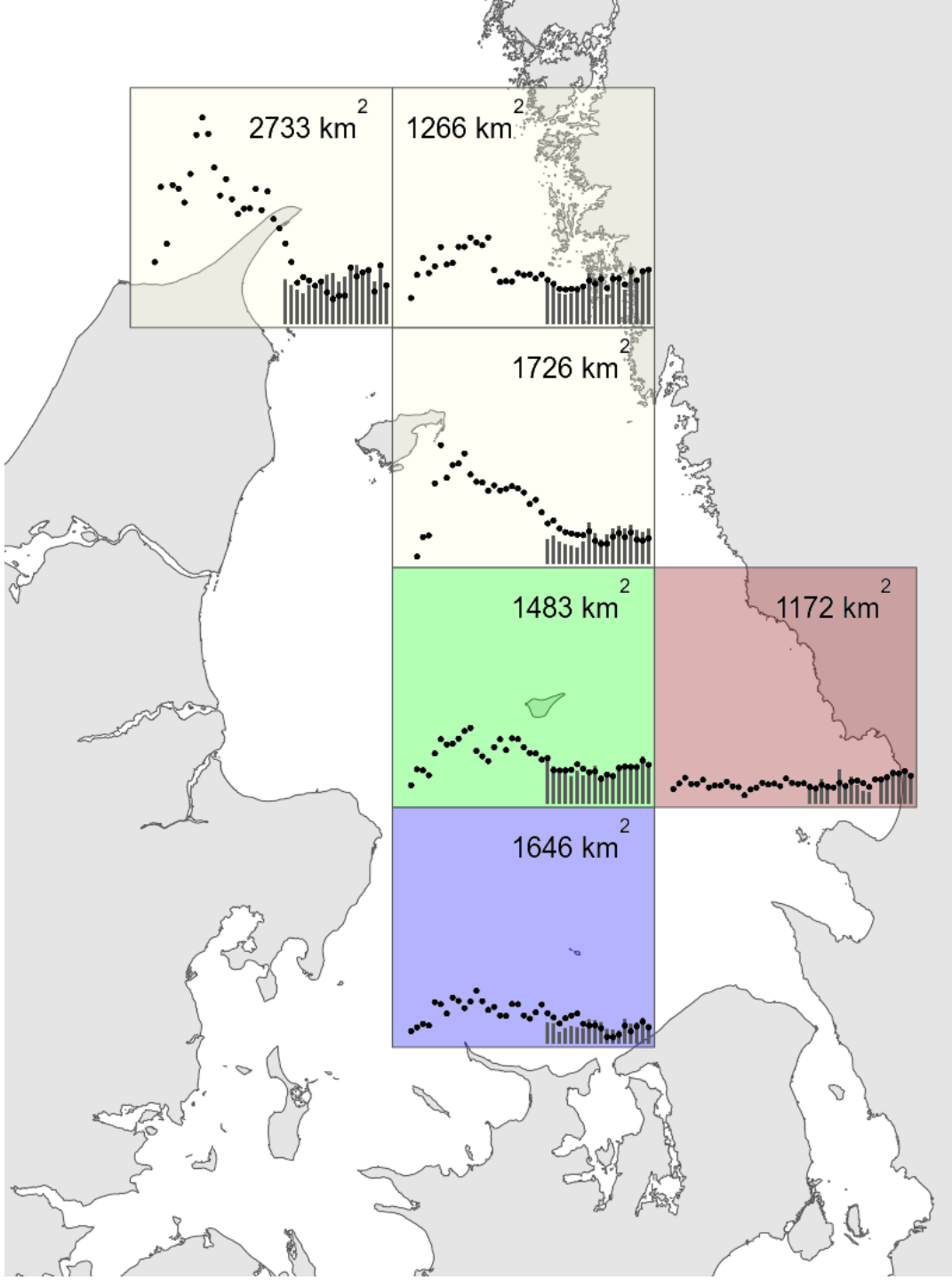
Total loss of biomass Kattegat up to one mio. tons/yr

