Structural and productivity changes from introducing ITQs in Danish demersal fisheries

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Outline

- The Danish regulatory system before and after 2007
- Structural changes
- Productivity changes
- Lesson learned (Advantages vs. Disadvantages)

The Danish regulatory system before 2007

- Overall – the Danish fisheries is managed by TAC's - set by the EU (in accordens with the relative stability principal)

Before 2007 – Moderate strong user rights

- (1) Quota restrictions (species, areas)
- (2) Effort restrictions (days at sea, KwH-days)
- (3) Technical measures (Gear restrictions)
- (4) Capacity restrictions (Overall fleet tonnage and KwH)
- - However, still a race to fish (yearly overall quotas)
- Even though, the fleet was reduced from 1995 to 2000, the economy continued to be hampered by the reduced TAC's leading to negative profitability in most fleet segments

The shift to ITQ's before 2007

- In 2001, a decision was taken by the Danish parliament to introduce ITQ's – "very strong user rights"
- Aim was to establish a management system that provided for the possibility of longer term economic viability and stability in the fishery and for a structural development to reduce fleet capacity and renew the fleet.

- Thus, ITQ's was introduce for the pelagic fleet in 2003 and 2004
- For the demersal fleet in 2007
- The ITQs were given to the fishermen free of charge (grandfathering)
- Demersal vessel was allocated a share based on their landings in the reference period 2003-2005

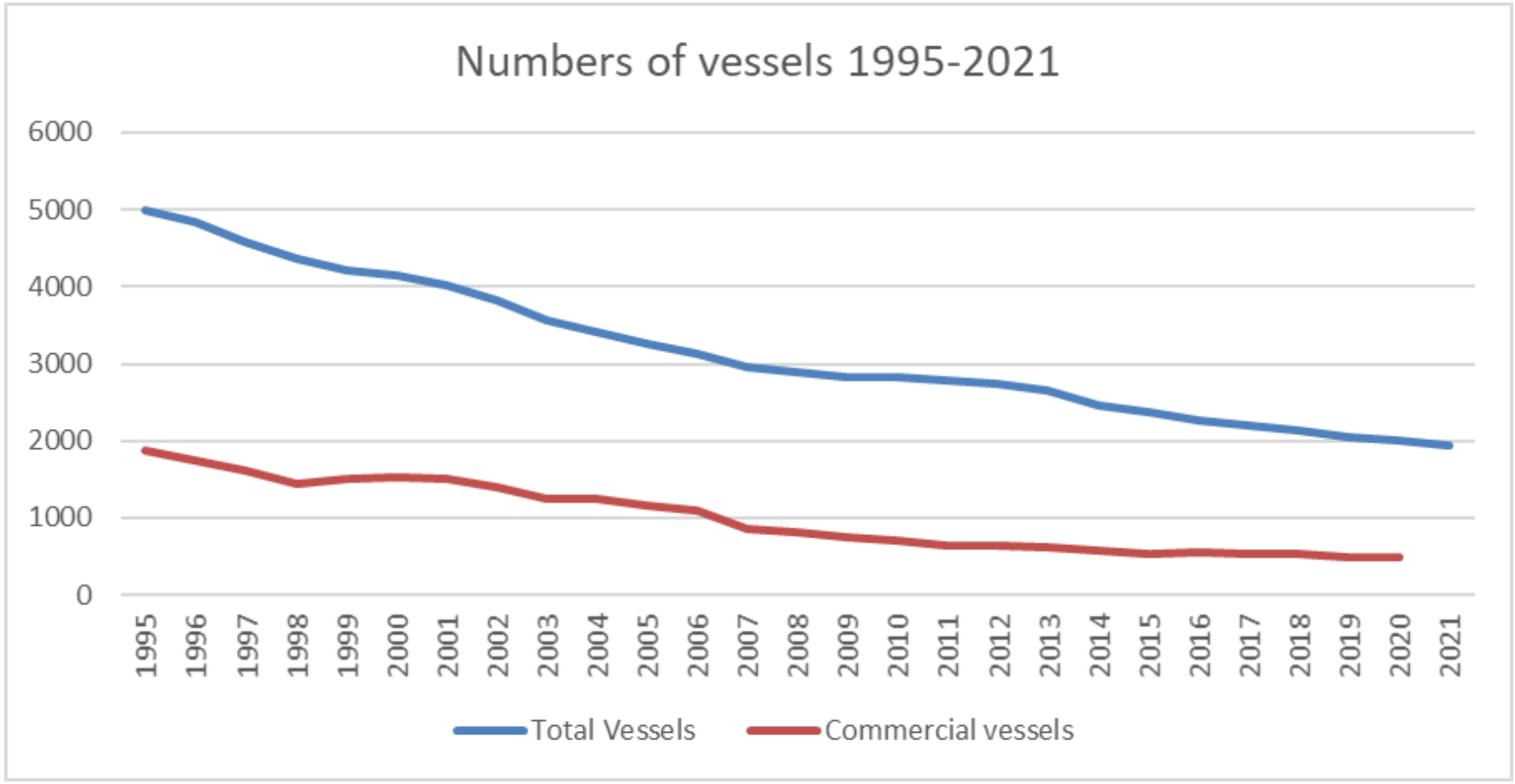
The Danish regulatory system after 2007

- The ITQ system introduced allowed for free trading of quotas
- Limits on ownership for individual stocks (Pelagic 10% and Demersal 4%)
- Rights were given for 8 years, but is now extended to 16 years

- Thus, in the following, we evaluate the introduction of “very strong user rights” from a system of “moderate strong user rights” looking:
- Structural changes
- Productivity changes

Structural changes

- The numbers of vessels has been declining from 1995-2021



Structural changes

- We analyse the most important demersal fleet segments and species

4 segments based on gear and catches:

