

Some information about CPUE in the Norwegian NEA-saithe trawl fishery

Åge Fotland, Irene Huse, Sigbjørn Mehl
*Institute of Marine Research (IMR),
Bergen, Norway*

CPUE for Norwegian trawl in the NEA-saithe fishery by predefined and limited numbers of vessels

Some questions about use of the CPUE series in the NEA saithe assessment has been addressed to the AFGW group in 2008 and 2009. Compared to previous years the total CPUE in 2007 and 2008 increased by about 25%, while the total survey index declined by about 20% in both of these years. For consistency and caution, the WG chose to base the 2008 and 2009 assessments on CPUE series not including 2007 and 2008 data.

The Union of Fishing Vessel Owners (Fiskebåtredernes Forbund) took an initiative to establish a more representative and stable CPUE series for the Norwegian trawl fishery of NEA saithe. The suggestion was to use a predefined and limited number of vessels when calculating the CPUE indices. These suggested vessels are known to take part in the saithe fishery on a regular basis, and are the following:

Granit IV
Langenes
Sunderøy
Båtsfjord
Nordøytrål
Havstrand
Ramoen

These vessels have a relatively long fishing history in the saithe fishery both north of 62°N and in the North Sea and are assumed to take part in the trawl fishery for the coming years as well. The time span for the tuning fleet index for this CPUE is from 1994 and onwards. Some of these vessels have contributed in this fishery in fewer years. The text table below shows the vessels that have participated in the different years. Langenes replaced Granit in 2005 and Granit IV replaced Juvel in 2003.

Years	Vessels					
1994	GRANIT	HAVSTRAND	JUVEL			
1995	GRANIT	HAVSTRAND	JUVEL			
1996	GRANIT	HAVSTRAND	JUVEL			
1997	GRANIT	HAVSTRAND	JUVEL			
1998	GRANIT	HAVSTRAND	JUVEL			
1999	GRANIT	HAVSTRAND	JUVEL	BÅTSFJORD		
2000	GRANIT	HAVSTRAND	JUVEL	BÅTSFJORD	NORDØYTRÅL	
2001	GRANIT	HAVSTRAND	JUVEL	BÅTSFJORD	NORDØYTRÅL	
2002	GRANIT	HAVSTRAND	JUVEL	BÅTSFJORD	NORDØYTRÅL	
2003	GRANIT	HAVSTRAND	JUVEL & GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY
2004	GRANIT	HAVSTRAND	GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY
2005	GRANIT & LANGENES	HAVSTRAND	GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY
2006	LANGENES	HAVSTRAND	GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY
2007	LANGENES	HAVSTRAND	GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY
2008	LANGENES	HAVSTRAND	GRANIT IV	BÅTSFJORD	NORDØYTRÅL	SUNDERØY

Table 1, Vessels chosen by The Union of Fishing Vessel Owners for their fishing pattern.

A yearly index has been computed for these vessels using the same method as the one currently used (see Stock Annex, WD 20 AFWG 2000 and WD 15 AFWG 2003). Due to a large increase in first quarter CPUE since 2003 this quarter has been left out in the averaging of annual CPUE used for tuning since 2006 for the whole time period.

	Q1	Q2	Q3	Q4	Q1 - Q4	Q2 - Q4
Years	Index					
1994	873	875	1271	1082	1025	1076
1995	1297	873	1011	473	913	786
1996	1083	1074		6516	2891	3795
1997	1319	1712	438	474	986	875
1998	644	625	501	991	690	706
1999	726	634	969	1592	980	1065
2000	358	643	732		578	687
2001	798	746		1286	854	881
2002	673	1167	1903	1040	1095	1263
2003	1946	1565	918	1156	1427	1205
2004	1765	2632	1589	1459	1720	1698
2005	2906	1273	1713	1335	1906	1406
2006	2995	913	1267	998	1593	1067
2007	2355	1092	1645	1236	1602	1301
2008	1949	1517	1271	1167	1490	1323

Table 2, Quarterly CPUE indices based upon Vessels chosen by The Union of Fishing Vessel Owners.

In Q3 1996, Q4 in 2000 and Q3 in 2001 none of these 7 vessels fished saithe. The index in Q4 in 1996 is based upon 3 large catches only.

