

UNREPORTED CATCHES IN THE BARENTS SEA AND ADJACENT WATERS FOR PERIODS FROM 1950 TO 1998

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ABSTRACT

Catch data for the northeast Atlantic with an emphasis on Norwegian fisheries are provided. The focus is on discards, by-catch, unreported, misreported and unallocated catches. Sixteen commercial fish and invertebrate species are represented with unreported catches exceeding 25% of the total catch for five of these species. Particular emphasis is drawn to Atlantic cod (*Gadus morhua*), redfish (*Sebastes* spp.) and haddock (*Melanogrammus aeglefinus*).

INTRODUCTION

This report evaluates information on the unreported catches of commercial fish and invertebrate species in parts of the northeast Atlantic Ocean. The trends presented here are based on data provided by Dingsør (this volume), who reported on discards, by-catch, unreported, misreported and unallocated catches, with an emphasis on Norwegian fisheries. Here, 'unreported catches' are defined as unreported with regards to the official ICES database ('STATLANT'). The areas considered in the present paper include ICES Fishery Statistical areas I (Barents Sea), IIa and b (Barents Sea/Norwegian Sea), IIIa (Kattegat and Skagerak), IV (North Sea), VI (the Northwest coast of Scotland and Ireland), and VII (Irish Sea and the English Channel). For a map of ICES Fisheries Areas, see Figure 1.

The official, reported catch data included in the present report are based on the official ICES landings database (STATLANT, year 2000 version). In the case of a few species (Atlantic cod (*Gadus morhua*), horse mackerel (*Trachurus trachurus*), and North Sea whiting (*Micromesistius poutassou*)), the ICES data were adjusted by ICES Working Group

estimates of catches. This was necessary because the ICES STATLANT data required for the present estimations and summaries were missing or were incomplete. All calculations of the 'percent unreported catches' documented in this report represent the percentages based on the total catch (total catch = official ICES STATLANT catch + unreported catch).

Of the sixteen commercial fish and invertebrate species for which some estimates of unreported catches were available (Table 1, also see Dingsør, this volume), the unreported catch exceeded 25 % of the total catch (total catch = official ICES catch + unreported catch) for five species at least some of the time for the areas considered here – redfish (*Sebastes* spp.), haddock (*Melanogrammus aeglefinus*), horse mackerel (*Trachurus trachurus*), witch flounder (*Glyptocephalus cynoglossus*), and European hake (*Merluccius merluccius*). In addition to these five species, the estimated unreported harvest of North Sea herring (*Clupea harengus*) and Atlantic cod (*Gadus morhua*) was assessed for periods with available information (Table 2).

The present report focuses on three species for which total catch estimates are of particular interest: Atlantic cod in the Barents Sea and Norwegian Sea (1950-1998), redfish in the Barents Sea during parts of the 1980s, and haddock in the North Sea (1963-1998). Attention is drawn to specific details and history of the present examples in a report by Dingsør (this volume).

Table 1. Species and time periods covered by report.

Common Name (<i>Species Name</i>)	Time Period
American plaice (<i>Hippoglossoides platessoides</i>)	1984-1998
Atlantic mackerel (<i>Scomber scombrus</i>)	1978-1998
Blue whiting (<i>Micromesistius poutassou</i>)	1977-1998
Cod (<i>Gadus morhua</i>)	1950-1998
European hake (<i>Merluccius merluccius</i>)	1984-1998
European ling (<i>Molva molva</i>)	1984-1998
European plaice (<i>Pleuronectes platessus</i>)	1985-1998
Haddock (<i>Melanogrammus aeglefinus</i>)	1963-1998
Herring (<i>Clupea harengus</i>)	1984-1998
Horse mackerel (<i>Trachurus trachurus</i>)	1984-1998
Redfish (<i>Sebastes</i> spp.)	1983-1987
Saithe (<i>Pollachius virens</i>)	1970-1998
Shrimp (<i>Pandalus borealis</i>)	1985-1998
Whiting (<i>Merlangius merlangus</i>)	1960-1998
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	1984-1998
Yellowtail (<i>Limanda limanda</i>)	1984-1998

