MSC FISHERY ASSESSMENT REPORT

PUBLIC COMMENT DRAFT REPORT

NORWAY
NORTH EAST ARCTIC AND NORTH SEA
SAITHE FISHERIES

THE NORWEGIAN SEAFOOD COUNCIL & NORWEGIAN FISHING VESSEL OWNERS ASSOCIATION

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MSC FISHERY ASSESSMENT REPORT

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Summary:

Project Name:
Country:
Determination Phases/Type of report:

☐ Preliminary Draft Report (Client's review)
☐ Peer Review Report
☒ Public Comment Draft Report (Stakeholders review)
☐ Final Report
☐ Public Certification Report

The objective of this assessment is the re-assessment of the Norway North East Arctic and North Sea saithe fisheries caught by Trawl, Purse seine, Gill nets, Hand line, Danish Seine, Long line and others.

Report No: 2012-0016	Subject Group:	
Report title: Norway North East Arctic and North Sea saithe fisheries		Keywords
Work carried out by: Dr. John Nichols, P1 expert Dr. Stephen Lockwood, P2 expert Dr. Dankert W. Skagen, P3 expert Sandhya Chaudhury, DNV Team Leader Guro Meldre Pedersen, DNV Team member		☐ No distribution without permission from the Client or responsible organisational unit.
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GLOSSARY

ACOM	(ICES) Advisory Committee on Management
ADAPT	Fishery stock assessment method
AFWG	(ICES) Arctic Fisheries Working Group
BIOFAR	BIOlogical investigations of the FARoese benthos
BSMP	Barents Sea Management Plan
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CPUE	Catch per unit effort
CRISP	Centre for Research-based Innovation in Sustainable fish capture and Pre-processing technology, at IMR, Norway
DNV	Det Norske Veritas
DoF	Directorate of Fisheries, Norway
EC	European Commission
EEZ	Exclusive Economic Zone
EFZ	Exclusive fishing zone
ETP	Endangered, threatened and protected species
EU	European Union
FAM	Fisheries Assessment Methodology
FaMRI	Faroe Marine Research Institute (Havstovan)
FDIR	The Fisheries Directorate, Norway
FFZ	Faroese fisheries zone
FNI	Fridtjof Nansen Institute
FVE	The Faroe Islands Fisheries Inspection
GADGET	Globally applicable Area Disaggregated General Ecosystem Toolbox
GPS	Global Positioning System
GRT	Gross register tonnes
GSN	Geological Survey of Norway
H&G	Headed and Gutted (fish)
HCR	Harvest Control Rule
HelCom	Baltic Marine Environment Protection (Helsinki) Commission
ICES	International Council for the Exploration of the Sea
IMR	Institute for Marine Research (Havforskninsinstituttet), Norway
IUU	Illegal, unregulated and unreported fishing
IWC	International Whaling Commission
JNRFC	Joint Russian–Norwegian Fisheries Commission

MAFF	Ministry of Agriculture, Forestry and Fisheries
MFCA	Ministry of Fisheries and Coastal Affairs
MSC	Marine Stewardship Council
MSVPA	multi-species virtual population assessment
MSY	Maximum sustainable yield
NAFO	Northwest Atlantic Fisheries Organization
NAMMCO	North Atlantic Marine Mammal Commission
NASCO	North Atlantic Salmon Conservation Organization
NE	North East
NEA	North East Arctic
NEAFC	North East Atlantic Fisheries Commission
NEZ	Norwegian Economic Zone
NFVOA	Norwegian Fishing Vessel Owners Association (Fiskebåtredernes Forbund)
NGO	Non – Governmental Organization
NINA	Norwegian Institute for Nature Research
Nordforsk	Nordic Council Cooperative Research
NPI	Norwegian Polar Institute
NS	North Sea
NSC	Norwegian Seafood Council
NWWG	North- Western Working Group
OSPAR	Oslo and Paris Commission for the protection and conservation of the North-East Atlantic and its Resources
PCDR	Public Comment Draft Report
PI	Performance Indicator
PISG	Performance Indicator Scoring Guidepost
RAC	Regional Advisory Council
ROV	Remotely operated vehicle
SG	Scoring Guidepost
SKSD	Norwegian Hydrographical Survey
TAC	Total Allowable Catch
UK	United Kingdom of Great Britain and Northern Ireland
UNESCO	United Nations Educational, Scientific and Cultural Organization
VPA	Virtual population analysis
WGDEC	(ICES) Working Group on Deep-water Ecology
WGECO	Working Group on Ecosystem Effects of Fishing Activities
WGMME	(ICES) Working Group on Marine Mammal Ecology
WGSAM	Working Group on Multispecies assessment Methods

XSA Extended survivorship analysis

LIST OF SYMBOLS & REFERENCE POINTS

B_{lim}	Minimum biomass below which recruitment is expected to be impaired or the stock dynamics are unknown.
B_{msy}	Biomass corresponding to the maximum sustainable yield (biological reference point); the peak value on a domed yield-per-recruit curve.
B_{pa}	Precautionary biomass below which SSB should not be allowed to fall to safeguard it against falling to B_{lim}.
$B_{trigger}$	Value of spawning stock biomass (SSB) that triggers a specific management action
F	Instantaneous rate of fishing mortality
Fbar	The age range of the fish, in years, for which annual fishing mortality is calculated in the stock assessment model.
F_{lim}	Exploitation rate that is expected to be associated with stock 'collapse' if maintained over a longer time (precautionary reference point).
F_{max}	F where total yield or yield per recruit is highest (biological reference point)
F_{MP}	Fishing mortality reference point as defined in management plans.
F_{msy}	F giving maximum sustainable yield (biological reference point).
F_{pa}	Precautionary buffer to avoid that true fishing mortality is at F_{lim} when the perceived fishing mortality is at F_{pa}.
MSY	Maximum Sustainable Yield
SSB	Spawning Stock Biomass
SSB_{MP}	Spawning stock biomass reference point as defined in management plans.

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LIST OF FISH SPECIES

Anglerfish	Lophius piscatorius
Atlantic catfish	Anarhicas lupus
Atlantic mackerel	Scomber scombrus
Basking shark	Cetorhinus maximus
Blue ling	Molva dypterygia
Blue ling	Molva dipterygia
Blue skate	Dipturus batis
Blue whiting	Micromesistius poutassou
Cod	Gadus morhua
Greenland halibut	Reinhardtius hippoglossoides
Haddock	Melanogrammus aeglefinus
Hake	Merluccius merluccius
Halibut	Hippoglossus hippoglossus
Ling	Molva molva
Lumpsucker	Cyclopterus lumpus
Plaice	Pleuronectes platessa
Pollack	Pollachius pollachius
Porbeagle shark	Lamna nasus
Redfish (beaked redfish)	Sebastes mentella
Redfish (golden redfish)	Sebastes marinus
Saithe	Pollachius virens
School shark or tope	Galeorhinus galeus
Shagreen ray	Leucoraja fullonica
Spiny dogfish	Squalus acanthias
Spiny tail ray	Bathyraja spinicauda
Spotted catfish	Anarhicas minor
Tusk	Brosme brosme
Whiting	Merlangius merlangus

1 EXECUTIVE SUMMARY

This report provides information on the re-assessment of the Norwegian saithe fisheries – North East Arctic (NEA) saithe and North Sea (NS) saithe, caught by Danish seine, demersal trawl, hooks and lines (not specified), seine nets (purse) and gill nets (not specified).

The client for this certification is the entire Norwegian fleet represented by Fiskebåtredernes Forbund (Norwegian Fishing Vessel Owners Association, NFVOA), and the certification is being coordinated by the Norwegian Seafood Council (NSC).

The report is prepared by Det Norske Veritas Certification AS. The assessment team used the default assessment tree as defined in the MSC Certification Requirements v1.2.

1.1 The Assessment team

Ms. Sandhya Chaudhury:	Lead Auditor and Team Leader, DNV
Dr. John Nichols:	Expert for Principle 1
Dr. Stephen Lockwood:	Expert for Principle 2
Dr. Dankert Skagen	Expert for Principle 3
Guro Meldre Pedersen:	Team member, DNV

1.2 Assessment timeline

Announcement of Re-Assessment:	18 July 2012
Site Visit and Stakeholder Consultation:	25-26 September 2012
Expected Date of Re-Certification:	15 June 2013
Target Eligibility date:	15 June 2013

1.3 Scores for separate Principles

Area	North Sea		North East Arctic	
Gear	Trawl	Purse seine, Gill nets, Hand line, Danish Seine, Long line and others:	Trawl	Purse seine, Gill nets, Hand line, Danish Seine, Long line and others:
Principle 1 - Target species	91,3	91,3	92,5	92,5
Principle 2 - Ecosystem	88,7	90,0	88,7	90,0
Principle 3 - Management	98,0	98,0	98,0	98,0

Table 1 Overall Principle-level scores for North Sea and North East Arctic saithe fisheries

1.4 Main strengths and weaknesses of the client's operation

1.4.1 Strengths

The attributes of the Norwegian North Sea and North East Arctic saithe fisheries that are helpful in achieving sustainability and thereby complying with MSC Principles and Criteria for Sustainable Fisheries are:

- The past twenty years has seen a period of mainly good to above average recruitment including the highest in 2005 resulting from the 2002 year class
- The Norwegian Ministry of Fisheries and Coastal affairs implemented a harvest control rule for the North-east Arctic saithe fishery in 2007 which is consistent with a precautionary approach to the management of the fishery
- The management plan has target and limit levels for both SSB and F which are also expressed in MSY terms and the plan is designed to provide a sustainable fishery and high long term yields.
- The proportion of the annual catch taken by the various gear types is well documented

1.4.2 Weaknesses

Weaknesses of the Norwegian North Sea and North East Arctic saithe fisheries in the context of fully meeting the MSC Principles and Criteria for Sustainable Fisheries are:

- The lack of any credible recruitment index in advance of recruitment to the fishable stock is an ongoing, but unavoidable, weakness in the annual assessment process.
- There is still an element of uncertainty related to the levels of unrecorded mortality through discarding and misreporting.
- Some uncertainty in the assessment process is generated by the lack of reliable early recruitment estimates (ICES, 2012d) related to the difficulty of surveying the early year classes

1.5 Draft determination with supporting rationale

The Norwegian North Sea and North East Arctic saithe fisheries achieved a score of 80 or more for each of the three MSC Principles, and did not score under 60 for any of the set MSC Criteria.

The assessment team therefore recommends the certification of the Norway North Sea saithe fishery and Norway North East Arctic saithe fishery for the clients Norwegian Fishing Vessel Owners Association (Fiskebåt) and Norwegian Seafood Council (Norges Sjømatråd).

1.6 Conditions for certification and time-scale for compliance

The fishery did not achieve a score below 80 against any scoring indicators. The assessment team has therefore not set any conditions for the certification of the fisheries.

The assessment team has put forth 3 recommendations related to:

1. PI 1.2.3 "Relevant information is collected to support the harvest strategy" for both North Sea and North East Arctic saithe fisheries. Based on comments and recommendations of the ICES working group, the client is recommended to explore ways in which they could help directly to improve the level of sampling for both saithe fisheries.

2. PI.2.1.2: There is a formally defined and ICES assessed management plan for the coastal cod stock and its fishery. However, this strategy is currently being confounded by the 'Autumn fishery fresh-cod scheme'. Consequently, it is recommended that the client should provide evidence in 2013 that it has engaged with the national fishery management authorities to develop additional effective means for further reductions in the total annual catch (i.e. including recreational catches) of coastal cod.

3. PI 2.2.2. The strategy for managing and minimising by-catch has not been tested explicitly for the saithe fisheries and it is some years since there has been an explicit exercise to assess just what the discard rates are across Norwegian fisheries. The client is recommended to enable the assessment of discard rates in the Norwegian saithe fisheries.

The full assessment was based on an assessment tree defined by the responsible CAB and had 3 conditions for the North Sea saithe fishery and 4 conditions and 1 recommendation for the North East Arctic saithe fishery. All conditions and recommendations from the full assessment are fully met.

2 AUTHORSHIP AND PEER REVIEWERS

2.1 Assessment team

The evaluation has been performed by the following team:

2.1.1 DNV

Sandhya Chaudhury (Lead Auditor, DNV Certification AS): B.Sc., MBA. Sandhya Chaudhury has been the Lead Auditor for various MSC Pre- and Full Assessments since 2005. She has participated in various MSC workshops introducing certification methodology for MSC Fisheries and Chain of Custody to workshop participants. Sandhya has auditor experience with other quality management standards since 2002 and industry experience since 1991.

Guro Meldre Pedersen (Lead Auditor trainee, DNV Certification AS): MSc, PhD. Guro Meldre Pedersen has been supporting the MSC programme since 2010 as Global Seafood Coordinator within DNV, and is now in the process of qualifying for Lead Auditor for the MSC Fishery programme.

2.1.2 Independent specialists

Dr. John Nichols is a retired UK government fisheries biologist with 42 years research experience in plankton ecosystems in the North Atlantic specializing in the taxonomy of North Atlantic & NW European plankton including phytoplankton, micro and meso-plankton, ichythoplankton and young fish. He has been a member of ICES working groups on herring, mackerel, horse mackerel, sardine and anchovy assessments; and mackerel and horse mackerel egg surveys. He was also a member of ICES study groups on herring larval surveys and plankton sampling. He was scientist in charge of numerous research vessel surveys for fish stock assessment purposes and directly involved in the assessment of pelagic and western demersal fish stocks from 1994 to 2000. Since retirement from his government post he has participated in numerous MSC assessments as the Principle 1 expert. The assessments include the Thames estuary herring, PFA North Sea Herring, Hastings Fleet Dover sole, the north east coast of England bass fishery, the SW mackerel handline fishery re-assessment, the Norwegian pelagic fisheries and a North Sea plaice fishery. He has also been a peer reviewer for two MSC reports on Scottish pelagic fisheries.

Dr. Stephen Lockwood is an independent marine environment consultant with over 40 years' experience of marine fishery and environmental research and management. From 1967 to 1999 he was a government fishery scientist at the Fishery Laboratory (now Cefas) Lowestoft and then Conwy, North Wales. His research covered fishery coastal ecology, stock assessment and management, and fishery interests in coastal zone management. As a consultant he has prepared environmental impact assessments for a variety of coastal and offshore developments and contributed both as an assessor, peer reviewer and annual auditor for numerous UK, European and North American fisheries seeking MSC certification.

Dr. Dankert W. Skagen has been a senior scientist at the Institute of Marine Research (IMR) in Bergen (Norway) from 1988 until his retirement in 2010. Dankert has worked with the introduction of the precautionary approach in fisheries and recently, on development of harvest control rules and management strategies in the North East Atlantic. Dankert has developed several programs for simulating harvest control rules that are commonly used. A major part of his work involved participation in ICES working groups and similar fora. He was a member of the ICES Living Resources Committee 1998 – 2000, the Resource Management Committee from 2003 (chairman 2005-2007), and member of ACFM 1999 - 2007. Since his retirement in 2010, he has been chairing the GFCM Assessment Working Group on Small Pelagics in the Mediterranean, served as consultant

for Global Trust Inc. on certification of the Icelandic cod fishery and Alaska pollock fishery, reviewed (for ICES) the evaluation of the management plan for Western Baltic Spring Spawning herring and for Icelandic cod, chaired an ICES benchmark workshop on demersal stocks West of the British Isles, reviewed the assessment of Canadian 4VWX herring and assisted the Pelagic RAC on development of a management plan for Blue whiting.

2.2 Peer Reviewers

Peer reviewers proposed and confirmed are:

Eskild Kirkegaard. Eskild has a M. Sc in Marine Biology and Chemistry and is the Principal Fisheries Advisor at the Technical University of Denmark, National Institute for Aquatic Resources. In his present position Eskild is involved in coordinating advice on fisheries management. He has been a member of a number of Working Groups and Committees under the International Council for the Exploration of the Sea (ICES) and a member of the Scientific, Technical and Economic Committee for Fisheries (STECF) of the European Commission. Esklid has been the chairman of ICES' Advisory Committee on Fishery Management from 1993 to 1995 (ACFM) and a member of several research evaluation panels.

Dr Michael Gregg Pawson. Mike Pawson retired as senior fisheries advisor at Cefas, Lowestoft, after 39 years carrying out biological research and providing scientific advice to Defra, the EC and other national and international organisations on fish stock abundance, technical conservation measures and fisheries management regulations, and on related monitoring, sampling, survey and research programmes, including discard sampling in *Nephrops* fisheries. Between 1974 and 1980 he initiated and led acoustic surveys for blue whiting and mackerel, and trawl surveys in the North Sea and, from 1980 to 1990, designed and managed MAFF's coastal fisheries programme, implementing biological sampling, trawl surveys, a fishermen's logbook scheme and socio-economic evaluation of sea bass fisheries. Between 1990 and 2002 Mike led the Cefas Western demersal team, providing analytical assessments and management advice for 12 finfish stocks including saithe and, since 2002, directed and managed the assessment of salmon and eel stocks in England and Wales and provided scientific advice on their conservation.

During this time he was co-ordinator of the Anglo-French English Channel Fisheries Study Group (1989-1997), chairman of the ICES Southern Shelf Demersal Stock Assessment Working Group (1996-98), Seabass Study Group (2000-04) and Elasmobranch Study Group (2001-02), and initiated and managed EU-funded multi-national projects on methods for egg-production stock biomass estimation, bio-geographical identity of English Channel fish stocks, bio-economic modelling of Channel fisheries, development of assessment methods for elasmobranchs and marine recreational fishing, and chaired scientific and technical meetings for the EC's hake recovery plan in 2000. Since his retirement from Cefas in 2007, Mike has taken part in seven Marine Stewardship Council fishery assessments. Mike has provided scientific evaluation, quality assurance and advice to several national and EC-funded projects on fisheries biology, monitoring and assessment, and one of his major roles over the last 15 years has been peer-reviewing scientific papers, project proposals, reports and manuscripts in preparation, and 35+ MSC assessments. All of Mike's work has been published in refereed Journals, in ICES and EC working group reports, and in contract reports.

The reports from the Peer Reviewers are given in Appendix 2.

3 DESCRIPTION OF THE FISHERY

3.1 Unit(s) of Certification and scope of certification sought

3.1.1 Unit of certification

According to the the MSC Certification Requirements v1.2, the proposed unit of certification shall include the target stock (s), the fishing method or gear and the practice (including vessels) pursuing that stock. The MSC Certification Requirements Guidance V1.1 specifies that the unit of certification is *"The fishery or fish stock (= biologically distinct unit) combined with the fishing method/gear and practice (= vessel(s) pursuing that stock"*. According to this definition, the re-assessment report addresses ten units of certification to maintain the ten individual certificates of compliance which were issued following the initial certification (Table 2).

The reassessed fisheries are defined as:

Species:	Saithe (*Pollacius Virens)*	
Stock:	Norway North East Arctic (NEA) saithe	Norway North Sea (NS) saithe
Geographical areas:	Norwegian EEZ ICES Sub-Areas I and II / FAO statistical area 27 (Figure 1)	North Sea ICES Area IV / FAO statistical area 27 (Figure 1)
Harvest methods:	Danish seines, Demersal trawl, Hooks and lines (not specified), Seine nets (purse), Gill Nets (not specified)	
Management	The NEA saithe stock is managed by Norwegian Authorities	The NS saithe stock is managed under EU-Norway Agreement and by Norwegian Authorities.
Client group / Fishing boats:	The certification applies to all vessels in the Norwegian fleet	

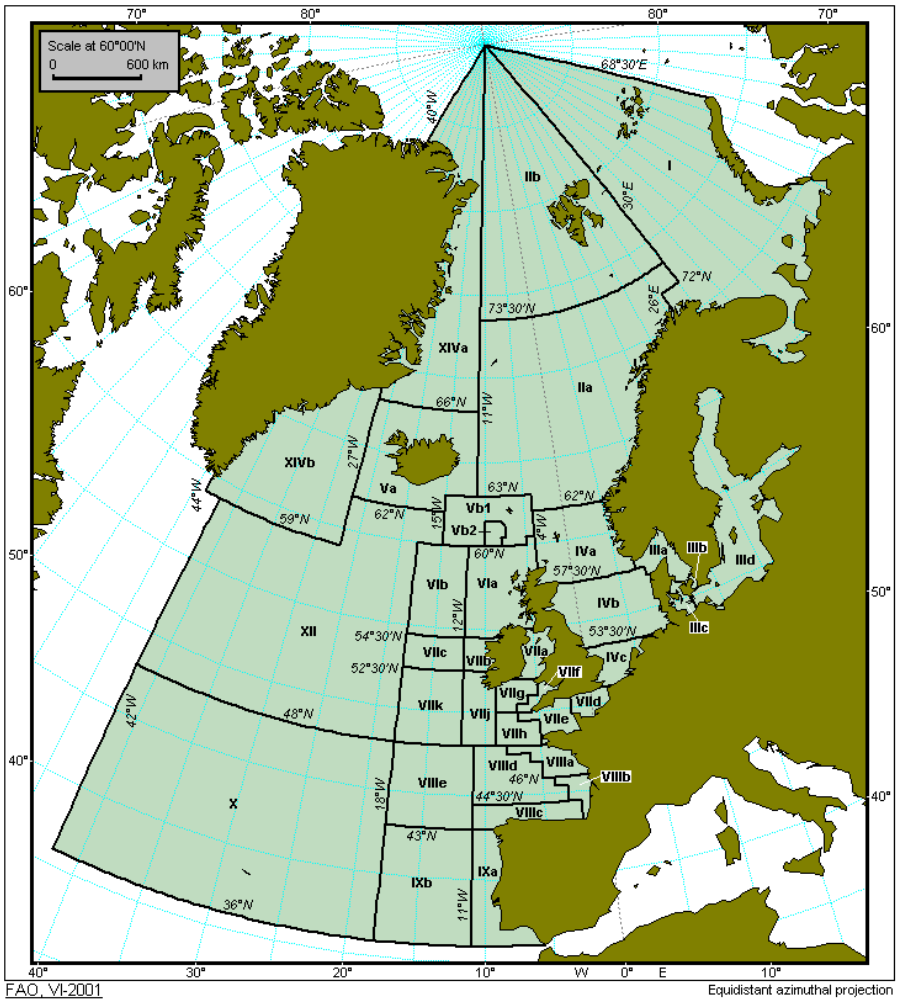

Figure 1 ICES areas including Norwegian EEZ ICES Sub-Areas I, II and IV (www.fao.org)

Actual Certificate#	Name	Validity End Date
DNV-NOR-MSC-F-60001-2009	Norwegian NS Saithe Trawl Fishery	15.06.2013
DNV-NOR-MSC-F-60003-2009	Norwegian NS Saithe Purse-Seine Fishery	15.06.2013
DNV-NOR-MSC-F-60004-2009	Arctic Saithe Danish-Seine Fishery	15.06.2013
DNV-NOR-MSC-F-60005-2009	Arctic Saithe Gill-Net Fishery	15.06.2013
DNV-NOR-MSC-F-60006-2009	Arctic Saithe Handline Fishery	15.06.2013
DNV-NOR-MSC-F-60007-2009	Arctic Saithe Purse-Seine Fishery	15.06.2013
DNV-NOR-MSC-F-60008-2009	Arctic Saithe Trawl Fishery	15.06.2013
DNV-NOR-MSC-F-60009-2009	Saithe Danish-Seine Fishery	15.06.2013
DNV-NOR-MSC-F-60010-2009	North Sea Saithe Gill-Net Fishery	15.06.2013
DNV-NOR-MSC-F-60011-2009	North Sea Saithe Handline Fishery	15.06.2013

Table 2 Certificate numbers and validity dates

3.1.2 Rationale for unit of certification

The entire Norwegian fleet in the defined geographical areas has been included in the unit of certification.

3.1.3 Other Eligible fishers

No other eligible fishers have been identified and the client does not wish to open for certificate sharing

3.1.4 Scope of Assessment in Relation to Enhanced Fisheries

From the information gathered during the assessment there are no indications of enhancement in this fishery.

3.1.5 Scope of Assessment in Relation to Introduced Species Based Fisheries

The Norwegian North East Arctic and North Sea saithe fisheries are not based on introduced species.

3.2 Overview of the fishery

3.2.1 Client name and contact information for the assessed fisheries

Coordinator name	**Norges Sjømatråd (Norwegian Seafood Council)**
Contact person	Ingrid Dahl Skarstein (NSC)
Address	Strandveien 106, Postboks 6176, 9291 Tromsø, Norway
Telephone	+ 47 77 60 33 33
Email	postmottak@seafood.no

Client	**Norwegian Fleet, represented by Fiskebåtredernes Forbund**
Contact person	Jan Ivar Maråk
Address	Røysegata 15, 6001 Ålesund, Norway
Telephone	+ 47 70 10 14 60
Email	fiskebat@fiskebat.no

3.2.2 Client information

3.2.2.1 Norwegian Seafood Council

The Norwegian Seafood Council (NSC) is a public company owned by the Ministry of Fisheries and Coastal Affairs and financed by the Norwegian Seafood industry through fees levied on all exports of Norwegian Seafood. NSC's activities are focused on three main areas as shown in Table *3*.

NSC Focus areas	Main activities
Joint marketing	• Support sales efforts of Norwegian exporters; • Joint marketing activities together with partners within the Norwegian Seafood industry; • Increase awareness of and preference for Seafood from Norway; • Establish a good foundation for the individual exporters when they are promoting their products to consumers all around the world.
Market Information	• Monitor trends and developments in global seafood sales with a special focus on Norwegian Seafood. • Produce monthly statistics for Norwegian Seafood export; • Gather updated information on import quotas, tariff rates and trade conditions in the various markets; • Advise Norwegian exporters on current framework trade conditions.
Communication and reputational risk management	• Increase market awareness of Norwegian Seafood through corporate communication, press grants and PR activities; • Safeguard and strengthen the image of Seafood from Norway and contribute to social debate with accurate, updated information about Norwegian seafood products and the Norwegian Seafood industry.

Table 3 NSEC focus areas and main activities.

NSEC has established five advisory marketing groups, one for each of the most important seafood sectors:

- Norwegian Salmon and Norwegian Fjord Trout
- Ground fish (cod, saithe, haddock etc.)
- Prawns and shellfish
- Conventional products (salted fish, clip fish and stock fish)
- Pelagic products (herring, mackerel and capelin)

NSEC head office is located in Tromsø, Norway while representative offices are located all over the world, including Sweden (Stockholm), Germany (Hamburg), France (Paris), Spain (Madrid), Portugal (Lisbon), Italy (Milan), Russia (Moscow), Brazil (Rio de Janeiro), Japan (Tokyo), Singapore, China (Beijing) and the USA (Boston)[1].

Each year, NSC implements around 500 marketing projects in 25 different countries all aimed at increasing demand for and consumption of Norwegian Seafood. In this context they coordinate the process of MSC Fisheries certification for the following fisheries, and in this respect represents the whole Norwegian fleet:

- North East Arctic cod
- North East Arctic haddock
- North East Atlantic mackerel;
- North Sea and Skagerrak herring;
- Norwegian Spring Spawning herring
- **North East Arctic saithe**
- **North Sea saithe**
- North East Arctic cold water prawn

3.2.2.2 Norwegian Fishing Vessel Owners Association

Fiskebåtredernes Forbund, the Norwegian Fishing Vessel Owners Association (NFVOA), is an employers' organization and representative body for the vast majority of Norwegian fishing boats over 27.5 meters.

The NFVOA represents its members in all consultations and negotiations concerning management of the fishery and provides members with up-to-date information whenever there is a change in regulations. The organization is active in a number of reference groups and takes every opportunity to contribute to further development in the relevant science, assessment and management of demersal stocks, not least with respect to gathering and providing reliable, high-quality data. In this context, NFVOA works effectively with the Ministry of Fisheries and Coastal Affairs (MFCA), the Directorate of Fisheries (DoF) and the Institute of Marine Research (IMR). In particular, NFVOA tries to influence the government to grant more resources for stock assessments since this is crucial to the setting of quotas, and promotes the message that sustainability and accuracy is in everyone's interest, including the fishermen.

3.2.3 The Norwegian saithe fisheries

The Norwegian saithe fisheries take place in two regions. The North East Arctic saithe stock is distributed from the Kola peninsula (Russian coast) in the north-east, south to Stad on the Norwegian coast at 62°N in ICES Sub-areas I and II. The North Sea saithe stock is distributed mainly along the northern edge of the continental shelf and in the Norwegian trench, an area which extends from the

[1] Norwegian Seafood Council: http://en.seafood.no/About-us

Skagerrak in the east, north of the Shetland Isles to off North West Ireland in the west, covering ICES Divisions IIIa, IVa and Sub-area VI. The northern boundary of the stock is at latitude 62°N. The stock boundaries are recognized as being for management purposes only.

3.2.3.1 Summary of the North Sea saithe fishery

A variety of gears are used in Norwegian saithe fisheries but North Sea saithe (ICES Sub-area IV, North Sea, and Division VIa, West of Scotland) are mainly taken in a directed trawl fishery in deep water at the edge of the continental shelf in the northern North Sea and along the Norwegian Trench. Norway has *c.* 50 % of the total allowable catch from the North Sea saithe stock and in a typical year, *c.* 80% of the Norwegian catch is taken by bottom trawl, *c.* 10% by gillnet and long-line, 10% from purse seine and a small amount with other fishing gears. Norway has introduced a 120 mm cod-end mesh size in trawls used by Norwegian-registered fishing vessels and all vessels fishing in Norwegian waters. Within EU waters, the regulations permit 110 mm cod-end mesh in trawls.

Since juvenile fish are distributed inshore and are virtually inaccessible to commercial fishing gear (or monitoring methodologies) until they are about 3 years old, discarding of young fish is assumed not to be a problem in this fishery (ACOMnss, 2012)[2]. By-catch of other demersal species occurs in some saithe trawl fisheries and saithe is also taken as unintentional by-catch in other demersal fisheries. In EU waters, discards may occur if vessels do not have a saithe quota; in Norwegian waters discarding is prohibited by law. Discarding appears to be a problem primarily associated with Scottish trawlers (WGNSSK, 2012)[3]. Total discards in 2011 were estimated to be 4900 t from 94 kt total landings from the North Sea and Skagerrak (WGNSS, 2012).

The Norwegian Coastguard and EU fishery enforcement agencies maintain a close presence with the demersal fishing fleet throughout their respective waters with on-board inspection, visual observation from sea and surveillance aircraft over-flights. IMR maintain an observer presence on up to 20 coastal and 11 offshore reference vessels in the demersal fleet, primarily for the purposes of biological sampling (which ICES suggest could be improved; ACOMnss, 2012) but also recording losses through gear damage or discarding and the presence of marine mammals (Anon. 2010[4]; Bowering *et al.*, 2011[5]). These data are raised to estimate total losses across the fleet. Both the DoF and IMR information indicate that the frequency and quantities of discarded fish slipped are low (ACOMnss, 2012) and too small to have a significant effect on the reliability of the annual assessment or undermine the management regime.

The IMR has agreed with the Norwegian Institute for Nature Research (NINA) that IMR observers will add seabirds to their list of by-catch species to be recorded. This will improve the quality of information that is available but no organisation (ICES, NINA, Norwegian NGOs) has raised any specific concerns with respect to retained, by-catch or ETP species in this fishery. Hitherto, no birds, marine mammals or ETP species have been recorded other than in the coastal pelagic fleet reference-vessel catches (Bowering *et al.*, 2011). Since 2011, all vessels >21 m are required to record catches of

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2 ACOMnss, 2012. Ecoregion: North Sea; saithe in Subarea IV (North Sea, Division IIIa (Skagerrak) and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2010/2010/sai-3a46.pdf

3 WGNSS, 2012. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak. ICES CM 2010/ACOM:13. http://www.ices.dk/reports/ACOM/2012/WGNSSK/Sec%2011%20Saithe%20in%20Subareas%20IV,%20VI%20and%20Division%20IIIa.pdf

4 Anon. (2010). The Norwegian Reference Fleet – a trustful cooperation between fishermen and scientists. *Focus on Marine Research* 1-2010. Institute of Marine Research, Bergen. Available at http://www.imr.no/filarkiv/2011/10/referencefleet.web.2010.pdf/en

5 Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, H. H., Gullestad, P. & Lorentsen, E. (2011). *Evaluation of the Norwegian Reference Fleet*. Institute of Marine Research, Bergen. Available at http://www.imr.no/filarkiv/2011/11/hi-rapp_16-2011_norsk.pdf_1/en

all sensitive species (e.g. ETP species), including estimates of quantities of cold-water coral or sponges taken in trawls.

