

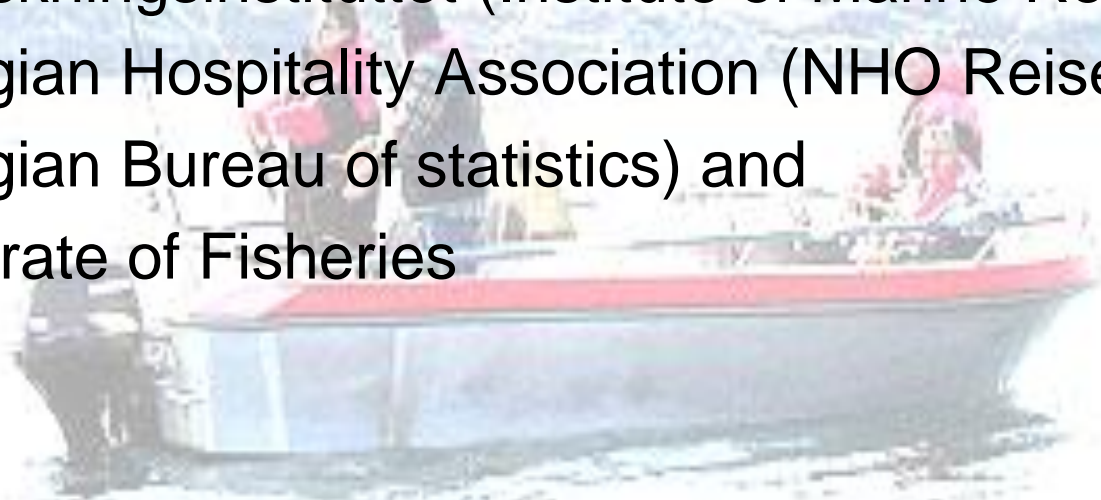
A probability-based survey with the use of self-sampling to estimate catch and effort in Norway's coastal tourist fishery

Authors of Report

- Jon Helge Vølstad, Knut Korsbrekke, Merete Nilsen, Michael Pennington, Kjell Nedreaas, Gro Nesheim Nilsson, and Rupert Wienerroither

Fishing tourism project

- Research project financed by the Norwegian Research council (2007-2010)
- Cooperation between:
 - Havforskningsinstituttet (Institute of Marine Research)
 - Norwegian Hospitality Association (NHO Reiseliv)
 - Norwegian Bureau of statistics) and
 - Directorate of Fisheries



- Estimates relates to business sector of the tourist fishery (445 businesses mapped in 2008)

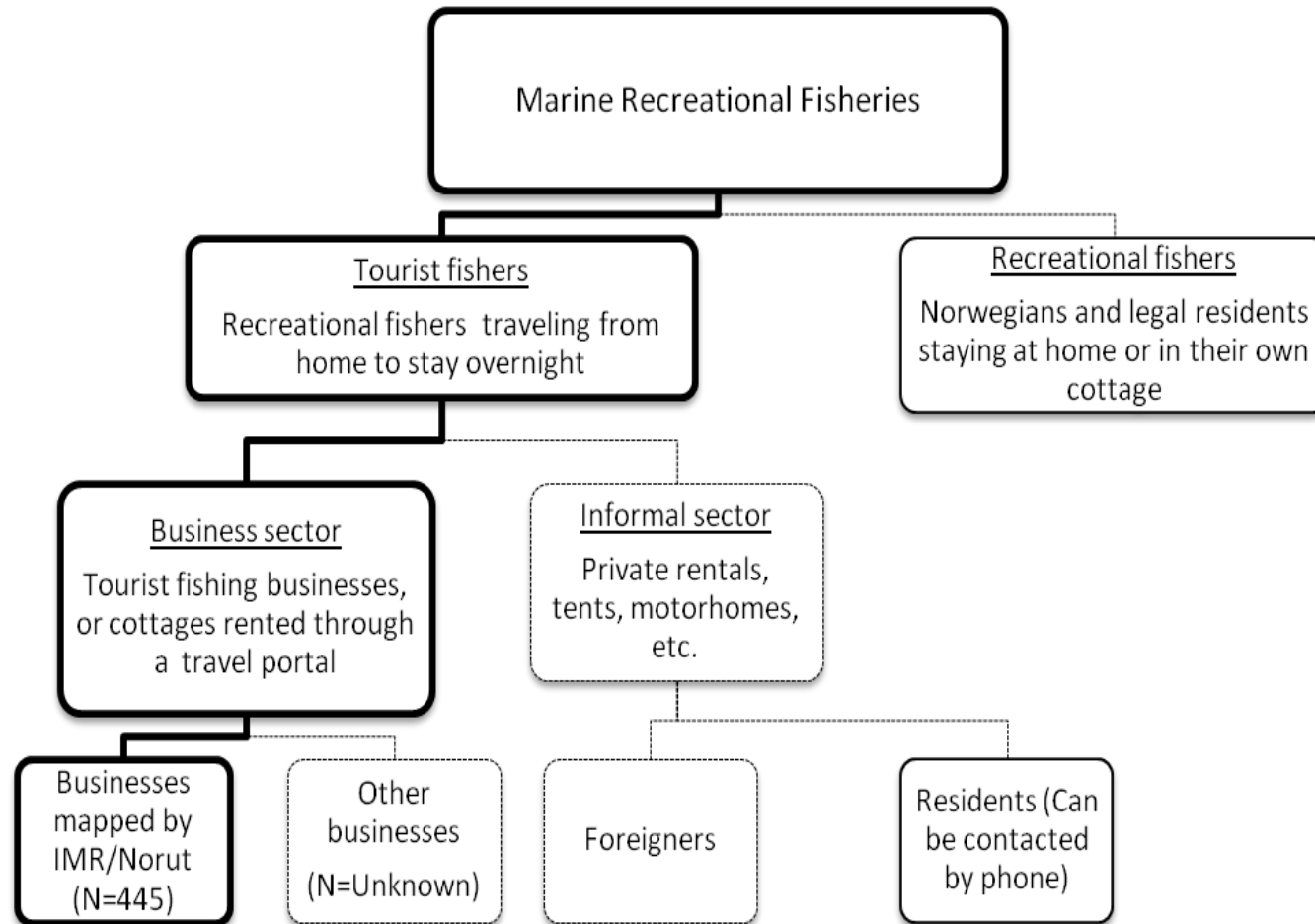
Catch data from recreational fishermen and tourists can help to ensure that:

- The fish stocks are not overfished
- Sufficient quantity of fish survive till they can reproduce
- The species growth potential is sustained
 - Ensure that large fish (trophy-fish) are available
- Commercial fishermen are obliged to report the quantity and species composition of their catches

The main objectives of the project was to

- To quantify and characterize the total catch and effort in the tourist fishery along the Norwegian Coastal Zone
- Develop a cost-effective monitoring system to collect data on catch per effort (e.g., mean catch per boat-fishing day) and the species composition of the catch
 - Conduct Pilot Projects in local areas to develop field data collection protocols and procedures that can be implemented at large spatial scales

Defining the target and study population of tourist fishers



The study focused on the business sector of the tourist fishery

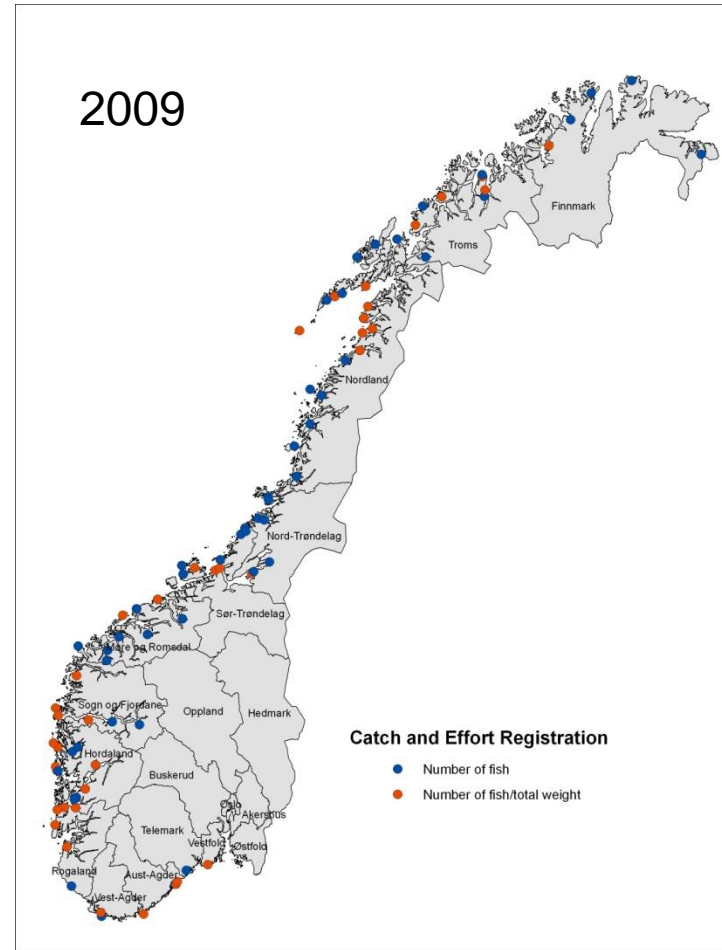
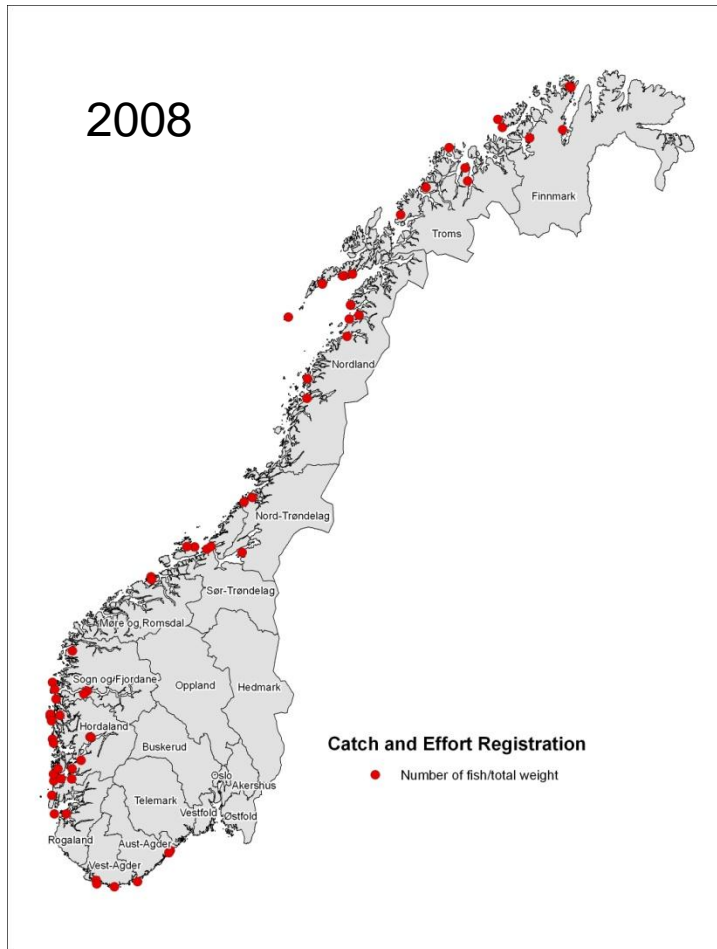
- Focused on boat anglers
 - Foreign and resident fishers
- IMR in collaboration with NORUT and NHA established a database tourist fishing businesses
 - 445 businesses mapped in 2008
 - ~2400 boats
- Collaboration with the Coast guard to assess relative size of the informal sector