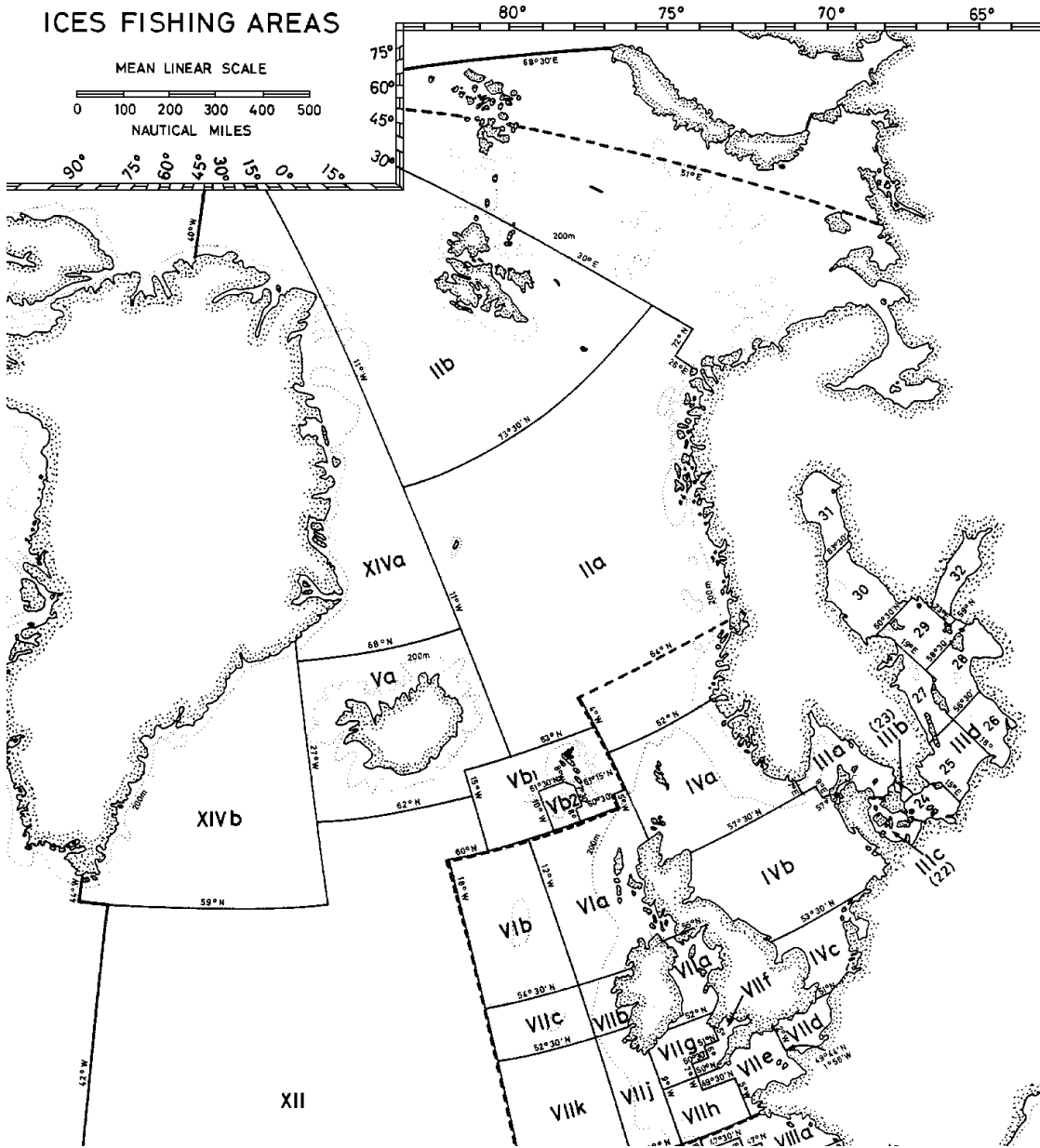


Figure 1. ICES Fisheries Statistical Areas mentioned in this report: I (Barents Sea), IIa and IIb (Barents Sea/Norwegian Sea), IIIa (Kattegat and Skagerak), IV (North Sea), VI (the Northwest coast of Scotland and Ireland), and VII (Irish Sea and the English Channel). For a complete map of ICES Areas, see www.ICES.dk/globec/data/fisharea.gif.

Table 2. Actual extractions of selected species from the Barents Sea and adjacent waters.