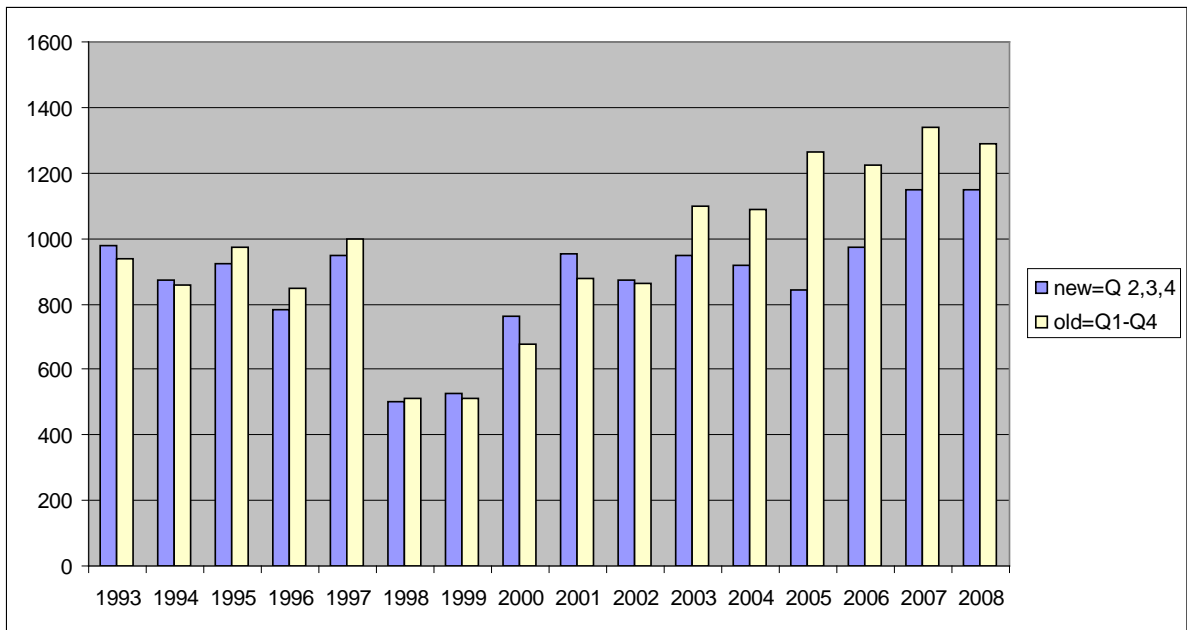


Figure 1, Standard Norwegian trawl CPUE by year, averaged over quarter 1-4 (old, applied before 2006) and over Quarter 2-4 (new, from AFWG 2006).