An aspect of the Coastguard surveillance duty is operation of the real time closure system that has been in force along the Norwegian Coast and in the Barents Sea since 1984, aimed at protecting juvenile fish. Based on scientific research data and mapping by Coastguard-chartered sentinel-fishing vessels. Fishing is prohibited in areas where the proportion by number of undersized cod, haddock and saithe combined exceeds 15% (the size limits vary by species). The time of notice before a closure of an area comes into force is 24 hours for Norwegian-registered vessels and 7 days for foreign-registered vessels. Before formal closure, the Coastguard requests vessels not to fish in an area with too much small fish observed during their inspections. A closed area is not opened until there is documented evidence of low juvenile catch rates from Coastguard sentinel-fishing vessels. An evaluation of the effectiveness of the system up to 1998 found a clear decrease in the discarding of small cod and haddock.

3.2.3.2 Norwegian North Sea saithe stock developments and fishery management

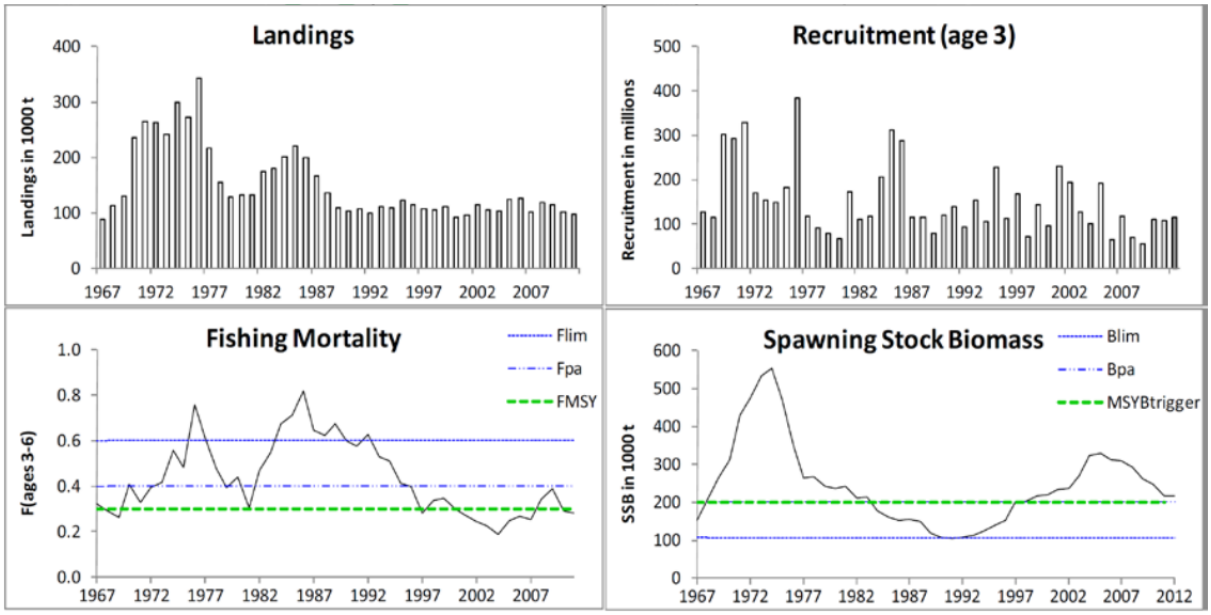

Figure 2 Saithe (in Subareas IV and VI, and Division IIIa. Summary of landings and stock assessment (weights in 000 tonnes) up to 2011 (ACOMnss, 2012).

The total landings reported to ICES in recent years have been less than the internationally agreed TAC (ACOMnss, 2010)[6]. It is sometimes suggested that when this happens it is indicative of errors in the scientific assessment. In this instance, however, a survey of the fishing industry (Napier, 2010)[7] suggests it is a function of very low prices for saithe, coupled with high fuel prices, that is causing these reductions in targeted fisheries. The survey also found that the industry perception is of increasing saithe abundance in the central and northern North Sea in 2009, with low or stable abundance in the south western North Sea.

[6] ACOMnss, 2010. Ecoregion: North Sea; saithe in Subarea IV (North Sea, Division IIIa (Skagerrak) and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2010/2010/sai-3a46.pdf

[7] Napier, I.R., 2010. Fishers' North Sea Stock Survey 2010. North Atlantic Fisheries College, Shetland, UK. http://www.nsss.eu/files/2010/NSSS-2010-FINAL-1.pdf

The fishery is managed according to an EU–Norway agreed management plan that was reviewed and renewed in 2008. ICES has endorsed the plan as being consistent with the precautionary and MSY-based approach. ICES follows established age-based analytical methodologies that take uncertainties into account in its assessment. The assessment and management plan utilise precautionary and MSY-based reference points consistent with MSC policy. Under normal circumstances various assumptions governing input parameters for the analysis are validated by the results from two Norwegian and one international (including Norway) scientific surveys and three (France, Germany and Norway) commercial trawl catch-per-unit-effort (cpue) indices (ACOMnss, 2012) but conflicting signals among the scientific surveys have become more apparent. All scientific surveys on adults have shortcomings in depth range (International Bottom-Trawl Survey-Q3) or coverage (Norwegian acoustic survey) and catches from older age classes in the surveys are not representative. Therefore, ICES placed greater reliance on the commercial cpue indices validating the assessment input parameters (ACOMnss, 2012).

In addition to this modification in the assessment procedures, the age distribution of Norwegian catch data has been revised substantially for 2010. This had significant implications for the overall assessment not least the biomass. Whereas the previous year's assessment indicated fishing mortality in excess of F_{msy} and biomass below MSYtrigger, the revised estimate shows that fishing mortality is at or about F_{msy} and biomass is marginally greater than MSYtrigger (Figure 2; ACOMnss, 2012). The declining trend in biomass over the past 5–6 years is principally a function of low–average recruitment since the last big year class in 2005 (Figure 2).

With respect to environmental interactions, ICES has noted (ACOMnss, 2012) a decrease in the mean weight-at-age since the mid-1980s, but the trend has now reversed (contributing in part to the positive revision in stock assessment 2012 compared with 2011). No other biological observations or concerns were raised with respect to the North Sea saithe stock. Indeed, ICES goes so far as to suggest that the saithe fishery exerts a lighter environmental footprint with respect to demersal biota than that of other trawl fisheries (ACOMnss, 2012).

Insofar as there is by-catch in the saithe fishery, it is principally cod and haddock, for which all vessels engaged in saithe fishing have quota (and *vice versa*) and must abide by the corresponding harvest control rules and management plans. The North Sea and Subarea VI (West of Scotland–Rockall) cod stocks remain below all biological reference points (there are no MSY-related reference points) and ICES continues to advocate a zero TAC for these stocks (ACOMnsc, 2012[8]; ACOMrc, 2012[9]; ACOMwsc, 2012[10]). Nevertheless, the EU–Norway has agreed TACs and any cod taken in the saithe fishery counts against the vessel and Norwegian quotas. There is also an internationally agreed cod recovery plan, which includes provisions for seasonal and real-time closed areas, to which Norway is a signatory.

In contrast, the North Sea haddock stock is in a relatively robust condition, SSB is above and fishing mortality is below MSY-related reference points (ACOMnsh, 2010)[11]. In Subarea VI and Division Vb (Rockall), however, the stocks are at or below the MSY-related reference point Btrigger and ICES is

[8] ACOMnsc, 2012. Ecoregion North Sea: cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and IIIa West (Skagerrak). ICES Advice Book 6.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-347.pdf

[9] ACOMrc, 2012. Ecoregion Celtic Sea and West of Scotland: cod in Division VIb (Rockall). ICES Advice Book 5.4.22. http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-rock.pdf

[10] ACOM,wsc, 2012. Ecoregion Celtic Sea and West of Scotland: cod in Division VIa (West of Scotland). Ices Advice Book 5.4.21. http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-scow.pdf

[11] ACOMnsh, 2012. Ecoregion North Sea: haddock in Subarea IV (North Sea), Division VIId (Eastern Channel), and IIIa West (Skagerrak) ICES Advice Book 6.4.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/had-34.pdf

advocating a precautionary approach relative to the draft management plan (ACOMrh, 2012[12]; ACOMwsh, 2012[13]).

3.2.3.3 Summary of the Norwegian NEA Sea saithe fishery

Norway accounts for more than 90% of the landings of NE Arctic saithe. Saithe are widely distributed throughout the NE Arctic but most of the fish is taken in offshore waters (i.e. > 12 miles from baselines) of the Norwegian Sea (ICES Sub-area II).

Norway accounts for more than 90% of the landings with about 40% of the Norwegian catch coming from bottom trawl, 25% from purse seine, 20% from gill net and 15% from other conventional gears (long line, Danish seine and hand line). The gill net fishery is most intense during winter, purse seine in the summer months while the trawl fishery takes place more evenly all year around (ACOMneas, 2012)14.15 In the Norwegian fishery, quotas may be transferred between one gear grouping and another if it becomes clear that the quota allocated to one of the fleets will not be taken.

In addition to quotas, the fisheries are managed by minimum mesh size, minimum size of fish in the catch, by-catch regulations, area closures, and other area and seasonal restrictions. Furthermore, sorting grids are used in the trawl fishery. Norway has a 120 mm cod-end mesh size in trawls used by all vessels fishing in Norwegian waters. (Within EU waters, the regulations permit 110 mm cod-end mesh in trawls.) Since the early 1960s, purse seiners and trawlers have dominated the fishery, with a traditional, gillnet fishery for spawning saithe as the third major component. The purse-seine fishery is conducted in coastal areas and fjords. Historically, purse-seiners and trawlers have taken, approximately, equal shares of the catches. Regulation changes led to a reduction in the amounts being taken by purse-seiners after 1990.

In the purse-seine fishery, slipping has been reported, mainly related to minimum size of fish in the catch. There is little quantitative information on discarding, which is illegal, other than what is gathered by IMR observers on reference-fleet vessels. Overall, however, discarding is considered to be low (ACOMneas, 2012).

The Norwegian Coastguard maintains close surveillance on the demersal fishing fleet throughout Norwegian waters with on-board inspection, visual observation from sea and surveillance aircraft over-flights. IMR maintain an observer presence on up to 20 coastal and 11 offshore reference vessels in the demersal fleet, primarily for the purposes of biological sampling but also recording losses through gear damage or discarding and the presence of marine mammals (Anon. 2010; Bowering *et al*., 2011). These data are raised to estimate total losses across the fleet. Both the DoF and IMR information indicate that the frequency and quantities of discarded fish slipped are low (ACOMneas, 2012) and too small to have a significant effect on the reliability of the annual assessment or undermine the management regime.

The IMR has agreed with the Norwegian Institute for Nature Research (NINA) that IMR observers will add seabirds to their list of by-catch species to be recorded. This will improve the quality of information that is available but no organisation (ICES, NINA, Norwegian NGOs) has raised any specific concerns with respect to retained, by-catch or ETP species in this fishery. Hitherto, no birds,

[12]ACOM, rh, 2012. Ecoregion Celtic Sea and West of Scotland: haddock in Division VIb (Rockall). ICES Advice Book 5.4.24. http://www.ices.dk/committe/acom/comwork/report/2012/2012/had-rock.pdf

[13] ACOM, wsh, 2012. Ecoregion Celtic Sea and West of Scotland: haddock in Division VIa (West of Scotland). ICES Advice Book 5.4.23. http://www.ices.dk/committe/acom/comwork/report/2012/2012/had-scow.pdf

[14] ACOMneas, 2010. Ecoregiona Barnets Sea ans Norwegian Sea: Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2010/2010/sai-arct.pdf

marine mammals or ETP species have been recorded other than in the coastal pelagic fleet reference-vessel catches (Bowering *et al*., 2011).

An aspect of the Coastguard surveillance duty is operation of the real time closure system that has been in force along the Norwegian Coast and in the Barents Sea since 1984, aimed at protecting juvenile fish. Based on scientific research data and mapping by Coastguard-chartered sentinel-fishing vessels. Fishing is prohibited in areas where the proportion by number of undersized cod, haddock and saithe combined exceeds 15% (the size limits vary by species). The time of notice before a closure of an area comes into force is 24 hours for Norwegian-registered vessels and 7 days for foreign-registered vessels. Before formal closure, the Coastguard requests vessels not to fish in an area with too much small fish observed during their inspections. A closed area is not opened until there is documented evidence of low juvenile catch rates from Coastguard sentinel-fishing vessels. An evaluation of the effectiveness of the system up to 1998 found a clear decrease in the discarding of small cod and haddock. The current, historically good conditions of NE Arctic stocks indirectly indicate the success of the joint Norwegian–Russian area closure system in the northeast Arctic (ACOM$_{neas}$, 2012).

3.2.3.4 Norwegian NEA saithe stock developments and fishery management

In 2011, Norway took *c.* 143 kt of NE Arctic saithe from a total international catch of *c.* 157 kt (ACOMneas, 2012). There has been a negative trend in total landings since 2006, partly a response to a declining SSB, itself a function of poor to average recruitment (Fig 4.2), partly a response to low prices for saithe, coupled with high fuel prices, causing these reductions in targeted fisheries (Napier, 2010; pers. comm. NFVOA).

The annual stock assessment is based on an extended survivor analysis (XSA) vertion of virtual population analysis (VPA). It is refined and validated with data from two Norwegian scientific surveys. At present, neither IMR nor ICES has defined MSY-based reference points for this stock but the HCR is based on well-established biological reference levels (B_{pa}, B_{lim}, F_{pa}, F_{lim}) including F_{pa}, which, in many fisheries, is at the same or similar level to that subsequently defined as F_{msy}, and B_{pa} (= Btrigger, the level at which corrective measures are initiated to rebuild stock towards B_{msy}) the ICES proxy for B_{msy}. In practice, the fishery is managed according to a Norwegian management plan (harvest control rules – HCR) that has been reviewed and endorsed by ICES as being consistent with the precautionary approach (ACOM$_{neas}$, 2012). Indeed, the management plan defined fishing mortality rate (FMP = 0.32) is lower than the ICES precautionary level (F_{pa} – 0.35).

Since 1995, SSB has been above B_{pa} but has decreased in recent years (Figure 4.2). Fishing mortality has been well below F_{pa} since 1996, although it has shown a rising trend since 2004–5 and is currently estimated to be *c*. F_{pa} (Figure 4.2). As with any saithe stock, recruitment cannot be estimated until the fish join the exploited stock due to the littoral–cryptic distribution and behaviour of the juvenile fish. Over time, the stock has maintained a relatively robust mean recruitment, albeit with inevitable peaks and troughs (Figure 4.2). The 2002 year class was the highest in the time-series 1960–2004 but the 2003 and 2004 were among the lowest and the 2005 year class is estimated to be around average. Poor year classes may be a function of reduced inflow of warm Atlantic water to the Norwegian Sea and Barents Sea (ACOM$_{neas}$, 2010).

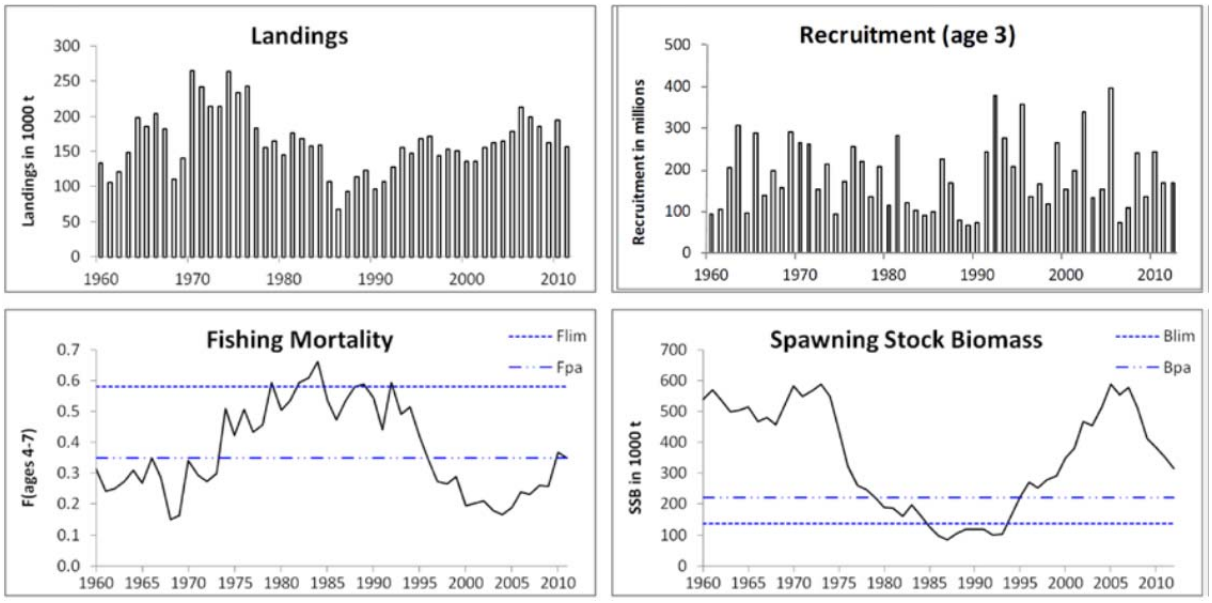

Figure 3 Summary of saithe stock assessment in Subareas I (Barents Sea area) and II (Norwegian Sea area); weights in kt (ACOMneas, 2012).

The lack of any credible recruitment index in advance of recruitment to the fishable stock is an ongoing, but unavoidable, weakness in the annual assessment process. In addition, the closure of the Norwegian harbour sampling programme in favour of the at-sea monitoring programme maintain by IMR–DoF–Coastguard possible results in catches from some (coastal) sector catches being under represented in the data.

The recent negative trend in recruitment has resulted in a comparable negative trend in spawning stock biomass although it is currently still *c.* 100 kt above B_{pa} (ACOMneas, 2012). ICES advice for 2013 is based on the management plan implemented by the Norwegian Ministry of Fisheries and coastal affairs and suggests that catches in 2013 should be no more than 164 kt. ICES maintains its advice that by-catches of coastal cod and *Sebastes marinus* advised should be kept as low as possible but does not advocate any specific protective or conservation measures with respect to these species taken in this fishery (ACOMneas, 2012).

3.2.4 Marine Environment Research

The principal Norwegian research marine environment research institute with specific responsibilities for the monitoring, assessment and provision of advice on living marine resources is the Institute of Marine Research (IMR), Bergen (Havforskningsinstituttet; http://www.imr.no/en). Although IMR has primary responsibility with respect to fisheries and all associated marine environmental research, it work in close partnership with numerous other Norwegian research and advisory bodies; e.g. the Norwegian Institute for Nature Research (NINA; http://www.nina.no/ninaenglish/Start.aspx), the Norwegian Polar Institute (NPI; http://www.npolar.no/en/), the Fridtjof Nansen Institute (FNI; http://www.fni.no/) as well as several of the Norwegian universities. IMR is also an active participant in or scientific advisor to the many international bodies that undertake or coordinate research and management in the marine environment and its resources; e.g. the Joint Norwegian–Russian Fisheries Commission (JNRFC; http://www.jointfish.com/eng), the Oslo and Paris Commission for the protection and conservation of the North-East Atlantic and its Resources (OSPAR; www.ospar.com), the International Council for the Exploration of the Sea (ICES, www.ices.dk), the International Whaling Commission (IWC; www.iwc.org), the North East Atlantic Fisheries Commission (NEAFC), the North Atlantic Marine Mammal Commission (NAMMCO;

www.nammco.no), the Baltic Marine Environment Protection (Helsinki) Commission (HelCom; www.helcom.fi). Although Norway is not a member of the European Union (EU), IMR is an active participant in many of the marine environment and resource research and development projects facilitated and coordinated by the European Commission (EC).

Much of the monitoring and research undertaken by IMR is aimed at meeting the short-term need for advice on the management of fish stock year-on-year. In this context it is among the leading world research institutes and has established a substantial body of data relating to its principal living marine resources dating back seventy years or more. This substantial body of information provides a bedrock upon which to base its long-term objectives for the development of ecosystem models[15,16] that will underpin more holistic, ecosystem-based management plans such as the Barents Sea–Lofoten Management Plan (MFCA, 2012;[17] Olsen *et al*., 2007)[18] and the Norwegian Sea management plan (MinEnv, 2009).[19] When the Norwegian North Sea–Skagerrak management plan (Klif, 2012)[20] is finalised and implemented in 2013, all Norwegian waters will be subject to integrated management plans. These plans seek to balance the needs of all the component parts of the ecosystem, e.g. predator–prey interactions, as well as ensuring the long-term sustainability of the commercial fisheries. The Norwegian ecosystem modelling programmes also contribute to the wider research efforts in this field (Bjørge, 2008;[21] Hjøllo).[22] Indeed, considerable research effort has been invested in modelling the interaction of fish species within the North Sea fish community and also within the wider North Sea ecosystem. In 1981 and 1991 ICES mounted a multinational fish sampling programme known as 'year of the stomach' to gather fish predator–prey data to underpin the multi-species virtual population assessment (MSVPA) model (Sparre, 1984);[23] such modelling work is ongoing (WGSAM, 2009; WGECO, 2010).[24,25]

A core activity for IMR is the gathering, collation and analysis of the data that underpin the assessment of individual fish stocks and their fisheries. Every fishing vessel must retain, record and land all commercial species, irrespective of quota allocations. These catch data are reported to and validated by the Directorate of Fisheries (DoF) before being passed to IMR as the basic building block of the stock assessments. In the past, these data have been complemented by a port-based biological sampling programme that gathered information on lengths, weights, sex, maturity stage and otoliths for ageing the fish. This port-based programme has been cut back in recent years (a cut-back that has raised concerns within ICES: $ACOM_{NEAsaithe}$, 2012;[26] $ACOM_{NSsaithe}$, 2012)[27] and such data are now gathered primarily during research-vessel trawl surveys and through IMR-trained crew self-

[15] ATLANTIS; http://www.imr.no/temasider/modeller/atlantis/atlantis/en
[16] NORWECOM.E2E; http://www.imr.no/temasider/modeller/norwecom.e2e/norwecom.e2e/en
[17] MFCA, 2012. Integrated Management Plans available at: http://www.fisheries.no/resource_management/Area_management/Integrated_management_plans/
[18] Olsen, E., Gjøsæter, H., Røttingen, I., Dommasnes, A., Fossum, P. & Sandberg, P. 2007. The Norwegian ecosystem-based management plan for the Barents Sea. ICES Journal 0f Marine Science 64: 599–602.
[19] MinEnv, 2009. Report No. 37 to the Storting (2008-2009) Integrated Management of the Marine Environment of the Norwegian Sea Report No. 37 (2008 – 2009) to the Storting.
[20] Klif, 2012. Integrated management plan for the North Sea and Skagerrak. Norwegian Climate and Pollution Agency, Oslo. http://www.klif.no/english/english/Areas-of-activity/Integrated-management-plan-for-the-North-Sea-and-Skagerrak/
[21] Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no
[22] Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf
[23] Sparre, P. 1984. A computer program for estimation of food suitability coefficients from stomach content data and multipsecies VPA. ICES CM 1984/25.
[24] WGSAM, 2009. Report of the Working Group on Multispecies assessment Methods. ICES CM 2009/RMC:10.
[25] WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf
[26] $ACOM_{NEAsaithe}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-arct.pdf
[27] $ACOM_{NSsaithe}$, 2012. Ecoregion: Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-3a46.pdf

sampling on the Norwegian reference fleet vessels (Bowering *et al*., 2011)[28]. These vessels are from all sectors of the fleet and are separated into inshore and offshore sectors Table 4.

Sector	Norwegian fleet	Reference fleet	%
Coastal demersal	5884	20	0.3
Offshore demersal	148	11	7.4
Coastal pelagic	174	2	1.1
Offshore pelagic	103	5	4.9
Total	6309	38	0.6
Fleet numbers 2010 (Bowering *et al*., 2011).			

Table 4: Norwegian fleet and reference fleet 2010 (Bowering et al., 2011).

In addition to the biological sampling the observers keep records of all species (macro-invertebrates, fish, birds and mammals) taken in the course of fishing. This is discussed in greater detail under bycatch, below.

Not only has IMR built up a substantial body of scientific data over the decades, its staff have also been at the forefront of publishing its findings through the local news media, national and international trade press, scientific meetings and internationally peer-reviewed journals and, most recently, through its own comprehensive web site. Much of the information that follows on the North Sea–Norwegian Sea ecosystem and its resources are a précis of what IMR has published.

[28] Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/en

3.3 Principle One: Target Species Background

3.3.1 Saithe Life History Outline

Because of its shoaling behavior, depth distribution and feeding habits, saithe is considered to be both a demersal and a pelagic species. They can be found living at depths between 0m and 500m and are known to make extensive vertical migrations. Saithe may congregate in very large shoals when the habitat is suitable and feeding conditions are good.

The species is distributed from the Bay of Biscay in the south to north of Norway in the Arctic Ocean and westwards via Greenland to the North American Atlantic coast. It is found to the west of the British Isles and in the northern North Sea but is uncommon in the English Channel, southern North Sea and most of the central North Sea.
Spawning occurs from January to April, to the north-west of the British Isles, in the northern North Sea, off Norway, around the Faroe Islands and south-west of Iceland. Spawning is well offshore in depths of 150 – 250m. In common with other large gadoids the species is highly fecund and a large female may spawn several million eggs. The planktonic eggs are spherical with a diameter of 1.0-1.22mm. The early stage eggs cannot be specifically identified but in the later stages the characteristic pigmentation of the embryo is a notable feature. The larvae hatch at about 3.5mm-4mm and their distinctive pigment patterns and gadoid shape ensure easy identification throughout their juvenile life history stages.

In early winter the North-east Arctic saithe make extensive spawning migrations southwards to their main spawning areas off the west coast of Norway. Spawning occurs mainly in February along the coastal banks from the Lofoten Islands in the north, southwards to the northern North Sea (Figure 4). The planktonic eggs and larvae drift northwards and by late spring the juveniles have reached a length of 2.5cm- 3.5cm and have begun to migrate into the fjords and inshore waters. The young fish then spend their first three to four years in this coastal environment feeding mainly on planktonic organisms, like copepods and euphausids, but are also able to change to a benthic diet if conditions dictate. With increasing age they gradually move off into deeper water where they become part of the fishable stock. This inshore habitat makes it virtually impossible to carry out pre-recruit surveys to assess the abundance of year classes prior to the fish entering the fishery.

In the northern North Sea spawning aggregations of North Sea saithe are found along the northern continental shelf edge and along the western edge of the Norwegian trench. Spawning occurs from January through to March in these areas at depths of around 200m. The planktonic eggs, larvae and post larvae are widely distributed in the Atlantic water masses in the northern North Sea. By late spring the juveniles begin to appear in the coastal waters around the Shetland Isles, Scotland and Norway. The inshore areas on the west and southern coasts of Norway are probably the most important nursery areas for the North Sea saithe stock.

As they grow and move offshore the feeding strategy of saithe changes from being mainly planktivores to become voracious predators feeding opportunistically on sandeel, herring, sprat, Norway pout, haddock, blue whiting and other young fish. They are known to make extensive migrations following shoaling aggregations of fish particularly herring and blue whiting. They grow rapidly at around 15cm per year for the first three to four years attaining an average weight of 1.5-2.0kg by age 4. They reach a length of 100cm (10-12kg) at around fourteen years of age and can reach a maximum length of around 130cm (ca 20 kg) at 25 to 30 years old.

There are observed differences in the proportion of saithe mature at age between the North-east Arctic and the North Sea. From the analysis of spawning rings on the otoliths of North-east Arctic saithe a

decreasing trend in the proportion mature at age has been noted in recent years. This can be seen in Table 5 which shows the three year running mean of the proportion mature for ages 4 to 15+ over the time period 2005 to 2011 (ICES, 2012a). This three year running mean is used in the stock assessment estimation of spawning stock biomass in order to smooth the observed annual fluctuations.

Year /Age	4	5	6	7	8	9	10	11	12	13	14	15 +
2005	0.03	0.30	0.82	0.97	0.99	1	1	1	1	1	1	1
2006	0.04	0.40	0.86	0.98	0.99	1	1	1	1	1	1	1
2007	0.05	0.42	0.87	0.97	0.98	1	0.97	1	1	1	1	1
2008	0.05	0.34	0.83	0.95	0.99	0.99	0.97	0.98	0.99	1	1	1
2009	0.03	0.27	0.70	0.91	0.97	0.98	0.97	0.98	0.99	1	1	1
2010	0.02	0.20	0.57	0.84	0.94	0.99	1	0.99	1	0.99	1	1
2011	0.02	0.19	0.46	0.80	0.91	0.98	1	0.99	1	0.99	1	1

Table 5 Proportion of North-east Arctic saithe mature at age over the period 2005 to 2011based on the running average over a three year period (ICES, 2012a).

For North Sea saithe the assessment working group (ICES, 2012b) has noted annual changes, since 1992, in the age at 50% maturity. This has varied from over 7 years old in 1996 to less than 4years old in 2001. In spite of these differences the annual estimation of spawning biomass is based on a fixed maturity shown in Table 6 where all fish of 7 years old and above are considered to be fully mature. This approach was endorsed by an ICES benchmark workshop (ICES, 2011a). After modelling the changes they considered the fixed maturity to give to be more statistically robust than a variable one based on annual changes.