Species	Area and countries	Time period	Official catch (t)	Unreported catch (t)	Total catch (t)	% Unreported
Cod	I, IIa and IIb: All countries	1950-59	7,681,958	2,407,700	10,089,658	23.9
		1960-69	7,442,286	972,423	8,414,709	11.6
		1970-79	8,205,008	366,615	8,571,623	4.3
		1980-89	4,050,224	295,876	4,346,100	6.8
		1990-98	5,232, 95	387,547	5,619,742	6.9
Redfish	I: All countries ^{a)}	1983-87	18, 45	171,800	189,945	90.4
Haddock	IIIa and IV: All countries	1963-69	1,704,494	1,603,694	3,308,188	48.5
		1970-79	2,228,827	1,726,795	4,015,022	43.0
		1980-89	1,396,920	742,319	2,139,239	34.7
		1990-98	627,219	570,459	1,197,678	47.6
European hake	IV: Denmark	1984-89	5,108	1,852	6,960	26.6
	IV: Denmark and Norway ^{b)}	1990-98	11,427	6,956	18,383	37.8
Herring	IV, VIIa and VIa: All countries	1984-89 ^{c)}	3,121,737	5,544	3,127,281	0.1
		1990-98	3,832,008	40,031	3,872,039	1.0
Horse mackerel	IV: Denmark and Norway	1984-89	312,471	88,741	401,212	22.1
		1990-98	1,028,276	59,756	1,088,032	5.5
Redfish	I: All countries ^{a)}	1983-87	18,145	171,800	189,945	90.4
Witch flounder	IV: Denmark and Norway	1984-89	2,879	1,251 ^{d)}	4,130	30.3
		1990-98	4, 62	3,522 ^{e)}	7,984	44.1

^{a)} Based on countries fishing for *Pandalus borealis*.

^{b)} Norway data are included for the years 1995-1998 only.

^{c)} Only includes unreported catches in areas IVb, IVc, VIId and VIa for 1989.

^{d)} Only includes Norway's unreported catch for years 1984, 1985 and 1989.

^{e)} Only includes Norway's unreported catch for years 1990, 1991 and 1992.

ACCOUNTS BY SPECIES

Atlantic Cod (*Gadus morhua*, Barents Sea and Norwegian Sea)

Atlantic cod are fished by several countries in the region encompassed in this study (ICES areas I, IIa and Iib, Figure 1). The key countries are Norway and Russia (formerly USSR), and to a lesser extent, the United Kingdom. In terms of

landings, the North Atlantic cod fishery is the largest of all the fisheries in the region (average official landings per year between 1950-1998 was over 665,000 tonnes/year, Table 2). Therefore, despite the relatively moderate proportions of unreported catch of cod (mean across all decades: 10.4%, Figure 2), the average annual unreported catch itself is rather large (over 90,000 tonnes per year).