Landing per area per yr of edible parts (tails) : 2 kg/ha/yr

CO2eq/kg : 20-90kg







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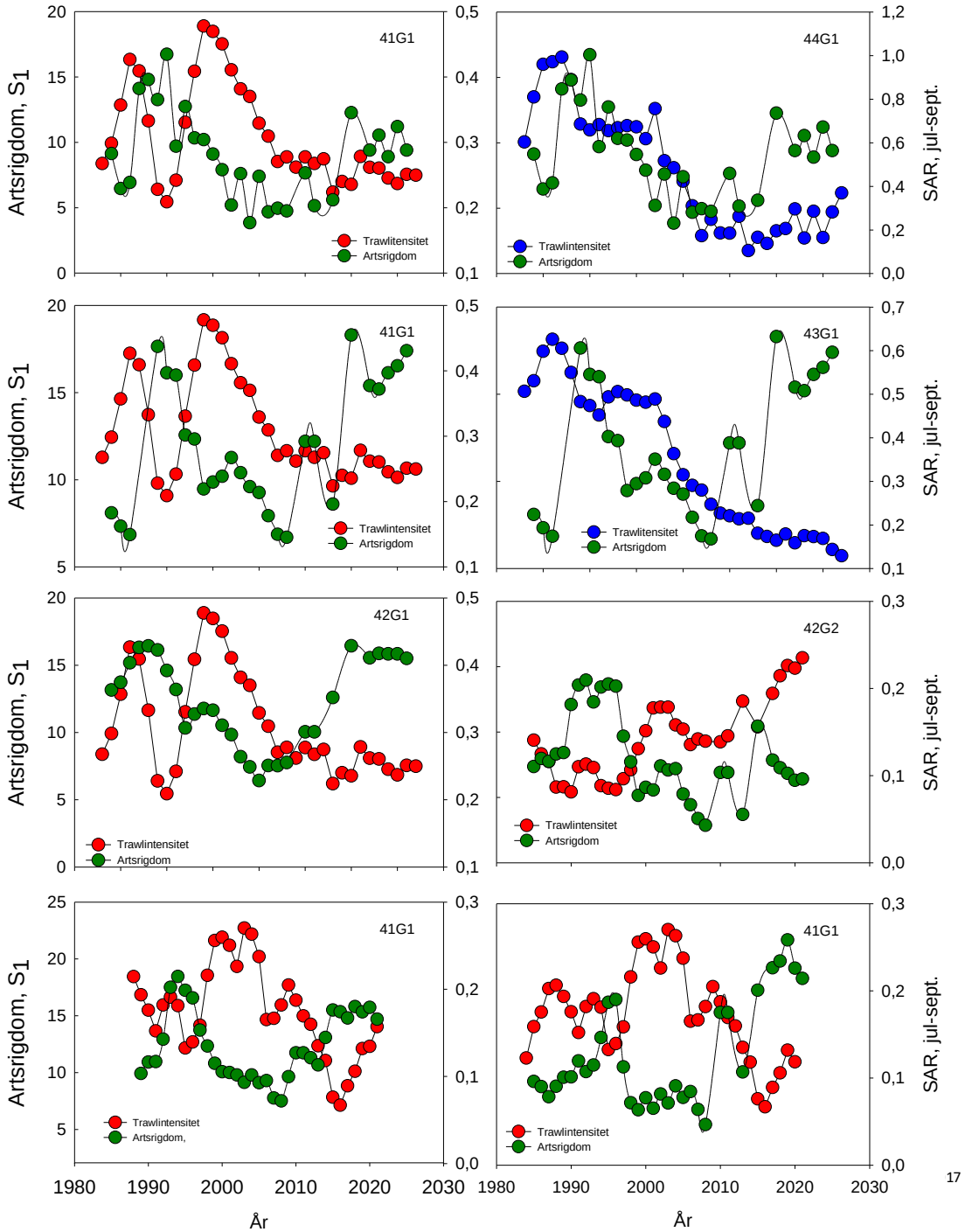