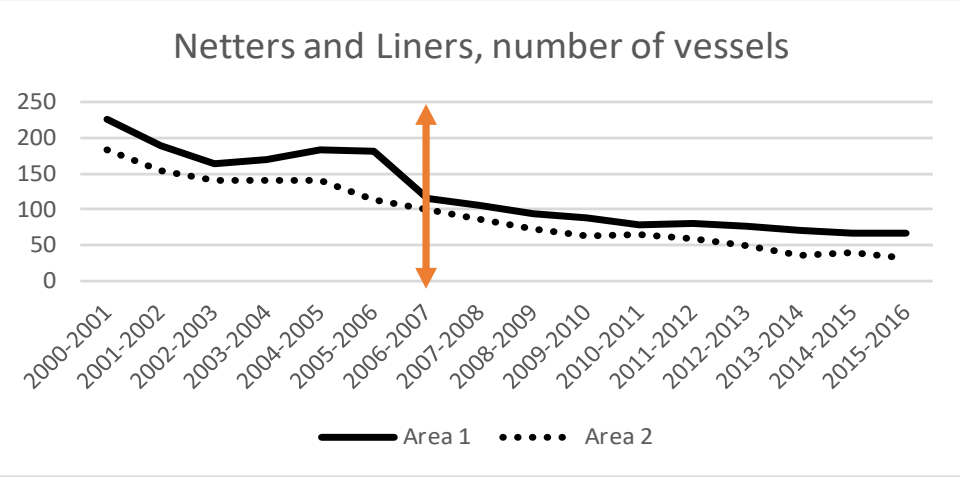
- Netters and liners: catching cod and plaice
- Nephroph Trawlers: catching nephrops, cod and plaice
- Trawlers: catching cod and plaice
- Danish seins: catching cod and plaice

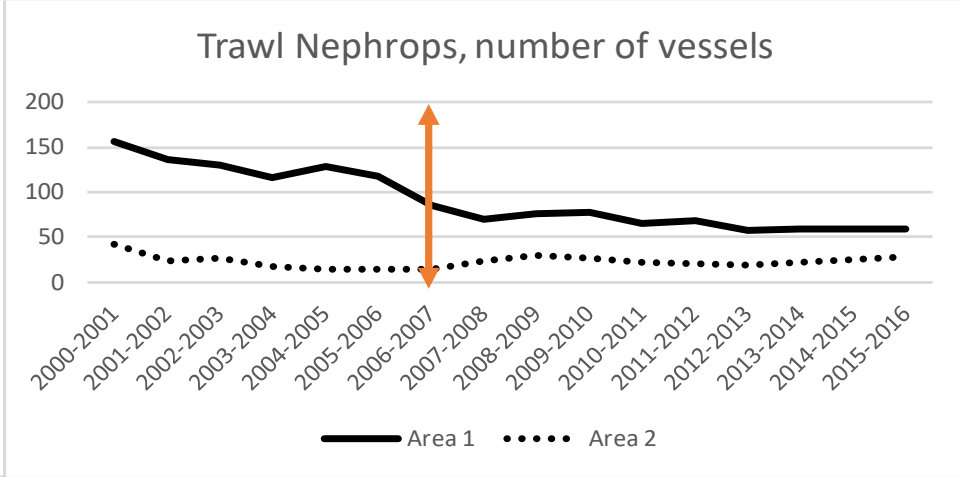
2 areas

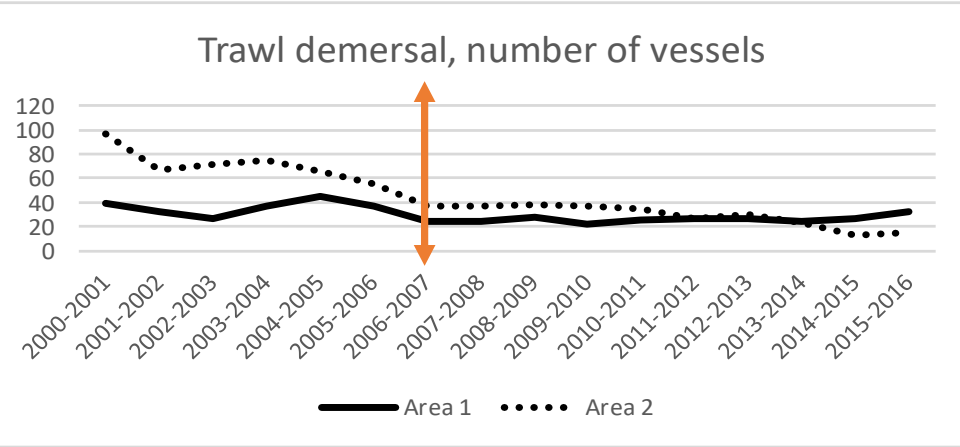
- Area 1: North Sea, Skagerrak and Kattegat
- Area 2: Baltic Sea

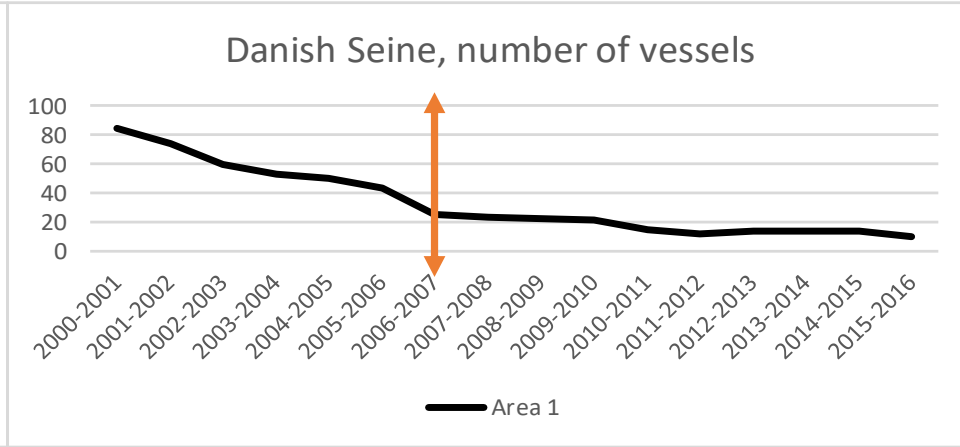
Structural changes

- Reduction in almost all segments and areas – Increase in 2003-2005!