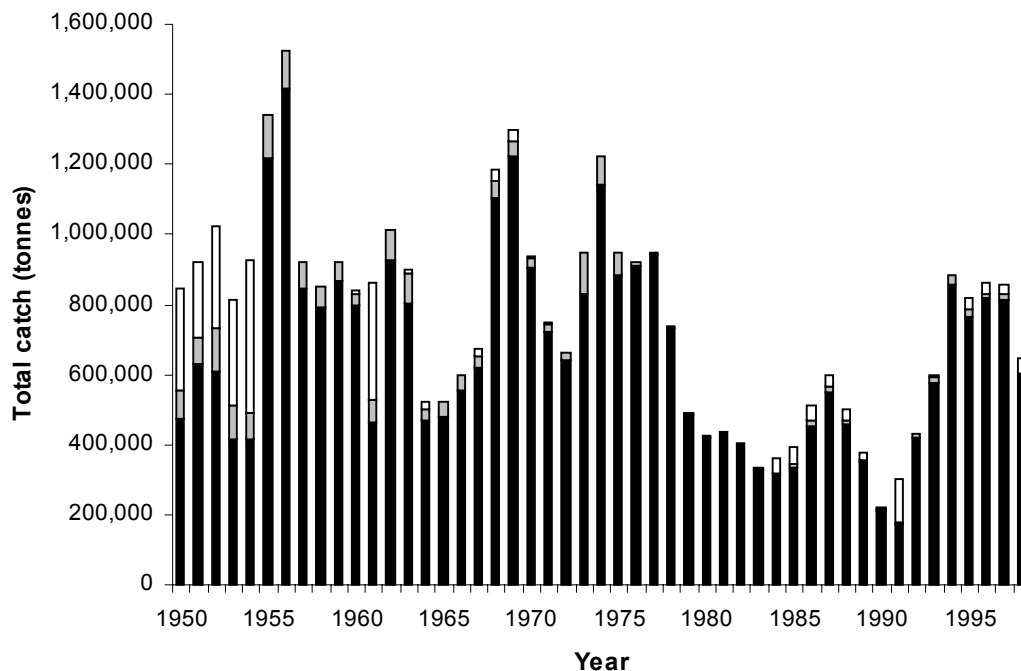


Figure 2. Total extractions (total catch) of cod by all countries in ICES I, IIa and Iib. Black: official landings from ICES STATLANT. Grey: Discards as estimated by Dingsør (this volume). White: unreported catches as estimated by Dingsør (this volume).

With the exception of the 1990s, the unreported proportion of cod caught by all countries combined appears to have declined across the decades since the 1950s (Table 2). One of the periods in which a decline in unreported catch occurred was in the late 1970s, just prior to a precipitous decline in total catches which occurred in the early 1980s (Figure 2). During this period of very low total harvest in the 1980s, the average total catch by all countries was approximately 430,000 tonnes-year⁻¹, down from 840,000-1,000,000 tonnes-year⁻¹ in the previous three decades (Table 2). Several factors related to decreasing catches may have contributed to the observed drop in discard rates in the late 1970s (Figure 3). Cold water in the Barents Sea in 1979-1981 led to an extreme westerly distribution of the cod stock (Nakken and Raknes, 1987), which in turn led to low trawl catches in ICES areas I and IIb. Further, the establishment of Exclusive Economic Zones (200 mile EEZ) in 1977, combined with a splitting of the cod stock between Norwegian and Russian responsibility

may have led to better management of the cod stock compared to earlier periods (Jakobsen, 1993).

However, there are two reasons to expect that the unreported catches documented here for the Atlantic cod are underestimated. First, Norway's average discard rates for cod of 2.5% of the total catch appears generally lower in comparison to the discard rates for other countries (Figures 4 and 5). This occurred because estimates of discards were available only for the bottom trawl gear type while the official ICES landing data used for our calculations includes all gear types without gear differentiation. Approximately $\frac{2}{3}$ of the Norwegian cod fleet is composed of gear types other than bottom trawl. Thus, our unreported/discard estimates (which only apply to trawl gear) are clear underestimates of total Norwegian unreported and discarded catch. This contrasts with catches of cod from other countries in the Barents Sea, which is almost exclusively by

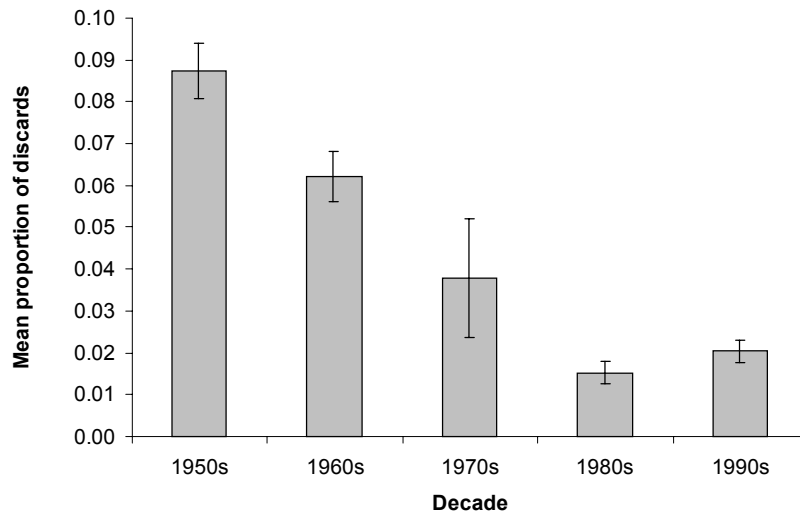


Figure 3. Mean discard rate (\pm SE) of Atlantic cod per decade (all countries) in ICES I, IIa and IIb.