Age	1	2	3	4	5	6	7+
Proportion mature	0	0	0	0.15	0.7	0.9	1.0

Table 6: The proportion of North Sea saithe mature at age

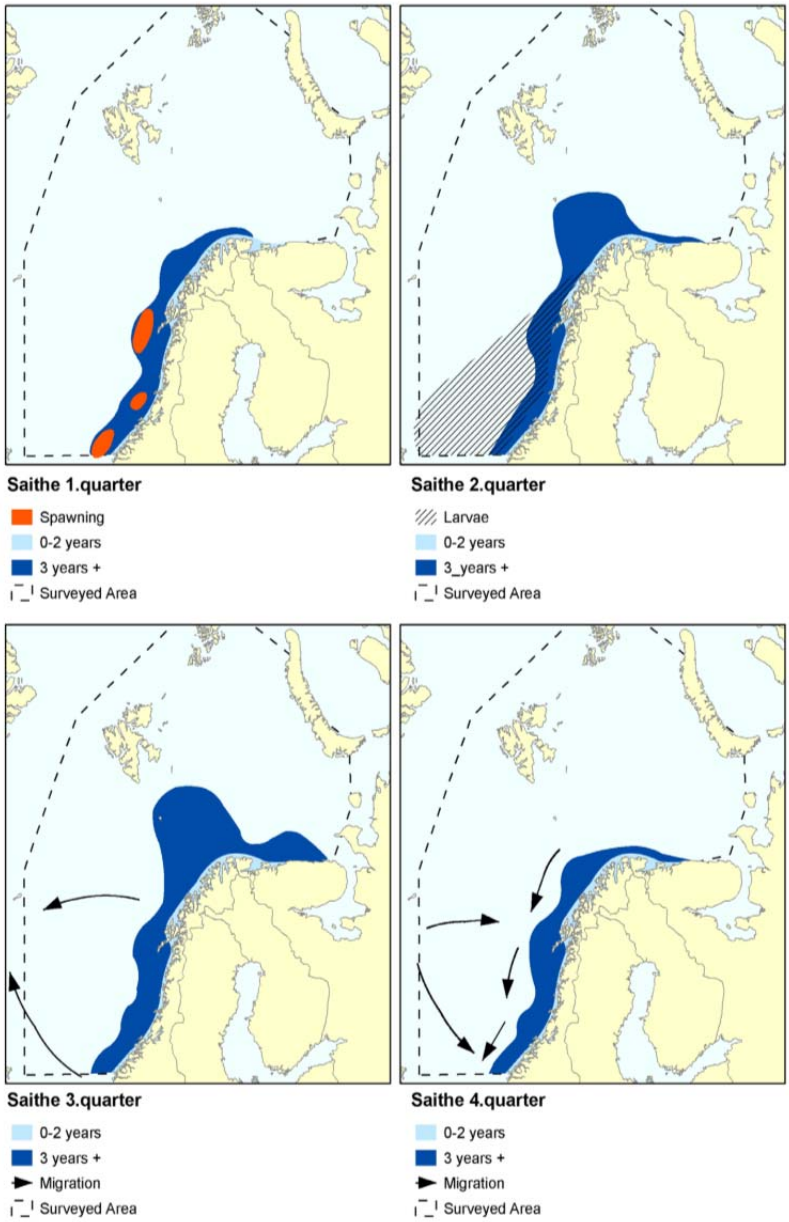

Figure 4 Distribution of the spawning areas, larvae and juveniles and the main migration patterns of North-east Arctic saithe in the four quarters of the year. (Figure from ICES, 2012a, stock annexe 5)

3.3.2 The history of the fishery

Fishing is an inherent part of the Norwegian tradition, culture and national character resulting in participation by both professional fishermen and part timers engaged in recreational fishing. Participating vessels vary from large offshore trawlers and purse seiners to small inshore vessels fishing nets and lines within fjords and along the open coast.

Norway takes over 90% of the North-east Arctic saithe catch and therefore the vast majority of the participating vessels are Norwegian. In the North Sea Norway takes over 50% of the catch with France, Germany, the UK and Denmark making up most of the remainder. The total number of Norwegian vessels which fish for saithe at any time is difficult to determine. However the proportion

of the annual catch taken by the various gear types is well documented. The majority of the North-east Arctic saithe catch is taken by trawlers (40%), followed by purse seiners (25%) and gill netters (20%). The remaining 15% is taken by various conventional gears including the Danish seine, long lines and hand lines (ICES, 2012a stock annexe 5). In the North Sea fishery most of the Norwegian catch, (85%), is taken by offshore trawlers fishing along the edge of the Continental shelf, with 9% taken by purse seiners, 4% by gill netters and the remaining 2% by the various conventional gears (ICES 2012b. stock annexe 3).

The fishery on the Northeast Arctic saithe occurs mainly in the near coastal waters out to around 400m depth, along the edge of the continental shelf. The area extends from the west Norwegian coast, north of latitude 62°N, along the north-west coast of Norway, the Finmark coast and into the Russian zone in the Barents Sea (ICES, 2012a stock annexe 5).

The fishery on the North Sea saithe stock occurs mainly along the northern Continental shelf edge from off the Hebrides in ICES sub-Area VI, north of the Shetland Isles and along the Norwegian trench. In the first quarter of the year the fishery tends to target spawning aggregations of mature fish whilst for the rest of the year a more general fishery includes immature fish. A small proportion of the annual catch is taken in a purse seine fishery along the west coast of Norway which targets juvenile fish (ages 2-4 years) in inshore waters (ICES, 2012b stock annexe 3)

All vessels participating in the fisheries are subject to a complex framework of management regulation, some common to all vessels, such as minimum landing size, with other regulations specific to vessel size or gear type all described in detail in Section 3.5. These include the effort control of demersal fisheries in the North Sea as an integral part of the North Sea cod recovery plan.

The descriptions of the gear are based on those previously used in the compilation of the assessment report on the Norwegian North-east Arctic offshore cod fishery www.msc.org/track-a-fishery/certified/north-east-atlantic/Norway-north-east-arctic-offshore-cod The majority of illustrations reproduced below are taken from *An Introduction to Commercial Fishing Gear and Methods Used in Scotland* published by Fisheries Research Services Marine Laboratory, Aberdeen, (Galbraith et al 2004) a publication that provides an ideal basic introduction to fishing gear and methods.

All Norwegian registered trawlers are engaged in single-vessel fishing; i.e., there are no pair trawlers towing a single net between them, each vessel tows its own trawl. Over the years there has been a great variety of development in trawl design to improve capture efficiency of certain species, operation in certain localities or to reduce operating costs. In the offshore saithe trawl fishery there has been a gradual movement towards more and more use of semi-pelagic gear operated just clear of the sea bed. This technique is entirely appropriate in relation to the partially pelagic and shoaling nature of this species. There is the added incentive of lower fuel costs, with less drag, and a reduced risk of gear damage from sea bed contact on rough ground. The semi-pelagic trawl is currently only permitted in the saithe fishery within the Norwegian 200nml EEZ, south of latitude 64°N. Prior to 2012 there was also a derogation to use this type of trawl in the saithe fishery north of 64°N. The results, of what was effectively a trial fishery in this area, are currently being reviewed, principally to check on the average size of the fish caught. Following the review the NFVOA expect to be able to resume the use of the semi-pelagic trawl in the saithe fishery north of 64°N.

The standard demersal trawl used in the saithe fishery is shown in Figure 5. The two towing warps lead from the fishing vessel to the otter boards, or doors, which act as para-vanes to pull the net open horizontally. These boards weigh 2–4 t and drag across the seabed; in so doing they have the potential

to disrupt seabed structure and damage seabed reefs or other protruding habitats. The boards are joined to the outer, wing-ends, of the trawl by the bridles, the lower parts of which may also drag across the seabed. In this type of demersal trawl the entire underside of the net from the footrope back to the cod-end is also in contact with the seabed. As a result both the trawl and the sea bed are likely to suffer some abrasion damage. In areas of relatively smooth seabed, e.g. sand or consolidated mud, the footrope can be relatively light and simple. On a hard, rocky seabed, such as is found throughout much of the Norwegian Sea, it is common practice to fit a rockhopper footrope (Figure 5). This enables the trawl to 'skip' over all but the largest seabed rocks and boulders. However, in doing so, it can also disturb seabed structure and communities by turning rocks and boulders over. On the larger vessels, the rockhopper discs (wheels) are 45 - 60cms in diameter.

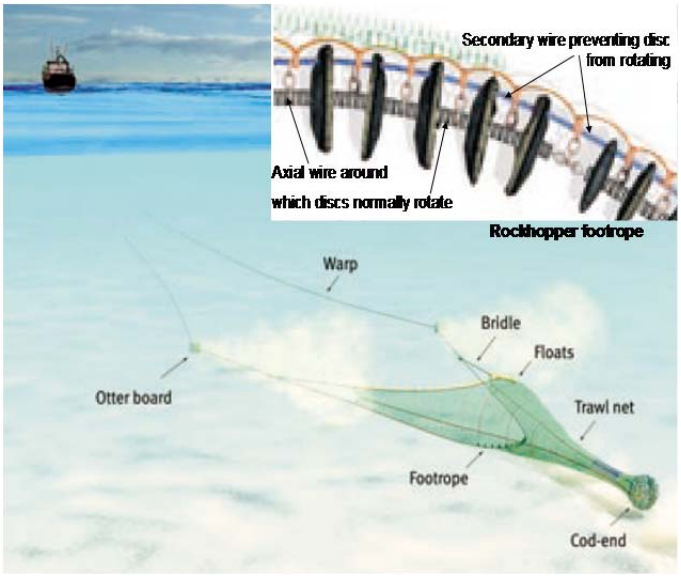

Figure 5 Outline of a demersal trawl with details of rockhopper footrope inset.

Among the key differences between demersal and pelagic trawls is that pelagic otter boards are larger (relative to the towing vessel) but never come into contact with the seabed. Whether they are used with a fully pelagic or a semi-pelagic trawl, the doors remain clear of the seabed, as do the bridles. Similarly, with both pelagic and semi-pelagic trawls, the body of the trawl from the belly to the cod end is towed clear of the seabed.

The principle difference between the two gears is that a fully pelagic trawl (Figure 6) is operated completely clear of the seabed, including the footrope, whereas semi-pelagic trawls in use in the saithe fishery, are fished with the footrope either in contact with the seabed or very close to it. As with full demersal trawls, the bottom-skimming trawl footrope of the semi-pelagic trawl can be very light on clear sandy grounds or rockhopper gear on hard, rocky ground. The industry is keen to move toward bottom-skimming, semi-pelagic in the saithe fishery both north and south of latitude 64^{o}N. These types of trawl are more fuel efficient than full demersal trawls. Environmentally, these gears have fewer adverse effects on ecosystem structure and function as they have either reduced or zero contact with the seabed habitat.

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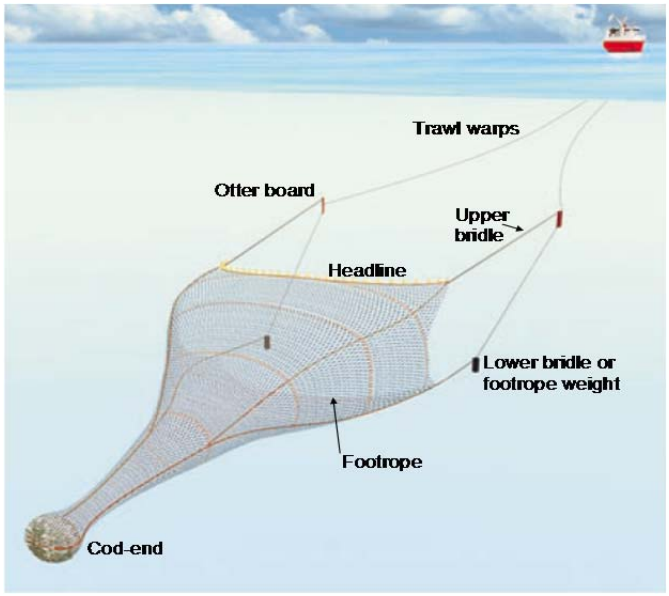

Figure 6 Outline of a full pelagic, i.e. mid-water, trawl as used in many fisheries for herring and mackerel.

Gill nets come in a variety of shapes and sizes, depending on the target species and deployment area. Those used in the Norwegian saithe fishery comprise plain panel netting, as shown in Figure 7, with 180 mm stretched mesh (90 mm bar length) net panels. Each panel is 50 meshes high (footrope–headline) and *c*. 30 m in length but 20–50 panels (depending on vessel size and location) are joined to form one net. Whilst and anchor is used to hold the net at the initial shoot (upstream) end of the net, a simple 20 kg weight is often used at the other end.

Gill nets are used mainly but not exclusively by the smaller (<27 m) vessels working within the fjords and along the coast. The gill net fishery is most intense during the winter. The smallest vessel may set the nets and stand by them for a few hours before hauling and returning to harbour but national legislation requires that all gill nets are hauled and the catch removed every 24 h, or less. Gill nets are highly size selective, either not retaining fish small enough to pass through the meshes or not admitting fish that are too large.

In spite of the close attention of the deploying vessel there is the potential for the gill net to be lost. This can be a particular problem in areas of very rough ground and strong tides. Every effort is made, by grappling, to recover lost gill nets not only because of their value but also because they may continue to fish for some time after their loss (ghost fishing). It is a requirement of their licence that vessels report lost gill nets and the NFVOA organise at least one recovery cruise each year to retrieve reported lost gear.

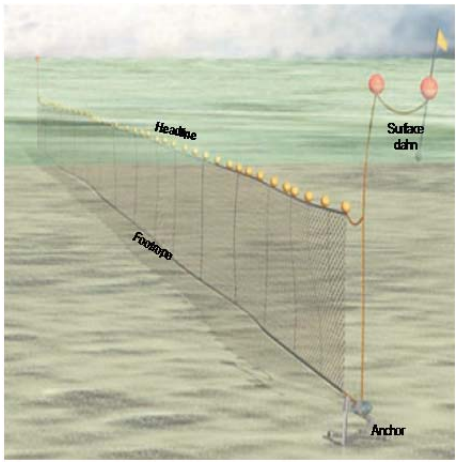

Figure 7 An outline of a gill net such as might be used in the Norwegian saithe fishery.

The general outline of a Danish seine is similar to the conical-bag shape of demersal trawls. In common with trawls, the net is also worked with two warps but there the similarity ends; the warps are wire-reinforced rope rather than heavy wire, there are no otter boards, only a simple cord-bound footrope is used and the gear is not towed.

A bottom or semi-pelagic trawler can make an economic catch from fish that are dispersed over a wide area, with tows lasting three hours or more and covering 10 to 15nml over the ground. However seine netters need to be fished where there is a high density of fish such as spawning concentrations and in areas where the seabed is relatively clear of obstructions which would damage the net. Once a suitable area has been located a marker dahn buoy is deployed (Figure 8) upstream of the target area. The vessel then steams away from the dahn simultaneously deploying the warp, the end of which has been attached to the dahn, to form one side of an eventual triangle. As the vessel nears the point at which half of its warp has been deployed the vessel turns through 90^{o} to lay the twin bridles, which connect the warp to the wing ends of the net, and then the net itself (Figure 8). Once the net and the second set of bridles are set, the vessel is turned towards the marker dahn, laying the second warp as it steams along the final leg of the triangle. The marker dahn and the other end of the warp are recovered and the vessel begins to haul the two warps simultaneously using a twin rope-coiling winch. Traditionally, Danish seiners would have anchored at this stage to ensure they had something to pull against. Current generation Danish seiners have sufficient power that the vessel can hold position and haul the net 'on the fly', i.e. without anchoring. As hauling commences, the warps straighten and gradually move toward the centre line, herding the fish as they do so. At the same time, the bridles and wing-ends begin to move forward and toward the centre line. By the time the warps are almost fully recovered the wings from each side of the net will have met enclosing the catch within the seine and cod-end. During this hauling process, the net will be towed c. the length of the warps, i.e. c. one mile but the fish will frequently not enter the cod end of the net until just prior to hauling on board. As a consequence the quality of the fish is superior to fish taken in a demersal trawl which may have been towed in the cod end of the net, along the seabed, for some considerable time. The environmental footprint of Danish seines, both in term of fuel consumption and seabed interaction, is significantly less than for demersal trawlers.

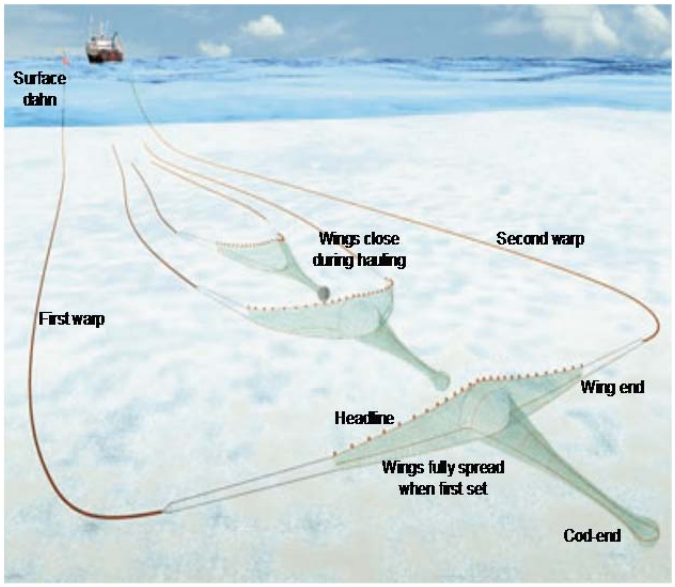

Figure 8 Outline of a Danish seine when first set and two further views during the process of hauling the seine

3.3.3 North East Arctic saithe – Stock assessment and management advice

3.3.3.1 Stock unit

The North-east Arctic saithe stock is distributed from the Kola Peninsula (Russian coast) in the north-east, south to Stad on the Norwegian coast at 62°N in ICES Sub-areas I and II. This southernmost stock boundary is recognised as being for management purposes only and that it has no strong biological basis (ICES, 2012a. stock annexe 5). It is known that there is mixing between adjacent saithe stocks in the North Sea the Faroe Islands and to some extent Iceland as well.

Tagging has shown that there are regular migrations of mature fish from the north Norwegian coast to the spawning areas off the west coast of Norway (ICES, 1965) but also to a lesser extent into the northern North Sea. There is also a substantial migration of immature saithe to the North Sea from the Norwegian coast between 62°N and 66°N (Jakobsen, 1981). In some years Jakobsen (1987) noted examples of mass migration from north Norway to Iceland and to a lesser extent to the Faroe Islands. '0'group saithe do also drift from the North Sea to the Norwegian coast north of 62°N.

3.3.3.2 Management plan

The Norwegian Ministry of Fisheries and Coastal affairs implemented a harvest control rule for the North-east Arctic saithe fishery in 2007. The harvest control rule contains the following elements (ICES, 2012a stock annexe 5; ICES, 2012c):

- estimate the average TAC level for the coming 3 years based on Fpa.
- TAC for the next year will be set to this level as a starting value for the 3-year period.
- the year after, the TAC calculation for the next 3 years is repeated based on the updated information about the stock development. However, the TAC should not be changed by more than +/- 15% compared with the previous year's TAC.
- if the spawning stock biomass (SSB) in the beginning of the year for which the quota is set (first year of prediction), is below Bpa, the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from Fpa at SSB=Bpa to 0 at SSB equal to zero.

> At SSB levels below Bpa in any of the operational years (current year and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.

The harvest control rule was evaluated by ICES in (2007) and again in 2011, due to changes introduced at the 2010 benchmark (ICES, 2010a). ICES concluded that it is consistent with a precautionary approach to the management of the fishery provided that the assessment uncertainty and error are not greater than those calculated from historical data. As a consequence all subsequent advice from ICES is based on the harvest control rule.

The overarching control of exploitation, resulting from the management plan and the annual advice on stock status from ICES is the annual TAC. The TAC is divided as quotas between fleets and gear types. Exploitation control is also supported by a raft of technical measures which address a wide range of potential uncertainty in relation to minimising the catches of immature saithe. These measures include minimum mesh size, closed areas and seasons, real time area closures, when high densities of juveniles are encountered and minimum landing sizes. The minimum landing regulations are related to both area and gear. For trawlers and other conventional gears the minimum landing size is 45cm reduced to 42cm north of Lofoten. For purse seiners the minimum landing size is 40cm between latitude 62^{o}N and Lofoten with the exception of the first 3000t of purse seine catch between 62^{o}N and 66^{o} 30'N where the minimum landing size is 35cm.

3.3.3.3 Biological reference points

Biological limit and precautionary approach reference points were re-estimated after the ICES assessment working group in 2005 (ICES, 2005) when the Fbar was changed from 3-6 to 4-7. Fbar is the age range of the fish, in years, for which annual fishing mortality is calculated in the stock assessment model. At the 2010 benchmark assessment the ICES working group (ICES, 2010a) re-evaluated the reference points after the age range in the assessment was changed from 11+ to 15+ years. After comprehensive analysis of all the relevant data and procedures the working group found that there were no compelling reasons to change the reference points. The current reference points on which the management of the stock is based are listed in Table 7. Maximum sustainable yield reference points have not yet been established for this stock. However the management plan targets for SSB and F are both precautionary and consistent with maintaining full reproductive capacity and a sustainable harvest. These reference points form an integral part of the management plan and the ICES advice on the exploitation of the stock. They are designed to maintain SSB above the management plan and precautionary approach spawning biomass target of 220,000t and to keep fishing mortality below the management plan level of F 0.35.

The Management plan SSB can therefore be considered as a target for the stock and a proxy for MSY. It is a point above which the stock is being harvested sustainably with full reproductive capacity and below which management action is triggered. This SSB target and the Management plan target F of 0.35 are considered to be both precautionary and consistent with MSY principles of maintaing full reproductive capacity and a sustainable harvest at a high level. These reference points are kept under regular review by ICES who have accepted that more work needs to be done in order to formally define MSY values for use in any future revision of the harvest control rule. At the last review in 2010 stochastic simulations showed that the highest long term yield, equivalent to MSY, is obtained at fishing mortalities lower than the Management plan target. However operation of the current harvest control rules has ensured that since 2011 F has remained below the Fmp (2012:F.31: 2013 predicted F0.52) and SSB has remained well above the SSBmp.

	Type	Value	Technical basis
Management plan	SSB_{MP}	220,000t	Bpa. The TAC is linearly reduced from Fpa at SSB=Bpa to 0 at SSB = zero
	F_{MP}	0.35	Average TAC for next 3 years based on Fpa
MSY approach	MSY $B_{trigger}$	Not defined	
	Fmsy	Not defined	
Precautionary	B_{lim}	136,000t	Change point in the regression. SSB/Rec
	Bpa	220,000t	Blim *exp(1.645*0.3)
	F_{lim}	0.58	F corresponding to an equilibrium stock =Blim
	Fpa	0.35	F set at level with 95% probability of avoiding Flim

Table 7 . Current reference points on which the management of the Norwegian NEA saithe stock is based.

3.3.3.4 The assessment model

The assessment model used by the Working Group is an extended survivor's analysis (XSA) commonly used within ICES and considered appropriate for many demersal stocks (Darby and Flatman, 1994). The model incorporates an age range matrix from 3 to 14 years with a plus group at 15 years. There are just two tuning indices available for calibration of the assessment only one of which is fishery independent. The fishery independent survey index is the Norwegian coast acoustic survey carried out in the fourth quarter of the year. The other index comprises catch per unit of effort (cpue) data from the Norwegian trawl fisheries. Up and until 2005 the assessment working group used a third tuning index, the cpue data from the Norwegian purse seine fishery. However this was found to have strong year effect bias and was therefore abandoned. At the 2010 benchmark workshop (ICES, 2010a) changes in the catch-ability at age were noted which affected the two remaining indices. These changes occurred around 2002 and as a result it was decided to split both indices into the periods before and after 2002. The Norwegian acoustic survey now comprises two indices, one covering ages 4 to 8 years for the period 1994 to 2001 and the other covering ages 3 to 7 years from 2002 to the last survey year. The Norwegian trawl survey is similarly split from 1994 to 2001 and 2002 to the last survey year with the age range, 3 to 15+ years, remaining the same for both periods. The age range had been changed from 3 to 11+ years in 2000 because of the increasing number of fish in the 11 plus group which is known to cause problems in virtual population analyses (VPA).

After thorough testing and with the implementation of the recommended changes the benchmark workshop in 2010 considered the XSA model to be entirely appropriate and robust for the stock. In the recent past other assessment models (ICA and ADAPT) have been tested and the results compared with XSA. It was concluded that there were no improvements to be gained from a change to another model.

3.3.3.5 Results of the annual assessments of stock status

Figure 9 shows the total annual landings of North-east Arctic saithe over the period 1960 to 2011. Over that period the annual landings have fluctuated reaching a peak of 264Kt in 1970 and in 1974. After that there was a steady decline, to just 67Kt in 1986. This has been attributed in part to the introduction of the national, 200nml, EEZs in 1977 with the restrictions on the catches by countries other than Norway. However, over this period there was a rapid decline in the spawning stock biomass (SSB) from 587Kt in 1973 to 85Kt in 1987 which must have been a major contributory factor in the decline in annual catches (Figure 10). The SSB did not begin to recover until the mid-1990s

when annual landings also began to steadily increase reaching 171KT in 1996 and a peak of 213Kt in 2006. Since then the annual landings have fallen to 157Kt in 2011.

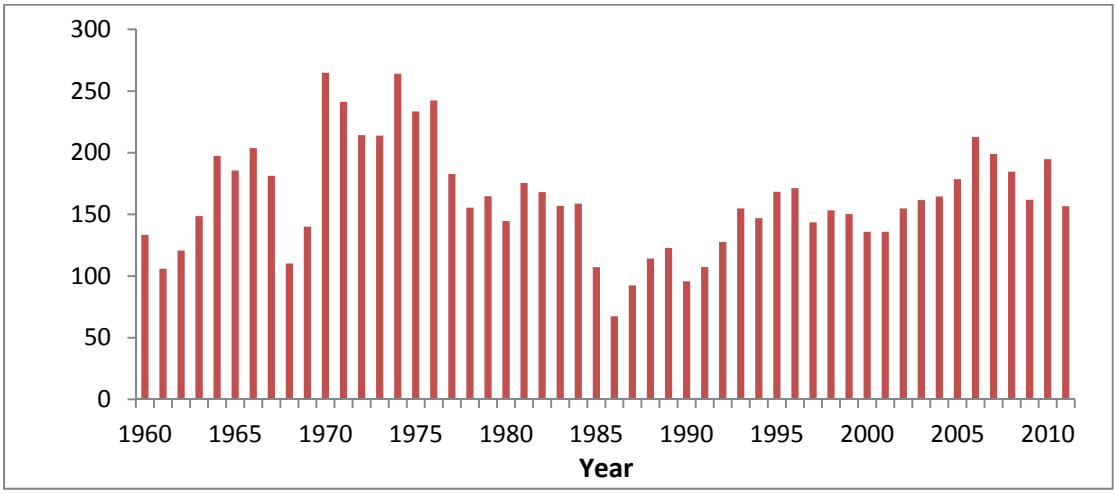

Figure 9: The total annual landings of saithe (thousands of tonnes) from the North East Arctic, over the period 1960 to 2011. (data source: ICES, 2012a)

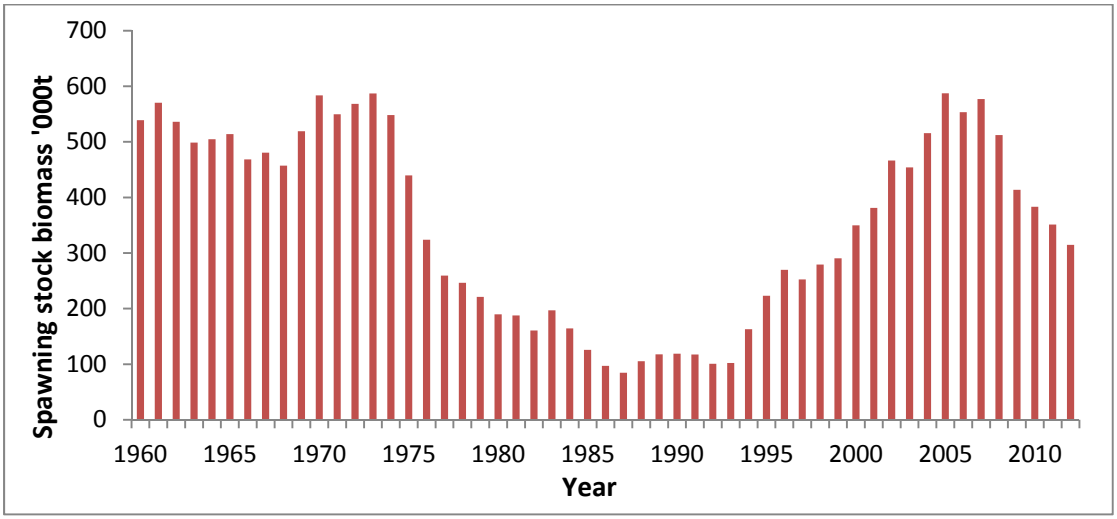

Figure 10: The annual estimate of the spawning stock biomass (SSB) of North East Arctic saithe (thousands of tonnes) over the period 1960 to 2012. (data source: ICES, 2012a)

The mean fishing mortality (F) on ages 4-7 years is shown in Figure 11 for the period 1960 to 2011, as measured in the stock assessment process. From 1960 through to 1973 F was below the current precautionary approach and management plan level (F0.35). From 1973 through to 1984 fishing mortality increased during a period when landings remained fairly high but the spawning biomass was falling rapidly. Fishing mortality increased to above the current precautionary limit level (F0.58) from 1982 to 1985. Thereafter fishing mortality fell in line with strict enforcement measures and reached the management plan target of F0.35 by 1996. Since then it has remained below that target level until 2010 when it crept marginally above it.

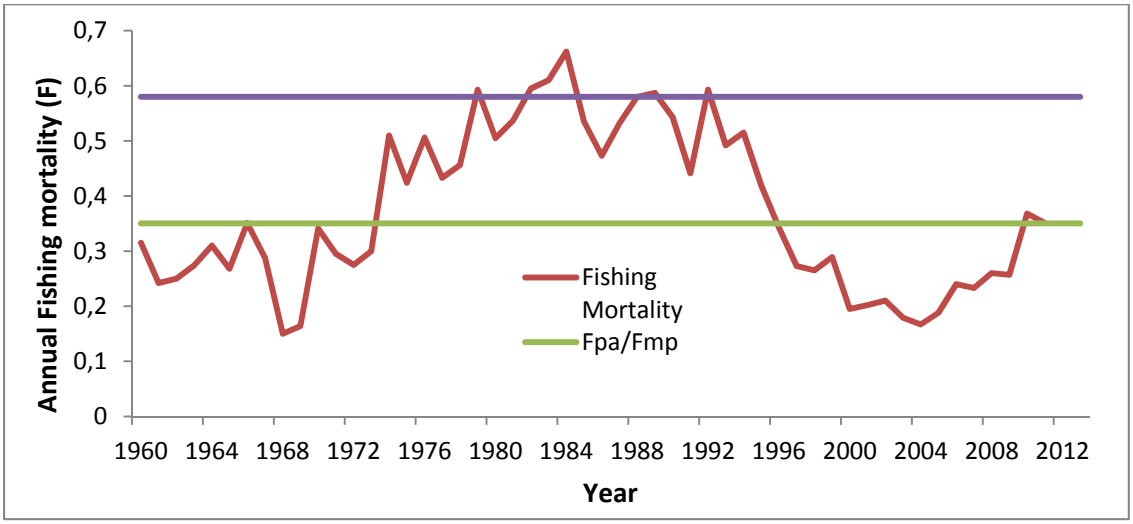

Figure 11 The mean annual fishing mortality, on fish aged from 4 to 7 years, in the North-east Arctic saithe stock in ICES Sub-areas I and II, over the period 1960 to 2011. The fishing mortality reference values for Fmp (management plan) and Fpa are also shown. Data source: ICES, 2012a.

The annual estimate of spawning stock biomass (SSB), relative to precautionary, management plan and limit reference points, is shown in Figure 12 for the period 1960 to 2011. SSB was below the precautionary level, Bpa from 1979 to 1995 and fell below the biomass limit level, Blim, between 1985 and 1994. After that SSB increased as fishing mortality was reduced and since then SSB has remained above the precautionary management plan level of 220,000t. It reached a peak, of 587,000t, in the historic time series, in 2005 (previously reached in 1973) but has since fallen to an estimated level of 315,000t in 2012.