- The survey involved two-stage sampling where:
 - A stratified sample of businesses (PSUs) was selected in the first stage, and
 - A census or a random systematic sub-sample of reporting weeks (every 6th week with a random start) was selected for each PSU.

Stratification

- Stratified random sample of businesses
- Four strata
 - Two regions: North and South of 62 °N
 - Allocation proportional to size by county
 - Size of businesses: < 4 boats; 4+ boats
- The businesses administered data collections
 - self sampling by tourist anglers

Sample of businesses



Fangst – Catch – Fang

Norsk English Deutsch	Innsats (Fra båt) Effort (From boat) Aufwand (vom Boot aus)		Torsk Cod Dorsch <i>Gadus morhua</i>		Lange Ling Leng <i>Molva molva</i>		Brosme Tusk Lumb <i>Brosme brosme</i>		Makrell Mackerel Makrele <i>Scomber scombrus</i>		Sei Saithe Köhler <i>Pollachius virens</i>	
	A #Båter #Boats #Boote	B #Fiskere #Fishers #Fischer	ANTALL NUMBER ANZAHL	RUNDVEKT ROUNDWEIGHT RUNDGEWICHT	ANTALL NUMBER ANZAHL	RUNDVEKT ROUNDWEIGHT RUNDGEWICHT	ANTALL NUMBER ANZAHL	RUNDVEKT ROUNDWEIGHT RUNDGEWICHT	ANTALL NUMBER ANZAHL	RUNDVEKT ROUNDWEIGHT RUNDGEWICHT	ANTALL NUMBER ANZAHL	RUNDVEKT ROUNDWEIGHT RUNDGEWICHT
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
__/__/2007				kg		kg		kg		kg		kg
Sum Summe				kg		kg		kg		kg		kg

Oppholdets varighet/ length of stay/ Aufenthaltsdauer:

/ - / 200

Dato for ankomst
Date of arrival
Datum der AnkunftDato for avreise
Date of departure
Datum der Abfahrt