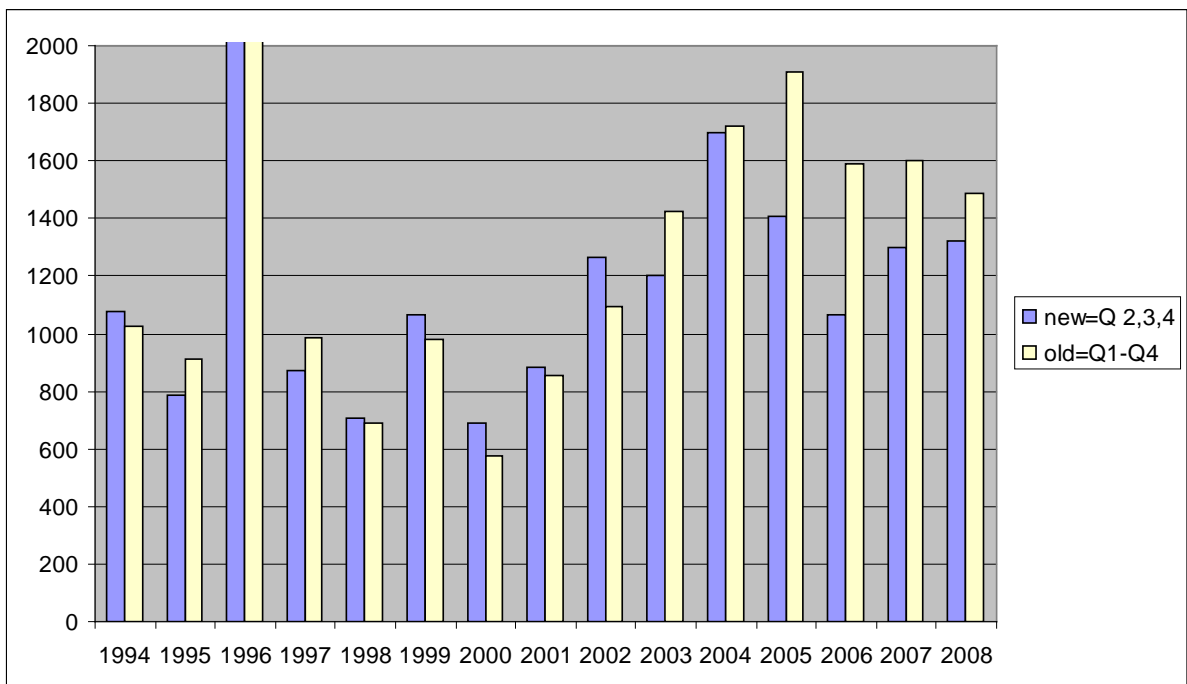


Figure 2, Norwegian trawl CPUE from the 7 vessels by year, averaged over quarter 1-4 and over Quarter 2-4.

The indices from the 7 vessels show a similar trend in the later years as the standard indices in use. The trend indicates that some of these vessels take part in a direct saithe fishery to a larger extent in the later years. There are some quarters that lack catches and one quarter (at least) that give an index that do not reflect the over all fishery in that quarter.