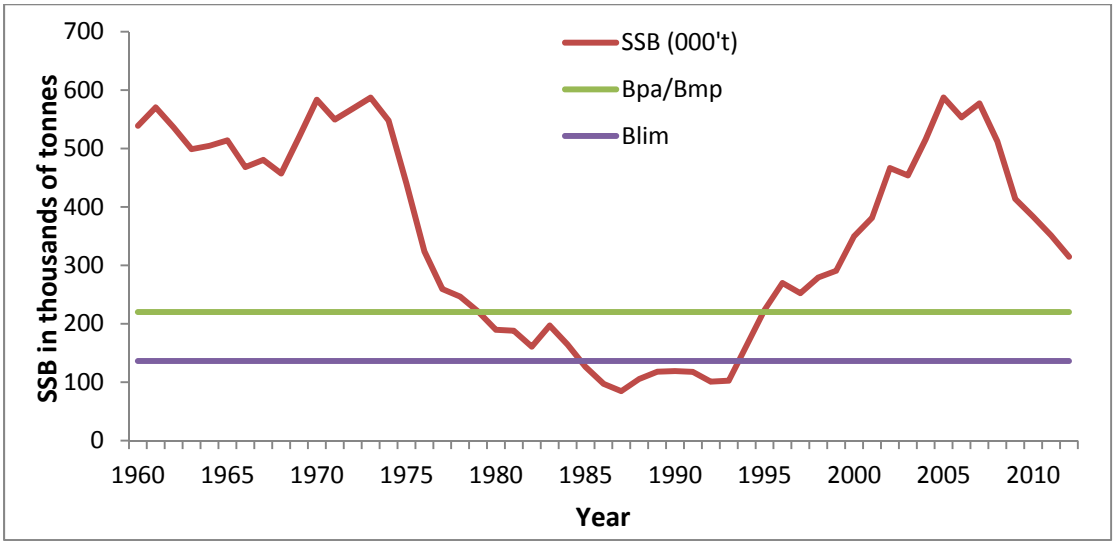

Figure 12 The annual estimate of spawning stock biomass (SSB in tonnes), at spawning time, of North-east Arctic saithe, in ICES Sub-areas I and II, over the period 1960 to 2012 . The management plan Bmp, precautionary, Bpa and biomass limit, Blim reference levels are also shown. Data source: ICES, 2012a

Because of the widespread inshore habitat of juvenile saithe early estimates of year class strength, as 1 or 2 years old fish, are currently not possible. The earliest estimates available are when the fish

appear in the fishery for the first time as 3 year olds. Annual recruitment of North-east Arctic saithe measured as numbers of 3year old fish in the stock is shown in Figure 13. Over the time series recruitment has fluctuated with periods of reasonable and poor recruitment and occasional very good year classes. This pattern appears to be fairly typical of saithe stocks and at levels of SSB over the historic time series there is no strong link between recruitment and SSB (Figure 14). The past twenty years has seen a period of mainly good to above average recruitment including the highest in 2005 resulting from the 2002 year class. This was followed immediately by the second poorest year class on record in 2003.

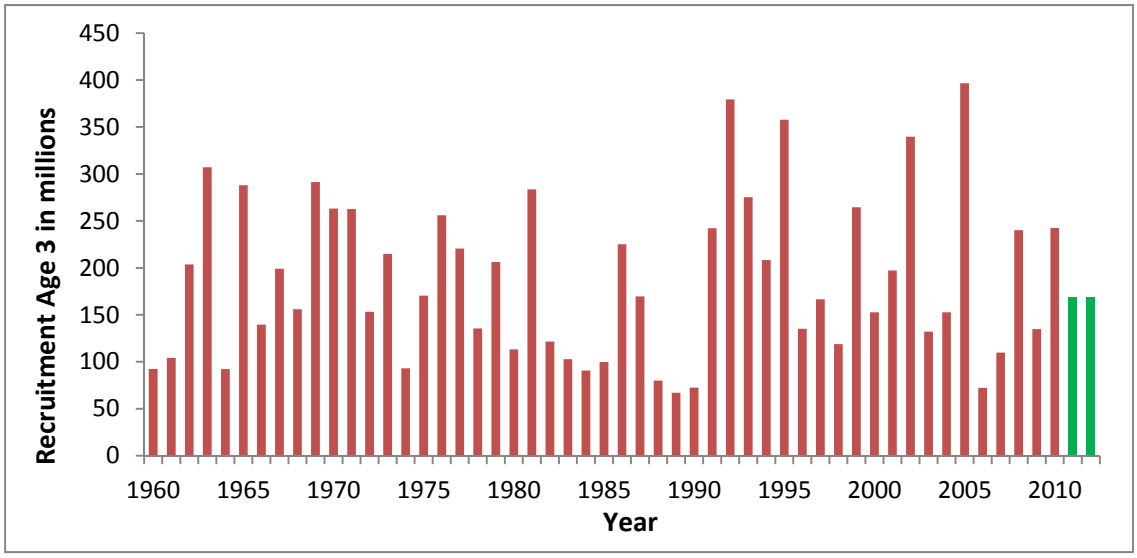

Figure 13: The annual estimate of recruitment, as thousands of recruits at age 3 years, of North-east Arctic saithe, in ICES Sub-areas I and II, over the period 1960 to 2011. The value for 2011 and 2012, in green is the geometric mean of the time series. Data source: ICES, 2012a.

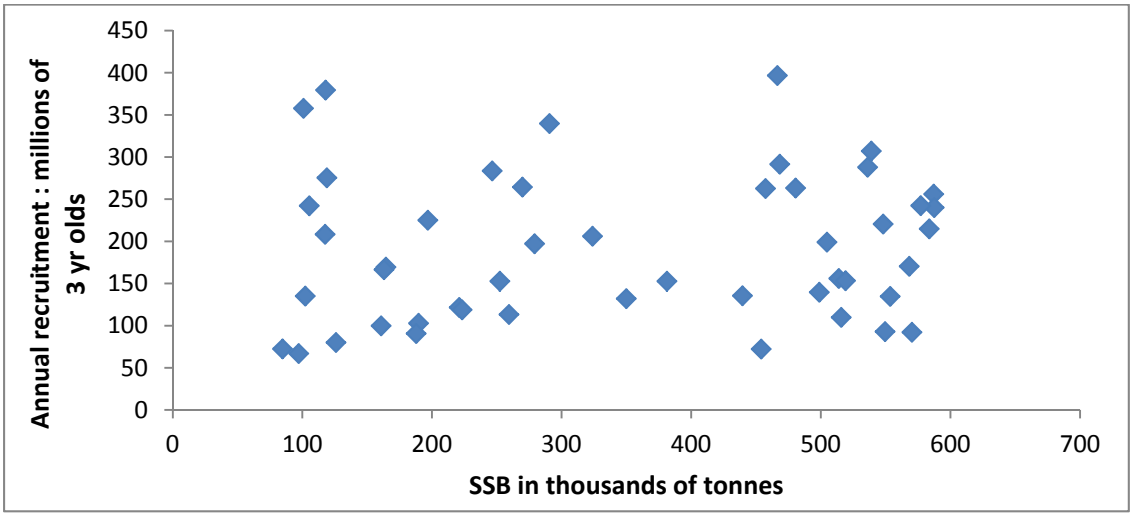

Figure 14: The relationship between spawning stock biomass (SSB) and annual recruitment of 3 year old saithe. The number of recruits is plotted against the SSB in the year in which they were spawned. Data source: ICES, 2012a.

The age structure of the population can be a useful indicator of the status of a fished stock taking into consideration the age at first maturity. When there are a large number of mature year classes, well represented in the population, this can be an indication that the stock, and the fishery on it, is sustainable. Such an age structure provides resilience to the effects of naturally fluctuating year class strength.

Figure 15 shows the population numbers at age for the North-east Arctic saithe stock in 2011 from the assessment in 2012 (ICES, 2012a). This shows that most of the fish in the population are immature with only around 50% of the 6 year olds mature and 80% of the seven year olds. The cause for some concern and caution in the management of this stock is perhaps best illustrated in Figure 16. This shows the numbers of fish at age, in millions, in the catch of North-east Arctic saithe in 2011. This clearly shows the high proportion, in numbers of fish, in the catch which are immature with only those eight years old and above fully mature. These data, coupled with the current decline in SSB since 2005, serve to support the concern of the Norwegian Fisheries Ministry. They expressed the view that the annual quota should at present be set lower than the ICES advice in order to stop the current decline in SSB (Site meeting)

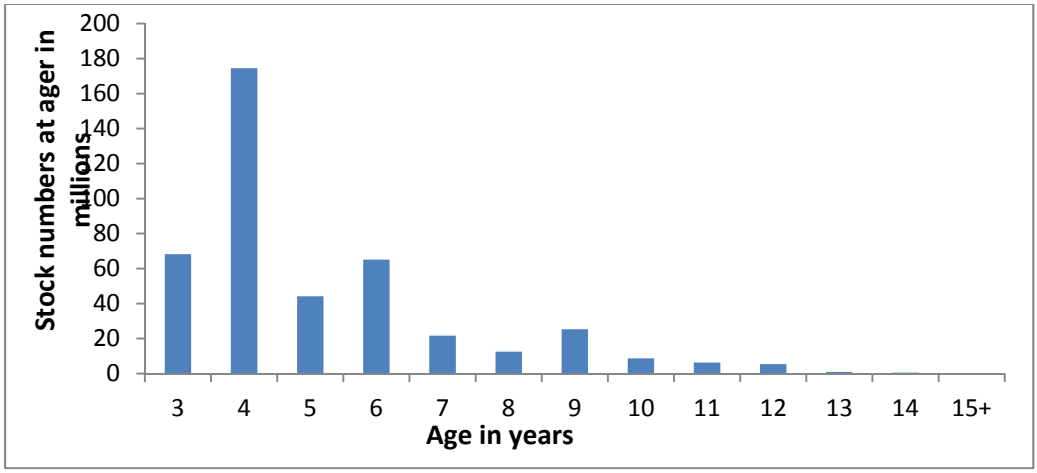

Figure 15 Numbers of fish at age, in millions, from the assessment of the North-east Arctic saithe stock in 2011 (data from ICES, 2012a).

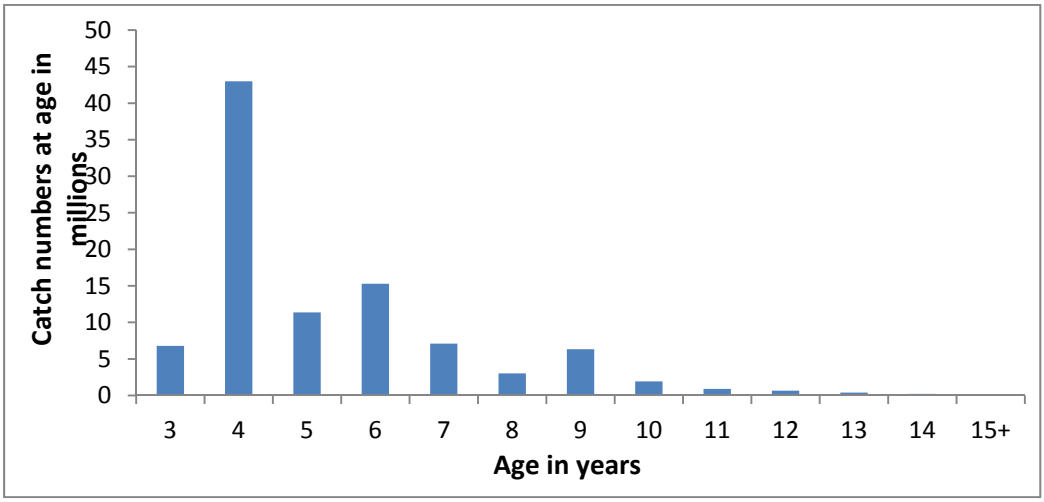

Figure 16 Numbers of fish at age, in millions, in the catch of North-east Arctic saithe in 2011 (data from ICES, 2012a)

3.3.3.6 Uncertainty in the assessment

The long term success of the harvest control rule is entirely dependent on the reliability of the annual stock assessment. The status of the stock is evaluated relative to reference points which drive the harvest control rule. Inevitably there are areas of uncertainty in the assessment process and it is therefore important to identify those uncertainties and take them into account.

The assessment is based on just two tuning indices only one of which, an acoustic survey, is independent of the fishery. The other survey consists of catch per unit of effort data from the Norwegian trawl fishery. The signals from these two indices are currently indicating different perceptions of the status of the stock. Investigation of the problem is continuing but the reasons for the difference are still not clearly understood (ICES, 2012c).
Some uncertainty in the assessment process is generated by the lack of reliable early recruitment estimates (ICES, 2012c). Prediction of future catch levels is an important element of the harvest control rule and these predictions currently have to rely on estimates of average recruitment. This lack of early information on recruitment is a systemic problem with all saithe stock assessments.
Sampling of the Norwegian commercial landings is considered by ICES to be less precise than it should be because a port sampling programme was terminated in 2009. This causes problems in the estimation of the catches of the oldest age fish. In spite of some recent improvements to sampling levels, including the expansion of the high seas reference fleet, there is still a lack of adequate sampling from some gear types in some areas and this continues to generate some uncertainty (ICES, 2012c). The assessment working group has recommended an increase in port sampling effort (ICES, 2012a; ICES, 2012c)

The estimation of the total annual catch of North-east Arctic saithe is considered to be reliable both by the ICES assessment working group and the Norwegian ministry of fisheries and coastal affairs. However there is still an element of uncertainty related to the levels of unrecorded mortality through discarding and misreporting. Because of the regulations governing the fishery in Norwegian waters this problem is considered to be minimal (ICES, 2012c).

In conclusion there is currently sufficient uncertainty in the assessment process for the Norwegian Ministry to be suggesting that the annual quota should be set lower than the ICES advice (Site meeting). The Ministry is particularly concerned about the conflicting signals from the commercial trawl survey index and the acoustic survey index and the declining SSB over the past seven years.

3.3.3.7 Management advice

An annual TAC for the North-east Arctic saithe fishery is agreed between Norway and Russia following advice from ICES on the status of the stock and following the protocol defined in the harvest control rule. Figure 17 shows the performance of that annual TAC, in relation to the advice and subsequent landings, over the period 1987 to 2011. Over that period the record of management of the fishery has been reasonably good with the exception of the period between 1997 and 2002 where the TAC and landings were as much as 60,000t in excess of the advice. Since 2002 the TAC and landings have again fallen into line with the advice and since 2007 landings have not exceeded the TAC.

The assessment of status of the stock in 2011 (ICES, 2012a) was an update assessment. The last benchmark assessment was carried out at WKROUND February 2010 (ICES 2010a). The estimate of SSB in the most recent assessment is 314,684t which is well above the precautionary and management plan level of 220,000t (Figure 9) although it has been falling steadily since reaching a peak in the historic time series of 587,000t in 2005. Fishing mortality has been well below the

precautionary approach and management plan level (F0.35) since 1996 (Figure 8) but has recently been increasing

For the fishery in 2011 ICES advised, on the basis of the management plan, that catches should be less than 173,000t (ICES, 2010c). The TAC was agreed, between Norway and Russia at 173,000t and the eventual landings in 2011 fell well below this at 157,000t.

For the fishery in 2012 ICES advised, on the basis of the management plan, that catches should be no greater than 164,000t and the TAC for 2012 was agreed at 164,000t (ICES, 2011c). This would lead to an estimated SSB in 2013 of 302,000t.

The advice for the fishery in 2013 (ICES 2012c) is firmly based on the catch constraint for the 2012 fishery of 164,000t and the management plan. This would lead to a catch of 164,000t in 2013 and an SSB of 292,000t.

ICES continues to include in its annual advice on the exploitation of this stock that by-catches of coastal cod and *Sebastes marinus* should be kept as low as possible

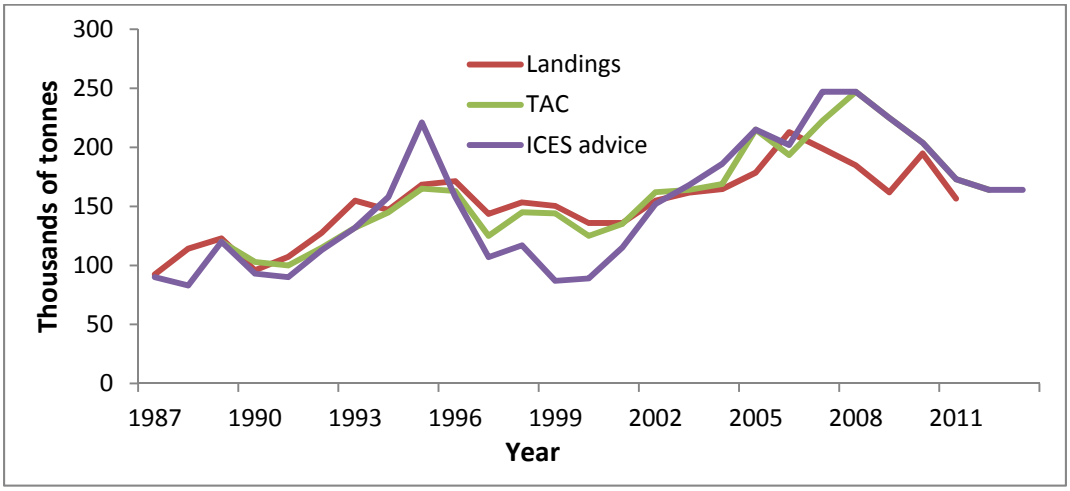

Figure 17 The pattern of annual landings against the annual ICES advice and agreed TAC for the North-east Arctic saithe fishery over the period 1987 to 2011 (data source ICES, 2012c)

3.3.4 North Sea saithe – Stock assessment and management advice

3.3.4.1 Stock unit

The North Sea saithe stock is distributed mainly along the northern edge of the continental shelf and in the Norwegian trench. The area extends from the Skagerrak in the east, north of the Shetland Isles to off North West Ireland in the west. This single stock, referred to for management purposes as the North Sea stock, covers ICES Divisions IIIa, IVa and Sub-area VI. The northern boundary of the stock is at latitude 62°N but it is recognised that there is no strong biological basis for this boundary (ICES, 2012b. stock annexe 3).

Tagging experiments by various countries have shown that there is mixing between adjacent saithe stocks in the northeast Atlantic (ICES, 2012b. stock annexe 3; Jakobsen, 1981; Jakobsen, 1987). Regular migrations of mature fish from the north Norwegian coast to spawning areas off the west coast of Norway and to a lesser extent into the North Sea have been noted (ICES, 1965). '0' group saithe do also drift from the North Sea to the Norwegian coast north of 62°N.

3.3.4.2 Management plan

An EU / Norway long term management plan for the saithe stock in the Skagerrak, the North Sea and west of Scotland was agreed in 2005. The plan was updated and re-evaluated by ICES in 2008 (ICES, 2012b). ICES have endorsed the plan as being consistent with the precautionary approach. The plan has target and limit levels for both SSB and F which are also expressed in MSY terms. It is designed to provide a sustainable fishery and high long term yields.

The 2008 agreed plan consists of the following elements:

1. Every effort shall be made to maintain a minimum level of Spawning Stock biomass (SSB) greater than 106 000 tonnes (Blim).
2. Where the SSB is estimated to be above 200,000 tonnes the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.
3. Where the SSB is estimated to be below 200,000 tonnes but above 106,000 tonnes the TAC shall not exceed a level which, on the basis of a scientific evaluation by ICES, will result in a fishing mortality rate equal to 0.30-0.20*(200 000-SSB)/94,000.
4. Where the SSB is estimated by the ICES to be below the minimum level of SSB of 106,000 tonnes the TAC shall be set at a level corresponding to a fishing mortality rate of no more than 0.1.
5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15% from the TAC the preceding year the Parties shall fix a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.
6. Notwithstanding paragraph 5 the Parties may where considered appropriate reduce the TAC by more than 15% compared to the TAC of the preceding year.
7. A review of this arrangement shall take place no later than 31 December 2012.
8. This arrangement enters into force on 1 January 2009."

As noted in paragraph 7 the plan is scheduled for a further review no later than December 2012. That process began in the spring of 2012 with a series of EU/ Norway meetings and is currently progressing according to plan (Site meeting, Norwegian Ministry).

The overarching control of exploitation, resulting from the above management plan is the annual TACs agreed between the EU and Norway. This is firmly based on the annual assessment of the status of the stock and the resultant advice on exploitation levels from ICES. The management plan is also supported by a range of technical measures. They consist of; a minimum landing size 40cm in the Norwegian zone south of 62^{o}N and 35cm in the EU zone, minimum mesh size of 120mm for Norwegian trawlers and 110mm for EU vessels. There is also a complete ban on discarding in Norwegian waters.

Opportunities to take the annual TAC have been limited by the introduction of days at sea regulations for demersal trawls, seines and gill nets in the North Sea and Skagerrak in 2003 and also by the effort constraints of the EU cod management plan introduced in 2009.
The ICES Advisory Committee on Management (ACOM) in their advice on the fishery in 2013 (ICES, 2012d) notes that the EU-Norway management plan does not clearly state whether the SSB in the intermediate year or the SSB at the beginning or end of the TAC year should be used to determine the status of the stock.

3.3.4.3 Biological reference points

The biological reference points for the stock are listed in Table 8. They have been established and agreed by ICES and they form an integral part of the harvest strategy for the North Sea saithe stock. Levels of exploitation are set according to very clear rules based on the state of the stock in relation to these reference points. The biomass limit point is set at the lowest observed level of SSB in the historic time series. This is a level above which there have been no appreciable signs of impaired recruitment

The MSY Biomass trigger level has been established for this stock at 200,000t. It is the same as the target SSB in the management plan and the precautionary approach level B_{pa}.

	Type	Value	Technical basis
Management plan	SSB_{MP}	200,000t	B_{pa}.
	F_{MP}	0.3	Or lower depending on SSB relative to SSB target
MSY approach	MSY $B_{trigger}$	200,000t	Default value B_{pa}
	F_{msy}	0.3	Stochastic simulation using hockey stick-recruitment
Precautionary approach	B_{lim}	106,000t	B_{loss} = 106,000t (estimated in 1998)
	B_{pa}	200,000t	High probability of maintaining SSB above Blim
	F_{lim}	0.6	F_{loss} the fishing mortality estimated to lead to stock falling below B_{lim} in the long term
	F_{pa}	0.4	Implies that $B_{cq}>B_{pa}$ and <10% probability that $SSB_{mt} < B_{pa}$

Table 8 Biological reference points (ICES, 2012d)

The precautionary reference points for the North Sea saithe stock were derived by ICES in 2006 and are:

$F_{0.1}$	0.10	F_{lim}	0.60
F_{max}	0.22	F_{pa}	0.40
F_{med}	0.35	B_{lim}	106,000 t
F_{high}	>0.49	B_{pa}	200,000 t

In 2010 the working group estimated the Fmsy to be 0.3 (ICES, 2010d). The working group in 2012 (ICES, 2012b) noted that Fmsy should be re-analysed if changes are found in maturity. The assessment working group also noted a decrease in the proportion of the catch taken by purse seiners. This has a significant effect on the exploitation pattern because the pursers tend to target young saithe. They commented that it might be more appropriate to change the age range on which the reference fishing mortality is based, currently 3-6 years, by excluding the 3 year olds

3.3.4.4 The assessment model

The assessment model used by the ICES assessment Working Group (WGNSSK) is an extended survivor's analysis (XSA) commonly used within ICES and considered appropriate for many demersal stocks (Darby and Flatman, 1994).

The model incorporates an age range matrix from 3 to 9 years with a plus group at 10 years.
The model is strongly supported by a total of six tuning indices for calibration of the assessment. Three of these indices are fishery independent and three comprise commercial catch per unit of effort (cpue) data. Brief details of the surveys and the cpue data sources are listed in Table 9.

At the 2011 benchmark workshop (ICES 2011a) all the input data for this assessment were rigorously explored. As a result changes were recommended to the assessment working group on the appropriate

age ranges for each of the surveys. The benchmark workshop considered the XSA model to be entirely appropriate and robust for the assessment of this stock.

Fishery independent surveys	Age range (years)	Data time series
Norwegian acoustic survey	3 - 6	1995 to present
Int. bottom trawl in 3rd quarter	3 - 5	1991 to present
Norwegian acoustic survey for saithe	2 - 4	2006 to present
Commercial cpue	**Age range (years)**	**Data time series**
French demersal trawl	3 – 9*	1990 to present
German otter trawl	3 – 9*	1995 to present
Norwegian bottom trawl	3 – 9*	1980 to present

Table 9 Brief details of surveys and cpue data sources

*After the 2011 benchmark assessment only ages 6 – 9 years were used for the cpue data for the 2011 assessment. This decision was reviewed in November 2011 and as a result the age range reverted to 3-9 years for the 2011 updated assessment and the assessment in 2012.

3.3.4.5 Results of the annual assessments of stock status

Figure 18 shows the total annual landings of North Sea saithe over the period 1967 to 2011. The fishery for North Sea saithe developed during the 1970s with annual landings steadily increasing from 88Kt in 1967 to 344Kt in 1976. The annual landing then fell rapidly to an average of 130Kt over the period 1979 to 1981. A short lived increase in the levels to 221Kt in 1985 was followed by a further decline over the next five years to reach a low of 104Kt in 1990. The decline in annual landings was reflected in a decline in the spawning stock biomass (SSB) over the same period (Figure 19). The SSB in 1974 was estimated at 555Kt falling to just 105Kt by 1991. It did steadily increase to 328Kt by 2005 but has since fallen to 217Kt in 2011. Since 1991 the the annual landings have been very stable averaging 108Kt fluctuating between 95Kt in 2001 and 126Kt in 2006.

The landings in 2011 were 97Kt of which 90Kt were taken in ICES Sub-area IV and Division IIIa and 7kt in ICES Sub-area VI. Figure 20 shows the proportion of landings taken by each country in Divisions IVa and IIIA in 2011 ICES. Norway took the highest proportion (52%) in Divisions IVa and IIIA followed by France (15%) and the UK and Germany 11% each. In Sub-area VI the majority of the landings were by the UK 60% and France 32%. A small proportion (5%) was landed by Ireland.

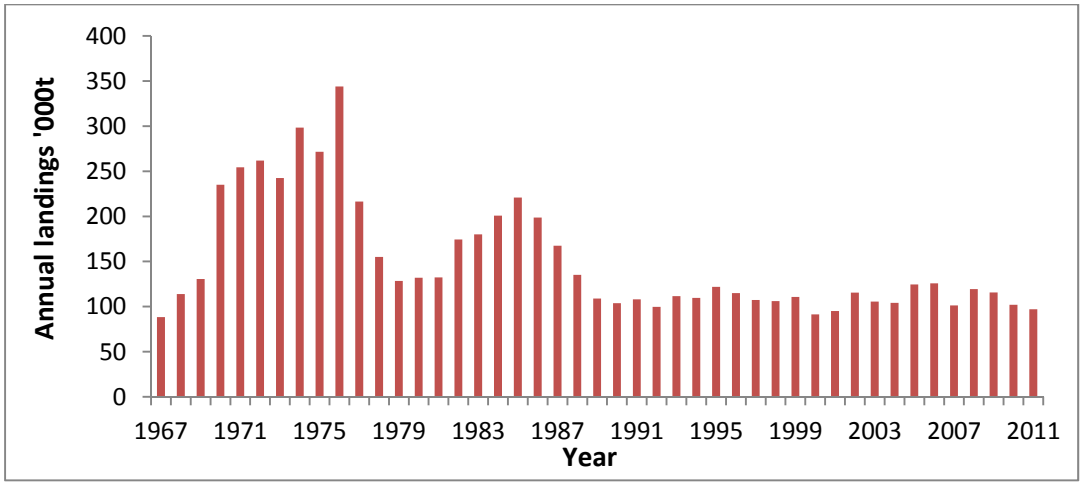

Figure 18 The total annual landings of saithe (thousands of tonnes), from the North Sea, over the period 1967 to 2011 (Data source ICES, 2012b).

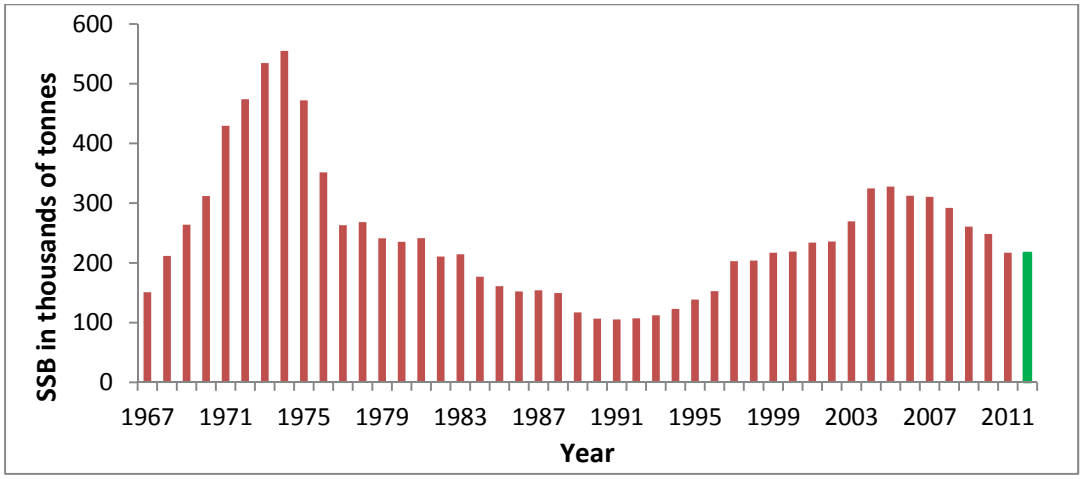

Figure 19: The annual estimate of the spawning stock biomass (SSB) of North Sea saithe (thousands of tonnes) over the period 1967 to 2011. The value shown for 2012 is the predicted level. (Data source ICES, 2012b).

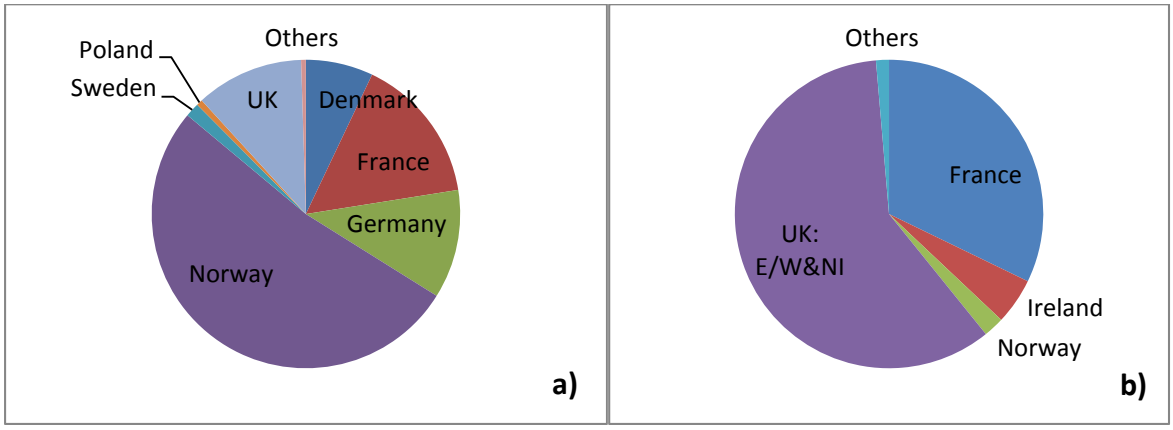

Figure 20: The proportion of the annual landings by the participating countries in the 2011 fisheries in a) ICES Divisions IVa and IIIa and b) in ICES Sub-area VI. (Data source ICES, 2012b).

The mean fishing mortality (F) on reference ages 3 - 6 years, together with the biological and management reference points is shown in Figure 21 for the period 1967 to 2011. From 1972 through to 1995 the fishing mortality was consistently above the ICES precautionary approach level of F0.4. It reached a peak of F0.82 in 1986 and then fell steadily to F 0.19, the lowest point in the historic time series, in 2004. This was well below the MSY and management plan target (F0.3). Since then it has remained below the ICES precautionary approach level (F0.4) and fluctuated around the management plan and MSY level (F0.3).