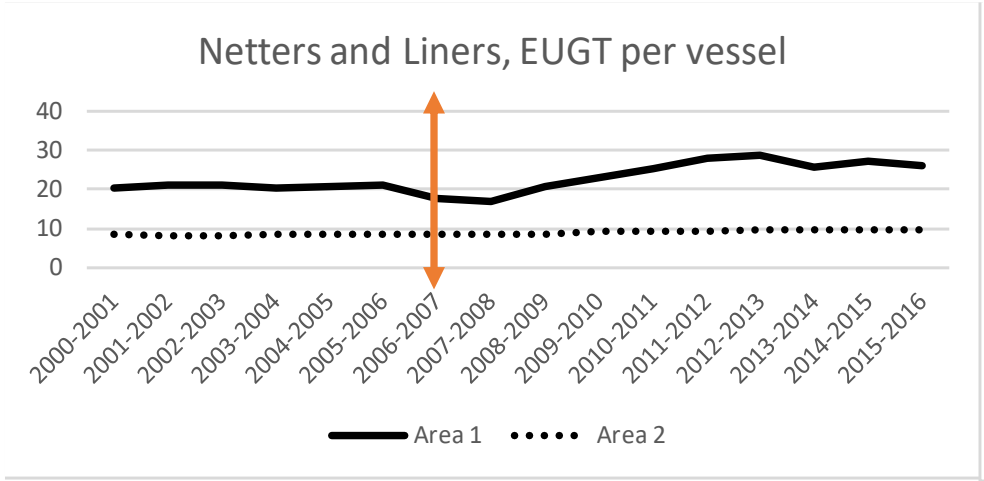


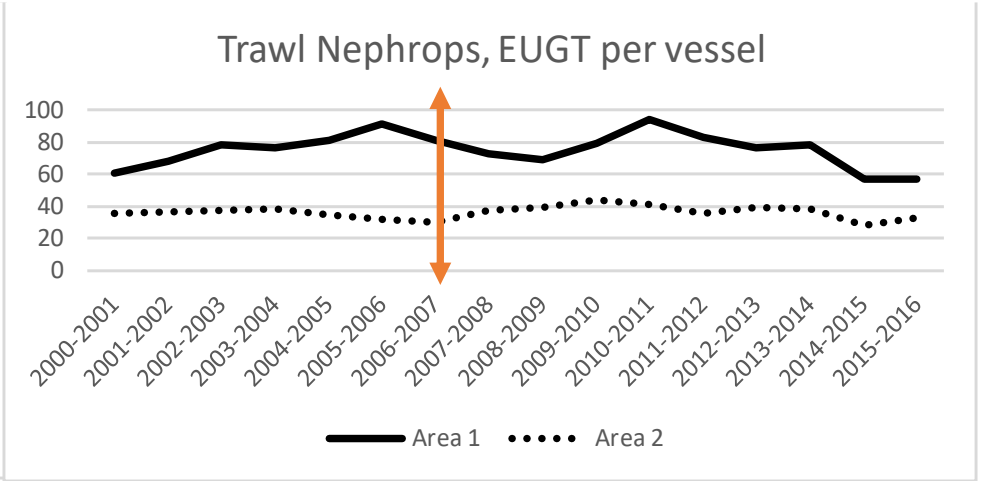


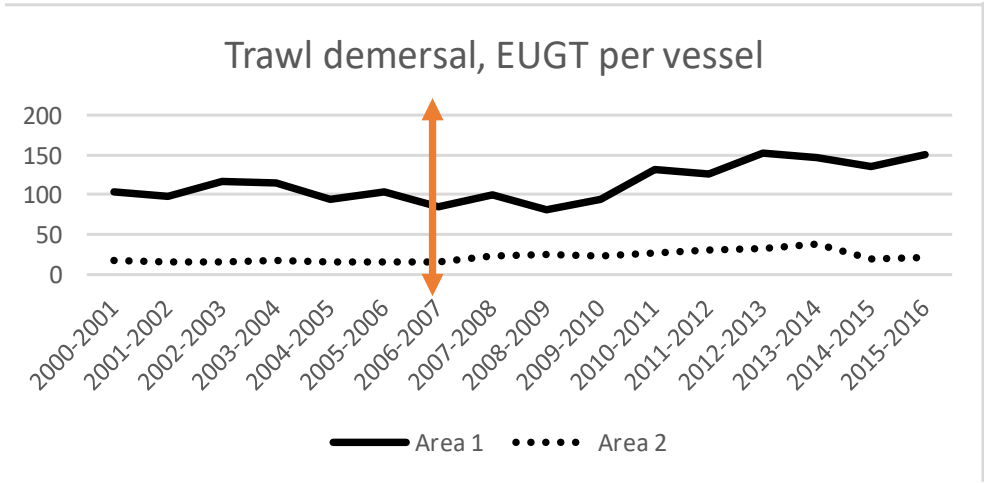


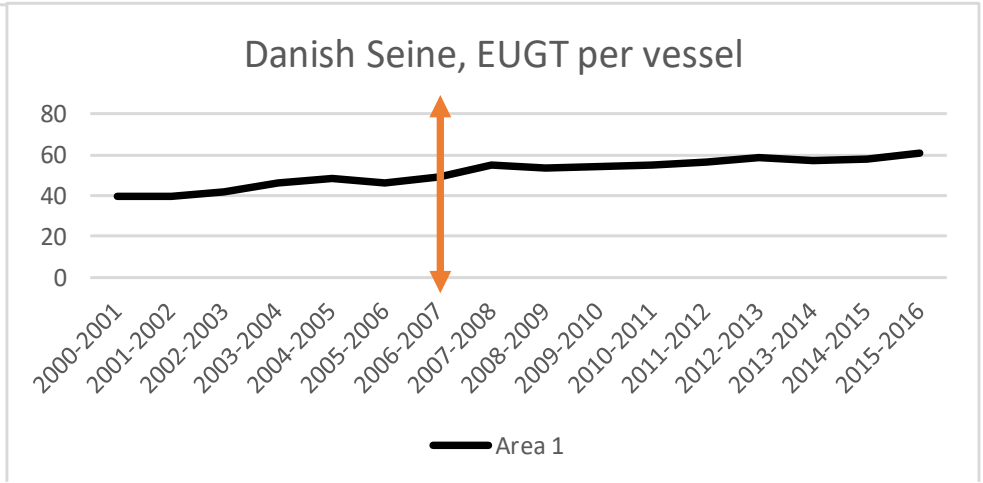
Structural changes

- Average gross tonnage per vessel tend to increase



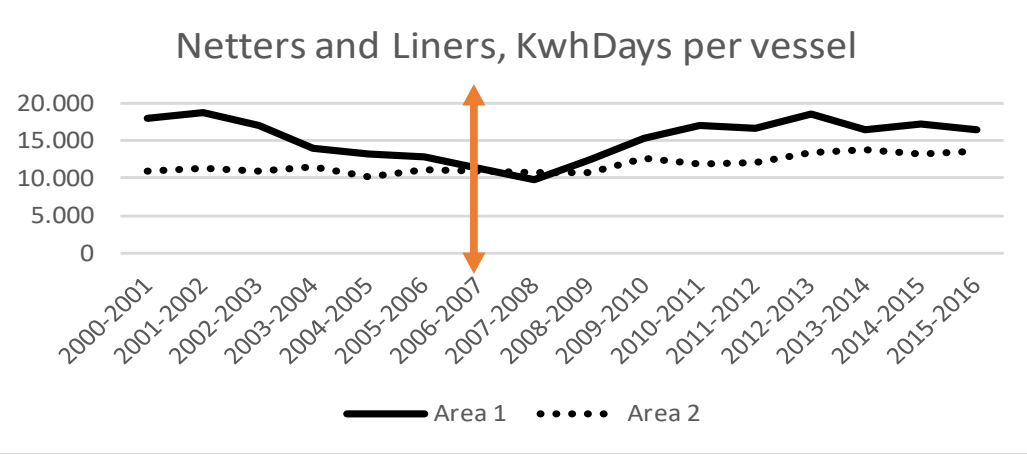


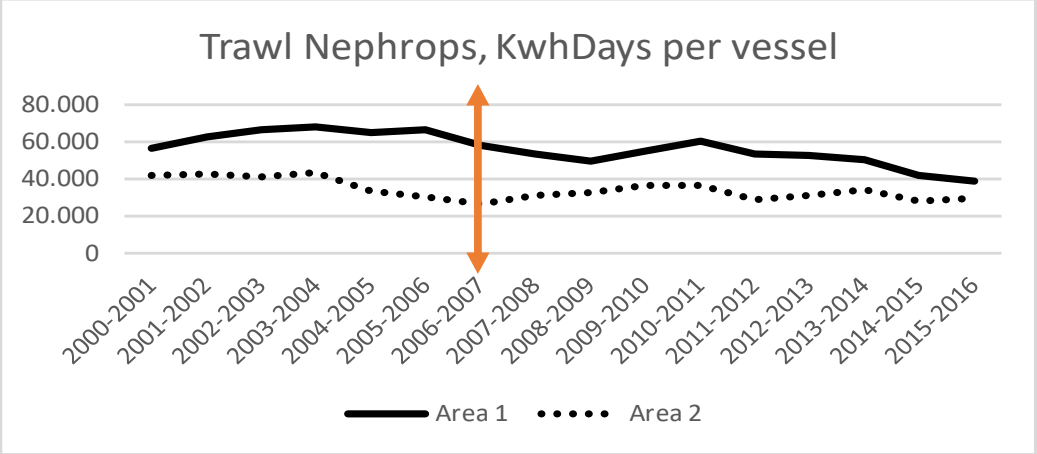


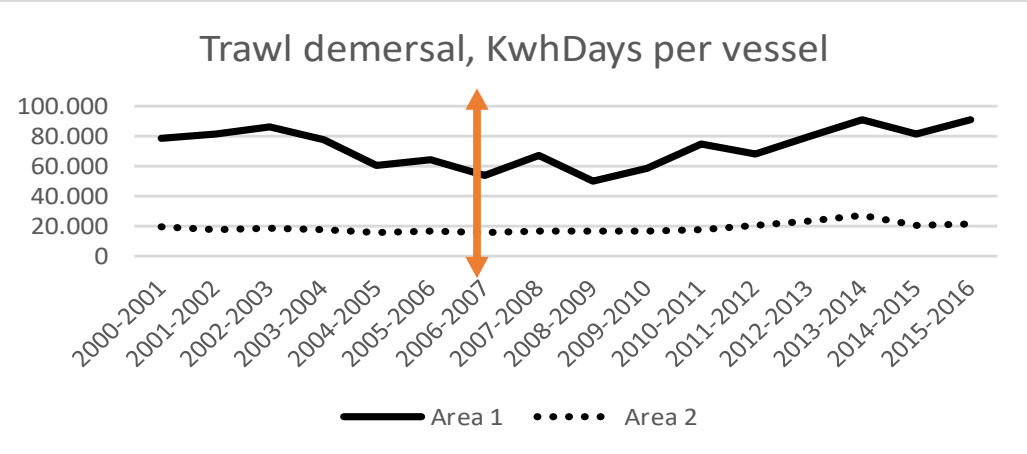


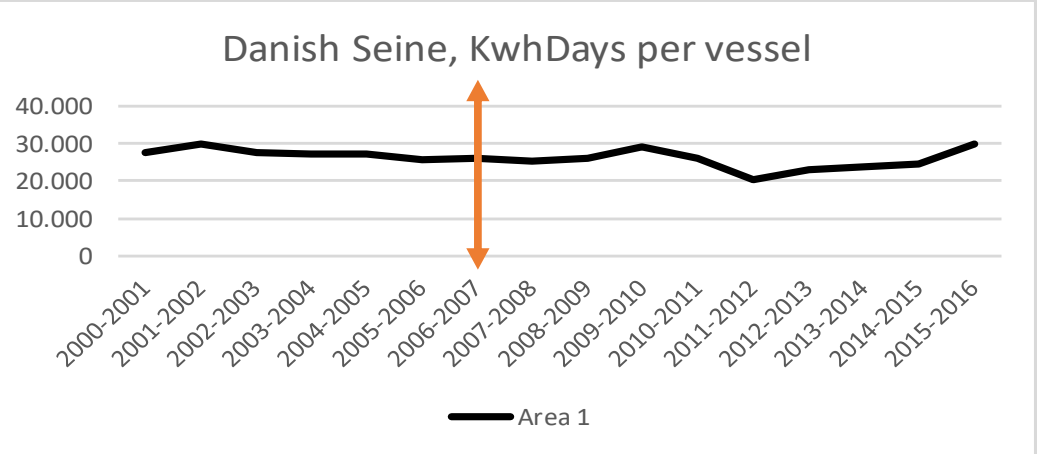
Structural changes

- Average KwHDays are decreasing until 2008-2009 – then increasing



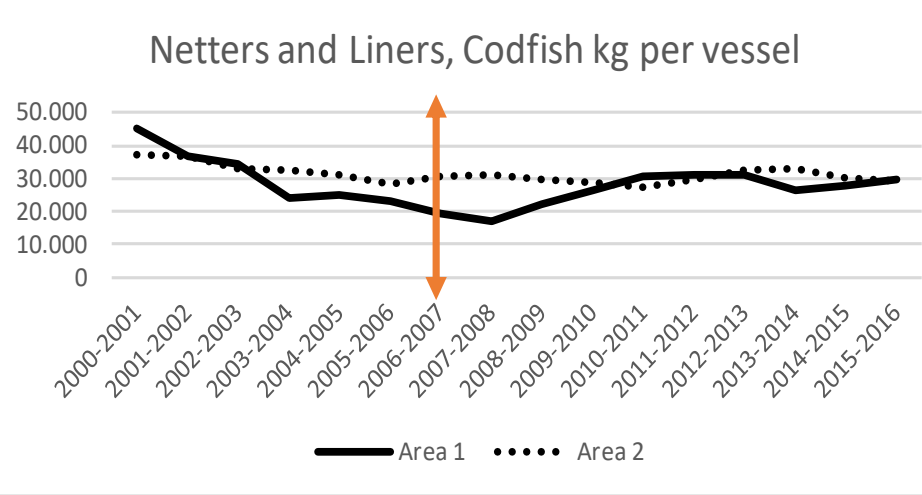


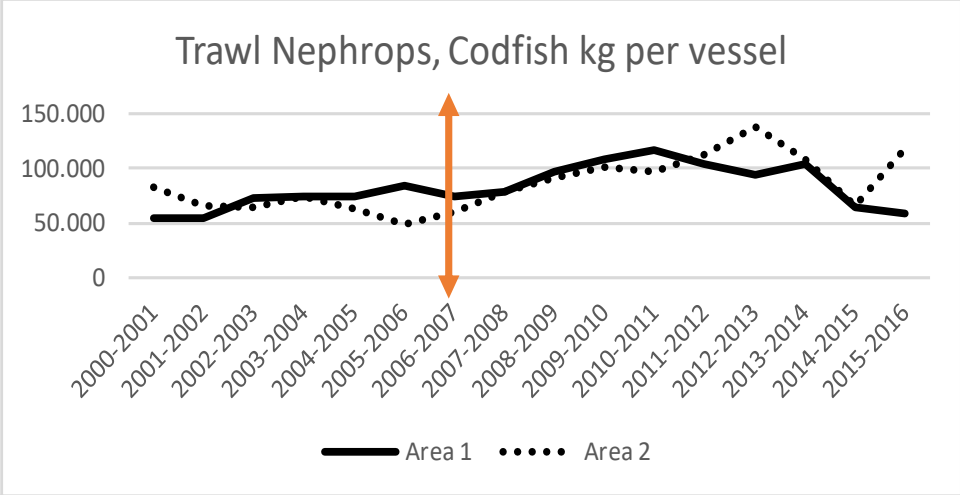


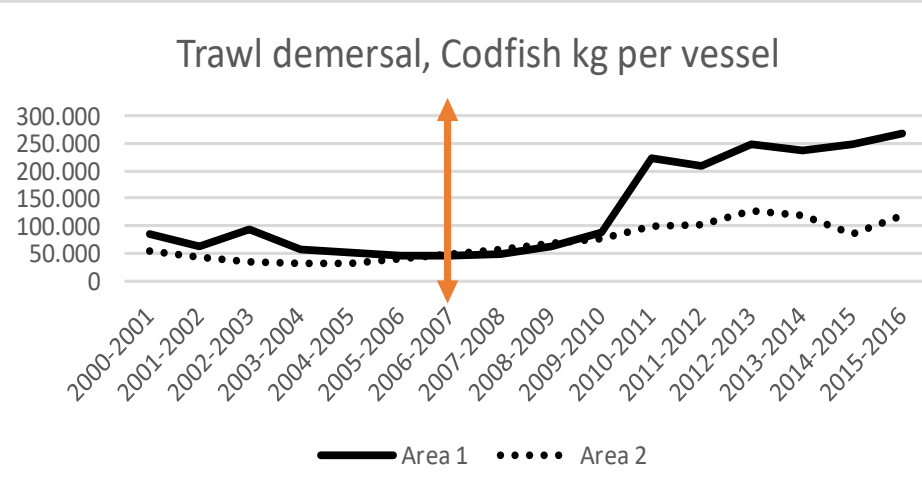


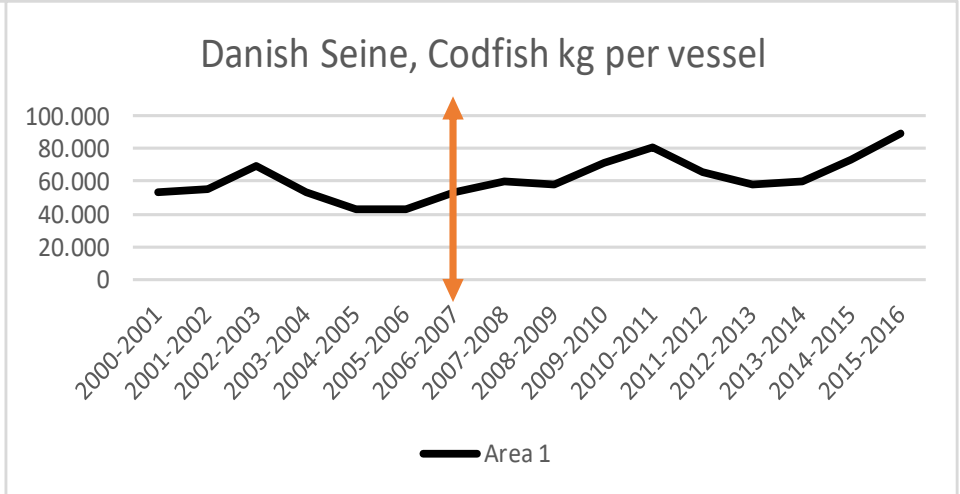
Structural changes