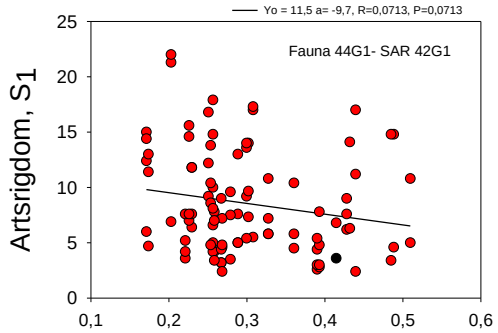
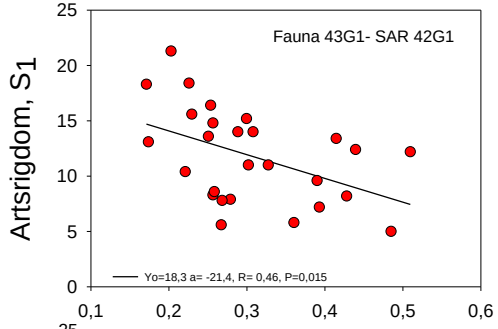
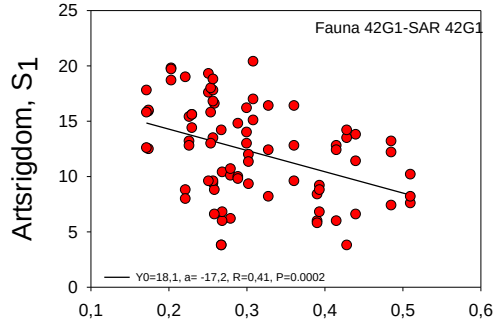
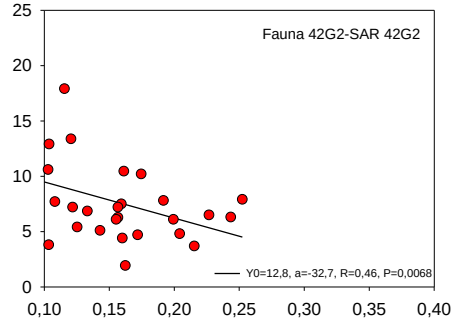
SENIOR RESEARCHER