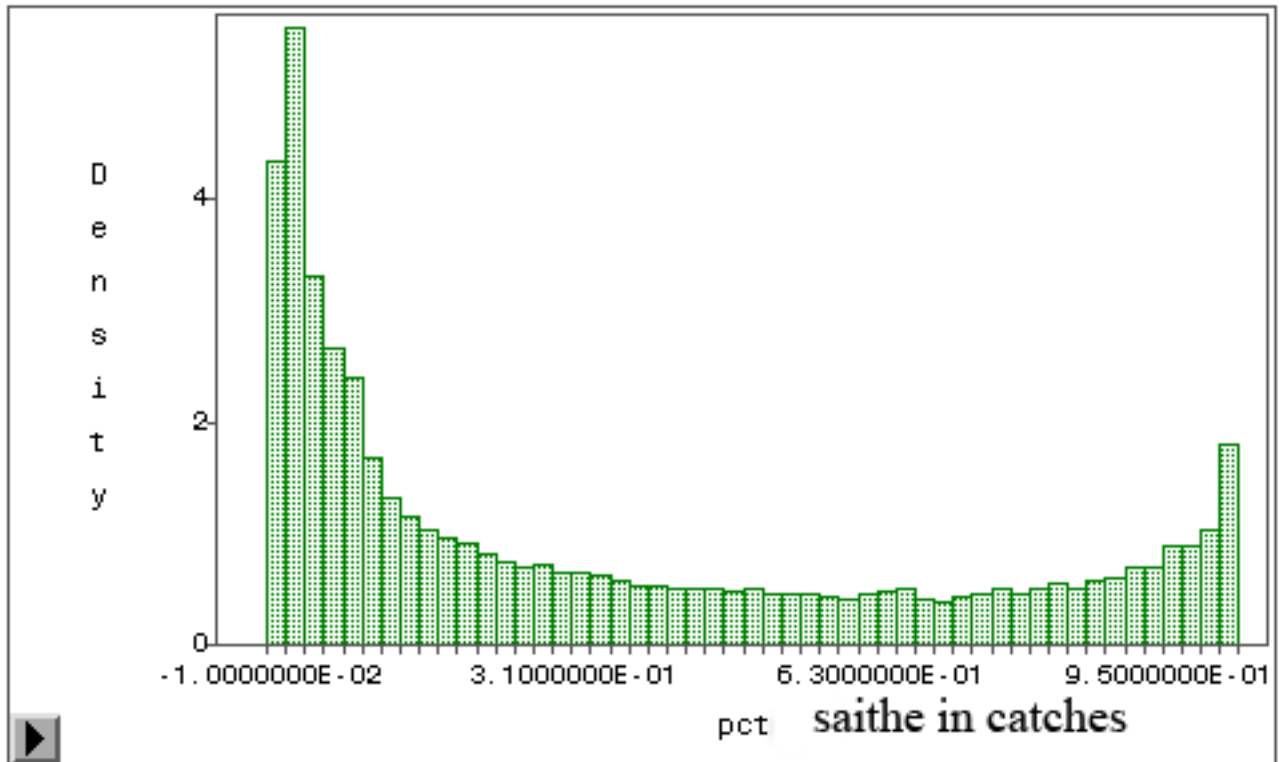


Figure 3, The fishing rate for NeA saithe trawl fishery time span: 1994-1999.

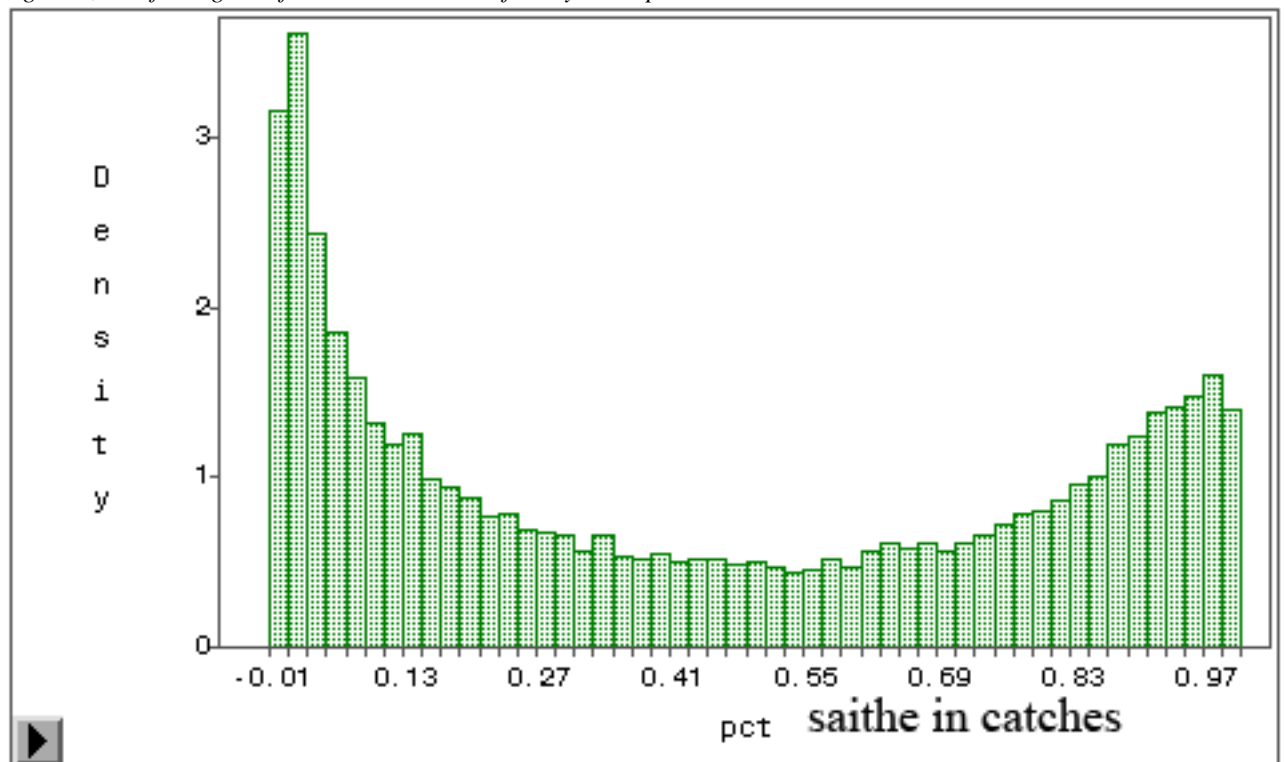


Figure 4, The fishing rate for NEA saithe trawl fishery time span: 2000-2008.
Source is Norwegian logbook data.