- Average catch of codfish per vessel – increase after 2007 for most segments



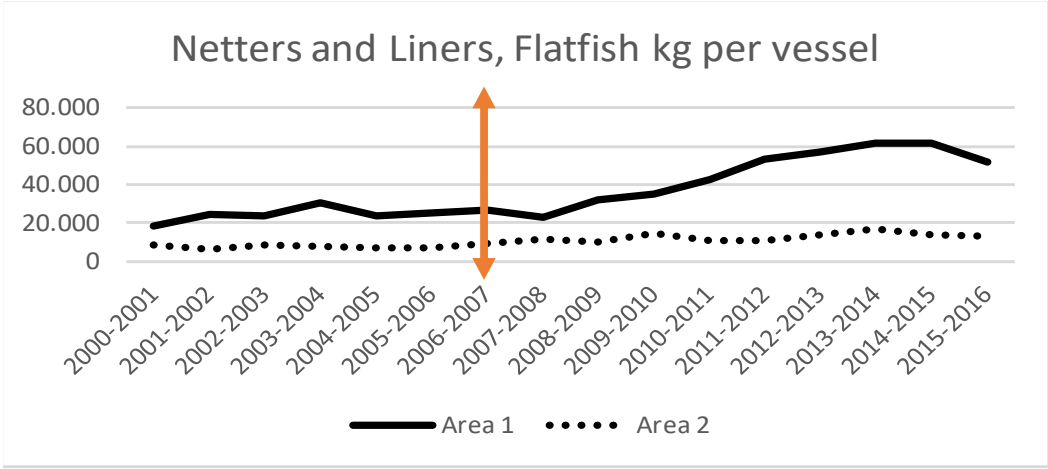


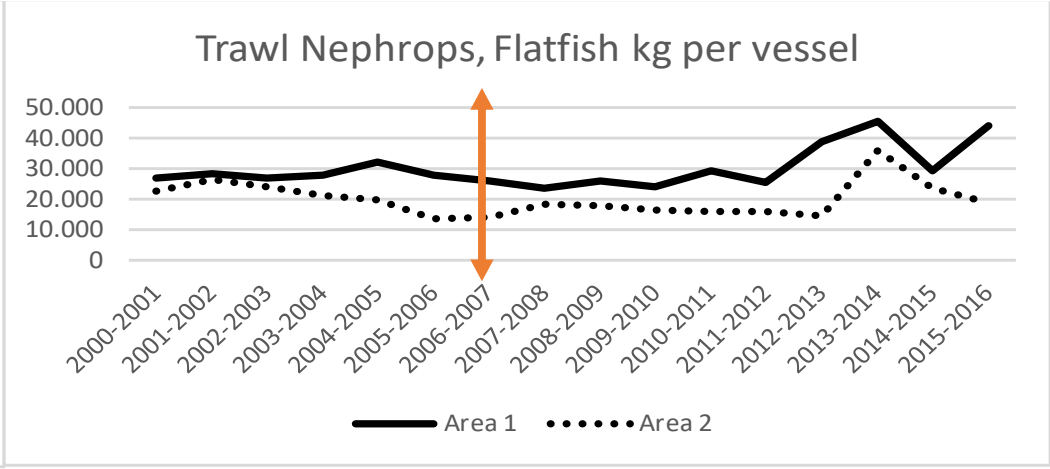


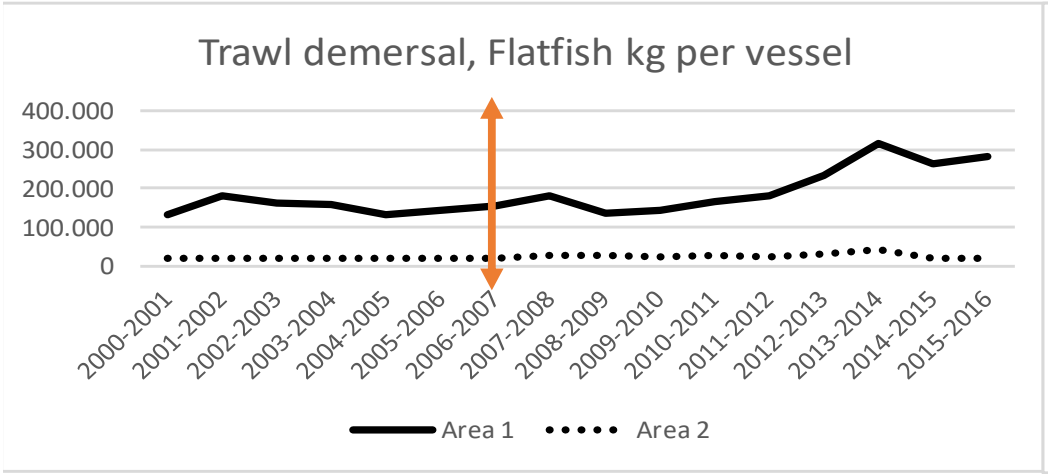


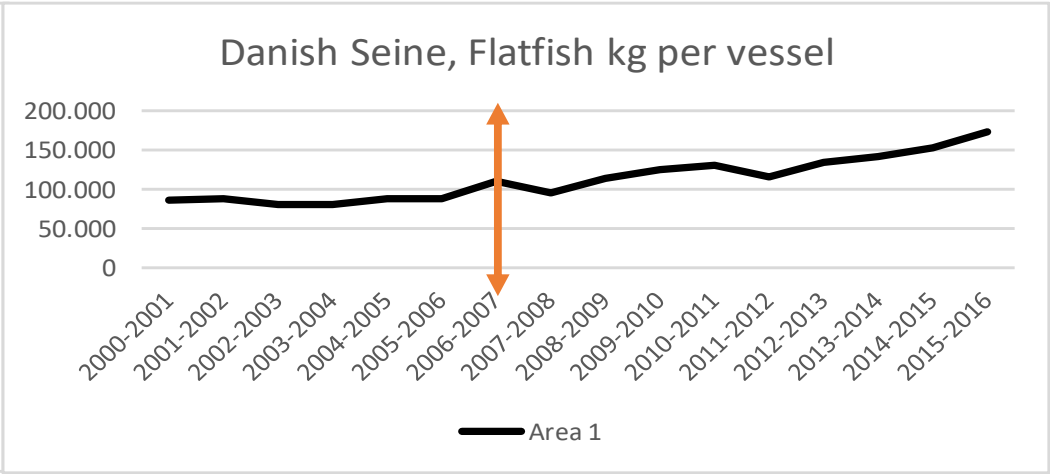
Structural changes

- Average catch of flatfish per vessel – increase after 2007 for most segments



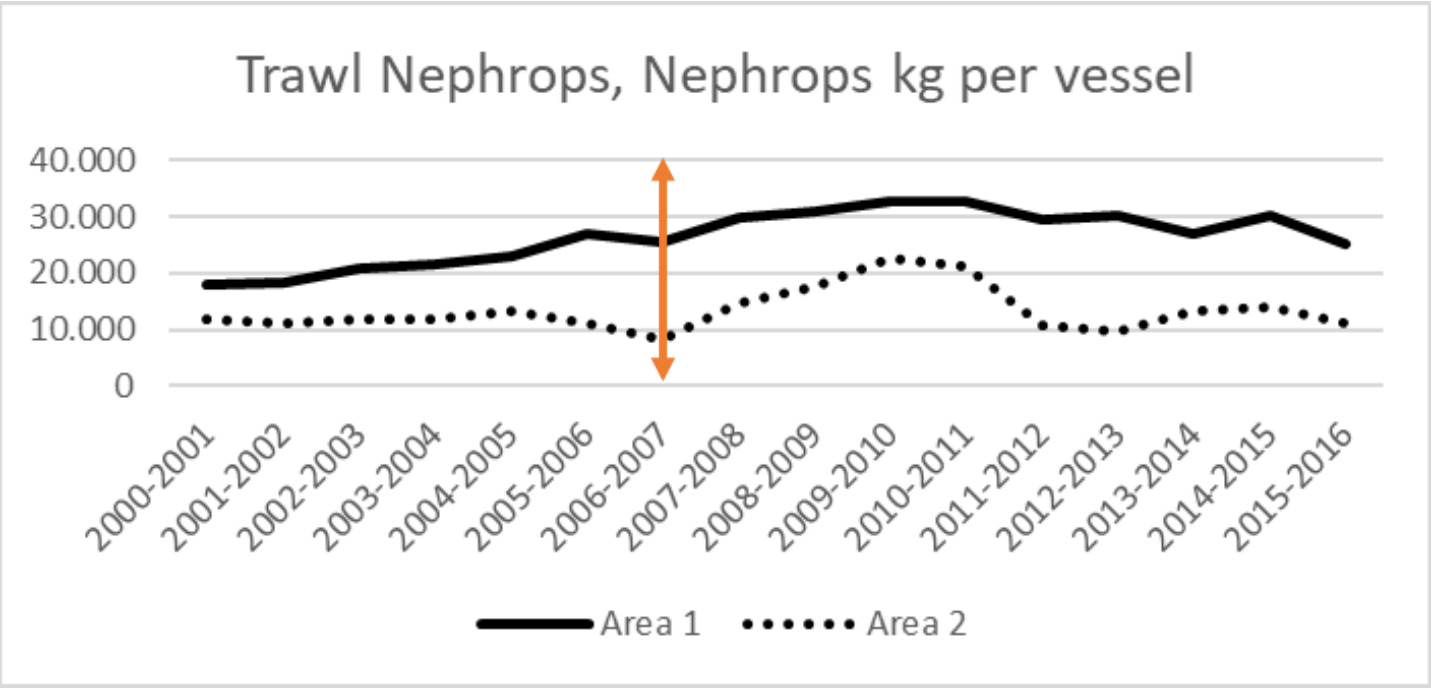






Structural changes

- Average catch of nephrops per vessel – increase and then decrease after 2007



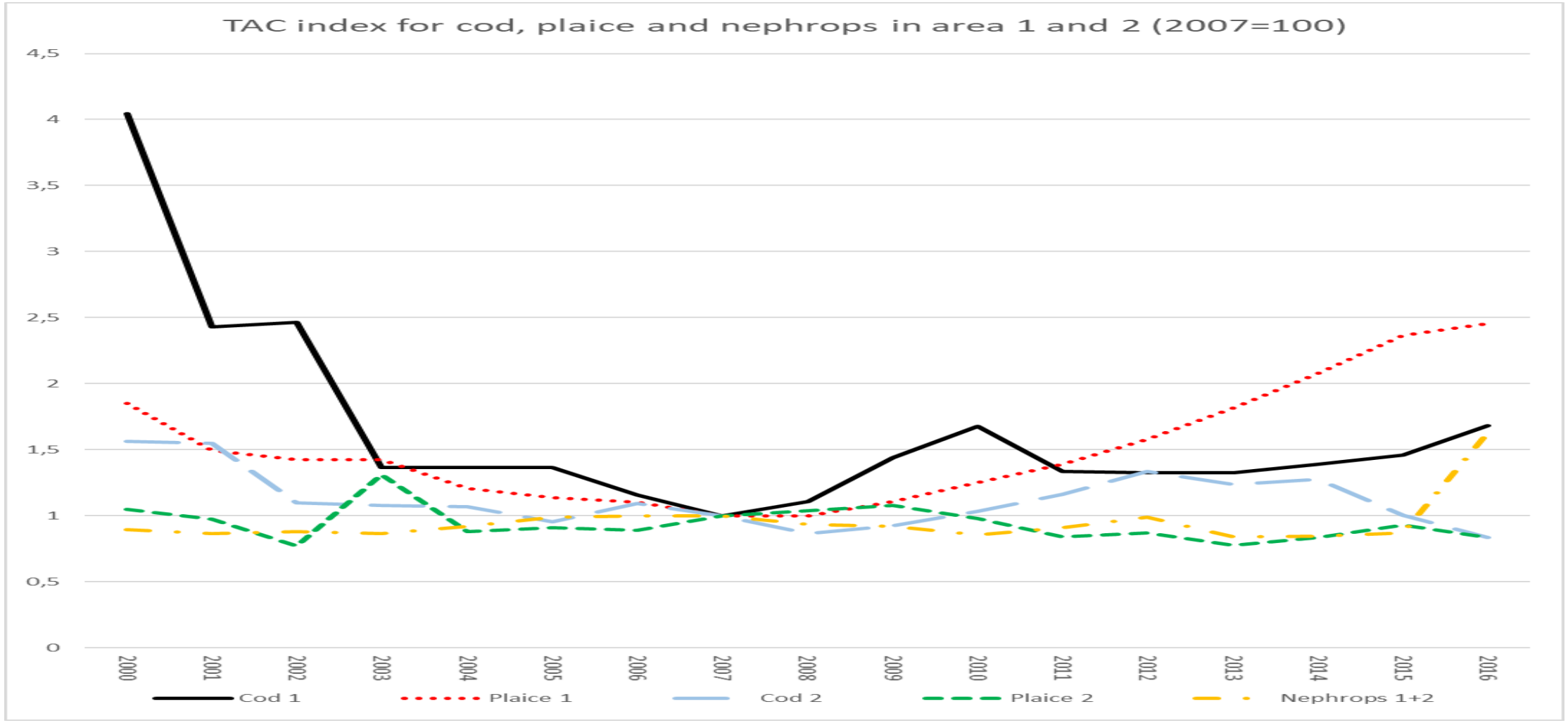
Productivity changes

- A year to year Malmquist index is used to calculate TFP
- Also estimating technical-, efficiency-, pure efficiency- and scale-change