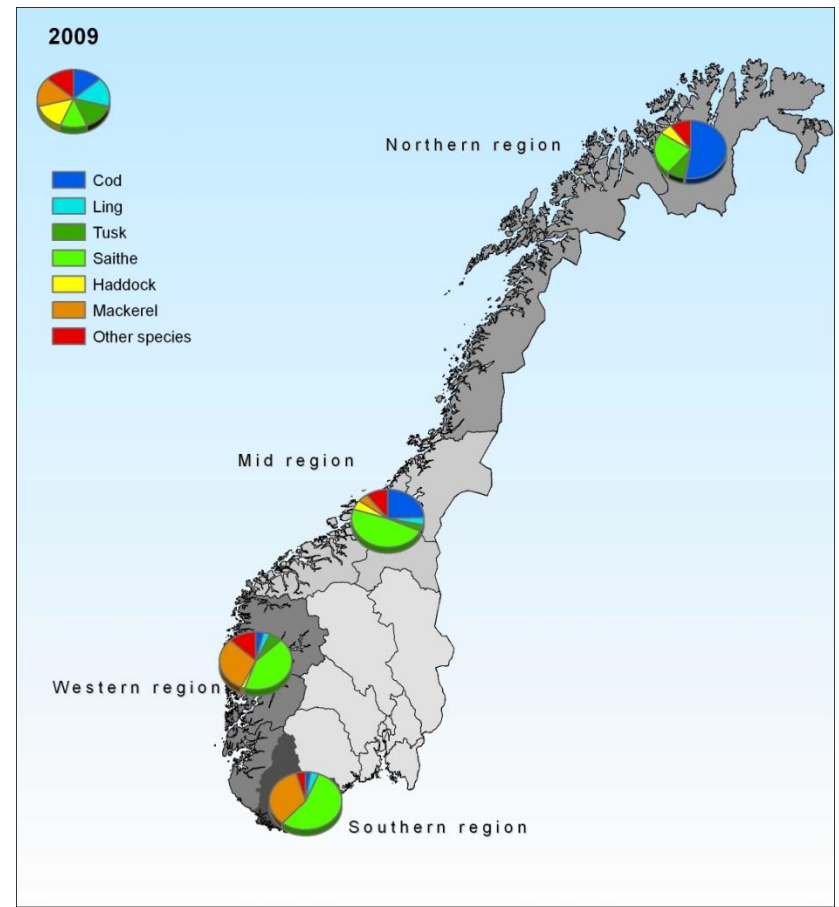
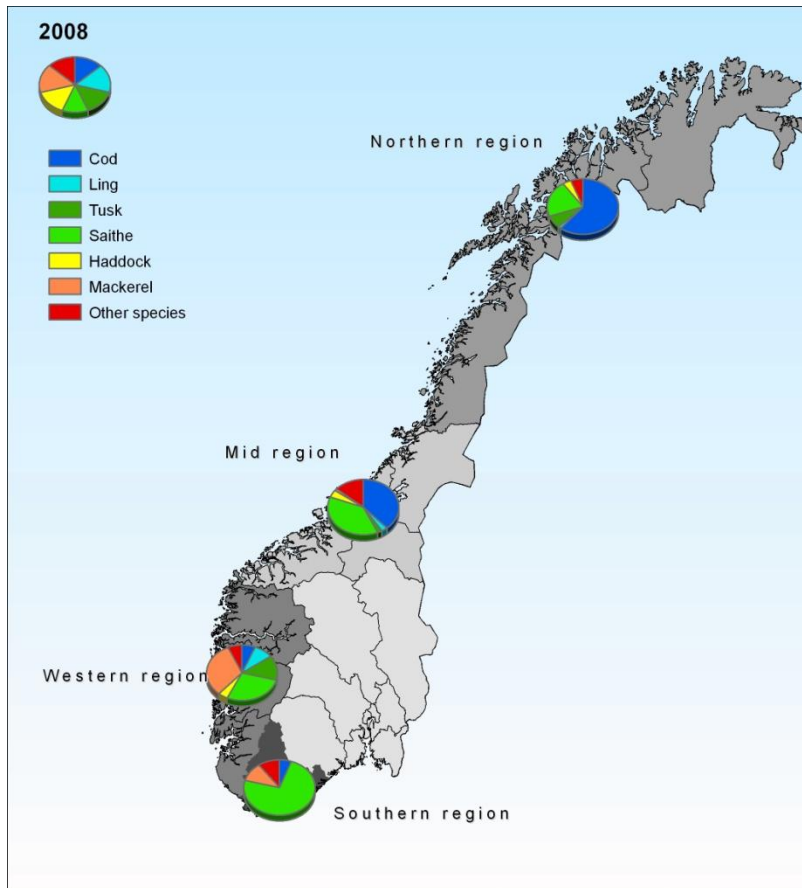
Collaboration with the Coast Guard

- Records for each boat inspected;
 - the number of anglers,
 - time and position of the boat,
 - citizenship of the anglers,
 - and their choice of accommodation
- Data can be used to assess relative size of each segment of the recreational fishery

Results from 2009

- 604 completed catch diaries from 51 businesses (out of 91)
- 7 businesses measured length of fish
 - Used to estimate weight through L-W relationships
- Difficult to get independent effort data
 - Mean activity of boats and length of season could be used to estimate effort by 2400 boats

Species composition of catches (reported number of fish)



Estimated total catch in numbers and weight by region and overall for 2009 National survey. (last column presents mean weight of fish)