The figures above show that there has been a shift in the last 8 years to a more intensive direct fishery for NEA saithe. To ensure that this shift in trend induces indices that are more stable over the whole time span 1994-2008, both tails in the

distribution perhaps should be left out. That would be an index that corresponds better to a more pure bycatch saithe fishery.

To increase the number of observations during a time period with decreasing directed saithe fishery, all days with 20% or more saithe are included. And to take account of a time period (2000-2008) with increasing directed saithe fishery, all days with 80% or more saithe are excluded.

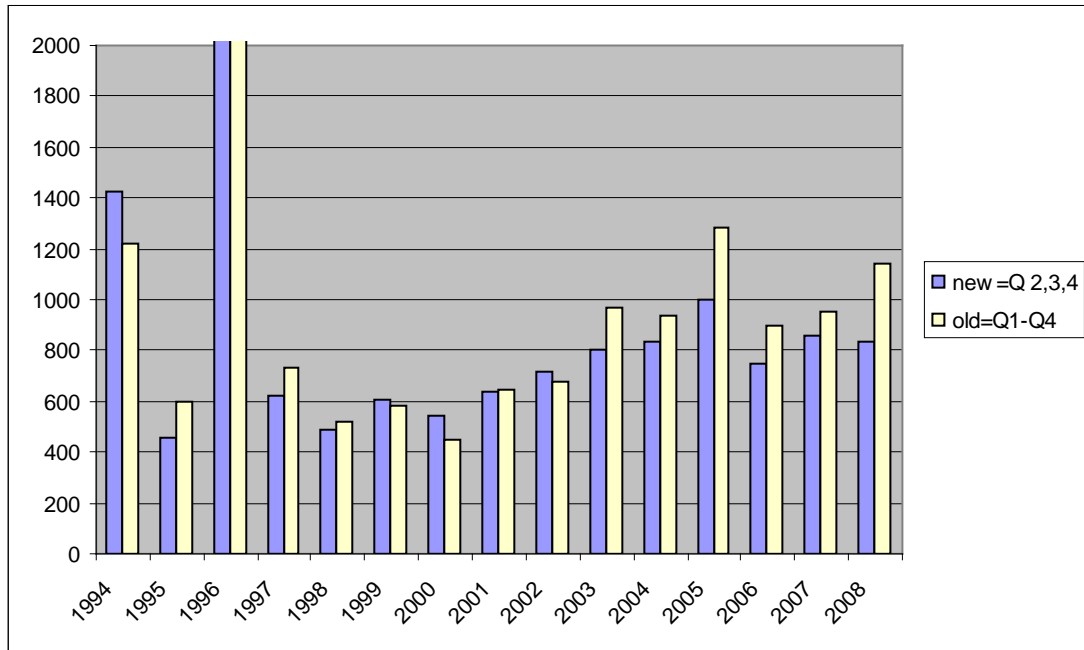


Figure 5, Norwegian trawl CPUE by year, averaged over quarter 1-4 and over quarter 2-4 (from the 7 vessels, catches with 20% - 80% saithe).