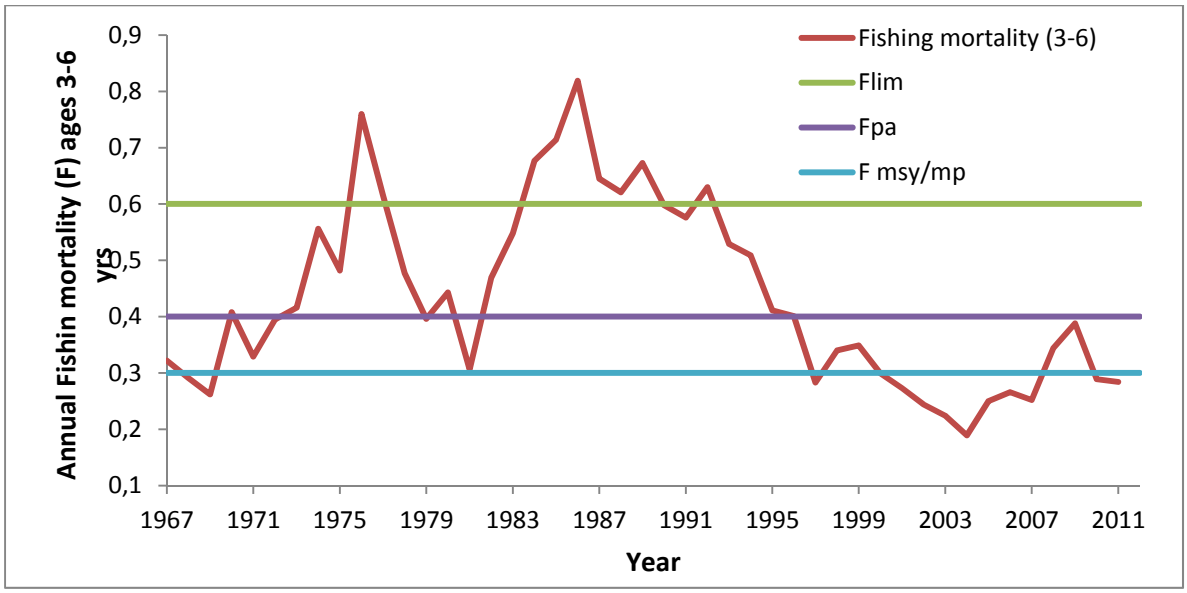

Figure 21: The mean annual fishing mortality, on fish aged from 3 - 6 years, in the North Sea saithe stock in ICES Divisions IVa and IIIa and Sub-areas VI over the period 1967 to 2011. The fishing mortality reference values for Fmsy/mp (management plan), Fpa and Fli mare also shown. Data source: ICES, 2012d.

The assessment of the status of the stock, in Subareas IV and VI and Division IIIa, in May 2011 (ICES, 2011d) was run as agreed during the benchmark workshop (WKBENCH: ICES, 2011a), i.e.with ages 3-5 excluded for the commercial tuning indices. However this decision was later reversed in an update assessment in November 2011. The resultant updated assessment of the stock

status in 2010 was an SSB of 248,300t and a fishing mortality of F 0.29. The assessment working group in 2012 (ICES 2012b) used the same settings as in the revised assessment from 2011.

The annual estimate of spawning stock biomass (SSB), relative to precautionary, management plan and limit reference points, over the period 1967 to 2011, is shown in Figure 22. The estimate of SSB in 2011 was 217,000t which is only 17,000t above the management plan, MSY B trigger level. SSB has been falling since 2004 after recovering from an historic low of 105,400t in 1991.

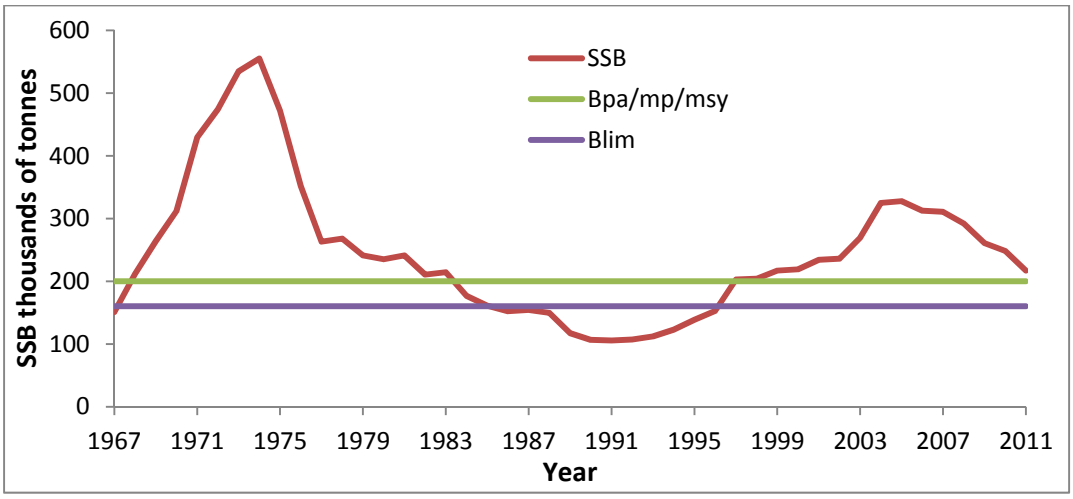

Figure 22: The annual estimate of spawning stock biomass (SSB in tonnes), at spawning time, of North Sea saithe, in ICES Sub-areas IV and VI and Division IIIa, over the period 1967 to 2011. The management plan Bmp/Bmsy, precautionary, Bpa and biomass limit, Blim, reference levels are also shown. Data source: ICES, 2012b.

Reliable estimates of year class strength are not possible based on the abundance of '0', '1' or '2' group juveniles. The inshore, fjord and rocky coastal habitats of these juvenile saithe make quantitative surveying of their abundance virtually impossible. The earliest recruitment estimates available are therefore of 3 year old fish when they begin to appear in the commercial catches for the first time.

Annual recruitment of North Sea saithe measured as numbers of 3 year old fish in the stock is shown in Figure 23. Over the time series, dating back to 1967 recruitment has generally fluctuated around the mean with and occasional very good year classes. Over the past twenty years the good recruitments have been around one and a half to two times the long term mean whereas in the period prior to that they were up to three times the mean. The last strong year class was in 2005 and since then recruitment has been at or below the long term mean. This pattern of recruitment is typical of saithe stocks and at levels of SSB over the historic time series there is no strong link between recruitment and SSB (Figure 24).

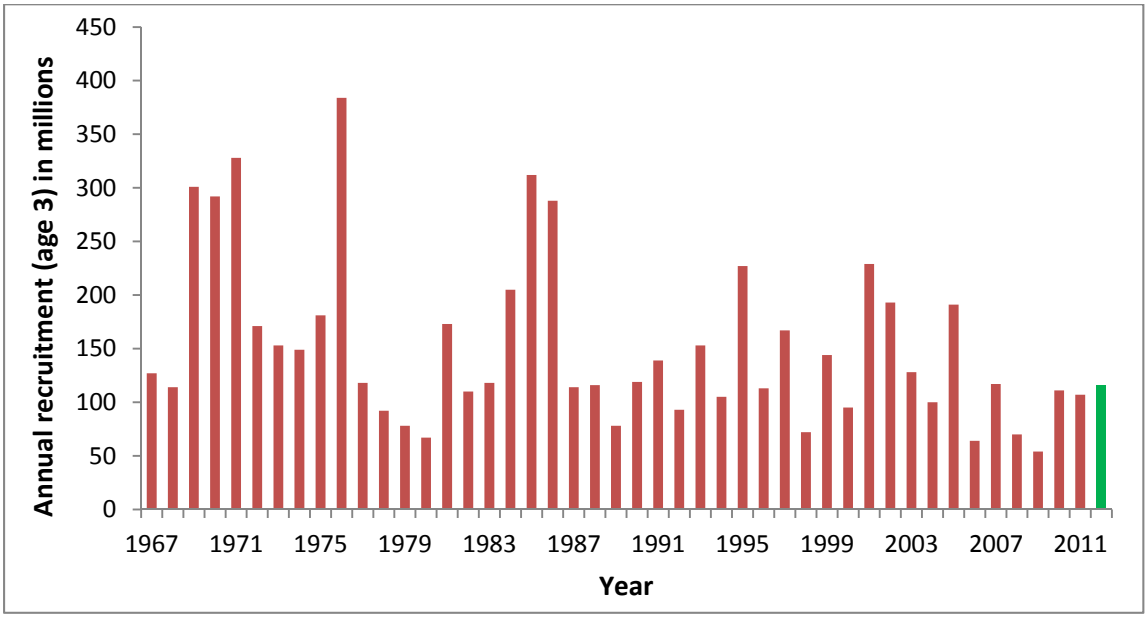

Figure 23: The annual estimate of recruitment, as thousands of recruits at age 3 years, of North Sea saithe, over the period 1967 to 2011. The 2012 figure, in green, is the geometric mean recruitment from 1988 to 2011. (Data source: ICES, 2012b)

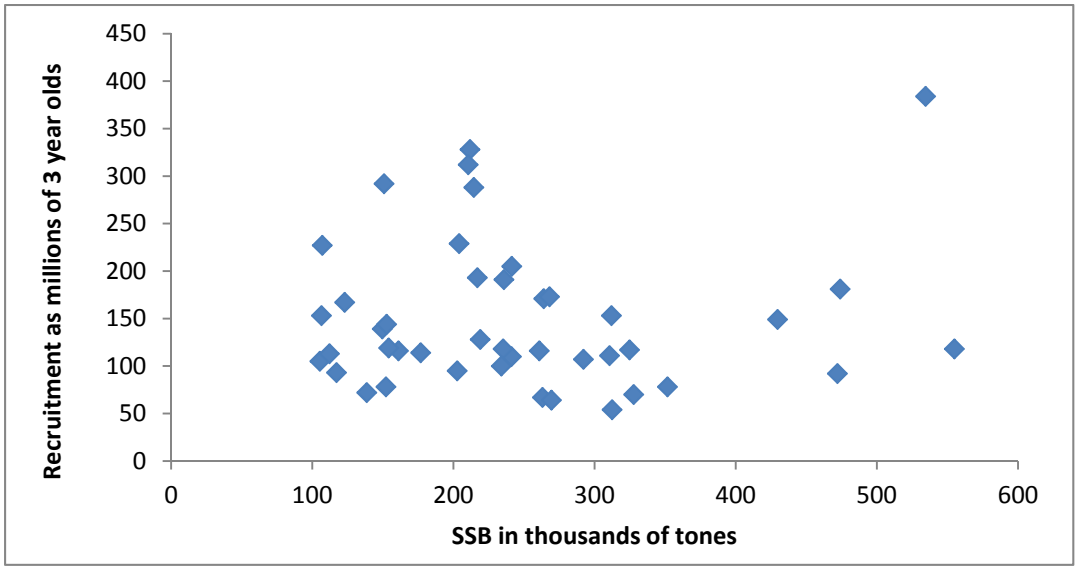

Figure 24: The relationship between spawning stock biomass (SSB) and annual recruitment of 3 year old saithe. The number of recruits is plotted against the SSB in the year in which they were spawned. (Data source: ICES, 2012b)

The age structure of the population is a useful indicator of the status of a fished stock taking into consideration the age at first maturity. If there are a large number of mature year classes, well represented in the population, this can be an indication that the stock, and the fishery on it, is sustainable. Such an age structure provides some resilience to the effects of naturally fluctuating year class strength which is a common feature of saithe stocks.

Figure 25 shows numbers of fish at ages 3 and above, in the population of North Sea saithe in 2011, from the assessment in 2012. This shows that most of the fish in the exploited population are immature with only around 15% of the 4 year olds mature 70% of the five year olds and 99% of the 6

year olds. The numbers of fish landed in each age group is shown in Figure 26. This shows that approximately 40% of the numbers of fish landed are immature. The proportion immature landed by weight is obviously much smaller. As noted earlier there is no indication that the spawning stock biomass levels are affecting the annual recruitment to the stock and the age structure of the population and catch does not therefore give any cause for immediate concern.

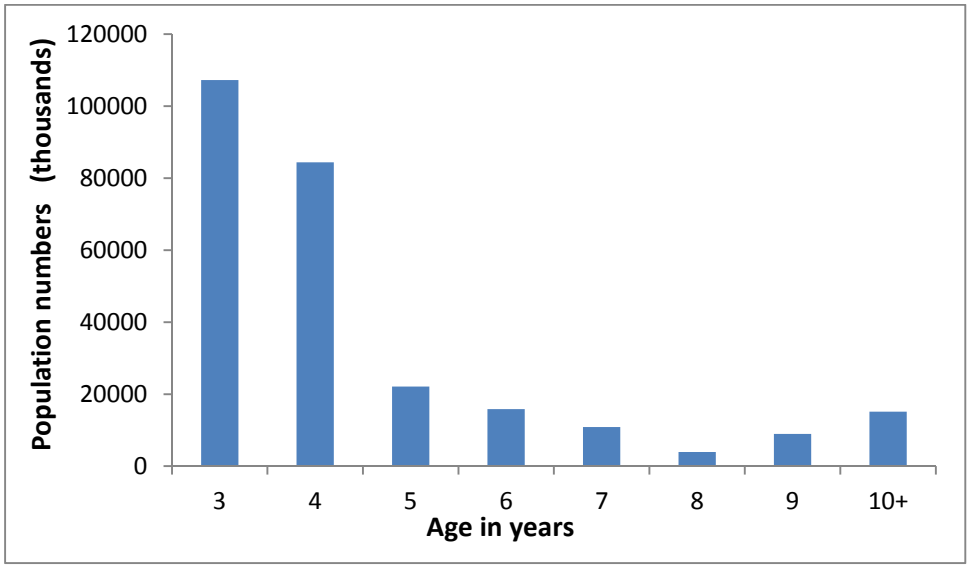

Figure 25 Thousands of fish at age, in the North Sea saithe stock population in 2011 (Data from ICES, 2012b).

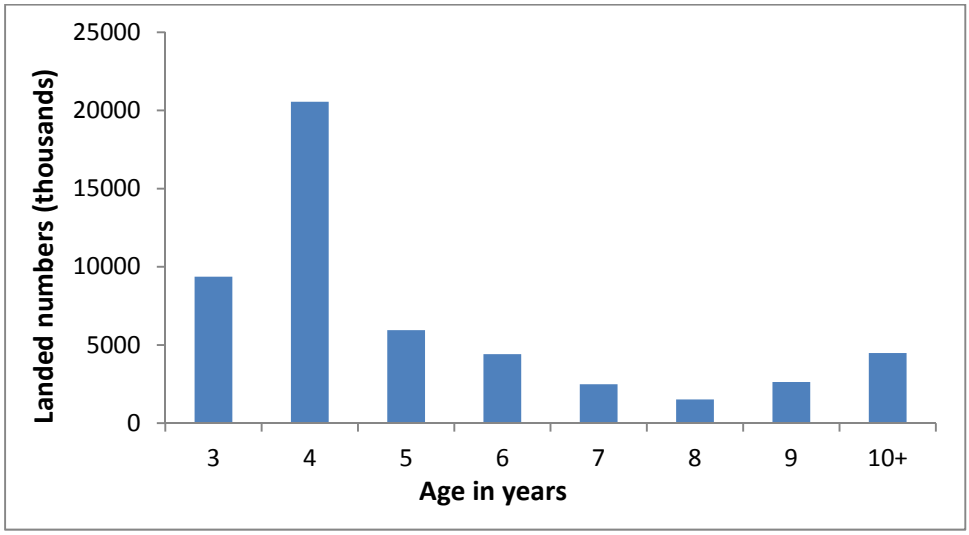

Figure 26 Thousands of fish at age landed from the North Sea saithe stock in 2011 (Data from ICES, 2012b)

3.3.4.6 Uncertainty in the assessment

Some uncertainty in the assessment process is generated by the lack of reliable early recruitment estimates (ICES, 2012d) related to the difficulty of surveying the early year classes. This lack of early information on recruitment is a systemic problem with all saithe stock assessments because of the nature and accessibility of the inshore nursery areas. For the North Sea stock recent estimates have been made even more uncertain because of the strong year effects in the surveys in the last three

years. These may have been caused by changes in distribution leading to migration into and out of the stock.

This problem has also affected the reliability of the commercial cpue tuning indices. During the 2011 benchmark assessment (ICES, 2011a) and the June 2011 working group assessment it was decided to use only the older ages 6-9 yrs instead of 3-9 yrs for the commercial cpue data thus reducing the influence of these indices. The reason for the decision was a perceived substantial change in the fishing patterns of the Norwegian and German fleets. This resulted in a greater reliance on the scientific surveys as tuning indices for the younger age groups in those assessments. However that decision was later reviewed and reversed because, although the fishing patterns of the trawler fleets have undergone spatial changes, strong year effects also occurred in the scientific surveys in the most recent years. As a consequence of the review the option to revert to the inclusion of the commercial cpue tuning fleets again at ages 3–5 was considered appropriate in the November 2011 update, and also in the 2012 assessment. However, the potential for bias in commercial cpue (for example hyper-stability) is a general concern for shoaling species such as saithe. The working group concluded that a reliable survey is needed to address this issue.

The reliability of the estimate of the proportion of mature fish in the stock inevitably affects the annual assessment of SSB. Changes in the proportions of fish that mature at age have been noted in recent years. These changes have been analysed by the ICES assessment working group but they have found no statistical basis for changing the long term fixed maturity ogive.

There is still some uncertainty related to the level of discarding in this fishery. Although discarding is banned in the Norwegian EEZ, in EU waters retention of over quota fish on board is illegal. Discarding of saithe is known to be significant in the Scottish fleet (ICES, 2012b) although this fleet is not considered to be typical of the North Sea saithe fishery as a whole. Overall levels of discarding are not considered to be significant and therefore estimates of discarding are not currently included in the assessment.

Norway took 48% of the total catch of North Sea saithe in 2011. Their biological sampling programme, related to this catch level, is considered by the ICES assessment working group to be ‘below a responsible level’ (ICES, 2012b). Their biological sampling programme does include a self-sampling scheme involving both their ‘high seas’ and ‘coastal’ fleets. In spite of this the ICES advisory committee has commented that the catch sampling data from the Norwegian industry should be improved (ICES, 2012d). This sampling problem has generated uncertainty in the assessment in relation to the estimates of catch at age and the need to revise the age distribution in the Norwegian catch data in 2010. This influenced the subsequent biomass estimates for 2010 which were increased by 30% whilst fishing mortality, as a consequence, was reduced by 25%.

3.3.4.7 Management advice

The annual scientific advice on the management of the North Sea saithe stock comes from the ICES advisory committee on management (ACOM). Their advice is firmly based on the EU – Norway management plan and informed by their North Sea demersal fisheries assessment working group (WGNSSK). Their advice is provided separately for ICES Sub-areas IV and Division IIIa, and for Sub-area VI.

Management of North Sea saithe is by setting an annual TAC and by a raft of technical measures which are periodically reviewed as appropriate. The annual TAC is agreed between the EU and Norway after which the EU portion is allocated to each participating country on the basis of an established formula.

Figure 27 shows the annual landings compared with the annual TAC allocation for the North Sea saithe fishery in ICES Sub-area IV and Division IIIa over the period 1987 to 2011. Figure 28 shows the equivalent information for the fishery in ICES Sub-area VI. Over that period the record of the TAC management of the fishery has been very good with landings never exceeding the TAC in either of these management areas with the exception of a very small overshoot in IV and IIIa between 1993 and 1995. In recent years the landings have been well below the TAC in both management areas but the reduced TAC in recent years has gradually lessened the difference. The potential to take the whole TAC allocation in the North Sea and Skagerrak is strongly influenced by the effort constraints imposed by the North Sea cod management plan. In 2011 the landings from Sub-area IV and Division IIIa were 89,704t against the TAC of 93,600t. In Sub-area VI the landings in 2011 were 7,400t against a TAC allocation of 9,700t

The total North Sea stock SSB at spawning time in 2010 was estimated at 248,300t and in 2011 at 217,000t. Based on the estimate of SSB in 2010 ICES advice, on the basis of the management plan and Fmsy that landings in 2011 should be no greater than 93,600 t in Sub-area IV and Division IIIa and no greater than 9,700t. This represented a 13% reduction in the TAC from the previous year (ICES, 2010d; 2010e). The eventual agreed TACs were 93,600t for Sub-area IV and Division IIIa and 9,700t for Sub-area VI. This was predicted to result in an SSB at spawning time in 2012 of 219,000t.

For the fishery in 2012 ICES advised, on the basis of the management plan that landings in 2012 should be no greater than 79,320 t in Sub-area IV and Division IIIa and no greater than 8,320t in Sub-area VI. This represented a 15% reduction in the TAC from the previous year (ICES 2011e). The eventual agreed TACs were 79,320t for Sub-area IV and Division IIIa and 8,230t for Sub-area VI. This was predicted to result in a SSB of 188,000t in 2013

The advice for the fishery in 2013 (ICES 2012d) is firmly based on the management plan with a TAC increase constraint of +15%. This results in projected landings in 2013 of 91,219t in Sub-area IV and Division IIIa and 9,464t in Sub-area VI. As a result the SSB is predicted to increase by 7% to 252,000t in 2014.

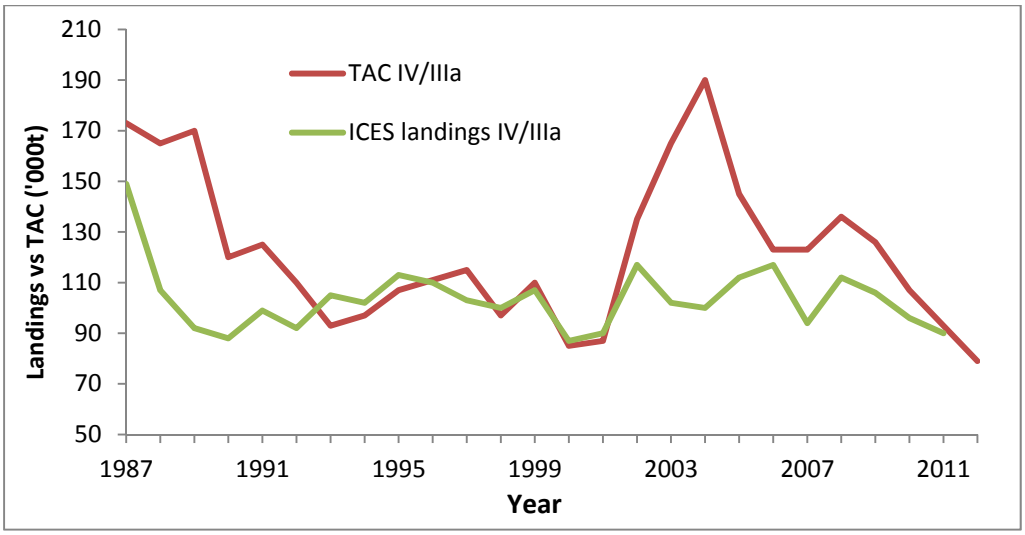

Figure 27: The pattern of annual landings against the agreed TAC for the North Sea saithe fishery, in ICES Sub-area IV and Division IIIa, over the period 1987 to 2011 (data source ICES, 2012e)

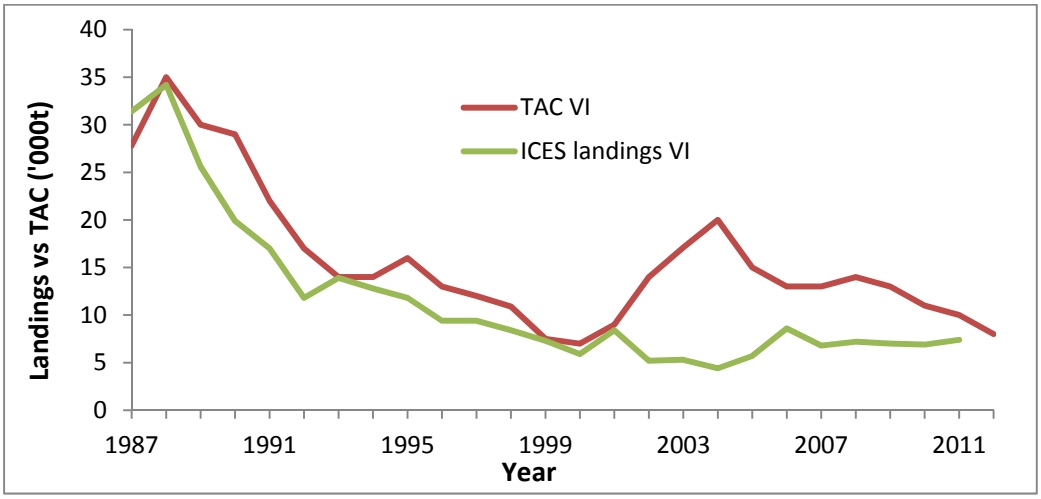

Figure 28: The pattern of annual landings against the agreed TAC for the North Sea saithe fishery, in ICES Sub-area VI, over the period 1987 to 2011 (data source ICES, 2012d)

3.4 Principle Two: Ecosystem Background

3.4.1 The North Sea–Norwegian Sea Aquatic Ecosystem

The North Sea comprises a shallow basin between Great Britain and continental Europe. The northern boundary to the North Sea is marked by the slope of the continental shelf, which also forms the southern boundary to the deeper water of the Norwegian Sea which extends northwards along the west coast of Norway. The Norwegian saithe fishery takes place in the northernmost part of the North Sea and throughout the shelf waters of the Norwegian Sea (Figure 29). As these are contiguous areas forming two boundaries to the Norwegian Sea they are treated as a single, Norwegian Sea ecosystem for the purposes of this report.

Figure 29: Areas of saithe trawling activity (dark blue) from logbook records of three trawlers in the Norwegian reference fleet (courtesy of IMR). The pale blue areas indicate the continental shelf, waters <200 m deep.

The Norwegian Sea is dominated by two deep basins of 3000–4000 m depth and the relatively warm water of the North Atlantic current that sweeps in from the south-west and northwards through the Norwegian Sea and into the Arctic. Every second about 8 million tonnes of warm Atlantic water enters the Norwegian Sea, which to about eight times the sum of the global river discharge. It is this warm water that maintains the relatively mild climate in northern Europe. The Atlantic water in the Norwegian Sea was unusually warm and salt since the turn of the century, with record-high temperature in 2007, since when it has fallen back to a more normal level.[29]

The ecosystem in the Norwegian Sea has a relatively low biodiversity, but the food chain is productive and some species occur in very high numbers.[30] The great basins are dominated by deep-sea fauna while there are deep-sea coral reefs which act as keystone habitats for a diverse associated community of invertebrate and fish species. There is intense primary production during the spring bloom, which supports a high zooplankton biomass but recent biomass is the lowest since the measurements started in 1997.[31] Plankton organisms uncommon to the Norwegian Sea are entering

[29] http://www.imr.no/filarkiv/havets_ressurser_og_miljo_2009/2.2_abiotiske_faktorer.pdf/nb-no
[30] http://www.imr.no/filarkiv/havets_ressurser_og_miljo_2009/2.1_introduksjon-okosystem_Norskehavet.pdf/nb-no
[31] http://www.imr.no/filarkiv/havets_ressurser_og_miljo_2009/2.3_primaer_sekundaerproduksjon.pdf/nb-no

the area at an increasing rate. The warm–temperate copepod *Calanus helgolandicus* appears to be displacing the normal Norwegian Sea copepod *c. finmarchicus*, and at times is the dominant species along the south-western coast of Norway. This change might have a detrimental effect on spring-spawning fish stocks if the fish larvae experience a reduction in their favoured food supply, i.e. larvae of *c. finmarchicus.*

3.4.2 Benthic Communities

For many years, Norway has maintained a major project, MAREANO,[32] to map benthic habitats, initially (since 2005) focusing on environmentally sensitive areas of the Barents Sea but extending to the northern reaches of the Norwegian Sea around Lofoten. The project started with detailed depth-mapping using multi-beam echo-sounders to produce terrain models for computer-based ecosystem modelling. Subsequently, IMR, the Geological Survey of Norway (NGU) and the Norwegian Hydrographical Survey (SKSD) collected information about habitats and bottom substrate, biology and potential pollutants by using video-observations, sediment samplers and traditional biological sampling equipment (beam trawl, bottom sledge and grab). In total, 76 000 km^2 have been mapped providing information about substrate and the composition of the bottom sediments. These maps show that the shelf areas are dominated by sand and gravel, with muddy deposits in local depressions. The substrata on the continental slope and the deep plains range from sandy gravel in the upper parts to gravelly sandy mud in the deep plains.

Through the MAREANO programme, the distribution of many sensitive and vulnerable benthic habitats have been identified and mapped in the northern Norwegian Sea and into the Barents Sea.[33] They show the distribution of deep-sea sponge aggregations (what the fishing industry refer to as "ostur" or 'cheese bottom'), sea pens and burrowing mega fauna, glass sponges, hard and soft-bottom coral gardens and coral reefs Figure 30. So far *c.* 1300 benthic species have been identified within the nature-type mapping. In general the nature types found close to or at the slope edges, where often coarse bottom substrate occur, are the most species-rich ones.

Among the most sensitive species are the deep-water coral reefs, which are home to incredibly rich biodiversity. In Norway, the reefs are formed by the coral species *Lophelia pertusa* and once they began to be studied in detail it became apparent that damage was being done to reefs by bottom trawling.

[32] http://www.mareano.no/english/news/seabed_to_be_mapped
[33] http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115

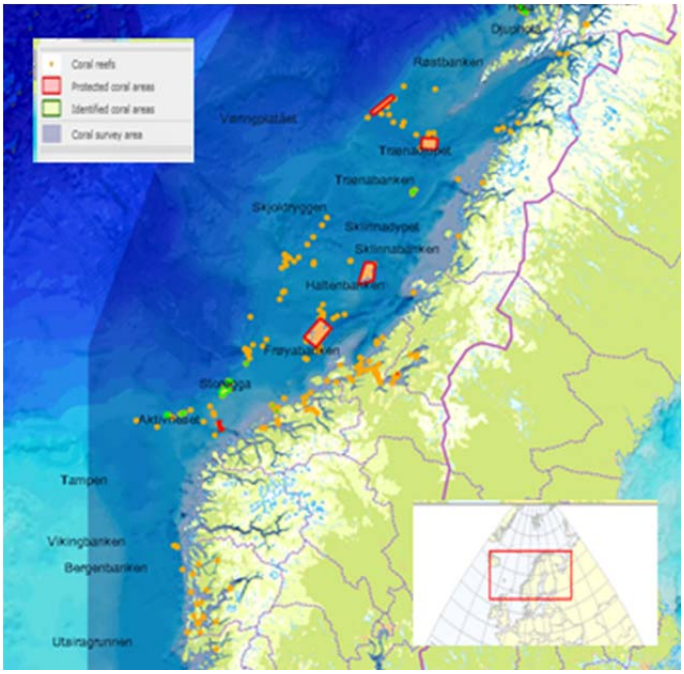

Figure 30 Distribution of coral reefs, mostly but not only Lophelia pertusa, on the continental shelf of the Norwegian Sea. All fishing is prohibited within the protected areas (red rectangles).[34]

Since 1997 IMR has monitored areas where this kind of damage had been reported, and its surveys of damaged and intact reefs has been used to establish conservation areas for coral reefs. The first such area was Sularevet, and subsequently a number of other areas have been protected (Figure 30) using both fisheries and conservation legislation. Around 600 coral reefs have been documented and mapped but many more (possibly ten times as many)[35] remain to be documented. Typically, the distribution of these reefs tends to be limited to depths 200–400 m at temperatures of 4–8º C (Bruntse & Tendel, 2001).[36] An individual reef (bioherm) studied during the Faroese BIOFAR project (a parallel project to MAREANO) was measured by sonar equipment to be *c.* 10 m high and 110 m wide (Bruntse & Tendel, 2001). A census of associated fauna carried out on a total of twenty-five 2 kg blocks of coral taken from two BIOFAR sampling locations identified 300 (non-fish) species, of which 256 species were found on the blocks examined and 42 species were identified from loose coral rubble (Jensen & Fredrikssen, 1992;[37] Bruntse & Tendel, 2001_{loph}). Reef areas are also recognised as good long-line fishing areas (Husebø *et al*., 2002)[38]. Remotely operated vehicle (ROV) studies in Norwegian waters have shown a preponderance of saithe and redfish around such reefs (Mortensen *et al*., 1995).[39]

It is probable that the large bioherms take many centuries, possibly millennia, to grow and it is universally recognised that their brittle structure makes them highly vulnerable to damage by towed fishing gears. Indeed, it is generally recognised that the cold-water coral areas were more extensive

[34] http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122
[35] http://www.mareano.no/english/topics/coral_reefs
[36] Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*
[37] Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69.
[38] Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99.
[39] Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158.

pre-trawling than they are today (WGECO, 2002). Nevertheless, the continuing, widespread existence of such large, potentially vulnerable structures suggests that while some reefs have been razed by past fishing activity (http://www.imr.no/coral/fishery_impact.php), the MAREANO programme has found that there are still many areas in Norwegian waters that remain unaffected.