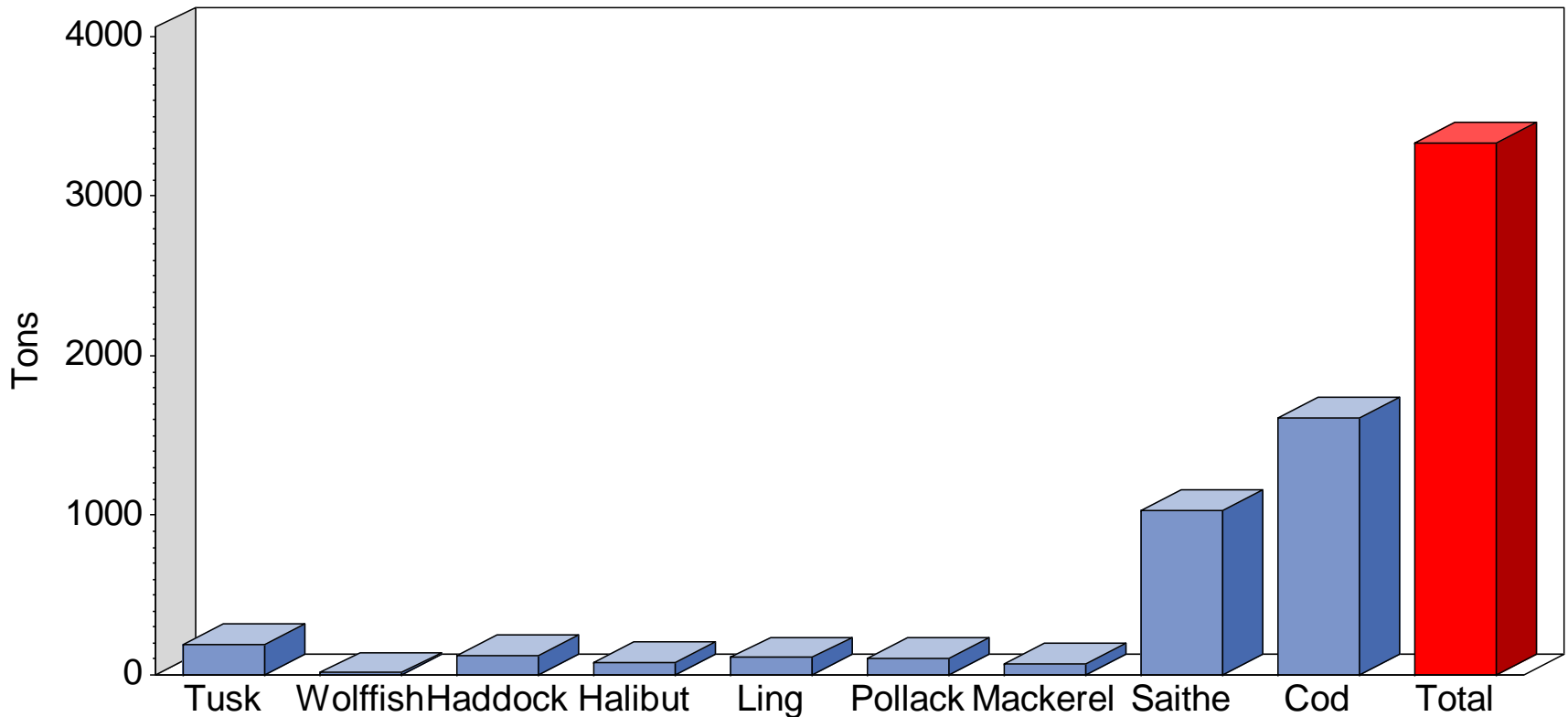
Species	Region	Number	SE(N)	Weight (kg)	SE(W)	RSE (W)	Weight_LCI	Weight_UCL	Mean(w)
All	All	1 543 005	237 477	3 335 157	572 810	17 %	2 212 449	4 457 865	2,2
	North-Mid	1 140 640	225 806	2 958 178	567 581	19 %	1 845 719	4 070 637	2,6
	Souh-West	402 365	73 534	376 979	77 224	20 %	225 620	528 338	0,9
Cod	All	542 762	118 565	1 612 977	348 486	22 %	929 944	2 296 010	3,0
	North-Mid	529 633	118 440	1 586 002	348 307	22 %	903 320	2 268 684	3,0
	Souh-West	13 129	5 447	26 976	11 176	41 %	5 071	48 881	2,1
Haddock	All	74 411	14 722	124 457	24 213	19 %	77 000	171 914	1,7
	North-Mid	68 018	14 611	115 067	24 069	21 %	67 892	162 242	1,7
	Souh-West	6 393	1 798	9 390	2 634	28 %	4 227	14 553	1,5
Saithe	All	565 195	122 687	1 033 165	246 401	24 %	550 219	1 516 111	1,8
	North-Mid	378 929	117 445	825 189	241 319	29 %	352 204	1 298 174	2,2
	Souh-West	186 266	35 479	207 976	49 784	24 %	110 399	305 553	1,1
Pollack	All	48 870	9 823	102 535	25 992	25 %	51 591	153 479	2,1
	North-Mid	31 703	9 213	81 094	25 655	32 %	30 810	131 378	2,6
	Souh-West	17 167	3 408	21 441	4 171	19 %	13 266	29 616	1,2
Halibut	All	5 367	1 699	79 934	29 383	37 %	22 343	137 525	14,9
	North-Mid	5 335	1 699	79 746	29 383	37 %	22 155	137 337	14,9
	Souh-West	31	28	188	169	90 %	-143	519	6,1
Mackerel	All	181 049	38 360	68 069	14 350	21 %	39 943	96 195	0,4
	North-Mid	26 838	7 100	13 620	3 575	26 %	6 613	20 627	0,5
	Souh-West	154 211	37 698	54 449	13 898	26 %	27 209	81 689	0,4
Ling	All	38 309	8 125	108 875	28 477	26 %	53 060	164 690	2,8
	North-Mid	21 988	6 949	68 495	26 896	39 %	15 779	121 211	3,1
	Souh-West	16 321	4 209	40 380	9 355	23 %	22 044	58 716	2,5
Tusk	All	82 846	24 579	189 582	51 856	27 %	87 944	291 220	2,3
	North-Mid	74 150	24 417	173 715	51 694	30 %	72 395	275 035	2,3
	Souh-West	8 796	2 816	15 867	4 103	26 %	7 825	23 909	1,8
Wolf fish	All	4 099	1 294	15 563	4 373	28 %	6 992	24 134	3,8
	North-Mid	4 046	1 292	15 251	4 365	29 %	6 696	23 806	3,8
	Souh-West	52	45	312	273	88 %	-223	847	6,0

Other species registered in catch logbooks, in northern and mid regions (NM) and western and southern regions (WS).
 Systematic order following Eschmayer and Fong (2010), English common names (FAO) according to Froese and Pauly (2010),
 Norwegian common names according to Artsnavnebasen (www.artsdatabanken.no).