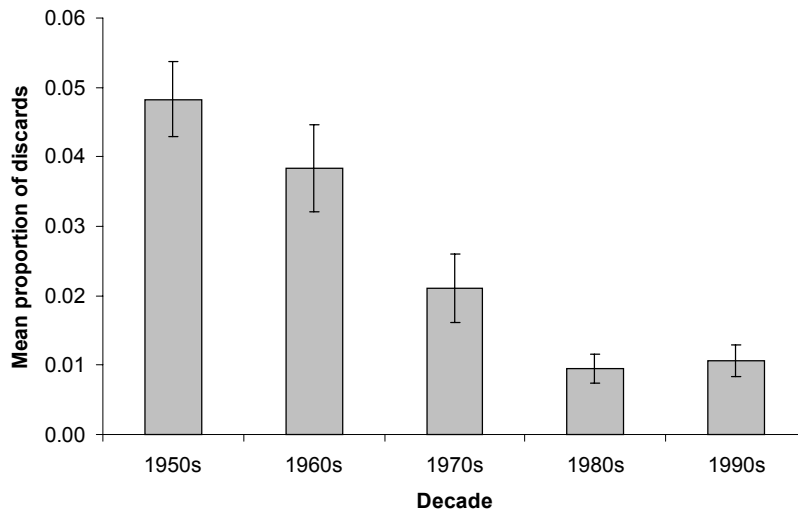


Figure 4. Mean discard rate (\pm SE) of cod by Norway in ICES I, IIa and IIb.

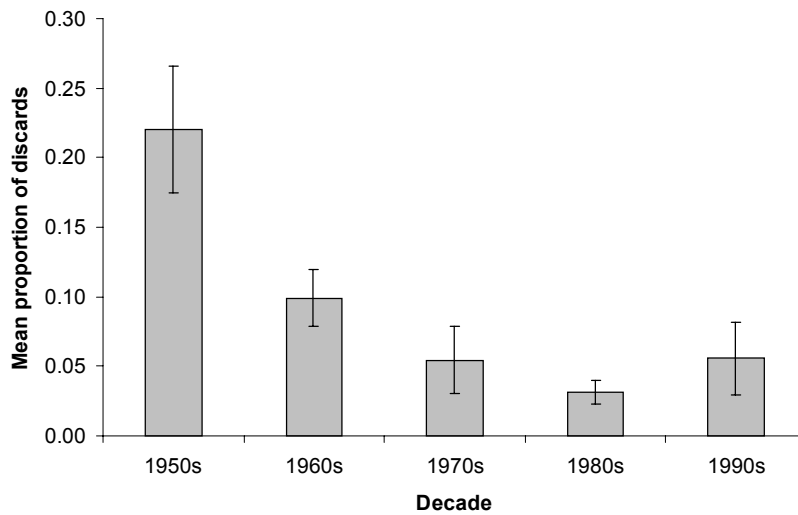


Figure 5. Mean discard rate (\pm SE) of cod by all countries excluding Norway in ICES I, IIa and IIb.

bottom trawl (Dingsør, this volume). The lack of information on discards for gear other than bottom trawl suggests that the cod discard rates reported here for Norway may underestimate the total discard rate for cod.

Secondly, additional evidence for underestimates of the unreported catches of cod come from two reports and state that large quantities of cod (average: 50,000 t-year⁻¹ from 1990 to 1996) were being harvested in the international 'loophole' in the Barents Sea (Anon., 2000: 1990-1994; Norwegian Directorate of Fisheries [unpublished]: 1995-1996). This area is outside of the multi-national agreements on total allowable cod catches. The year in which this harvesting began is unknown, but assumed to predate 1990. Attempts have been made by Norway and Russia to stop or control these catches through negotiations with the offending countries. However, no evidence exists to indicate that the negotiations have been successful to date (G. Dingsør, Institute of Marine Research, Bergen, Norway, pers. comm.).

On the other hand, it is possible that Norway's unreported catches in recent years may in fact be close to the true value for two reasons. Since the late 1980s Norway has a 'discard ban', and more recently a policy of temporary closure of fishing areas has been implemented to conserve stocks (Isaksen, 1997). The area closure system, introduced in 1986, is a system of real-time closures of areas containing large quantities of small fish. Presently, an area is being closed when:

- more than 15% of the catches are below minimum catch size; or
- the by-catch exceeds 1000 individuals of juvenile haddock and cod per tonne; or
- the by-catch exceeds 300 individuals of Greenland halibut per tonne; or
- the by-catch exceeds 1000 individuals of redfish per metric ton shrimp catch.