In addition to the known areas of coral in Norwegian waters, there are also areas along the shelf edge in UK waters to north of Scotland. Although none of these areas currently has marine protected area status, an extensive UK MPA programme is in hand and it is anticipated that some of these coral reefs will fall within designated MPA within the near future (2–3 years).

Despite the adverse effects of towed gear in the past, the consensus of opinion among those interviewed during this assessment (industry, ministry, scientists) is that this practice has been discontinued as the industry becomes more environmentally aware. Indeed, skippers actively avoid known areas of coral as the economic consequences of coral–trawl-gear interactions can be quite severe – damaged or lost nets with loss of catch and fishing time.

As with the coral, the deep-water sponge communities provide keystone habitat for a wide variety of invertebrate species. The sponge community itself is also very diverse with at least 350 species identified in the northern parts of the NE Atlantic (WGDEC, 2012).[40] They are widely distributed throughout the NE Atlantic, particularly in the deeper water along the edge of the continental shelf (Figure 31).

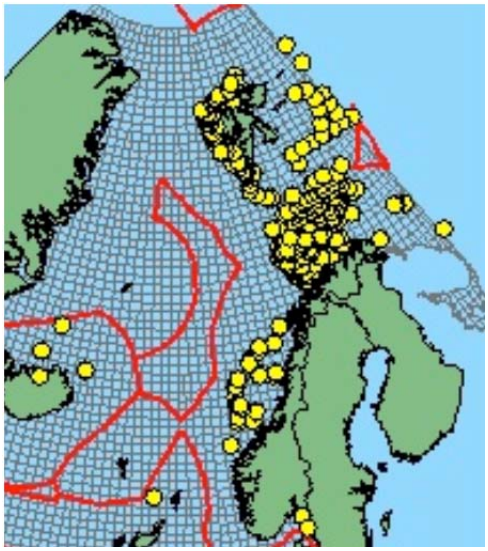

Figure 31 Distribution of known sponge communities in Norwegian waters (OSPAR, 2010).

Sponge communities are considered to be extremely vulnerable to commercial trawling suffering immediate declines through direct removal of sponges and further reductions in population densities of sponges due to delayed mortality (Freese, 1999, 2001).[41],[42] In the Barents Sea, during the MAREANO mapping programme, it was observed that in some places the trawl-door ruts are closely spaced, and traces of trawling were seen in about 90% of the video recordings. In places where there

[40] WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29.
[41] Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126.
[42] Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13.

were a large number of trawl tracks, large quantities of sediments were observed on the surface of sponges, and unattached sponges had collected in the trawl ruts (OSPAR, 2010).[43] Such sediment has raised concern that it could block the sponge respire-feeding system and cause indirect mortalities but since the sponges otherwise gave the impression of being healthy, it would seem that they have some ability to recover by cleaning the respiro-feeding system after exposure to high sediment loads. Nevertheless, persistent exposure would undoubtedly result in severe stress and (some) mortality (Garcia *et al*., 2007).[44]

In the past fishermen have been known to use fishing gear to "improve" ground by repeatedly towing their gear over ostur grounds (Klitgaard & Tendal, 2001)[45] but the consensus of opinion among scientists, administrators and skippers interviewed during this assessment is that this practice has been discontinued as the industry becomes more environmentally aware. This view is given added credence by the ongoing existence of extensive sponge communities.

Also, it should be noted that for purely pragmatic operational reasons, skippers generally avoid known areas of high sponge abundance to minimise the risk of adverse economic interactions. Significant catches of sponges both crush the fish, making them unfit for human consumption, and can burst the net on hauling. Either outcome results in a loss of time and catch and increases costs.

3.4.3 Fish communities

A total of 267 marine fish species have been recorded in Norwegian waters of which 166 are recognised as being regular Norwegian spawners (Gjøsæter *et al*., 2010).[46] The range of species is what might be expected from the boreal NE Atlantic. A detailed list of all fish species recorded by observers on demersal reference-fleet is given in the description of bycatch (below) but the more abundant species landed by demersal vessels are listed by name in the official annual landing statistics (Table 10; DoF, 2012)[47] and the species comprising 'Other fishes' are listed in Table 16).

	2009	2010	2011*	Avg 09-11
Saithe	202377	228114	190295	206929
Atlantic cod (incl. coastal cod)	243659	283481	340099	289080
Haddock	106324	124696	159512	130177
Ling	16716	18413	15856	16995
Tusk	13763	17013	14825	15200
Atlantic redfish (2 spp.)	8296	13339	9755	10463
Greenland halibut	10176	9789	10220	10062
Angler	5324	6364	5692	5793
Catfish (2 spp.)	7025	3975	6085	5695
Lumpsucker	2844	2540	1209	2198

[43] OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf

[44] Garcia E G., Ragnarsson, S.A., Steingrimsson, S.A., Navestad, D., Haraldsson, HÞ., Fossa, J.H., Tendal, O.S. & Eriksson, H. 2007. Bottom trawling and scallop dredging in the Arctic. Nordic Council of Ministers, Copenhagen 2007

[45] Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*

[46] Gjøsæter, J., HesthagenT., Borgstrøm, R., Brabrand, Å., Byrkjedal, I., Christiansen, J., Nedreaas, K., Pethon, P., Uiblein, F., Vøllestad., L. & Wienerroither, R., 2010. Pisces. In The 2010 Norwegian Red List for Species. Artsdatabanken, Trondheim. http://www.artsdatabanken.no/RL_Gruppe_Fisk_qFNn3.pdf

[47] DoF, 2012. Economic and biological figures from Norwegian fisheries 2011. Directorate of Fisheries, Bergen. http://www.fiskeridir.no/english/statistics/norwegian-fisheries/economic-and-biological-key-figures

Hake	1714	1794	2302	1937
Pollack	2154	1914	1741	1936
Halibut	1588	1881	1971	1813
Plaice	1690	1671	1804	1722
Blue ling	392	526	323	414
Whiting	115	169	87	124
Other fishes	330	273	243	282
			All species total	**700819**

Table 10 Total three-year average annual landings (tonnes) of demersal fish species by all gears 2009 – 11 (Directorate of Fisheries; http://www.ssb.no/english/subjects/10/05/fiskeri_en/tab-2012-01-26-01-en.html)

3.4.3.1.1 North East Arctic Cod

The North-East Arctic (NEA) cod stock spawns in late winter in the northern Norwegian Sea, around the Lofoten Islands after which the adult fish migrate north into the Barents Sea to feed. Eggs and larvae drift northwards in the Norwegian coastal current and spend their first 3–5 years in the Barents Sea before joining the mature stock on its spawning migration into the Norwegian Sea.

The stock is subject to an annual, age-based analytical assessment by ICES supported by three fishery-independent abundance indices. Advice is formulated with respect to a full suite of MSY and precautionary approach-based biological reference points. Currently the stock biomass is at the highest level ever recorded (> 2 Mt), is safely within all safe reference levels ($F << F_{MSY}$) and retains full reproductive capacity (Table 11, $ACOM_{NEAcod}$, 2012).[48] A management plan has been defined and agreed with the Joint Russian–Norwegian Fishery Commission[49] and ICES has endorsed it as being consistent with the MSY and precautionary approaches.

Value			Technical basis
Management plan	SSB_{MP}	460 000 t	B_{pa}, TAC linearly reduced from F_{pa} at SSB = B_{pa} to 0 at SSB equal to zero.
	F_{MP}	0.40	F_{pa}, average TAC for the coming 3 years based on F_{pa}.
MSY approach	MSY $B_{trigger}$	460 000 t	Bpa, and trigger point in HCR.
	F_{MSY}	0.40	Long-term simulations.
Precautionary approach	B_{lim}	220 000 t	Change point regression.
	B_{pa}	460 000 t	The lowest SSB estimate having >90% probability of remaining above B_{lim}.
	F_{lim}	0.74	F corresponding to an equilibrium stock = B_{lim}.
	F_{pa}	0.40	The highest F estimate having >90% probability of remaining below F_{lim}

Table 11: Biological reference levels and technical basis for North East Arctic Cod ($ACOM_{NEACod}$, 2012)

[48] $ACOM_{NEAcod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.1. www.ices.dk/committe/acom/comwork/report/2012/2012/Cod-arct.pdf

[49] http://www.barentsportal.com/barentsportal09/index.php?option=com_content&view=article&id=309%3Ajoint-russian-norwegian-management-of-the-fisheries-in-the-barents-sea&catid=71%3Afisheries&Itemid=167&lang=en

The Norwegian NEA cod fishery is MSC certified (http://www.msc.org/track-a-fishery/certified/north-east-atlantic/Norway-north-east-arctic-offshore-cod/assessment-downloads-1/22.09.2011_North_East_Arctic_Inshore_COD_Fishery_Final_Report_-2b_Determination.pdf).

3.4.3.1.2 Norwegian coastal cod

The distribution of coastal cod is limited to waters less than 12 miles from the coast but they are mostly found in the fjords. The further offshore they are, and during the spawning season, there is an increased likelihood of mixing with NEA cod. The two groups of fish cannot be differentiated other than by comparison of otoliths taken during the biological sampling programme. Cod catches within 12 miles are apportioned to NEA and coastal cod according to the proportions in the biological samples.

There are no biological reference points for this stock. This is a trends-based assessment. The survey indicates that the SSB is close to its lowest value. Recruitment has remained low in recent years and F appears variable without a clear trend since 2000 (Figure 32). A stock rebuilding plan defined by the Norwegian authorities was provisionally endorsed by ICES in 2010 as being consistent with the precautionary approach ($ACOM_{cocod}$, 2012).[50] Current estimates of annual landings are 40–45 000 t, including an estimate of unreported recreational catches.

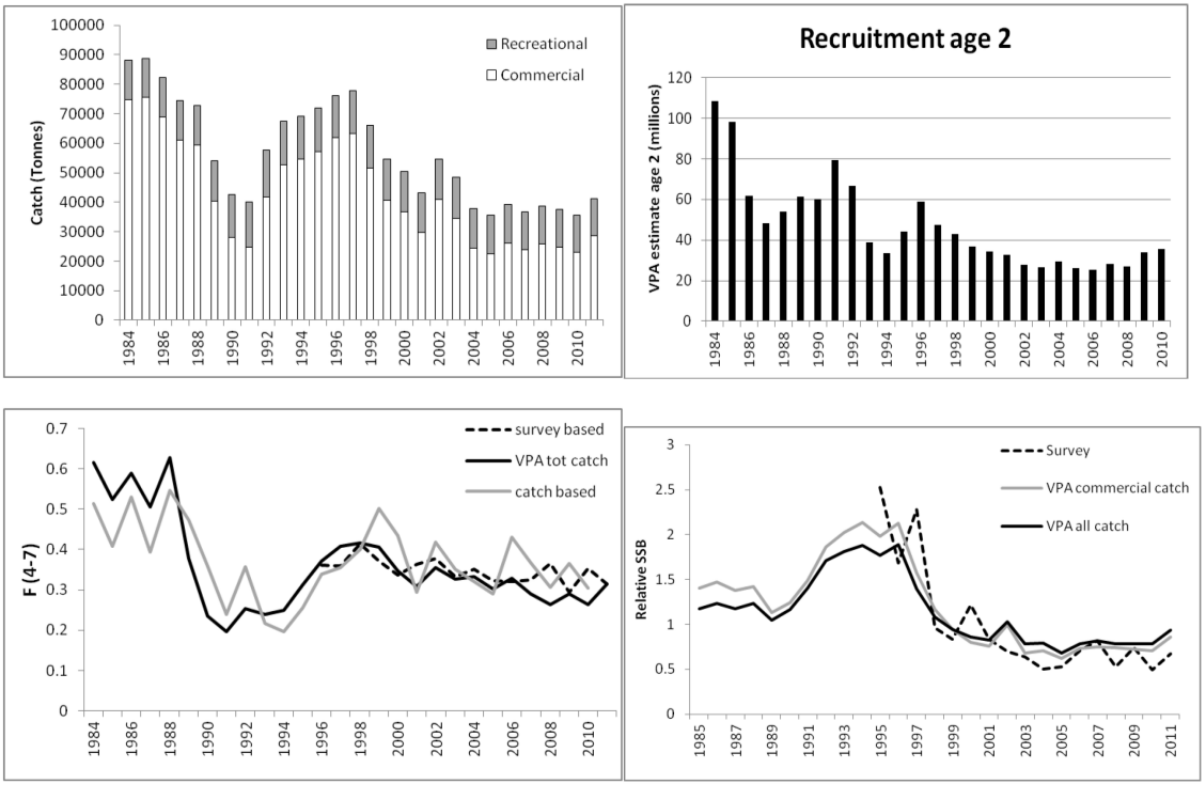

Figure 32: Summary of current and recent stock status of Norwegian coastal cod (ACOMcocod, 2012).

In addition to the general fishery conservation measures for Norwegian waters, there is a complex suite of inshore gear-related technical conservation measures aimed at minimising catches of coastal cod, not the least of which are restrictions on trawling and Danish seining in inshore waters.

[50] $ACOM_{NEA\ cocod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Norwegian coastal waters cod). ICES Advice Book 3.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-coas.pdf

The Norwegian coastal cod fishery is an integral part of the MSC certified Norwegian NEA cod fishery.

3.4.3.1.3 North Sea cod

Cod are widely distributed throughout the North Sea, but there are indications of sub-stocks. Genetic studies have indicated two subpopulations with long-term differences in recruitment trends, and largely inhabiting different regions of the North Sea, with cod from the deep-water subpopulation not expected to re-colonize depleted areas in the southern North Sea ($ACOM_{NScod}$, 2012).[51] The Norwegian saithe fishery takes place on the fringes of the deep water in the Northern North Sea (Fig 3.4.2a) where, by inference, the cod are less depleted.

Spawning takes place from January to April, during which dense spawning aggregations may be formed. During their first six months, cod are pelagic and feed mainly on planktonic copepods. At a size of approximately 7 cm they adopt a demersal way of life but continue to feed on crustaceans. As they grow bigger fish become more and more important as prey. Males and females start to mature as 2 or 3 year olds, respectively, but not until an age of 6 years old all cod are mature.

The stock is subject to a state–space age-structured assessment model with estimates of unaccounted removals (SAM) by ICES. ICES advice is given consistent with an EU–Norway management plan that was updated in December 2008. ICES evaluated the plan in 2009 and concluded that it is in accordance with the precautionary approach. There is also a range of agreed biological reference points (Table 12, $ACOM_{NScod}$, 2012).

	Type	Value	Technical basis
Management plan	SSB_{MP}	150 000 t	= B_{pa}
	F_{MP}	0.4	Mortality rate when SSB > SSB^{MP}.
MSY approach	MSY $B_{trigger}$	150 000 t	The default option of B_{pa}.
	F_{MSY}	0.19	F_{max} 2010, within the range of fishing mortalities consistent with F_{MSY} (0.16–0.42).
Precautionary approach	B_{lim}	70 000 t	B_{loss} (~1995).
	B_{pa}	150 000 t	B_{pa} = Previous MBAL and signs of impaired recruitment below 150 000 t.
	F_{lim}	0.86	F_{lim} = Floss (~1995).
	F_{pa}	0.65	F_{pa} = Approx.

Table 12: Biological reference points North Sea cod ($ACOM_{NScod}$, 2012)

There has been a gradual improvement in the status of the stock over the last few years and ICES considers that the stock is being exploited sustainably ($ACOM_{NScod}$, 2012). SSB has increased from the historical low in 2006 but remains just below B_{lim}. Fishing mortality declined from 2000 and is now below F_{pa}, but is estimated to be well above F_{MSY}. Recruitment has been poor since 2000.

In addition to the management plan there are a number of biological and technical conservation measures aimed specifically at the North Sea cod. These include spawning area closures, real-time closures in areas where cod catches exceed threshold levels and cod-related mesh regulations.

[51] $ACOM_{NScod}$, 2012. Ecoregion: Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.2. www.ices.dk/committe/acom/comwork/report/2012/2012/cod-347.pdf

3.4.3.2 Haddock *Melanogrammus aeglefinus*

3.4.3.2.1 North East Arctic haddock

In the early months of the year, mature haddock migrate southwards from the Barents Sea to the west coast of Norway where they spawn, mostly along the shelf edge, March–May. After spawning, the adult fish migrate northwards to their summer feeding grounds in the Barents Sea. The extent of the summer–winter haddock distribution within the Barents Sea varies from year to year in response to temperature and the distribution and abundance of prey species. Their migrations extend to the Svalbard Shelf in the north and eastwards towards Nova Zemlya but the extent of the distribution is limited by the Polar Front associated with the ice sheet. During the spawning migration of capelin, haddock prey on capelin and their eggs on the spawning grounds. When the capelin abundance is low or when their areas do not overlap, haddock can compensate for the lack of capelin with other fish species such as young herring, or with euphausids and benthos, which are predominant in the haddock diet throughout the year. Density-dependent growth has been observed for this stock and the present growth rate is low. Cod is the main predator on haddock and this predation is included in the natural mortality used in the assessment. The predation by cod on haddock has been high in recent years due to the large cod stock size ($ACOM_{NEAHad}$, 2012).[52] Variation in the recruitment of haddock has been associated with changes in the influx of Atlantic waters to the Barents Sea. Water temperature in the first and second years of the haddock life cycle is one of the factors that determine year-class strength; the probability of good recruitment is very low when the temperature is low. Additionally, a steep rise or fall of the water temperature shows a marked effect on the abundance of year classes. This information on environmental influence is not yet taken into account in the assessment ($ACOM_{NEAHad}$, 2012).

The stock is subject to an annual, age-based analytical assessment by ICES supported by four fishery-independent abundance indices. Advice is formulated with respect to a full suite of MSY and precautionary approach-based biological reference points. Currently, following two exceptional year classes, the stock biomass has just past the highest level ever recorded (> 450 kt), is safely within all safe reference levels ($F \approx F_{MSY}$) and retains full reproductive capacity (Table 13, $ACOM_{NEAhad}$, 2012). A management plan has been defined and agreed with the Joint Norway–Russia Fishery Commission and ICES has endorsed it as being consistent with the MSY and precautionary approaches.

	Value		Technical basis
Management plan	SSB_{MP}	80 000 t	Bpa, TAC linearly reduced from Fpa at SSB = B_{pa} to 0 at SSB equal to zero.
	F_{MP}	0.35	Previous F_{pa} estimated prior to the revision of the historical time-series for this stock.
MSY approach	MSY $B_{trigger}$	80 000 t	B_{pa}, and trigger point in HCR.
	F_{MSY}	0.35	Stochastic long-term simulations.
Precautionary approach	B_{lim}	50 000 t	B_{loss}.
	B_{pa}	80 000 t	B_{lim}*exp (1.645*0.3).
	F_{lim}	0.77	Corresponds to SPR value of slope of line from origin at SSB = 0 to geometric mean recruitment at SSB = B_{lim}.
	F_{pa}	0.47	F_{lim}*exp (−1.645*0.3).

[52] $ACOM_{NEAhad}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Haddock in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.3. www.ices.dk/committe/acom/comwork/report/2012/2012/had-arct.pdf

Table 13 Biological reference values North East Arctic haddock ($ACOM_{NEAHad}$, 2012)

The Norwegian NEA haddock fishery is MSC certified (http://www.msc.org/track-a-fishery/certified/north-east-atlantic/Norway-north-east-arctic-offshore-haddock/assessment-downloads-1/26.04.2010-norway-nea-offshore-haddock-pcr.pdf).

3.4.3.2.2 North Sea haddock

In common with other haddock stocks, the North Sea haddock stock exhibits sporadic high recruitment, leading to dominant year classes in the fishery. These large year classes often grow more slowly than less abundant year classes, possibly due to density-dependent effects. Recruitment appears poorly determined by either spawning-stock biomass or egg production ($ACOM_{NShad}$, 2012).[53] During their first six months of life, haddock are pelagic and feed mainly on copepods. At a size of approximately 7 cm they adopt a demersal way of life, when they tend to shoal at depths 40–300 m; they are most abundant in the northern half of the North Sea. Spawning takes place from February to May, at depths of 100–150 m. Haddock primarily prey on benthic and epibenthic invertebrates, sandeels, and herring eggs; they are an important prey species, mainly for saithe and other large gadoids.

The stock is subject to an annual, age-based analytical assessment by ICES supported by three fishery-independent abundance indices. Advice is formulated with respect to a full suite of MSY and precautionary approach-based biological reference points. Following a strong year class a decade ago, the stock peaked at *c.* 450 kt but, in the absence of further strong year classes the stock has been declining steadily since 2003. Nevertheless, the stock is currently within all safe reference levels ($F \approx F_{MSY}$; SSB > MSY $B_{trigger}$) and retains full reproductive capacity (Table 14, $ACOM_{NShad}$, 2012). An EU–Norway management plan has been implemented and ICES has endorsed it as being consistent with the MSY and precautionary approaches.

	Value		Technical basis
Management plan	SSB_{MP}	100 000 t	Trigger value B_{lim}.
	F_{MP}	0.30	
MSY approach	MSY $B_{trigger}$	140 000 t	Default value B_{pa}
	F_{MSY}	0.30	Provisional proxy is the management target F_{mgt}, within the range of fishing mortalities consistent with F_{MSY} (0.25–0.48).
Precautionary approach	B_{lim}	100 000 t	Smoothed B_{loss}.
	B_{pa}	140 000 t	$B_{lim*}1.4$
	F_{lim}	1.00	$F_{lim*}1.4$
	F_{pa}	0.70	10% probability that $SSB_{MT} < B_{pa}$.

Table 14: Biological reference values North Sea haddock ($ACOM_{NSHad}$, 2012)

In addition to the haddock management plan, there are a number of biological and technical conservation measures aimed specifically at the North Sea cod fishery but affecting haddock fishing. These include cod spawning area closures, real-time closures in areas where cod catches exceed threshold levels and cod-related mesh regulations.

[53] $ACOM_{NShad}$, 2012. Ecoregion: Haddock in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.3. www.ices.dk/committe/acom/comwork/report/2012/2012/had-34.pdf

The Scottish NS haddock fishery (>50% the total international landings) is MSC certified (http://www.msc.org/track-a-fishery/certified/north-east-atlantic/SFSAG-north-sea-haddock-fishery/assessment-downloads-1/17.09.2010-sfsag-haddock-final-feport-v4.pdf).

3.4.3.3 Ling *Molva molva*

The life history traits of ling are in line with other members of the gadoid family and suggest that this stock is less vulnerable to fishing mortality than typical deep-water species. Although ling can be taken as bycatch in trawl fisheries, including the saithe fishery, it is overwhelmingly a target species for Norwegian longline fisheries (which are no a subject for this certification assessment) in both the northern North Sea and the Norwegian Sea ($ACOM_{NEAling}$, 2012;[54] $ACOM_{NSling}$, 2012).[55] In neither area is there a quantitative stock assessment; stock status is described by reference to trends in catch per unit of effort in the Norwegian longline fisheries. In both areas the CPUE has shown a sustained positive trend since 2000 (Figure 33) but in the absence of absolute biological reference points the exact status of the stock is unknown.

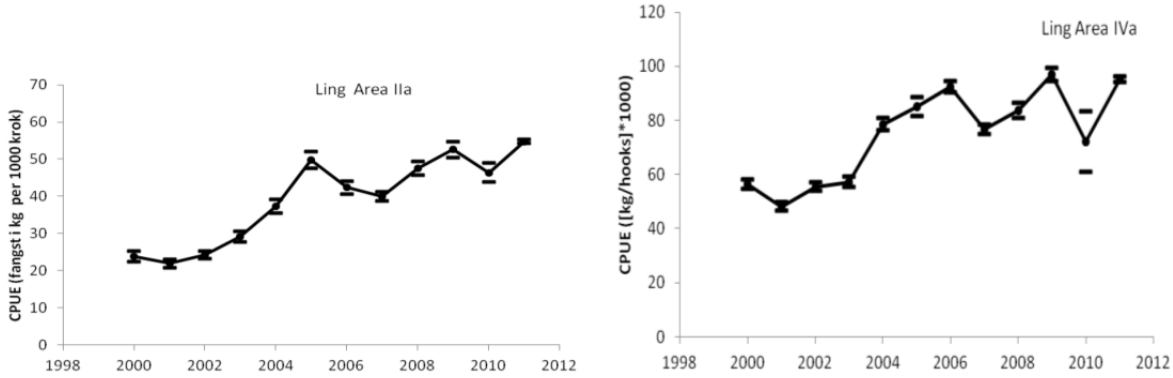

Figure 33 Norwegian cpue ([kg/hook] × 1000) for ling separately for Divisions IIa (Norwegian Sea) and Iva (North Sea) 2000–2011 (ACOMNEAling, 2012; ACOMNSling, 2012).

There are no management plans or specific objectives for this species. Ling quotas are not allocated to Norwegian vessels targeting saithe; ling comprises a small part of saithe vessels' total catch.

3.4.3.4 Tusk *Brosme brosme*

The life history traits are in line with other members of the gadoid family and suggest that tusk is less vulnerable to fishing mortality than typical deep-water species. Tusk is a bycatch species in longline, trawl, and gillnet fisheries for a range of species, including ling and other gadoids. Norway has traditionally landed a large share of the total international landings and in 2011 Norwegian landings for all areas (except Faroese waters) constituted 86% of the total landings. About 90% of the Norwegian landings are taken by longliners ($ACOM_{NEAtusk}$, 2012;[56] $ACOM_{NStusk}$, 2012),[57] which are not included in this certification assessment. In neither area is there a quantitative stock assessment;

[54] $ACOM_{NEALing}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 http://www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf

[55] $ACOM_{NSLing}$, 2012. Ecoregion: Widely distributed and migratory stocks – Ling (*Molva molva*) in Divisions IIIa and IVa, and in Subareas VI, VII, VIII, IX, XII, and XIV (other areas). ICES Advice Book 9.4.10.4 http://www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20IIIa%20IVa%20VI%20VII%20VIII%20IX%20XII%20XIV.pdf

[56] $ACOM_{Tusk}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Tusk (*Brosme brosme*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.12.1 http://www.ices.dk/committe/acom/comwork/report/2012/2012/Tusk%20in%20I%20II.pdf

[57] $ACOM_{NSLing}$, 2012. Ecoregion: Widely distributed and migratory stocks – Tusk (*Brosme brosme*) in Divisions IIIa and IVa, and in Subareas VI, VII, VIII, IX, XII, and XIV (other areas). ICES Advice Book 9.4.12.5

stock status is described by reference to trends in catch per unit of effort in the Norwegian longline fisheries. In both areas the CPUE has shown a sustained positive trend since 2000 (Figure 33) but in the absence of absolute biological reference points the exact status of the stock is unknown.

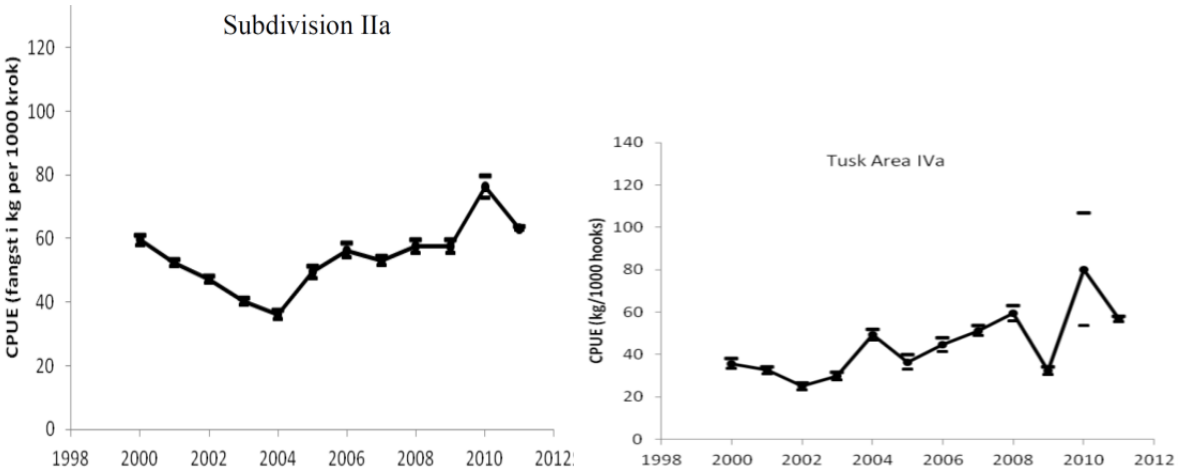

Figure 34: Norwegian cpue ([kg/hook] × 1000) for ling separately for Divisions IIa (Norwegian Sea) and Iva (North Sea) 2000–2011 (ACOMNEAtusk, 2012; ACOMNStusk, 2012).

There are no management plans or specific objectives for this species. Tusk quotas are not allocated to Norwegian vessels targeting saithe; tusk comprises a small part of saithe vessels' total catch.

3.4.3.5 Atlantic redfish *Sebastes* spp.

Atlantic redfish are listed on the Norwegian Red List and are included with other ETP species (Section 0).

3.4.3.6 Greenland halibut *Reinhardtius hippoglossoides*

Greenland halibut is a long-lived, slow-growing species showing considerable sexual dimorphism in growth and maturation. An earlier ban on targeted fishing for Greenland halibut was lifted by the JRNFC in 2010 and since then Greenland halibut has been fished in a directed gillnet fishery, and also as bycatch in the fishery for other demersal species, including the saithe fishery.

In the absence of defined reference points and an accepted assessment the status of the stock cannot be fully evaluated. The species is subject to a trends-based assessment using data from the Norwegian survey of the continental slope and a Russian autumn trawl survey of the eastern Barents Sea. The Norwegian data an erratic pattern about a long-term, relatively stable mean (Figure 35), whereas the Russian data indicate a period of sustained growth since the mid 1990s (Figure 35). As the data cover different areas, but together cover the entire stock distribution, ICES concludes that "Biomass estimates from the surveys are not consistent but give evidence of a stable or increasing stock ($ACOM_{GrHal}$, 2012).[58]

There are no management plans or specific objectives for this species. Greenland halibut quotas are not allocated to Norwegian vessels targeting saithe; Greenland halibut comprises a small part of saithe vessels' total catch.