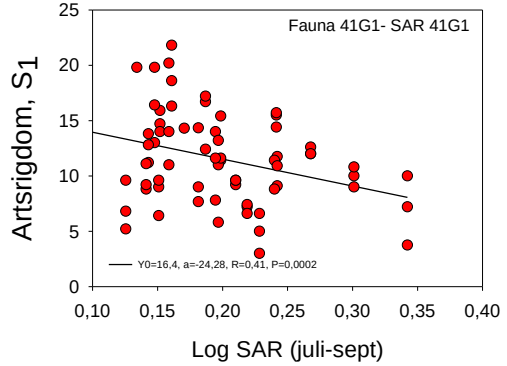

41G1
Trawlitensitet
Artsrigdom
Artsrigdom, S1
SAR, jul-sept.
44G1
Trawlintensitet
Artsrigdom
43G1
42G1
42G2
Artsrigdom,
År
1980
1990
2000
2010
2020
2030

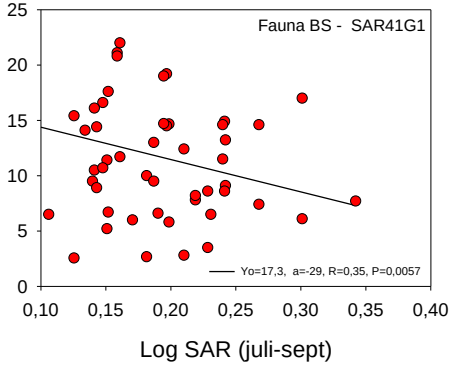

Yo = 11,5 a= -9,7, R=0,0713, P=0,0713
Fauna 44G1- SAR 42G1
Artsrigdom, S1

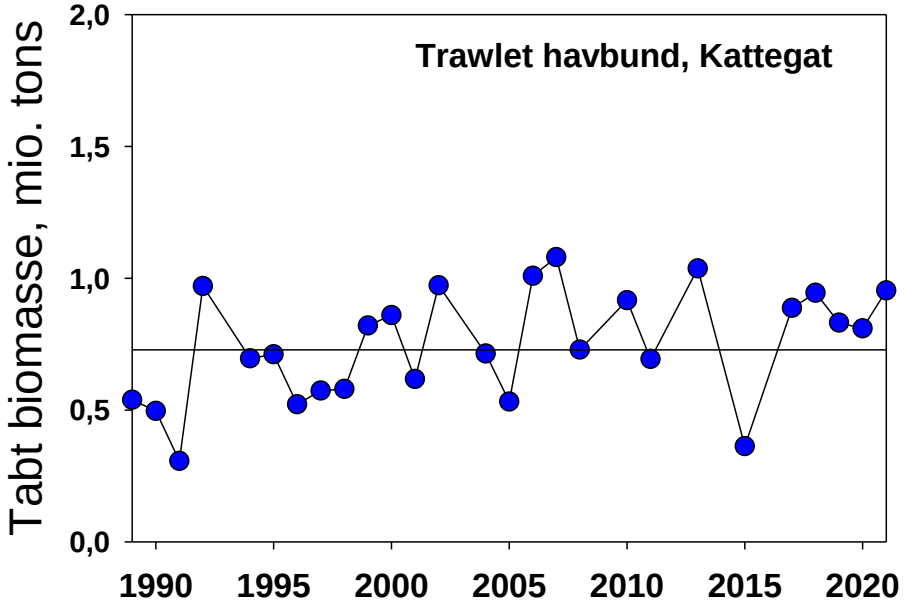

Fauna 43G1- SAR 42G1