The closing and opening of areas is based on extensive surveys by chartered commercial fishing vessels. Furthermore, since 1986 a change of fishing area is mandatory if a vessel encounters too many non-targeted species or juveniles (Isaksen, 1997). Thus, commercial skippers have the legal responsibility to move their vessel a minimum distance of 5 nautical miles when the mixture of 'illegal' to legal fish becomes too high (G. Dingsør, Institute of Marine Research, Bergen, Norway, pers. comm.). However, discarding may still occur as enforcement of these rules is problematic and therefore it would be

expected that some discarding would still occur above the level reported.

Redfish

During the 1980s a fishery for northern shrimp (*Pandalus* spp.) developed in the Barents Sea (ICES I). ICES undertook a study that reported on additional catches of non-targeted species (Dingsør, this volume). Data presented here relate to redfish (*Sebastes* spp.) catches that were discarded from the shrimp fishery during an assessment period from 1983-1987.

The total reported landings for redfish from ICES I over the five-year time period was 18,145 tonnes, representing an average of 3,629 tonnes per year (range 2, 027-5, 411; Figure 6). Discards of redfish from the shrimp fishery amounted to 171,800 tonnes over the five year assessment period. This represents an average of 34, 360 tonnes per year or over 87 % of the total extraction of Barents Sea redfish. The discarded amount of redfish (171,800 tonnes) was nearly the same as the amount of northern shrimp targeted (192,923 tonnes over 5 years).

Subsequently, discard rates have decreased due to changes in the shrimp fishing gear, e.g., in 1989 the 'Nordmøre' sorting grid was introduced into the shrimp fishery to decrease by-catch of juvenile fish (especially cod and haddock). As a result of adopting these sorting grids fishers were allowed into formerly closed areas (Isaksen, 1997). In 1993 both Norway and Russia made the use of the grid compulsory in the shrimp fishery in their EEZs and around Svalbard (Isaksen, 1997).

Haddock

The haddock fishery in the North Sea mainly involves vessels of Belgian, Danish, English, French, Scottish, and Norwegian origin (Anon., 2001). Some haddock are also taken as by-catch in the industrial fishery for such species as herring, sandeels and Norway pout undertaken by Danish and Norwegian vessels (Anon., 2001). In recent years the haddock stock has been dominated by the strong 1999 year class (Anon., 2001).

The quantities of unreported catches of haddock (tonnes) from Kattegat and Skagerak (Area IIIa, Figure 1) and The North Sea (Area IV, Figure 1) are amongst the highest unreported catches documented for any of the species examined (Table 2). Furthermore, these unreported catches of haddock were consistently high (average annual unreported catch: approx. 129,000 tonnes, range: 28,500 – 599,000 tonnes (Figure

7, Table 2) across the entire 36-year time period for which data were available. Interestingly, these levels of unreported catches were consistent despite by-catch limitations (haddock and other

species) imposed on the shrimp fishery in the early 1980s, and a haddock discard ban, introduced in the late 1980s (Dingsør, this volume).