[58] $ACOM_{GrHal}$ 2012. Ecoregion: Barents Sea and Norwegian Sea – Greenland halibut in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ghl-arct.pdf

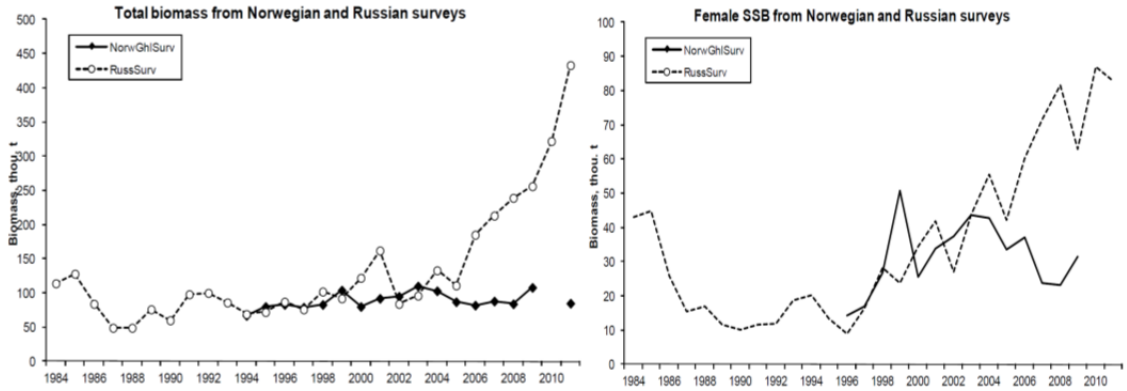

Figure 35: Greenland halibut in the Norwegian and Barents Seas. Left: Biomass (swept area) estimate of the mature female biomass (Norwegian Greenland halibut survey along the continental slope in August and Russian autumn trawl survey). Right: Total biomass estimates from the Norwegian Greenland halibut survey along the continental slope in August, and Russian autumn trawl survey. No Norwegian survey in 2010

3.4.3.7 Anglerfish *Lophius piscatorius*

Anglerfish mature at large size, resulting in a large proportion of the catch consisting of immature fish. This makes the stock susceptible to recruitment overfishing and management measures are required to ensure sufficient numbers to survive to spawning size. Catches of anglerfish on the northern shelf (from Division VIb to Division IIIa; i.e. including the northern North Sea) come from the same biological stock. Spawning appears to occur largely in deep water off the edge of the continental shelf, although mature females are rarely encountered. They are caught in a targeted gillnet fishery and as a bycatch in other demersal fisheries, including the Norwegian saithe trawl fishery in the North Sea. A Norwegian large-meshed gillnet fishery targeting fish over 60 cm has developed along the Norwegian coast since the early 1990s. The stock is subject to a trends-based assessment using abundance indices from directed Irish and Scottish anglerfish surveys ($ACOM_{monk}$, 2012).[59] Trends in both abundance and biomass appeared to peak about 2007 – 2008 and have since been declining (Figure 36).

There are no management plans or specific objectives for this fishery. Anglerfish quotas are not allocated to Norwegian vessels targeting saithe; anglerfish comprises a small part of saithe vessels' total catch.

[59] $ACOM_{monk}$, 2012. Ecoregion: Celtic Sea and West of Scotland + North Sea – Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Division IIIa, and Subareas IV and VI. ICES Advice Book 5.4.29. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ang-ivvi.pdf

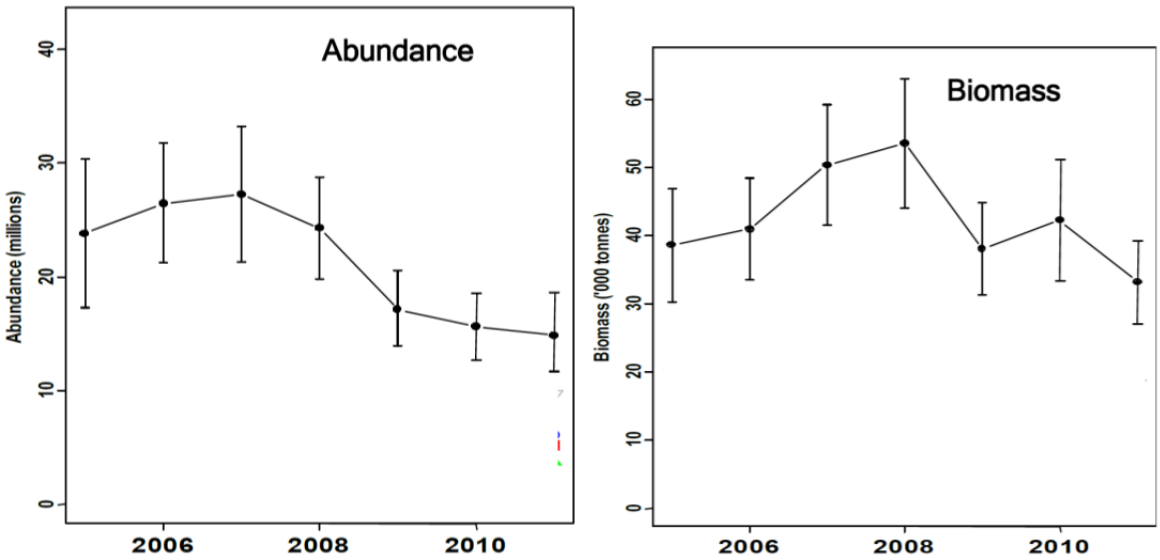

Figure 36: Anglerfish Left: Total abundance (millions) and Left: stock biomass (thousand tonnes, with 95% confidence limits) (lower panel) from Scottish anglerfish surveys (ACOMmonk, 2012).

3.4.3.8 Atlantic catfish *Anarhicas lupus* and spotted catfish *A. minor*

Atlantic and spotted catfish are widely distributed throughout the NE Atlantic but have not been subject to intense study or stock assessment. They mostly occur on mud or sand bottoms at depths 40–200 m. They are targeted by longliners (which are not subject to this certification assessment) and trawling. In Icelandic waters, recent survey data have shown a declining trend in Atlantic catfish recruitment indices[60] but similar data are not available for other areas.

There are no management plans or specific objectives for this species. Catfish quotas are not allocated to Norwegian vessels targeting saithe; catfish comprises a small part of saithe vessels' total catch.

3.4.3.9 Lumpsucker *Cyclopterus lumpus*

Lumpfish are found Biscay to Iceland and the northern Barents Sea; they live in the kelp forest along the coast during first year of life and then swim in the ocean. They live 7–15 years and can grow to > 60 cm and weigh > 5 kg. They spawn in shallow inshore waters during the spring when they are subject to a targeted gillnet fishery from small boats. The fishing is most intense in shallow areas from 5–40 meters deep, often in the outer parts of the coast that is exposed to the open sea; consequently, fishing is very dependent on the weather, especially since only small boats are used in the shallow areas. The market for roe from lumpfish absorbs approximately 4 000 t of raw roe every year; most is salted in barrels at landing sites or by the fishers themselves.

There are no management plans or specific objectives for this species. As the lumpfish fishery is so specific in time, place and gear, and with little interaction with other species (DoF, pers comm.), it will not be given any further consideration in this certification assessment.

3.4.3.10 Hake *Merluccius merluccius*

European hake is widely distributed over the North-east Atlantic shelf. Although there is no clear evidence of multiple populations in the North-east Atlantic, ICES assumes two different stock units: a southern stock and a northern stock. Fish from the northern stock are taken by demersal trawlers, including saithe trawlers, and gillnetters in the northern North Sea. The stock is subject to a length-

[60] http://www.fisheries.is/media/skjal/graph/5-atlantic-catfish-(g)-catch-distribution-(hafro).png

based analytical assessment supported by four fishery-independent trawl survey abundance indices ($ACOM_{hake}$, 2012).[61]

At present there is not a complete range of biological reference points, only an estimate for F_{MSY} = 0.24. The fishery is in transition under the terms of an EU stock-recovery plan (which has not been assessed by ICES). The plan aims to increase the SSB to above 140 000 t with a fishing mortality (F management plan = F_{MP}) of 0.25, constrained by a year-to-year change in TAC of 15% when SSB is above 100 000 t. Current estimates of F are greater than F_{MSY}, but have been showing a sustained decline over the past 5 years (Figure 37). Estimates of SSB have been increasing steadily over the same period ($ACOM_{hake}$, 2012), which suggest that F_{MSY} will be achieved with the next year or two.

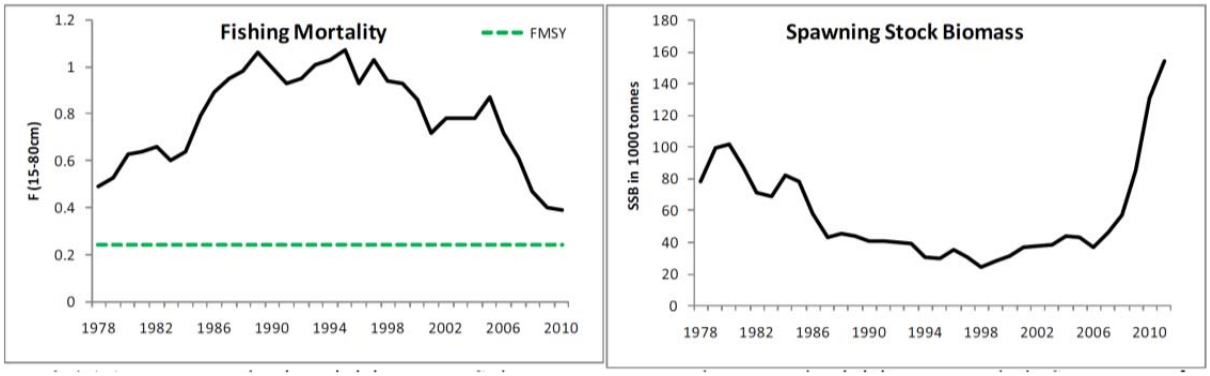

Figure 37: Estimates of fishing mortality rates (F) and spawning stock biomass (SSB) for the northern component of the European hake stock (ACOMhake, 2012).

Hake quotas are not allocated to Norwegian vessels targeting saithe; hake comprises a small part of saithe vessels' total catch.

3.4.3.11 Pollack *Pollachius pollachius*

Pollack is a benthopelagic species, found mostly close to shore over hard bottom. It is found down to *c.* 200 m but 0-group is found in shallow coastal waters. It can live to at least 15 years; reach 130 cm in length and > 18 kg in weight. The main spawning occurs in March–April. Pollack is mainly caught as a bycatch in trawl fisheries in the open North Sea, mainly in the directed saithe fisheries. They are also taken in the Norwegian coastal gillnet fisheries. There is neither analytical assessment nor any biological reference points, consequently, the state of the stock is unknown but total international landings from the North Sea have been relatively stable at *c.* 1500 – 2000 t over the past 20 years ($ACOM_{poll}$, 2012).[62]

There are no management plans or specific objectives for this species. Pollack quotas are not allocated to Norwegian vessels targeting saithe; pollock comprises a small part of saithe vessels' total catch.

3.4.3.12 Halibut *Hippoglossus hippoglossus*

Atlantic halibut is a flatfish and is the largest boney fish in the NE Atlantic waters. It is widely distributed but current knowledge of halibut biology and distribution is limited; in particular,

[61] $ACOM_{NShake}$, 2012. Ecoregion: Widely distributed and migratory stocks – Hake in Division IIIa, Subareas IV, VI, and VII, and Divisions VIIIa,b,d (Northern stock). ICES Advice Book 9.4.1. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hke-nrth.pdf

[62] $ACOM_{NSpoll}$, 2012. Ecoregion: North Sea – Pollack in Subarea IV and Division IIIa. ICES Advice Book 6.4.32. http://www.ices.dk/committe/acom/comwork/report/2012/2012/pol-nsea.pdf

spawning behavior and larval movements remain a mystery. Although the maximum size this species can reach is uncertain, individuals up to 350 kilograms and 3.60 meters have been captured. Halibut are quite localized and often spawn within a very limited area where they can be subject to targeted fisheries. This makes them vulnerable to overfishing, not least because of their slow growth rate and late sexual maturation.

Catches of halibut are too low to enable any meaningful assessment, either nationally or internationally. Nevertheless, the Norwegian authorities recognise that it is in a depleted state and have implemented a strategy to aid its recovery. In addition to minimum mesh size regulations, fishing for halibut during spawning season — 20 December to 31 March — with nets, trawls, and seines is prohibited. In addition, among all the commercial species it is the only one that can be discarded. Indeed, if any is still alive at the time it is taken on board, all halibut < 80 cm total length must be returned to the sea immediately.

3.4.3.13 Plaice *Pleuronectes platessa*

European Plaice are distributed in the eastern Atlantic from the Barents Sea in the north to the northwest coast of Africa in the south. Within this area there are a number of different of stocks but the North Sea stock is by far the largest and this is most abundant in the Southern Bight and German Bight, areas where spawning occurs in late winter and early spring. After spawning, the adult fish migrate to areas in the central North Sea and further north to feed. Although they are a species normally associated with relatively shallow water, they can be found down to *c.* 200 m. The heaviest fishing activity is in the southern and central North Sea where large quantities are taken by beam trawlers; only small quantities (< 2000 t) are taken as bycatch in the Norwegian saithe fishery.

Although plaice in the Norwegian Sea are not subject to assessment (the quantities caught are too small), the North Sea plaice stock is subject to an ICES analytical age-based assessment, supported by three fishery-independent abundance indices, and there is a full suite of biological reference points. There is also an internationally agreed management plan for EU waters that has been endorsed by ICES as being consistent with both the precautionary approach ($ACOM_{plaice}$, 2012).[63] From an SSB fluctuating around MSY Btrigger in the late 1990s, the stock has grown since *c.* 2003 to a level (600 kt) almost twice as high as its previous peak during the previous 60 years. Over the same period fishing mortality has fallen from fluctuating around Fpa (=) down to the level of FMSY (=). Overall, ICES is satisfied that the stock is being exploited sustainably and that it retains full reproductive capacity (Table 15, $ACOM_{plaice}$, 2012).

	Value		Technical basis
Management plan	SSB_{MP}	230 000 t	Stage one: Article 2 of the management plan.
	F_{MP}	0.60 0.30	Stage one: Article 2; Stage two: Article 4 of the management plan..
MSY approach	MSY $B_{trigger}$	230 000 t	Default value B_{pa}
	F_{MSY}	0.25	Simulation studies and equilibrium analyses taking into account a number of possible stock–recruitment relationships (range of 0.2–0.3).
Precautionary	B_{lim}	160 000 t	B_{loss} = 160 000 t, the lowest observed biomass in 1997 as assessed in 2004.

63 $ACOM_{plaice}$, 2012. Ecoregion: North Sea – Plaice in Subarea IV (North Sea). ICES Advice Book 6.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ple-nsea.pdf

approach	B_{pa}	230 000 t	c. $B_{lim*}1.4$
	F_{lim}	0.74	F_{lioss} for ages 2 – 6
	F_{pa}	0.60	5th percentile of F_{loss} (0.6) and implies that $B_{eq}>B_{pa1)}$ and a 50% probability that SSB_{MT} ~ B_{pa}.

Table 15 Reference values and technical basis for plaice ($ACOM_{Plaice}$ 2012).

3.4.3.14 Blue ling *Molva dipterigia* spp.

Blue ling are listed on the Norwegian Red List and are included with other ETP species (Section 0).

3.4.3.15 Whiting *Merlangius merlangus*

Whiting are found throughout the North Sea but tend to be most abundant in the western and shallower southern North Sea. Spawning starts in January in the south but continues for several months throughout the North Sea. The fish mature when they are about two years of age. They are a major predator in the North Sea food web, preying heavily on Norway pout, sandeels and herring, but also fry of cod, haddock and its species. The whiting is mostly found near the bottom at 10-200 m depth, but it may also rise from the bottom up into the free water layers. Although whiting is frequently taken in association with other gadoid species, and nephrops, only trivial quantities (< 100 t) are taken in the Norwegian saithe fishery.

The stock is subject to an ICES analytical age-based assessment supported by two fishery-independent abundance indices but the only reference point is F_{MP} (0.30) as defined in the EU – Norway management plan for this stock. ICES has reviewed this plan but has not yet endorsed it as being consistent with either the precautionary or MSY approach. In 2011 ICES considered an F_{MP} of 0.3 (with a 15% TAC constraint) to be consistent with long-term stability even when recruitment is poor for several consecutive years. Based on a considerable revision in the level of fishing mortality in 2012, the target F is no longer considered applicable and the management target needs re-evaluation $ACOM_{whit}$, 2012).[64]

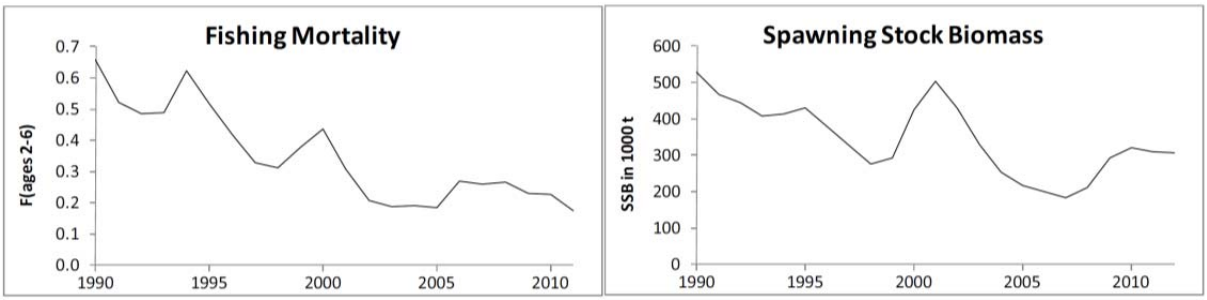

Figure 38 Whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel): stock assessment (weights in thousand tonnes), including intermediate-year forecasts for 2012 (ACOMwhit, 2012).

Although there has been a sustained downward trend in fishing mortality over the past 20 years, SSB has also followed a negative trend, albeit with occasional peaks or increases. There has been a modest increase in SSB over the past 5 years (Figure 38).

64 $ACOM_{whit}$, 2012. Ecoregion: North Sea – Whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel). ICES Advice Book 6.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whg-47d.pdf

3.4.3.16 Other fishes

This aggregated category comprises a very wide range of elasmobranch and bony fishes that are taken in such small numbers and with such irregularity that they are not shown in the official published landing statistics (Table 10) but they are identified on sales slips after landing. Observers on reference fleet vessels record all species of fish caught during their trips and the fish can be separated into those that are retained and sold and those that are not, i.e. discarded bycatch (Bowering et al., 2011). This retained component can be further separated into those that appear in the published landing statistics (Table 10) and those that comprise 'Other fishes' (Table 16; c. 300 t year–1). While there are many species in common to both the catches from the inshore reference fleet and the offshore reference fleet, there are also noticeable differences. The offshore fleet catches a wider variety of elasmobranch species (c. 15 species) than the inshore fleet (c. 6 spp.) but the inshore fleet catches a wider variety of bony fishes (c. 25 spp.) than the offshore fleet (c. 17 spp.).

Offshore reference fleet		Inshore reference fleet	
Common name	**Scientific name**	**Common Name**	***Scientific name***
Elasmobranchs			
Arctic skate	*Amblyraja hyperborea*		
Blackmouthed dogfish	*Galeus melastomus*		
Blue skate	*Dipturus batis*	Blue skate	*Dipturus batis*
Longnosed skate	*Dipturus oxyrinchus*		
		Porbeagle shark	*Lamna nasus*
Rabbitfish	*Chimaera monstrosa*		
Rough rattail	*Macrourus berglax*	Rough rattail	*Macrourus berglax*
Round skate	*Rajella fyllae*		
Roundnose grenadier	*Coryphaenoides rupestris*	Round-nose grenadier	*Coryphaenoides rupestris*
Sailray	*Dipturus linteus*		
Spinytail skate	*Bathyraja spinicauda*		
Spurdog	*Squalus acanthias*	Spurdog	*Squalus acanthias*
Starry skate	*Amblyraja radiata*		
Thornback ray	*Raja clavata*	Thornback ray	*Raja clavata*
Tope shark	*Galeorhinus galeus*		
Velvet belly	*Etmopterus spinax*		
Boney fishes			
Argentine	*Argentina sphyraena*	Argentine	*Argentina sphyraena*
		Atlantic herring	*Clupea harengus*
Atlantic salmon	*Salmo salar*	Atlantic salmon	*Salmo salar*
		Ballan wrasse	*Labrus bergylta*
Blue whiting	*Micromesistius poutassou*		
Brill	*Scophthalmus rhombus*	Brill	*Scophthalmus rhombus*
Common mora	*Mora moro*		
		Corkwing wrasse	*Symphodus melops*
Dab	*Limanda limanda*	Dab	*Limanda limanda*
European conger eel	*Conger conger*		
European seabass	*Dicentrarchus labrax*	European seabass	*Dicentrarchus labrax*
Flounder	*Platichthys flesus*	Flounder	*Platichthys flesus*
		Garfish	*Belone belone*
		Goldsinny wrasse	*Ctenolabrus rupestris*
Greater argentine	*Argentina silus*	Greater argentine	*Argentina silus*
Greater forkbeard	*Phycis blennoides*	Greater forkbeard	*Phycis blennoides*
Grey gurnard	*Eutrigla gurnardus*	Grey gurnard	*Eutrigla gurnardus*
		Horse mackerel	*Trachurus trachurus*
		John dory	*Zeus faber*
Lemon sole	*Microstomus kitt*	Lemon sole	*Microstomus kitt*
		Mackerel	*Scomber scombrus*
Megrim	*Lepidorhombus whiffiagonis*	Megrim	*Lepidorhombus whiffiagonis*
		Scorpion fish	*Scorpaenidae*
		Small-mouthed wrasse	*Centrolabrus exoletus*
Sole	*Solea solea*	Sole	*Solea soleas*
		Sprat	*Sprattus sprattus*
Turbot	*Scophthalmus maximus*	Turbot	*Scophthalmus maximus*
Witch	*Glyptocephalus cynoglossus*	Witch	*Glyptocephalus cynoglossus*

Table 16: Species comprising 'Other fishes' in published landing statistics (Table 10); i.e. fish caught irregularly in small numbers but retained, recorded and landed for sale as recorded from offshore and inshore reference fleet catches (Bowering et al., 2011)

Overall, the 'Other fishes' category is dominated by spurdog (*Squalus acanthias*) which typically contributes 200–250 t per year (MFCA, pers comm.). In common with other large elasmobranchs, spurdog is a Norwegian Red species and is discussed further under ETP species (Section 0). The other species that are listed here (Table 16) are taken in such small total annual quantities that the potential

effect of the Norwegian saithe (or even the demersal) fisheries is trivial in terms of stock management and stock status.

3.4.4 Seabirds

Seabird populations are monitored under the auspices of the Norwegian nature conservation agency, NINA (Barrett *et al*., 2012);[65] some 10 million seabirds are present at most times of the year in the northern North Sea–Norwegian Sea and many interact with the commercial fisheries. Some, such as fulmars *Fulmarus glacialis*, have increased in abundance in the Norwegian and North Sea ($ACOM_{seabirds}$, 2012),[66] probably in response to increased quantities of fish offal and discards. Others, such as terns (Sternidae) and auks (Alcidae) may be in direct competition for resources. For example, reproductive failures of the Atlantic puffin *Fratercula arctica* presaged the collapse of herring *Clupea harengus* stocks off Norway during the 1970s (Barth, 1978;[67] Lid, 1981;[68] Vader *et al.,* 1989;[69] Anker-Nilssen 1992)[70]. Other seabirds are affected by the abundance of cod (Erikstad, in press).[71] Following a review and analysis of a comprehensive array of seabird population data ICES found that only four species showed a sustained long-term decline in abundance: black-backed gulls, great black-back gulls, herring gulls, kittiwakes and skuas. Other species either fluctuated around a long-term mean or showed sustained increase in abundance, most notably lesser black-back gulls and cormorants. On an earlier occasion, Greenstreet *et al.* (1999)[72] reviewed the potential of cormorants and shags to be used as a tool in assessing the relative abundance of 0-group saithe in Norway. Although there was evidence of high consumption of saithe in years with strong recruitment and low consumption in years of low recruitment the relationship was not strong enough for stock assessment purposes.

A longstanding concern with respect to seabirds and fishing has been estimates of potential mortalities resulting from seabird–fishing-gear interactions (BirdLife, 2012).[73] Estimates have always been difficult to make but reference fleet vessels record seabird–fishing gear interactions (Table 17) and these data have been subject to review (Bowering *et al*., 2011).

The reference-fleet data indicate that across the fleet, such interactions are not common but direct interviews with fishermen yielded estimates deaths of 10 000–12 000 birds per year in 2009–10

[65] Barrett, B., Anker-Nilssen, T., Bustnes, J. O., Christensen-Dalsgaard,, S., Descamps, S., Erikstad, K.-E., Lorentsen, S.-H., Strøm, H. & Systad, G.H., 2012. Key-site monitoring in Norway 2011. Seapop Short Report 1–2012. NINA, Oslo. http://www.seapop.no/no/files/short-reports/2012/seapop-short-report-1-2012.pdf

[66] $ACOM_{seabirds}$, 2012. Ecoregion: General advice – EcoQO for seabird populations in OSPAR regions II and III. ICES Advice Book 1.5.5.1 http://www.ices.dk/committe/acom/comwork/report/2012/Special%20Requests/OSPAR_EcoQO_for_seabird_populations.pdf

[67] Barth E.K. 1978. Lundetragedien på Røst. Fauna (Oslo) 31: 273-274.

[68] Lid G. 1981. Reproduction of the Puffin on Røst in the Lofoten Islands in 1964-1980. Fauna Norvegica C 4: 30–39.

[69] Vader W., Anker-Nilssen T., Bakken V., Barrett R. & Strann K.B. 1989. Regional and temporal differences in breeding success and population development of fisheating seabirds in Norway after collapses of herring and capelin stocks. Trans. 19th IUGB Congress, Trond-heim 1989: 143-150.

[70] Anker-Nilssen T. 1992. Food supply as a determinant of reproduction and population devel-opment in Norwegian Puffins *Fratercula arctica*. Dr. scient. thesis terr. ecology, Univ. Trondheim.

[71] Erikstad, K.E., T.K., Barrett, R.T, Vikebø, F. & SANDVIK, H., (in press). Temporal variations in fish abundance affects seabird populations: cod – guillemot interactions in the Barents Sea. Proceedings of the Annual Larval Fish Conference 2013. Miami Florida. http://www.larvalfishcon.org/Conf_Abstracts.asp?ConferenceCode=36th&AbstractID=1531

[72] Greenstreet S.P.R., Becker P.H., Barrett R.T., Fossum P. & Leopold M.F. 1999. Consumption of pre-recruit fish by seabirds and the possible use of this as an indicator of fish stock recruitment. In: Furness R.W. & Tasker M.L. (eds) Diets of seabirds and consequences of changes in food supply: pp. 6-17. ICES Cooperative Research Report 232. International Council for the Exploration of the Sea, Copenhagen.

[73] BirdLife Workshop on Seabird Bycatch in Gillnet Fisheries. Symposium proceedings. http://www.birdlife.org/eu/pdfs/20120703_GillnetSeabirdBycatchWorkshopREPORT.pdf

(Fangel *et al.*, 2011)[74]. Northern fulmars, cormorants (*Phalacrocorax* spp.), black guillemots and razorbills are the birds most often drowned in fishing gear in Norway, with the highly specific, targeted inshore gillnet fishery for lumpsucker and the northern longline fishery for Greenland halibut raising particular cause for concern, but neither of these fisheries is of particular relevance with respect to saithe and the saithe fishery (IMR, DoF, pers comm.). Apart from longline vessels deploying bird-scarer streamers when shooting their lines to minimise the risk of birds taking bait and preventing hooks from fishing, and some seasonal closed areas near seabird nesting sites, there is no explicit management plan or strategy for minimising seabird bycatch. The reality being that for the targeted saithe fisheries, seabird bycatch is too low to justify formulation of an explicit strategy. The electronic logbook used by all vessels >15 m requires any interactions with seabirds (including 'zero' results) be recorded but this aspect of the system is not yet fully operational.

Seabirds recorded in demersal fishing gear	
Black guillemot	*Cepphus grylle*
Black-legged kittiwake	*Rissa tridactyla*
Common eider	*Somateria mollissima*
Common guillemot	*Uria aalge*
Cormorants	*Phalacrocorax* spp.
Great black-backed gull	*Larus marinus*
Northern fulmar	*Fulmarus glacialis*
Razorbill	*Alca torda*

Table 17: Seabirds catches (2010) recorded by inshore demersal reference-fleet vessels. No seabird catches were recorded by offshore reference-fleet vessel (Bowering et al., 2011)

3.4.5 Marine Mammals

The Institute of Marine Research is the lead agency for monitoring the status and providing advice on the management, including hunting, of marine mammals.[75] A wide variety of marine mammal species occur regularly throughout the area including many of the baleen whales, toothed whales, such as the long-finned pilot whale *Globicephala melas*, harbour porpoise *Phocoena phocoena*, common dolphin *Delphinus delphis*, white-sided dolphin *Lagenorhynchus acutus*, Risso's dolphin *Grampus griseus*, killer whale *Orcinus orca* and seals such as grey seal *Halichoerus grypus*, harbour seal *Phoca vitulina* and hooded seal *Crystophora cristata* (Bjørge *et al*., 2010).[76] Information on cetacean distribution and abundance is gathered on a ship-of-opportunity basis, e.g. during fishery research cruises (Figure 39; PGNAPES, 2009)[77] and by observers aboard the Norwegian reference fleet (Table 18).

Mammals recorded in demersal fishing gear	
American mink	*Mustela vison*
European otter	*Lutra lutra*
Common harbour seal	*Phoca vitulina*
Grey seal	*Halichoerus grypus*

[74] Fangel, K., Wold, L.C, Aas, Ø., Christensen-Dalsgaard, S., Qvenild, M. & Anker-Nilssen, T. 2011. Bycatch of seabirds in Norwegian coastal fisheries. A mapping and methodology study with focus on gillnet and longline fisheries. NINA Report 719. http://www.nina.no/archive/nina/PppBasePdf/rapport/2011/719.pdf

[75] http://www.imr.no/forskning/faggrupper/sjopattedyr/en

[76] Bjørge, A., Lydersen, C., Skern-Mauritzen, M. & Wiig, Ø. (Eds), 2010. Marine Mammals. Fisken og havet, special edition 2–2010. http://www.imr.no/filarkiv/2011/05/sjoens_pattedyr_web.pdf/en

[77] PGNAPES, 2009. Report of the Planning Group on Northeast Atlantic Pelagic Ecosystem Surveys (PGNAPES). ACOM ICES CM 2009/RMC:06

Harbour porpoise	*Phocoena phocoena*
White-beaked dolphin	*Lagenorhynchus albirostris*
Pilot whale	*Globicephala melas*

Table 18: Mammal catches (2010) recorded by inshore reference-fleet vessels. No mammal catches were recorded (Bowering et al., 2011)

The fishery–marine mammal interactions recorded on reference-fleet vessels was reviewed during 2011 (Bowering et. al., 2011; WGMME, 2011)[78] and results show that such interactions are infrequent and the numbers involved are certainly trivial in population terms. From a Norwegian perspective, marine mammals, particularly seals, are seen as a potential threat to the fishing industry rather than fishing being a threat to marine mammals (Bjørge *et al*., 2010).

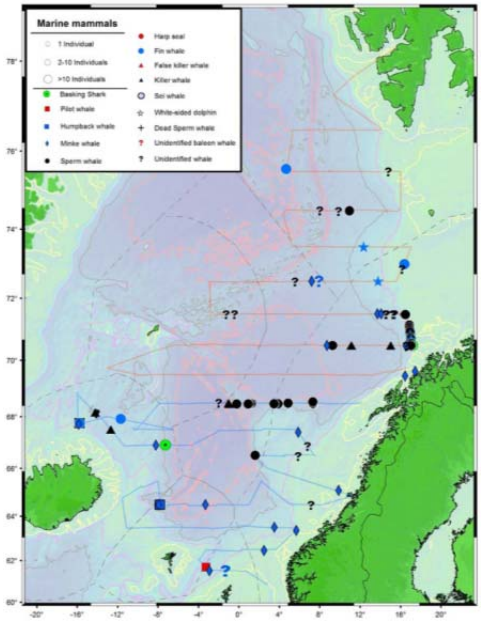

Figure 39 Marine mammals and basking sharks observed in the Norwegian Sea in daylight hours, 15 July-6 August 2009 (PGNAPES, 2009).