Yo=18,3 a= -21,4, R= 0,46, P=0,015
Artsrigdom, S1

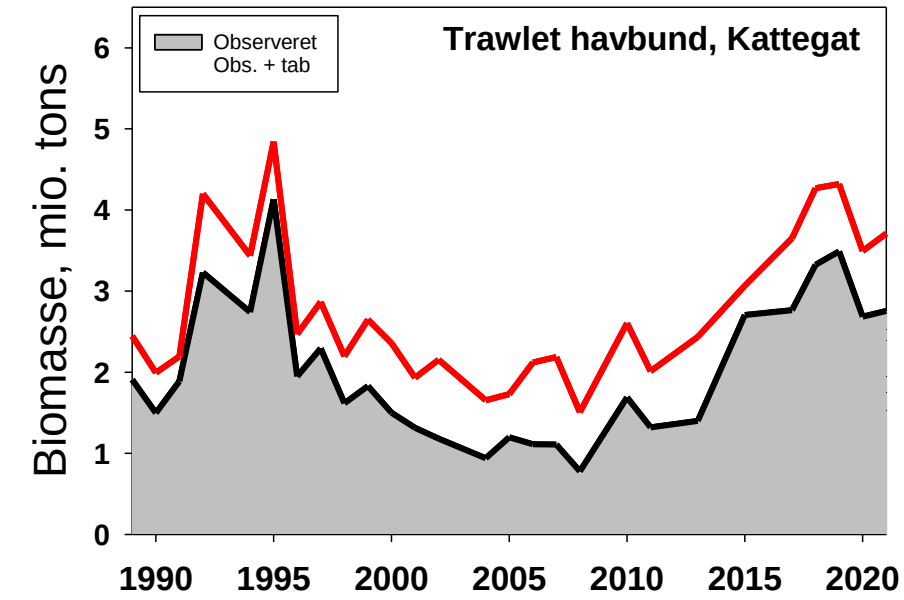

Fauna 42G1-SAR 42G1
Y0=18,1, a= -17,2, R=0,41, P=0.0002
Artsrigdom, S1

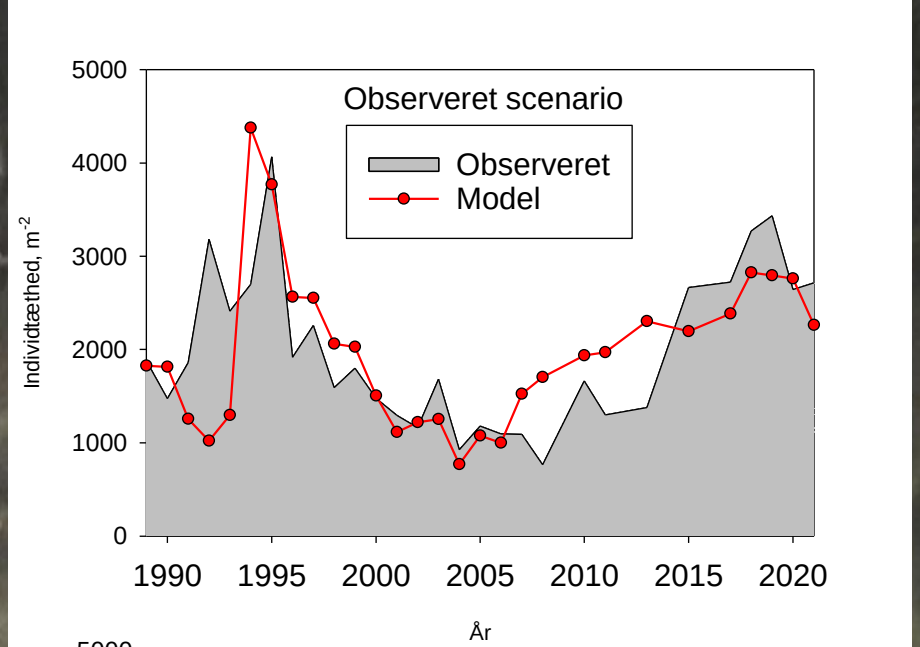

Fauna 42G2-SAR 42G2
Y0=12,8, a=-32,7, R=0,46, P=0,0068

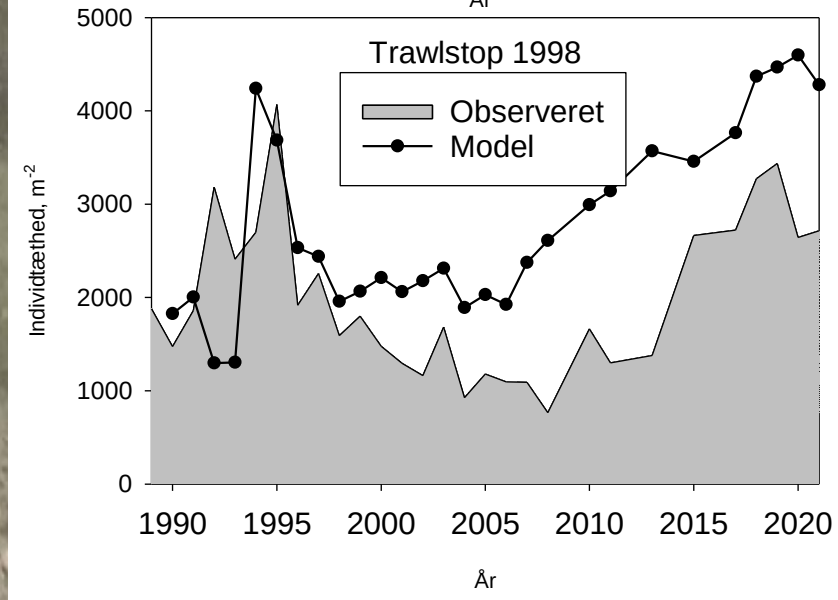

Fauna 41G1- SAR 41G1
Y0=16,4, a=-24,28, R=0,41, P=0,0002
Artsrigdom, S1
Log SAR (juli-sept)