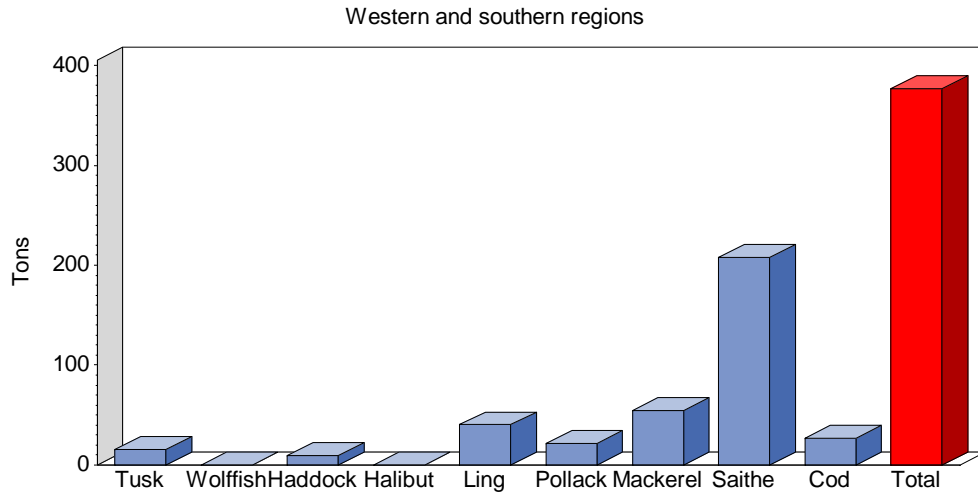
Family	Species	English	Norwegian	NM	WS
Clupeidae	<i>Clupea harengus</i> Linnaeus, 1758	Atlantic herring	Sild	x	x
Gadidae	<i>Merlangius merlangus</i> (Linnaeus, 1758)	Whiting	Hvitting	x	x
Gadidae	<i>Micromesistius poutassou</i> (Risso, 1827)	Blue whiting	Kolmule		x
Gadidae	<i>Trisopterus luscus</i> (Linnaeus, 1758)	Pouting	Skjeggtoresk		x
Lotidae	<i>Molva dypterygia</i> (Pennant, 1784)	Blue ling	Blålange	x	x
Merlucciidae	<i>Merluccius merluccius</i> (Linnaeus, 1758)	European hake	Lysing	x	x
Lophiidae	<i>Lophius piscatorius</i> Linnaeus, 1758	Angler	Breiflabb	x	x
Belonidae	<i>Belone belone</i> (Linnaeus, 1761)	Garfish	Horngjel	x	x
Sebastidae spp.		Rockfishes	Uerfamilien	x	x
Triglidae	<i>Eutrigla gurnardus</i> (Linnaeus, 1758)	Grey gurnard	Knurr	x	x
Cyclopteridae	<i>Cyclopterus lumpus</i> Linnaeus, 1758	Lumpfish	Rognkjeks		x
		Wrasses	Leppefiskfamilien	x	x
Labridae spp.					
Anarhichadidae	<i>Anarhichas</i> spp.	Wolffishes	Steinbitfamilien	x	
Ammodytidae spp.		Sand lances	Silfamilien		x
Scophthalmidae	<i>Lepidorhombus whiffiagonis</i> (Walbaum, 1792)	Megrim	Glassvar		
					x
Scophthalmidae	<i>Psetta maxima</i> (Linnaeus, 1758)	Turbot	Piggvar		x
Scophthalmidae	<i>Scophthalmus rhombus</i> (Linnaeus, 1758)	Brill	Slettvar		x
Pleuronectidae	<i>Limanda limanda</i> (Linnaeus, 1758)	Common dab	Sandflyndre	x	x
Pleuronectidae	<i>Pleuronectes platessa</i> Linnaeus, 1758	European plaice	Rødspette	x	x
		Righteye flounders	Flyndrefamilien		x
Pleuronectidae spp.					
Soleidae spp.		Soles	Tungefamilien		x

Estimated total catch nationally (2009 survey)(RSE=17%)