- An output oriented DEA model with VRS is used to estimate the underlying distance functions

- For adjustment of the biomass (fishing opportunities) a Lowe index is constructed following Walden and Kitts 2014.
- TAC's for the different species in different areas are used for the calculation and the total catch share in each segment.

TAC's – base year 2007

- TACs for cod, plaice and nephrops 2000-2016



Productivity change

	NL (1)	NL (2)	NEP-TR (1)	NEP-TR (2)	TR (1)	TR (2)	Seine (1)
2000-2001	0,68	1,00	0,65	1,02	0,72	0,97	0,71
2001-2002	1,02	0,75	1,07	0,75	1,02	0,66	1,02
2002-2003	0,87	1,05	0,85	1,06	0,91	0,93	0,78
2003-2004	0,86	0,96	0,91	1,18	0,97	1,16	0,87
2004-2005	0,99	0,82	1,01	0,75	0,90	0,80	1,00
2005-2006	0,93	1,29	0,96	1,13	1,00	1,39	1,19
2006-2007	0,95	1,08	1,05	1,01	1,04	1,00	1,00
2007-2008	1,11	0,83	1,10	0,95	1,11	0,96	1,09
2008-2009	1,13	1,04	1,21	1,09	1,25	1,02	1,23
2009-2010	1,45	1,17	1,07	1,24	1,38	1,25	1,28
2010-2011	1,05	1,18	0,88	0,95	1,05	1,22	1,08
2011-2012	1,03	1,14	1,14	1,21	1,07	1,19	1,03
2012-2013	1,14	1,01	1,05	0,89	1,30	0,89	1,20
2013-2014	1,16	1,17	1,11	0,99	1,24	1,09	1,42
2014-2015	1,27	0,76	1,11	0,98	1,25	0,88	1,16
2015-2016	1,15	0,78	1,34	0,87	1,03	0,82	0,97
2000-2016	1,05	1,00	1,03	1,00	1,08	1,01	1,06
2000-2006	0,89	0,98	0,91	0,98	0,92	0,98	0,93
2006-2016	1,14	1,01	1,11	1,02	1,17	1,03	1,14

Productivity change

- All segments experience a decrease in TFP from 2000-2006
- All segments experience an increase in TFP from 2006-2016
- In Area 1 the effect is “large” – In Area 2, only “minor”

- **Without** adjustment for biomass changes these findings are less apparent, but the overall TFP from 2000-2016 is almost identical

- The decline and growth seems equally driven by efficiency, technical and scale changes in the different segments

- There may be some evidence of strategic behaviour in 2005

lesson learned - introduction of strong user rights - advantages

- Decrease in overall capacity, (however, the vessels left are larger on average)
- Increase in TFP, (increase in landings per vessel – capacity utilization)
- Improvement of the economics situation for the remaining fishers (Andersen et al. 2010 and Merayo et al. 2018)
- Thus, the main goal of the implementation of ITQs is reached

lesson learned - introduction of strong user rights - disadvantages

- … But have also lead to concentration of fishing rights (quota-kings)
- Concentration of landings (5 harbours in Northern Jutland)
- If small scale fishers or certain areas should be protected – more focus should be put on this before introducing ITQ's
- New/young fishers – difficult to enter the fisheries

- There have been criticism of the management of the quotas
- Issues with leasing rules and regulation according to quota shares
- In 2021, one has been convicted for the ownership of to many quota shares
- Quotas sold to fishers/companies outside Denmark

Thank you