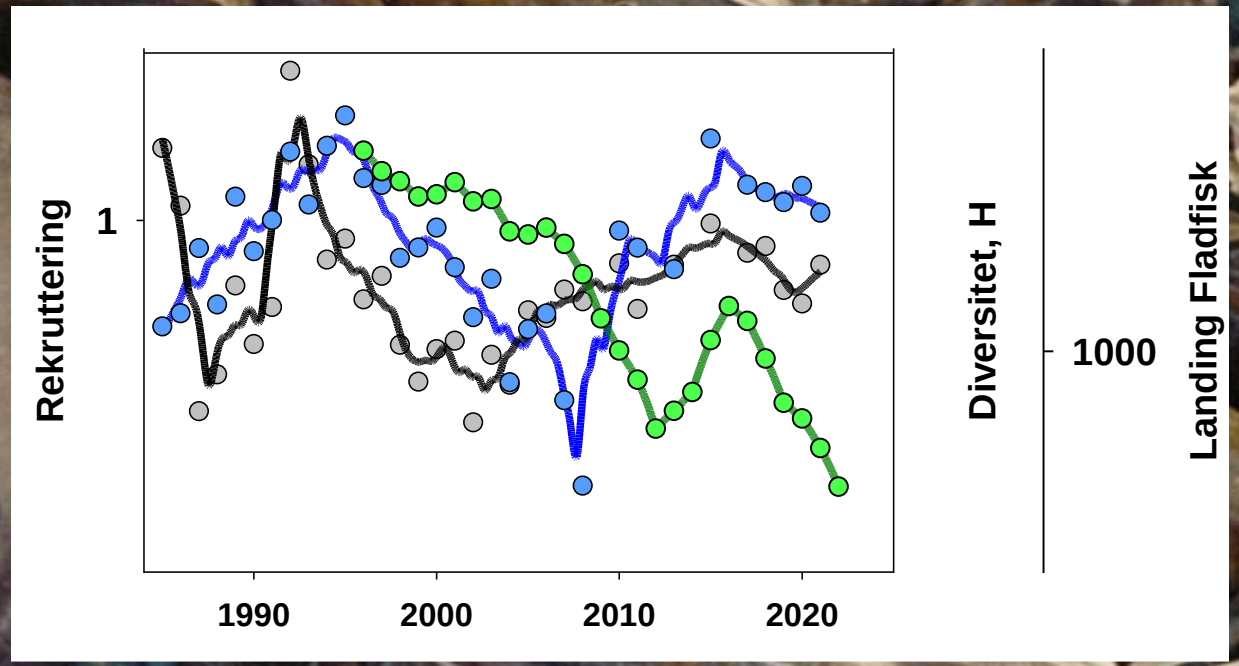

Fauna BS - SAR41G1
Yo=17,3, a=-29, R=0,35, P=0,0057
Log SAR (juli-sept)

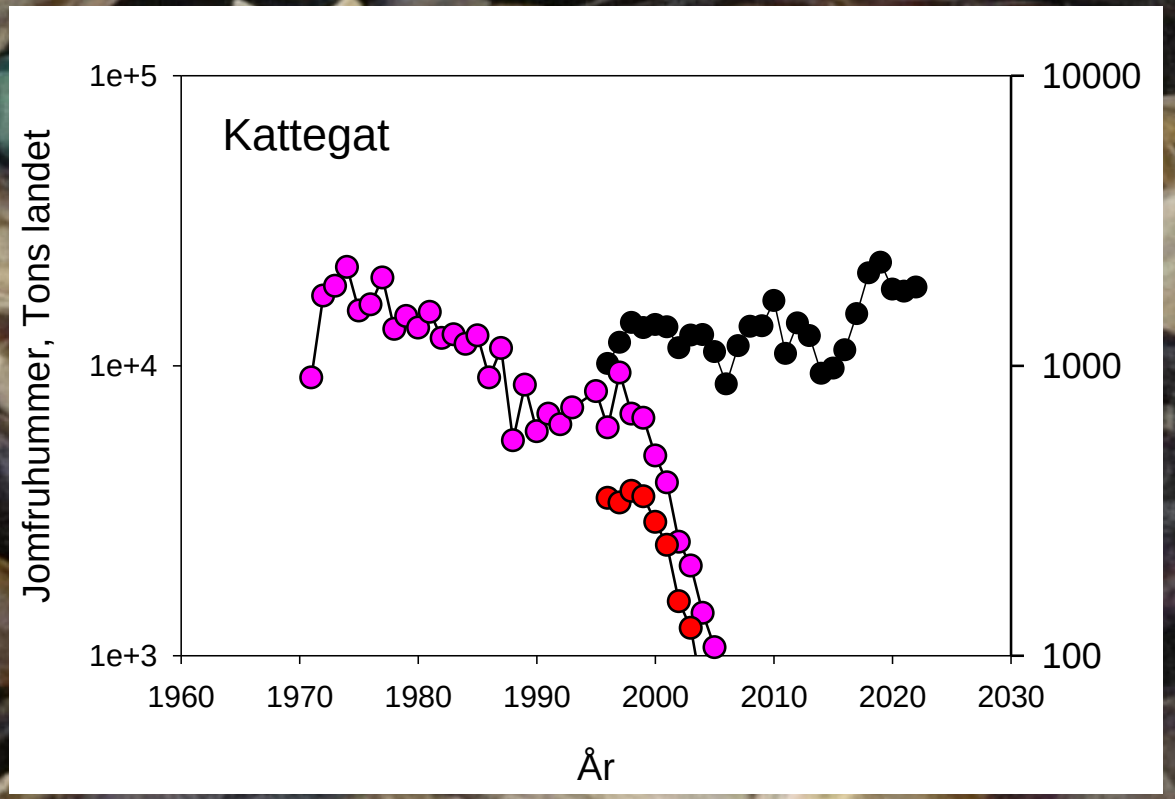

Trawlet havbund, Kattegat
Tabt biomasse, mio. tons
2,0
1,5
1,0
0,5
0,0
1990
1995
2000
2005
2010
2015
2020