Norway total

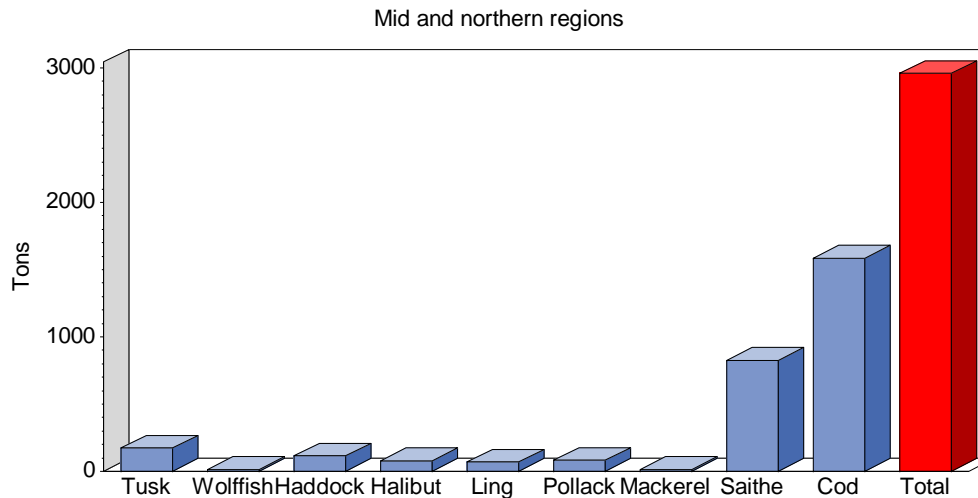


Estimated total catch



RSE=20%

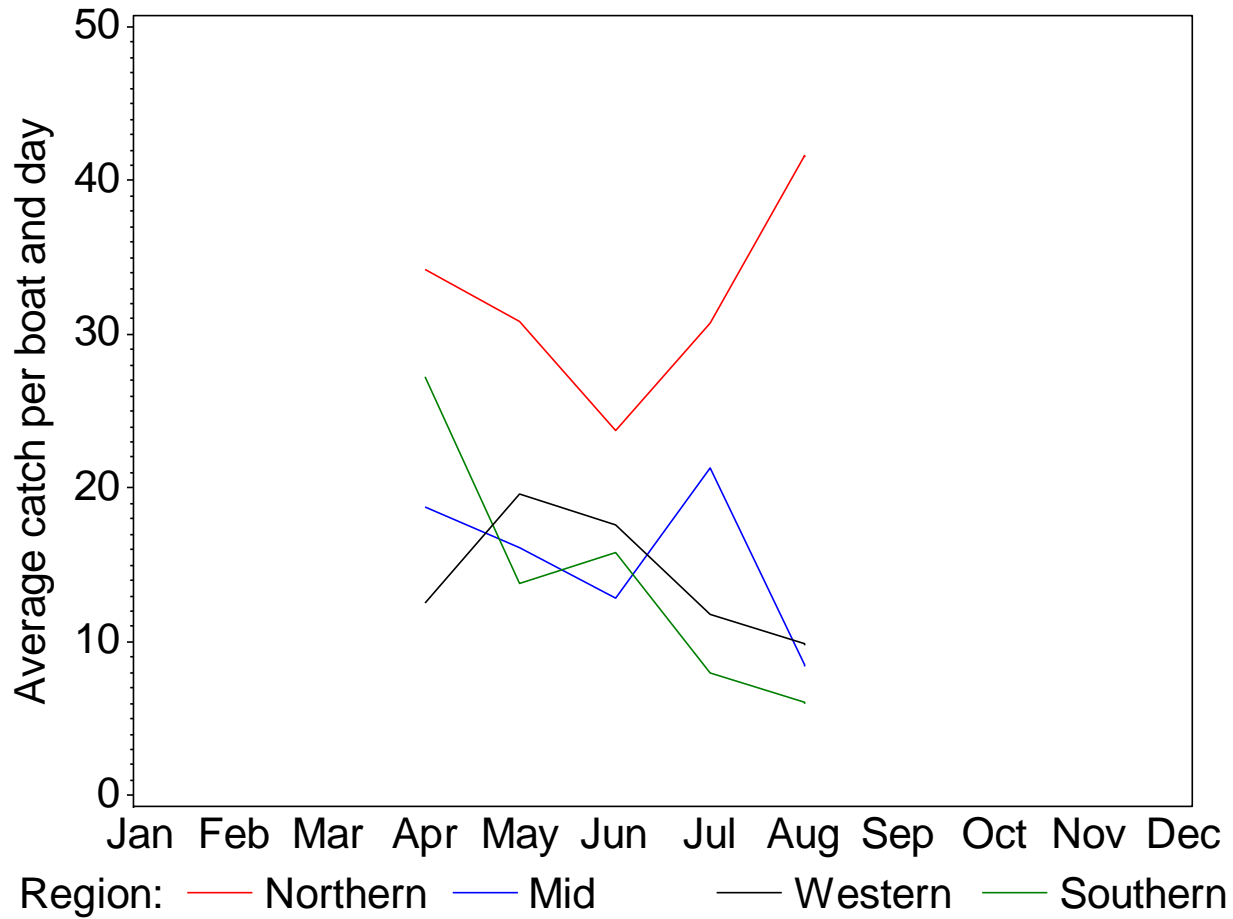
RSE=44% for cod



RSE= 19%

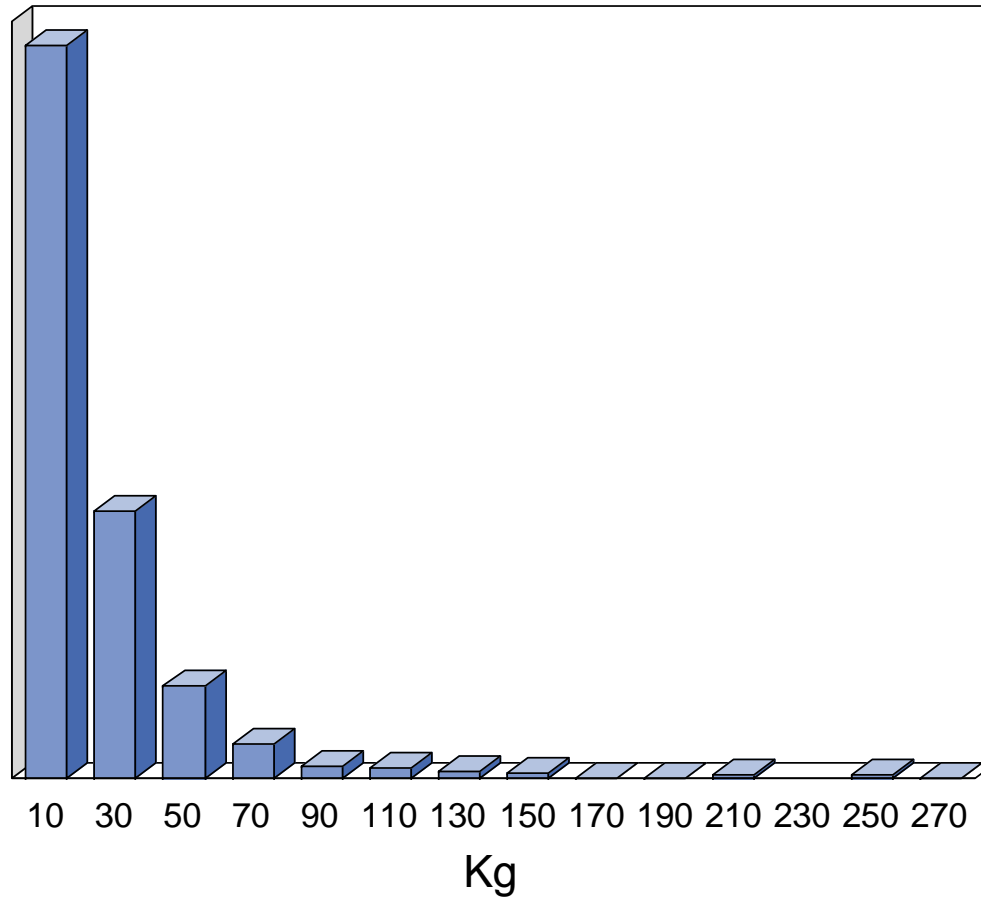
RSE=22% for cod

CPUE by regions

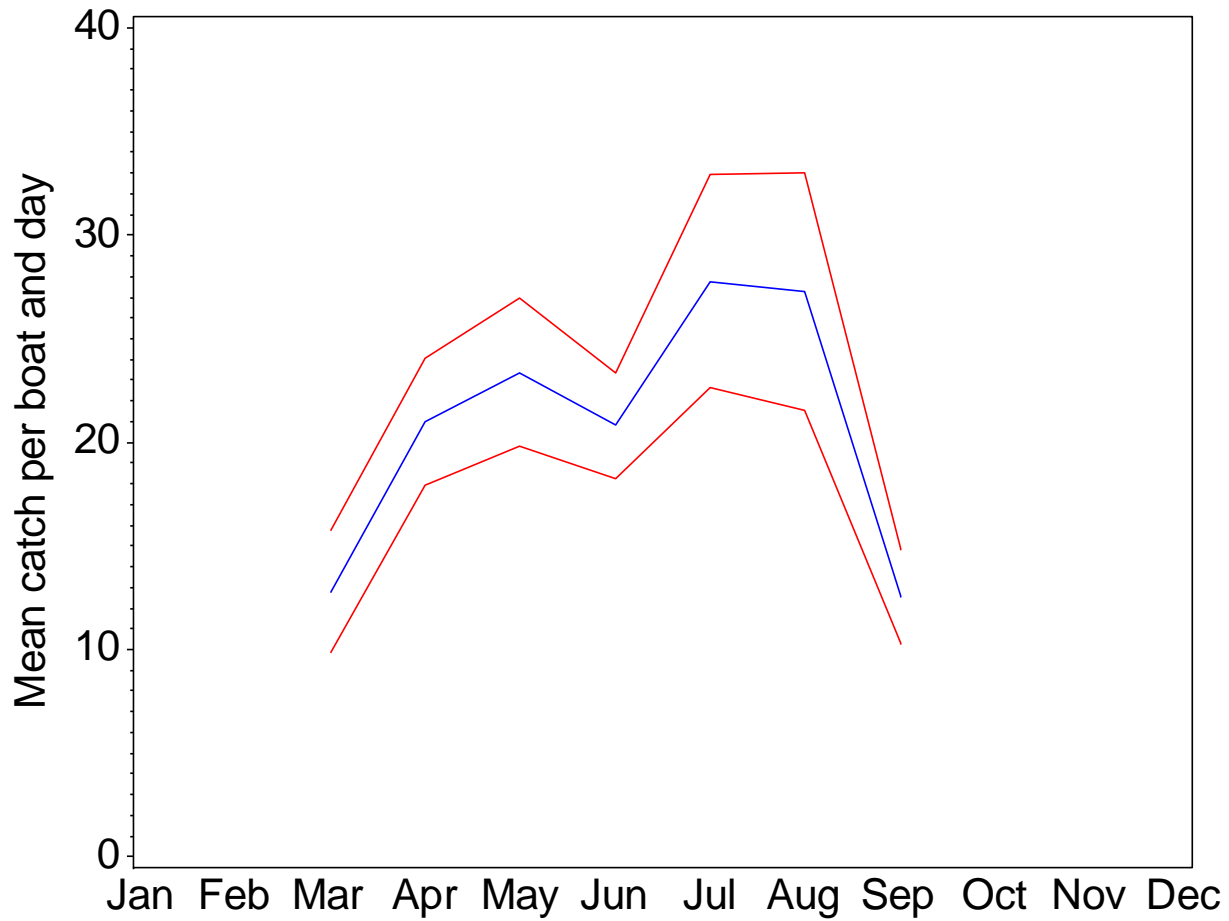


Distribution of reported daily catches

Distribution of total catch per boat



CPUE by month



- Undersøkelsen er videreført i 2010, med datainnsamling på et utvalg av bedrifter.
- Lengde og alder på torsk i tillegg på et underutvalg.



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