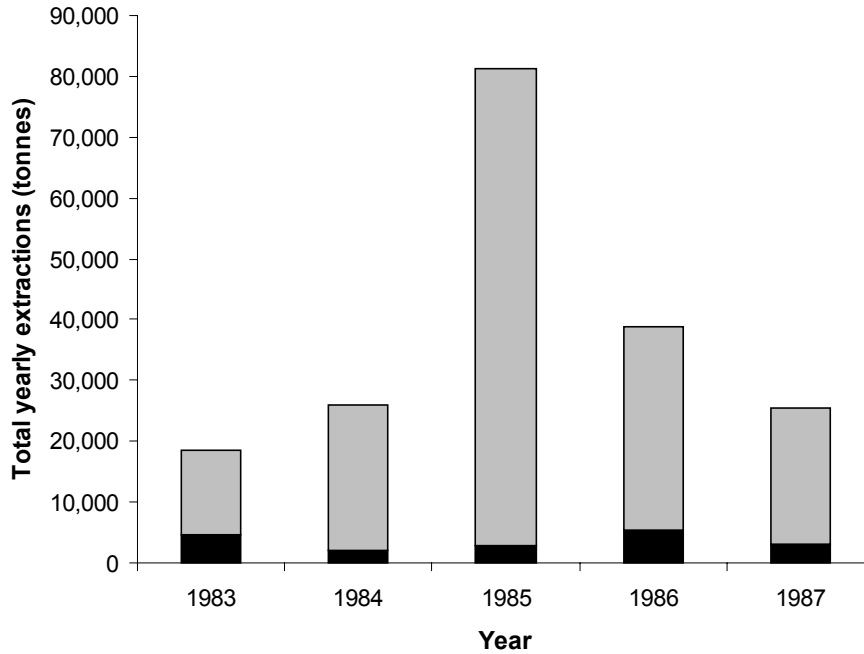


Figure 6. Total annual extractions of redfish (reported landings plus discards) in the Barents Sea (ICES I), based on the assessment period from 1983-1987. Black: official ICES reported landings. Grey: discards of redfish by the northern shrimp fishery.

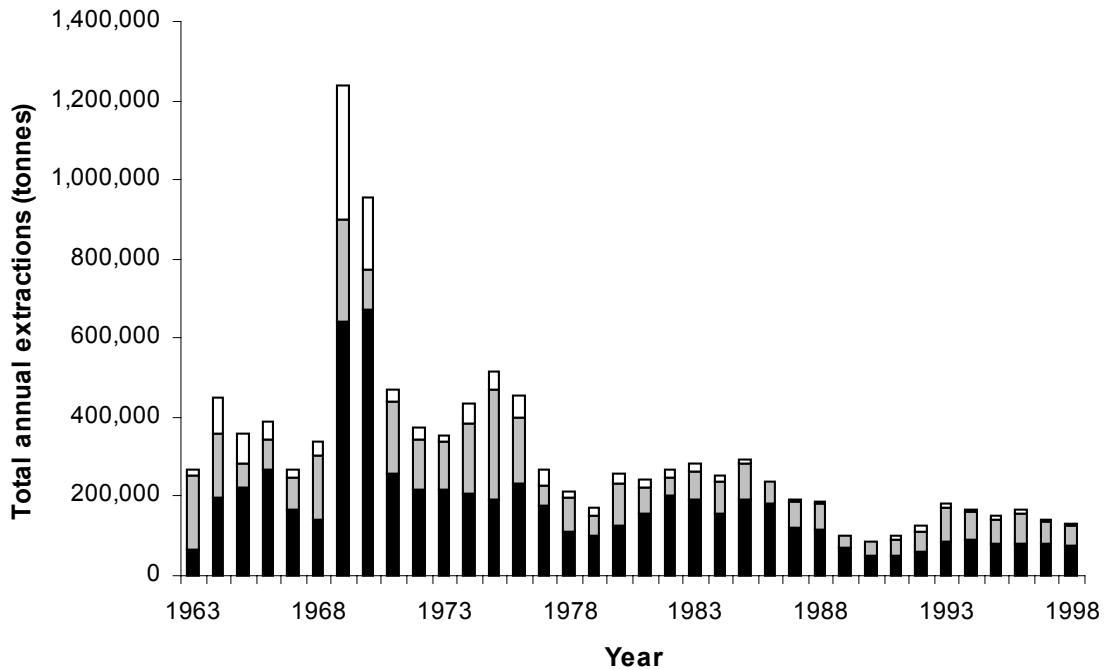


Figure 7. Total annual extractions of haddock taken by all countries in ICES IIIa and IV. Black: official landings from ICES STATLANT. Grey: Discards as estimated by Dingsør (this volume). White: unreported catches as estimated by Dingsør (this volume).

CONCLUSIONS

This assessment indicates that unreported and discarded catches can be of a substantial magnitude in some stocks. The discrepancies between the official ICES data (ICES STATLANT) and adjusted total catches illustrate that complete public accounting of extractions of a publicly owned resource should form the foundation of fishery management. Knowledge of total extractions could be important to the stability of the stocks even when total catch is low (Hilborn and Walters, 1992). While we acknowledge that in many cases these non-landed or non-reported catches are incorporated into stock assessments by the ICES Working Groups (e.g., Working Group on the Assessment of the North Sea, Skagerrak and Kattegat, Anon., 2001), it is surprising that none of these unreported catch estimates are accounted for in the official ICES database (STATLANT). Given that the general public is the ultimate resource owner, they should have the right to know what is extracted from the ocean and how much of this extraction is actually being landed, discarded or not reported. This would contribute markedly to transparency in publicly run institutions.

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