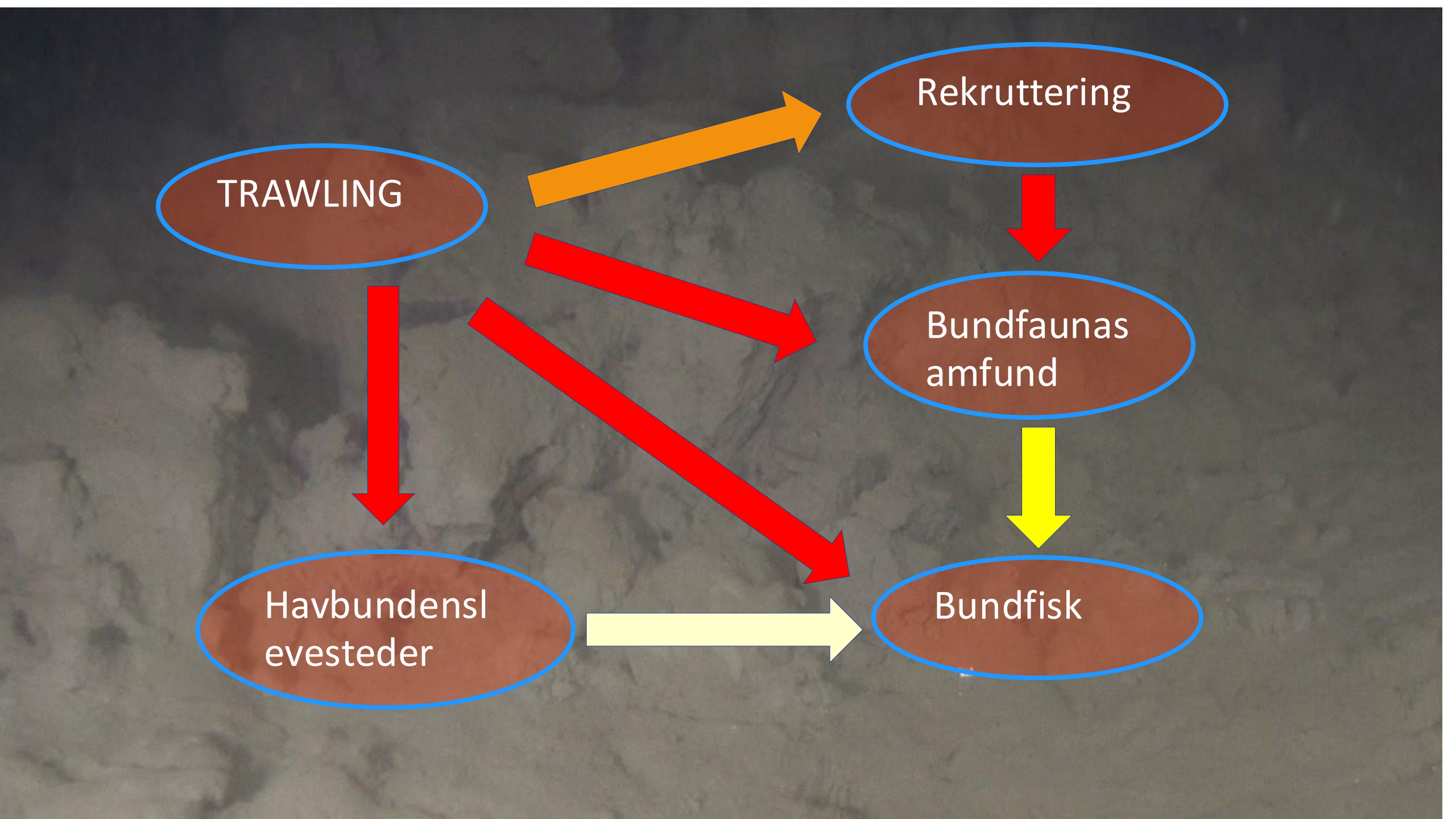

Observeret
Obs. + tab
Trawlet havbund, Kattegat
Biomasse, mio. tons
6
5
4
3
2
1
0
1990
1995
2000
2005
2010
2015
2020

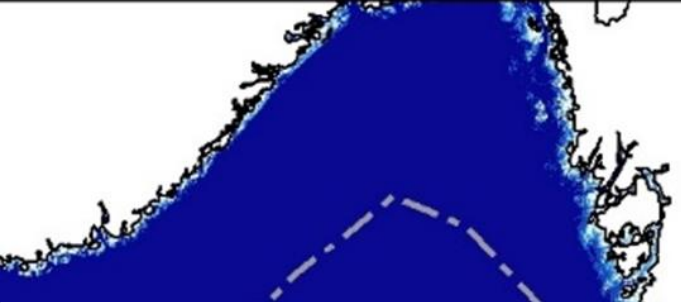

Observeret scenario
Observeret
Model
Individtæthed, m-2
5000
4000
3000
2000
1000
0
1990
1995
2000
2005
2010
2015
2020
År