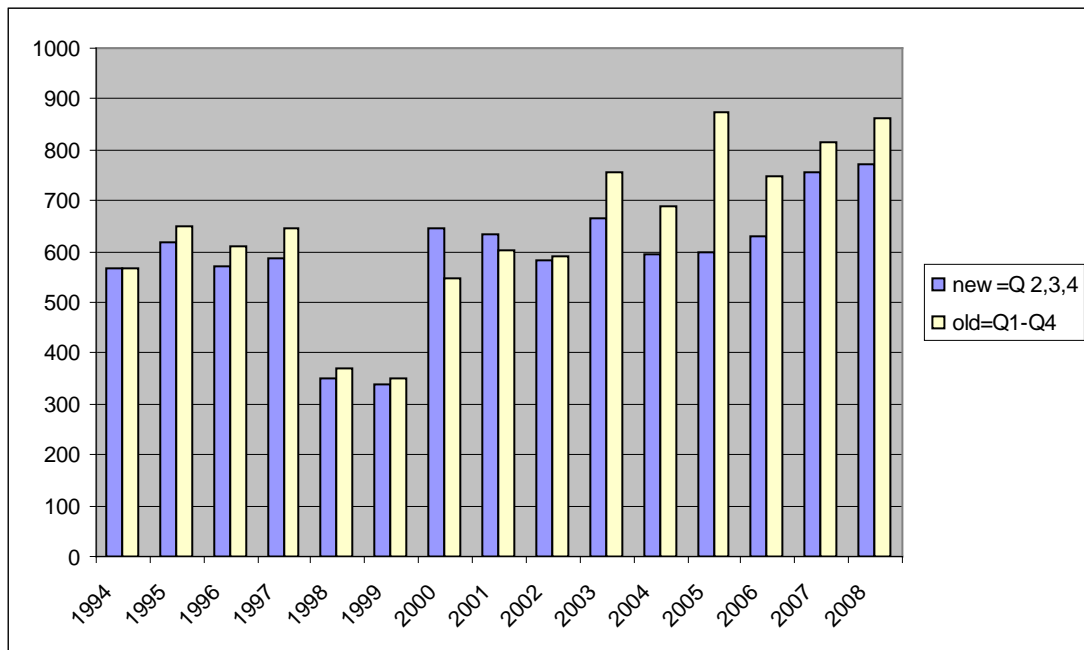


Figure 6, Standard Norwegian trawl CPUE by year, averaged over quarter 1-4 (old) and over quarter 2-4 (as current index, but only catches with 20% - 80% saithe).

However, the assumed shift in the 8 last years of fisheries may also be due to a change in the quotas for the given vessels. If the quota per vessel is increasing due to a decrease in total number of participating vessels or changes in ownership structures, this may affect the fishing strategy and hence the CPUE. We show the quotas for the selected seven vessels in the areas north and south of 62 °N.

If the landings during the first part of the year are low, the quotas for the last months may be redistributed among the active vessels, or “set free”. Since Norwegian regulations ban discarding, the fishermen will normally use part of their saithe quota as a quota for bycatch in other (cod) fisheries, and change to a directed saithe fishery when the saithe quota is large.

North of 62 °N the quotas given to each vessel has been increasing from 2002 to 2009. The tendency for these vessels quota (regression analysis) is not so clear in the North Sea, suggesting maybe a more stable fishing pattern for the period 2002-2009. However, the different vessels used in this analysis seem to have entered north and south part of the fisheries at different times of this period.

There is also reason to believe that an index based on vessels chosen for their fishing pattern during a limited time period may be more vulnerable than the overall cpue index. Salthaug and Godø (2001) suggested a standardisation model for commercial CPUE that should be considered in light of this.