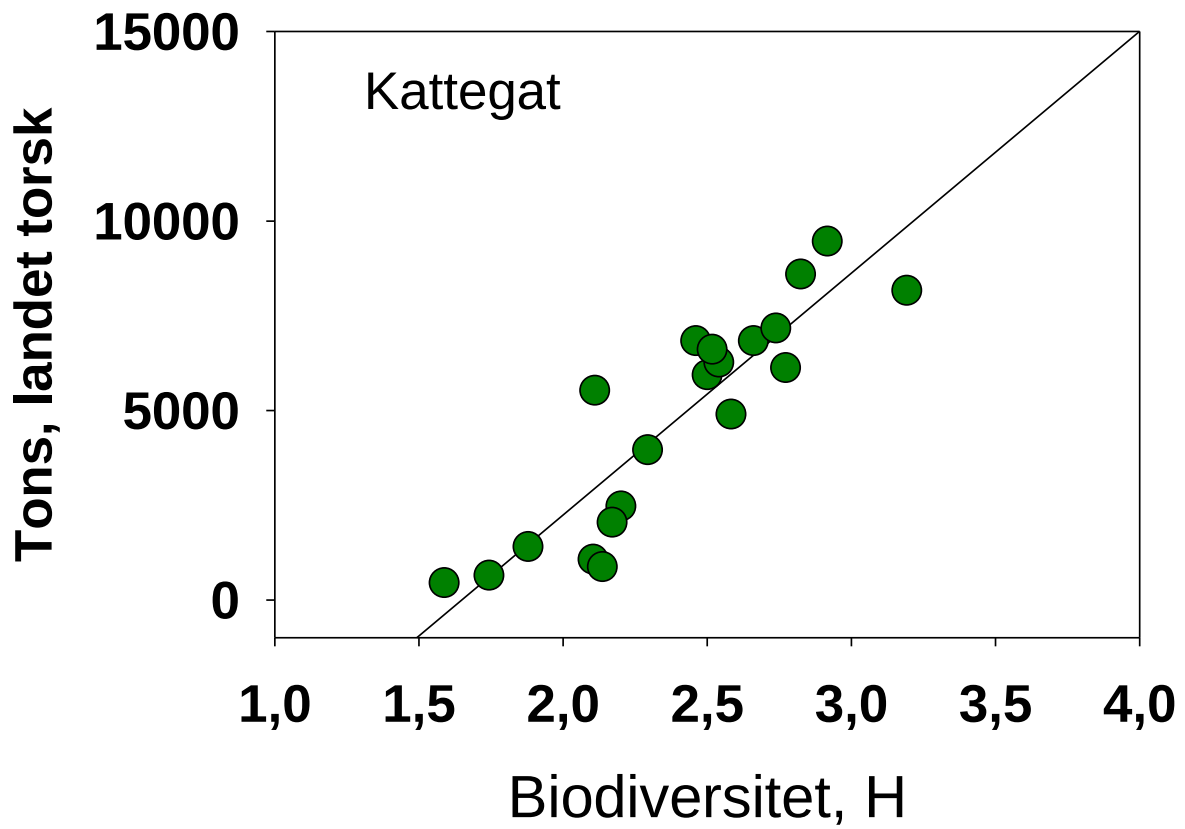

Trawlstop 1998
Observeret
Model
Individtæthed, m-2
5000
4000
3000
2000
1000
0
1990
1995
2000
2005
2010
2015
2020
År


Rekruttering
1
1990
2000
2010
2020
Diversitet, H
1000
Landing Fladfisk


Kattegat
Jomfruhummer, Tons landet
1e+5
1e+4
1e+3
10000
1000
100
1960
1970
1980
1990
2000
2010
2020
2030
År


TRAWLING
Rekruttering
Bundfaunas amfund
Havbundensl evesteder
Bundfisk





30 % of the area needs to be protected against trawling. However, this gives no guaranty of stopping the loss of biodiversity. These areas should be placed in donor areas

It is needed to set an upper limit of per quota trawled area

Possibility of seasone closure during benthos spawning and in case of hypoxia.

Thanks for your attention