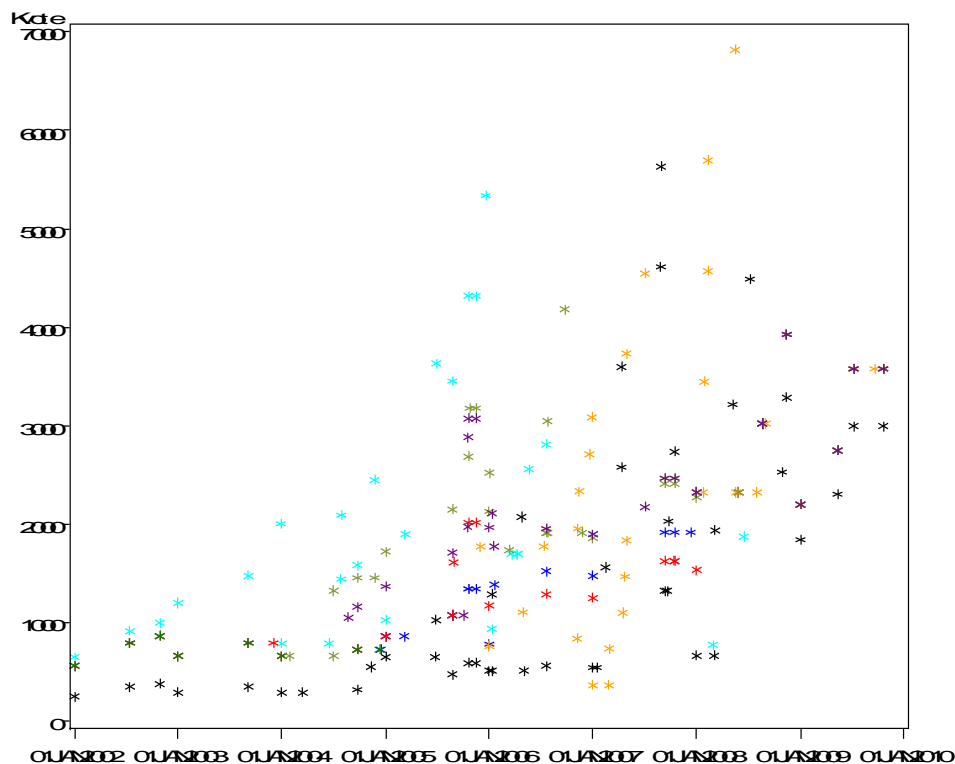


Figure 7, Distribution of saithe quotas for the selected north of 62 °N during 2002-2009, individual vessels indicated by different colours.

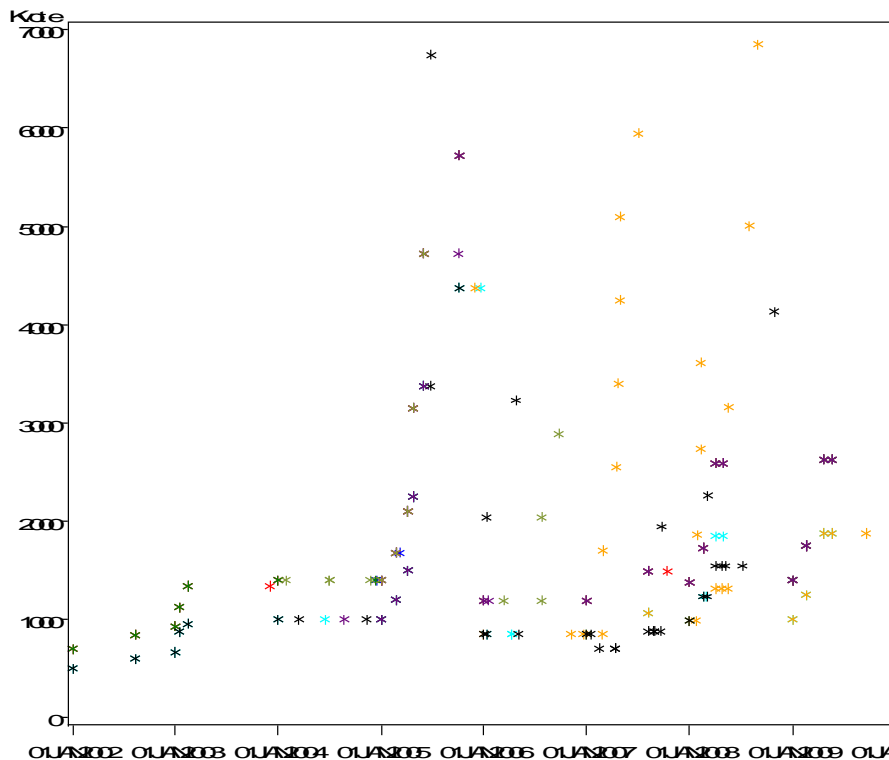


Figure 8, Distribution of saithe quotas for the selected vessels south of 62 °N during 2002-2009, individual vessels indicated by different colours.

Summary

The various CPUE index series show different absolute levels but similar trends for the later time period.

The CPUE index based upon the 7 vessels could implement new bias or noise due to lack of quarterly indices and index values out of range.

To ensure that the choice of CPUE data gives a series that both reflect the time period with little direct fishery (1994-1999) and the later period (2000-2008) with more direct fishery, there are 2 options.

- A To leave out Q1 in the averaging and use all catches with > 20% saithe for the rest of year (as current index).
- B To leave out days with catches with > 20% but < 80% saithe.

Option B may be more robust in connection to direct fishery for saithe in other Quarters than Q1. The trends in the indices for later years in both options are similar.

References

- Maråk, J.I., 2009. The Union of Fishing Vessel Owners , ETABLERING AV NYE CPUE-SERIER FOR SEI – VALG AV FARTØY.
- Salthaug, A., and O.R. Godø, 2001. Standardisation of commercial CPUE. Fisheries Research, 49: 271- 281