All of these species prey on fish and their position within the Norwegian–North Sea ecosystem is reviewed by the ICES Working Group on Marine Mammal Ecology (WGMME, 2008, 2011).[79] No specific concerns have been raised with respect to the saithe or the demersal fishing fleets. Although client fleet skippers have not hitherto kept formal records of marine mammal sightings, such animals are, in effect, part of their everyday life and something on which they make a mental note. Of the species listed here, sightings of harbour porpoise, (unspecified) dolphins and killer whales (orcas) are not unusual but nor are they considered a daily commonplace. The electronic logbook used by all vessels >13 m requires any interactions with seabirds (including 'zero' results) be recorded but this aspect of the system is not yet fully operational.

[78] WGMME, 2011. Report of the Working Group on Marine Mammal Ecology (WGMME). ICES CM 2011/ACOM:25. http://www.ices.dk/reports/ACOM/2011/WGMME/wgmme_2011_final.pdf

[79] WGMME, 2008. Report of the ICES Working Group on Marine Mammal Ecology. ICES CM 2008/ACOM 44. http://www.ices.dk/reports/ACOM/2008/WGMME/wgmme_2008.pdf

3.4.6 Endangered, threatened and protected species

Many benthic invertebrate species in Norwegian waters qualify at endangered, threatened or protected (ETP) species but foremost among these are the coldwater corals (see Section 3.4.1 above). Seabirds and marine mammals are all protected species, including those mammals that are hunted (subject to national legislation),[80] in that they are covered by one or more of a multiplicity of international conventions for species protection to which Norway is a signatory. In Norway, the role of all these species and habitats, and their role in the marine ecosystems are safeguarded by the Marine Resource Act (DoF, 2008).[81] The act introduces important principles that seek to protect both species and habitat, and requires ongoing research to understand and protect the ecosystems and stocks. There are also some marine protected areas designated specifically for marine mammals (http://en.wikipedia.org/wiki/Norwegian_Directorate_for_Nature_Management). Although it is doubtful that any skipper will deliberately try to harm either seabirds or mammals during the course of fishing operations, it is inevitable that some fatal interactions do occur. At present, the only records are the non-quantitative records gathered by reference-fleet vessels, which show that such interactions are most likely to occur with the inshore fleet (Table 17 & Table 18).

In addition to these charismatic and totemic species, there are also a number of marine fish species, predominantly but not exclusively elasmobranch species (skates, rays, dogfish and sharks), that are recognised as ETP species insofar as they appear on the Norwegian Red List: golden redfish *Sebastes marinus*, blue ling *Molva dipterygia*, arctic lumpsucker *Cyclopteropsis mcalpini*, Norwegian pollock *Theragra finnmarchica*, smooth sandeel *Gymnammodytes semisquamatus*, basking shark *Cetorhinus maximus*, common or blue skate *Dipturus batis*, Greenland shark *Somniosus microcephalus*, porbeagle shark *Lamna nasus*, school shark or tope *Galeorhinus galeus*, shagreen ray *Leucoraja fullonica*, spiny tail ray *Bathyraja spinicauda*, spurdog or spiny dogfish *Squalus acanthias*. Of these, arctic lumpsucker, Norwegian pollock, smooth sandeel and Greenland shark have not been recorded in the Norwegian demersal reference-fleet catches (Bowering et al., 2011) and are not discussed further here but the status of each of the others is summarised here, starting with the species that appear in the annual summary of Norwegian demersal fish landings (Table 10).

3.4.6.1 Golden redfish *Sebastes marinus*

There are two species of redfish in the NE Arctic, golden redfish and beaked redfish *Sebastes mentella*. The greater part of the fishery for S mentella takes place in international waters between Norway–Iceland–Faroe Islands; the ICES assessment is that this stock is in relatively robust condition (exploitation consistent with MSY approach; $ACOM_{ment}$, 2012).[82] Norwegian catches of beaked redfish in recent years have been less than 5% of the total (c. 10 000 t) redfish landings. Consequently, the focus here is on golden redfish. Although the Norwegian golden redfish stock is recognised as being in a highly depleted state ($ACOM_{gold}$, 2012),[83] and appearing on the Norwegian Red List, they do not yet appear on the Red List of the International Union for the Conservation of Nature (IUCN; www.iucn.org).

Golden redfish grow to *c.* 50 cm in length and are found and fished throughout the North Atlantic at depths of 100–1000 m. It is a very slow-growing, long-lived ovoviviparous species with a late age of

[80] Sealing Act (1951); Saltwater Fishing Act (1983); Participation Act (1999); Marine Resources Act (2008);

[81] DoF, 2008. The Marine Resources Act: Act of 6 June 2008 no. 37 relating to the management of wild living marine resources. Directorate of Fisheries, Bergen. http://www.fiskeridir.no/english/fisheries/regulations/acts/the-marine-resources-act

[82] $ACOM_{ment}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Golden redfish (*Sebastes marinus*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/smn-arct.pdf

[83] $ACOM_{Gold}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Beaked redfish (*Sebastes mentella*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.6. http://www.ices.dk/committe/acom/comwork/report/2012/2012/smr-arct.pdf

maturity, which makes it particularly vulnerable to fishing pressure. There are quota-controlled directed gillnet and longline fisheries and but trawlers do not have quota and can only take it as bycatch. If the number of golden redfish in any haul exceeds 15% the total catch, the vessel must report the catch to the Coastguard and move a minimum of three nautical miles before shooting the trawl again. The Coastguard–Directorate of Fisheries has the option to impose a real-time closed area to protect the species if there are persistent records of golden redfish catches from a particular area (DoF, MFCA pers comm.). All directed fisheries, except handline, are prohibited in the period 20 December–31 July and in September.

The Norwegian stock of golden perch is subject to an ICES analytical age–length-structured assessment supported by two fishery independent trawl survey abundance indices ($ACOM_{gold}$, 2012). There are neither precautionary nor MSY-based biological reference points. The current fishing mortality is *c.* 0.3, which is very high compared to the natural mortality of *c.* 0.05. ICES has concluded that SSB has been decreasing since the 1990s and is currently at the lowest level in the time-series. Fishing mortality has been increasing since 2005 and is currently at the highest level in the time-series. The stock has also been suffering from sustained low recruitment and in the absence of improved recruitment the stock is expected to continue to decline. ICES has recommended a ban on all directed fisheries ($ACOM_{gold}$, 2012).

There is neither a management nor stock recovery plan. The principal conservation strategy is not to allocate quotas but to minimise bycatch in the trawl fisheries through the move-on and real-time closure measures.

3.4.6.2 Blue ling *Molva dipterygia*

Although the NE Atlantic blue ling stock is recognised as being in a highly depleted state ($ACOM_{BLing}$, 2012),[84] and appearing on the Norwegian Red List, they do not yet appear on the Red List of the IUCN.

Blue ling are found from Morocco to Iceland, in the North Sea and Skagerrak, and in the southwestern Barents Sea. It is most common in warm, deep shelf regions, the continental slope, and in the fjords, typically at 350–500 m depths, but may also occur down to 1500 m. It is also found in the Mediterranean Sea, in waters off Greenland, the east coasts of Canada and the United States. Blue ling occur in particularly dense aggregations during spawning along the Reykjanes Ridge south of Iceland, around the Faroe Islands, west of the Hebrides, and along the edge of the Norwegian continental shelf. They can live *c.* 30 years and grow to 1.5 m in length and 15 kg; their diet consists mainly of fish.

The ICES assessment is limited to catch-based trends and there are no biological reference points; consequently, there are no meaningful stock or catch forecasts ($ACOM_{Bing}$, 2012).

[84] $ACOM_{Bling}$, 2012. Ecoregion: Widely distributed and migratory stocks – Blue ling (*Molva dypterygia*) in Divisions IIIa and Iva, and Subareas I, II, VIII, IX, and XII. ICES Advice Book 9.4.11.3.
http://www.ices.dk/committe/acom/comwork/report/2012/2012/Blue%20ling%20in%20IIIa%20IVa%20I%20II%20VIII%20IX%20XII.pdf

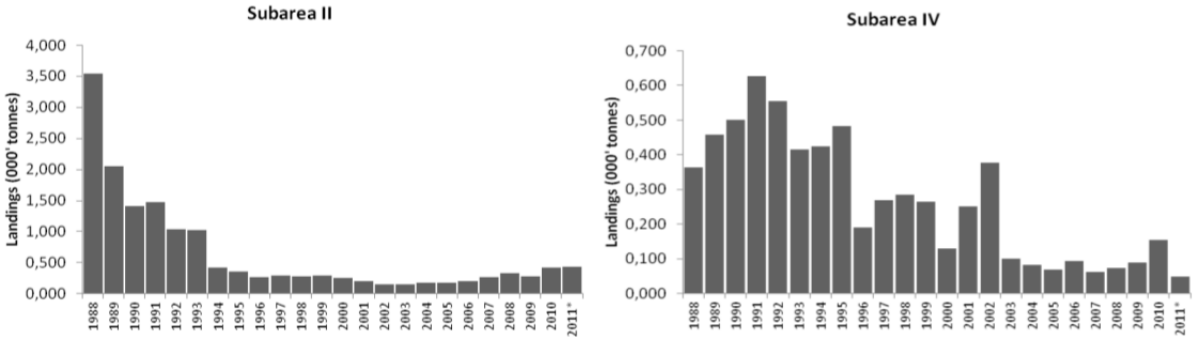

Figure 40 International total reported landings of blue ling from (left) the Norwegian Sea and (right) North Sea (Note order of magnitude difference in y-axis and for comma read decimal point; ACOMBling, 2012).

While landings from the Norwegian Sea have been relatively constant at 2.5–5 kt over the past 20 years whereas there has been a sustained decline from *c.* 600 t to < 100 t over the same period in the North Sea (Figure 40). Changes of this order in such small landings can be a consequence of changes in fishing practice, driven either by management measures or consumer demand, just as much as changes in (local) stock abundance. ICES advice is that there should be no directed fisheries for blue ling, and a reduction in bycatch should be considered until the scientific information is sufficient to prove the fishery sustainable. Catch quotas for are not allocated for blue ling in Norwegian waters and the total annual bycatch in Norwegian fisheries (c. 400 t;
) is too small to justify specific conservation measures. In the unlikely event that a vessel catches more than 15% by number of blue ling in a particular haul, the vessel must report the catch to the Coastguard and move a minimum of three nautical miles before shooting the gear once more.

3.4.6.3 Basking shark *Cetorhinus maximus*

The basking shark is the second largest fish in the world; only the whale shark (*Rhincodon typus*) is bigger. A fully grown basking shark can be between 8 and 10 m weigh several tonnes. In the spring and summer basking sharks can be seen swimming with its mouth open as it uses its gills to filter plankton from the seawater. Basking sharks appear in the northern part of the North Sea and Norwegian Sea from early spring to late summer. Like other elasmobranchs, basking sharks reproduces slowly; they do not become fertile until > 4 year of age and in-utero gestation of the eggs lasts for two years. There can be up to 6 sharks per litter, each measuring about 1.5 m in length. Historically, there have always been basking shark fisheries in Norway but since 2006 directed fishing has been prohibited by law. If taken as bycatch by Norwegian vessels, they must still be retained and landed even though they have virtually no commercial value. The species is listed as vulnerable on the IUCN website (Fowler, 2005).[85]

3.4.6.4 Common or blue skate *Dipturus batis*

This common or blue skate is the largest European rajid and was once an abundant constituent of the demersal fish community of north-western Europe. It formerly occupied the shelf and slope areas of the NE Atlantic and Mediterranean but now appears to be virtually absent from much of this range. It continues to be caught as bycatch of multispecies trawl fisheries, including the Norwegian saithe fishery, which cover much of its shelf and slope habitat. Fisheries data indicate that populations of *D. batis* have undergone an extremely high level of depletion in the central part of its range around the British Isles since the early 20th century (the three generation period). It has been extirpated from most inshore areas, but is still caught in Scottish waters, especially around the Shetlands and off North-west

[85] Fowler, S. L. 2005. *Cetorhinus maximus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1 http://www.iucnredlist.org/details/4292/0

Scotland, and also along the shelf edge and in the Celtic Sea. Accurate international species-specific landings data are lacking, although Icelandic landings have declined. French landings appear stable, though this is likely to be attributed to a re-direction of fishing effort from shelf seas into deeper water. The life history and demography of this species allow little capacity to withstand fishery exploitation; its large body size renders it catchable by fishing gears even from birth (Dulvey *et al*., 2006).[86] As fishing pressure on this species is unlikely to be reduced in the future, it is assessed by IUCN as critically endangered throughout its range.

Individual specimens are caught rarely in the Norwegian saithe fishery; they must be retained, recorded and landed.

3.4.6.5 Porbeagle shark *Lamna nasus*

The porbeagle shark can be found worldwide in temperate waters (5–18° C) and it appears both alone and in shoals, sometimes close to the surface. It can be over 30 years old, 3.5 meters long and weighing *c.* 230 kg. Like other sharks, the porbeagle reproduces slowly and directed fisheries may have depleted the stock faster than the sharks could reproduce. Fifty years ago the porbeagle was a common shark in the North-East Atlantic but the numbers are now so low that there is no longer a specialized commercial fishery for this shark in northern Europe, including Norway. Although there is no longer any directed fishing for porbeagle shark in Norwegian waters but it is taken occasionally as bycatch in trawl and gillnet fisheries; they must be retained, recorded and landed. The species is described as being vulnerable in the IUCN Red List (Stevens *et al*., 2006).[87]

3.4.6.6 School shark or tope *Galeorhinus galeus*

The tope has a worldwide, mainly coastal and bottom-associated distribution in temperate areas. Like other elasmobranchs it is vulnerable to fishing pressure due to slow growth, relatively high age at first maturity and relatively low fecundity. This species makes extensive migrations, for example, animals tagged in the United Kingdom showing mixing throughout their Northeast Atlantic distribution. Spatial and temporal variations in size structure and sex ratio are apparent for various populations of tope, which have implications for management. The species appears to have fairly discrete pupping and nursery areas, which are often in shallow, protected bays and estuaries. Globally, some populations are listed by IUCN as vulnerable or near threatened but the current designation for the NE Atlantic is 'data deficient' (Walker *et al*., 2006).[88] Small numbers may be taken in association with spur dogfish but there are no directed fisheries for this species in Norway; if caught, they must be retained, recorded and landed.

3.4.6.7 Shagreen ray *Leucoraja fullonica*

The shagreen ray is a relatively rare ray species distributed throughout the shelf waters and continental slope of the NE Atlantic, and into the eastern Barents Sea, at depths of 30–550 m. It can grow to *c.* 1 m total length. Accurate determination of abundance trends in the northeast Atlantic are not possible, as most earlier surveys have focused on shelf fishing grounds, with no long-term, standardised surveys sampling off the edge of the continental shelf. Reported French landings for this species were more than 370 tonnes in 1983, but since 1984 annual landings have been more stable

[86] Dulvy, N.K., Notarbartolo di Sciara, G., Serena, F., Tinti, F. & Ungaro, N., Mancusi, *c.* & Ellis, J. 2006. *Dipturus batis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/39397/0

[87] Stevens, J., Fowler, S.L., Soldo, A., McCord, M., Baum, J., Acuña, E., Domingo, A. & Francis, M. 2006. *Lamna nasus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/11200/0

[88] Walker, T.I., Cavanagh, R.D., Stevens, J.D., Carlisle, A.B., Chiaramonte, G.E., Domingo, A., Ebert, D.A., Mancusi, C.M., Massa, A., McCord, M., Morey, G., Paul, L.J., Serena, F. & Vooren, C.M. 2006. *Galeorhinus galeus*. In: IUCN 2012. IUCN Red List of Threatened Species. http://www.iucnredlist.org/details/39352/0

and averaged about 75 tonnes. Species-specific landings data prior to this are not available. Trends in surveys are difficult to determine accurately due in part to limited time-series data for this species, and given some uncertainty in the taxonomic identification in earlier survey. English (Cefas) surveys in the North Sea have not recorded this species since 1998, though occasional specimens are taken in the Celtic Sea. Scottish (FRS) surveys continue to record shagreen ray in various surveys around Scotland. Given the low numbers caught in surveys in offshore shelf habitats, it is possible that the main part of the distribution is now in deeper water, such as along the edge of the continental shelf. Indeed, most of the recent captures of this species in Scottish surveys have been made in waters deeper than 200 m (Ellis *et al*., 2009).[89] The IUCN list the species as near threatened.

It is not, nor has it ever been a target species but is taken in mixed demersal fisheries throughout its range, including the Norwegian saithe fishery. Any that is taken by Norwegian fishing vessels must be retained, recorded and landed.

3.4.6.8 Spiny tail ray *Bathyraja spinicauda*

Spiny tail ray is a deep-sea demersal species found along the upper and middle continental slope from 140 to more than 1500 m. The species is widely distributed along the continental slopes (200–2000 m) of the Arctic and boreal regions of the North Atlantic.
In the NE Atlantic, it is found from eastern Greenland, Iceland, along the Iceland–Faroe Islands–Shetland Ridge to the northern North Sea, coast of Norway the Barents Sea. Spiny tail skate feed on other skate species, redfish, sea bream, cod, and pelagic fish species including capelin and sandeels but in the Barents Sea were found to feed mainly on benthos as juveniles. Age or size at sexual maturation, growth, and lifespan of Spiny tail Skate are unknown. This is one of the largest (c. 180 cm) and hence potentially least resilient species of ray. There are no data on age or size of maturation for spiny tail ray; spawning has been observed during June and July off Greenland but there is no information about spawning elsewhere in the western North Atlantic. In the Barents Sea, females were found to have spawned in October; the egg cases of spiny tail skate are *c.* 21cm long. At low sub-Arctic temperature egg development is thought to take years rather than months (Kulka *et al*., 2009).[90] It is listed as near threatened in the IUCN Red List.

There has never been a target fishery for this species but if it is taken by a Norwegian vessel it must be recorded, retained and landed.

3.4.6.9 Spurdog or spiny dogfish *Squalus acanthias*

Spiny dogfish has a worldwide distribution and is known to be among the most abundant of shark species. The species is subdivided into several populations, and the NE Atlantic stock extends from the Bay of Biscay to the Barents Sea.
Tagging studies during the late 1950s showed seasonal movements of this stock from summers off the coast of Scotland to winters in Norwegian waters. Similar tagging studies in the 1970s showed a distribution extending from the southern North Sea during summer to waters off Scotland during winter. In recent years, their distribution appears once more to be more northerly. It is probable that changes in occurrence of this species in Norwegian waters reflect combined effects of changes in both migration patterns and population size (Albert, 2012).[91]

[89] Ellis, J., Ungaro, N., Serena, F., Dulvy, N., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, *c.* & Notarbartolo di Sciara, G. 2009. *Leucoraja fullonica*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/161461/0/print

[90] Kulka, D.W., Orlov, A.M., Devine, J.A., Baker, K.D., & Haedrich. R.L. 2009. *Bathyraja spinicauda*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/summary/161366/0

[91] Albert, O. T., 2012. Spiny dogfish. Institute of Marien Research, Bergen. http://www.imr.no/temasider/fisk/hai/piggha/piggha/en

Dogfish form large schools, and once individuals are encountered large quantities may be captured. Males and females often form their own schools, as do large and small fish. Females give birth to a small number (7–11) of live offspring after a two-year gestation period. Capturing large schools with many pregnant females has a significant effect on future recruitment levels. Therefore, the spiny dogfish, like many other species of shark, are considered particularly vulnerable to overexploitation. In Norwegian waters, the condition of the spiny dogfish population is uncertain. It is unclear which parts of the larger NE Atlantic population utilise Norwegian coastal waters. It is also unclear to what extent their occurrence in Norwegian waters is linked to important processes in the population's life cycle, such as feeding, mating, and giving birth to live offspring.

The NE Atlantic stock of spiny dogfish has provided the basis for a valuable fishery for more than a hundred years. Throughout the 40-year period from 1950–1990, it is reported to have supported annual landings of 30 000–60 000 tons. Traditionally, the United Kingdom, Ireland, France, and Norway have conducted the largest fisheries for spiny dogfish in the NE Atlantic. Directed fisheries — with long lines and nets — have been conducted in the North Sea, west of Scotland, the Irish Sea, and in Norwegian waters, but, they are also landed as by-catch in trawl fisheries, including the saithe fishery. Total international landings of spurdog from the NE Atlantic have shown a sustained long-term decline from *c.* 50 000 t in the early 1960s to *c.* 1000 t in 2010, and still falling ($ACOM_{dog}$, 2011).[92] The Norwegian catch has contributed *c.* 10% of this total over this period.

The stock has been subject to an ICES age–length and sex-structured assessment supported by commercial catch data and information from numerous trawl surveys in the North Sea and west of Scotland ($ACOM_{dog}$, 2011). At present, the only biological reference point is for an MSY exploitation ratio (catch as a proportion of the total biomass, assuming average selection over the last three years, reflecting a non-target selection pattern) = 0.029. Estimates of this exploitation ratio have shown an increase from an MSY level = 0.029 *c.* 1950 rising to a peak of c.0.13 *c.* 1980 and then a sustained decline to the current level a little below MSY exploitation ration 0.029 (Figure 41). Estimates of stock biomass have shown a sustained decline from *c.* 1 Mt in the middle of the 20th C to a current low of *c.* 100 kt (Figure 41)

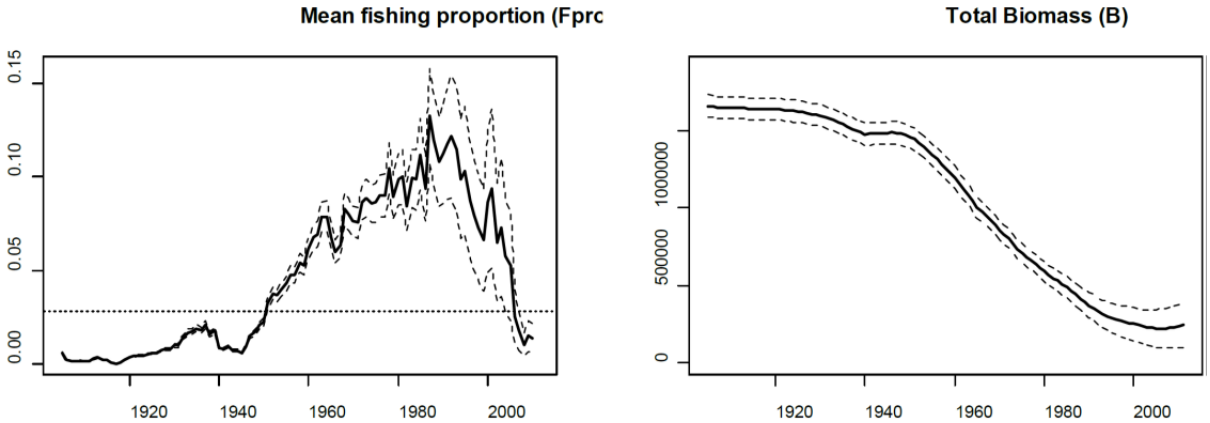

Figure 41 Spurdog in the Northeast Atlantic. Long-term trends in (left) mean exploitation ratio (average ages 5–30; dotted horizontal line = MSY exploitation ratio) and (right) total biomass (tonnes). Dashed lines reflect estimates of precision (±2 standard deviations) ($ACOM_{dog}$, 2011)

[92] $ACOM_{dog}$, 2011. Ecoregion: Widely Distributed and Migratory Stocks – Spurdog in the Northeast Atlantic. ICES Advice Book 9.4.6. http://www.ices.dk/committe/acom/comwork/report/2011/2011/Spurdog%20NEA.pdf

On the basis of this MSY-approach assessment, ICES has advised that there should be no directed fisheries for spurdog in the NE Atlantic. This advice is reinforced by its qualitative precautionary-approach advice: "Given that spurdog spawning biomass and recruitment are currently the lowest observed and that spurdog is a long-lived, slow-growing, and late-maturing species and therefore particularly vulnerable to fishing mortality, ICES advises on the basis of the precautionary approach that there should be no targeted fishery and that catches in mixed fisheries should be reduced to the lowest possible level."

Fishery managers have accepted this advice and more stringent regulations have been introduced. Indeed, directed fisheries are now prohibited in both Norwegian and EU waters and strict by-catch regulations introduced in Norway. If the number of spurdog caught in any one haul comprises 15% the total catch, the catch must be reported to the Coastguard and the vessel must move at least three nautical miles before shooting the gear again. (Small inshore vessels using nets or lines may land up to 20% of total catch in any one week.) There is also a minimum acceptable size limit in Norway and, again, a vessel must report and move on if undersize fish are caught. The Norwegian Ministry of Fisheries and Coastal Affairs has instructed IMR to prepare a research programme to investigate the stock structure and distribution in greater detail so that can be targeted more precisely at Norwegian stocks and fisheries (Albert, 2012).

In view of the stock's significant decline over the past 60–70 years, the IUCN has listed the species as critically endangered.

3.4.7 Retained Species

By law, all Norwegian-registered fishing vessels must retain, record and land all commercial species caught; the only exception being halibut less than 80 cm total length which must be returned to the sea alive. The total annual fish landings by Norwegian-registered vessels are reported to the Directorate of Fisheries who publishes details on their website.[93] The demersal species for 2009–2011 and a three year average figure for these demersal species are given in
. As the three main gadoid species (cod, haddock and saithe) tend to be taken together in mixed catches, even when targeting cod or haddock or saithe, the total catch figures are treated as if all species were bycatch in the saithe fishery – a more conservative approach than trying to identify precisely what quantities of which species are actually taken in directed saithe fishing.

The average annual total catch figure in tonnes and as a percentage of the three-year average total of demersal fish landings are given here in Table 19. In line with MSC guidelines, 'Main retained species' are those comprising more than 5% the total demersal landings; all other species are 'retained' species. Species that appear on the Norwegian Red List (redfish, blue ling and 'Other fishes' – predominantly elasmobranchs) are treated as endangered, threatened or protected (ETP) species. Lumpsucker, which is taken in a highly targeted, inshore seasonal gillnet fishery for its roe is not discussed further here.

	Average catch 2009-11 (t)	% of total catch
Saithe (Target species)	206 929	29.5
Main retained species		

[93] Directorate of Fisheries; http://www.ssb.no/english/subjects/10/05/fiskeri_en/tab-2012-01-26-01-en.html

Atlantic cod	289 080	41.2
Haddock	130 177	18.6
Retained species		
Ling	16 995	2.4
Tusk	15 200	2.2
Atlantic redfish*	10 463	1.5
Greenland halibut	10 062	1.4
Angler	5793	0.8
Catfish	5695	0.8
Lumpsucker**	2198	0.3
Hake	1937	0.3
Pollack	1936	0.3
Halibut	1813	0.3
Plaice	1722	0.2
Blue ling*	414	0.1
Whiting	124	<0.1
Other fishes	282	<0.1
Average total demersal catch	**700819**	

*, Norwegian Red List species included in 'Retained species' calculations but treated as ETP species.
**, Lumpsucker is included in the 'Retained species' calculations but given no further consideration as a retained species as it is the target species in a very specific inshore seasonal fishery.

Table 19: Three-year annual average (2009 – 2011) catch of demersal fish species in tonnes and as a percentage of total demersal landings

Clearly, cod (which includes NE Arctic, Norwegian coastal and North Sea cod) and haddock (NE Arctic and North Sea) are main retained species. As described earlier, all are subject to quantitative analysis and with the exception of coastal cod, there are biological reference points. NE Arctic cod and both haddock stocks are in good shape whilst coastal and North Sea cod are recovering. All are covered by ICES endorsed management plans to which Norway is a party.

Among the retained species, plaice is also subject to an analytical assessment with biological reference points, is covered by an ICES-endorse management plan and is good shape. ICES undertakes quasi-analytical or qualitative assessments are carried out on ling, tusk, hake and whiting, which all show positive indicators with respect to stock status or exploitation levels, plus Greenland halibut and anglerfish for which the indicators are less positive or are unclear. While Pollock catch levels have been stable for some time its current stock status, and that for catfish and halibut, is not known. Ling, tusk and Greenland halibut are subject to Norwegian quota management in their respective targeted (gillnet or longline) fisheries but their contribution is minor in the targeted trawl and Danish seine fisheries for saithe. Also, apart from spur dog (which is treated as an ETP species), the catches of fishes comprising the 'Other fishes' category (Table 16, Table 19) are in trivial quantities.

3.4.8 Bycatch

The bycatch comprises all species that are caught but are then discarded, i.e. not retained onboard. This may include macro-epibenthos (e.g. crabs), seabirds and (exceptionally) marine mammals. In recent years, the fishing industry has become increasingly aware of the need for marine environmental protection and has contributed information to the BIOMAR programme on the distribution of sensitive habitats such as areas of sponges and corals. As an operational policy, mobile gear vessels, which can do most harm to these habitats, choose to avoid them to minimise the risk of lost time and costs associated with damaged gear. Areas of coral are also protected by designated marine protected areas within which towed gear is explicitly prohibited. Further than these general observations, no specific data are collected, e.g. by reference-fleet vessels, of interactions with epibenthic species such as corals or sponges.

Hitherto, vessels did not keep records of fishery interactions with seabirds or marine mammals but with the introduction of the electronic logbook system, there is a requirement to record all such interactions and a body of quantitative data will become established. At present, there are no quantitative data available as the system is not fully operational across the fleet. Such records as there are, have been gathered by inshore and offshore demersal reference-fleet vessels (Bowering *et al*., 2011). The number of seabirds taken in a year by the inshore demersal fleet might number *c*. 10 000, but this tends to be in particular longline and gillnet fisheries targeting Greenland halibut and lumpsuckers (Fangel *et al*, 2011). Interactions with marine mammals is very low (Bowering *et al*., 2011), particularly when compared with controlled Norwegian hunting for marine mammal species. For most vessels and gear types, interactions are a matter of chance and skippers will do what they can to avoid contact with seabirds and marine mammals whenever they can, but there is little specific that they can do. Longline vessels (which are not subject to this assessment) fly bird-scarer streamers to distract birds from taking bait from hooks during shooting. ICES working groups assessing fishery interactions with seabirds and marine mammals have not identified specific problems with Norwegian saithe fisheries ($ACOM_{seabirds}$, 2012; WGMME, 2011).

Notionally, there are no discard fish species as the Marine Resources Act requires that all commercial fish caught by Norwegian-registered vessels (and all other vessels fishing in Norwegian and Russian waters) must be retained, recorded and landed. Nevertheless, it is known that discarding of commercial species occurs to varying degrees in certain fisheries, not least if the safety of the vessel is deemed to be compromised. Discarding (slipping) is recognised as a problem in pelagic fisheries (Vold, *et al*., 2010)[94] and is the subject of ongoing research in the CRISP project, as are aspects of gear technology affecting the demersal fisheries (Valdemarsen, 2010).[95,96] Despite the ban on discarding by both Norwegian and Russian authorities, discarding is also known to be a problem in the NEA Arctic fisheries when small haddock are abundant ($ACOM_{NEAhad}$, 2012), but the scale of the problem in any particular year is unknown. In the Arctic (ling and tusk) longline and (cod) gillnet fisheries discarding can be *c*. 10% (Kelleher, 2005).[97] Discarding is also known to be high (*c*. 23%) in the seasonal gillnet lumpfish fishery (Kelleher, 2005). The use of square-mesh panels and sorting grids (as used in Norwegian demersal fisheries north of 62° N) are recognised as making a significant contribution to reduce this problem in demersal fisheries but across all Norwegian fisheries a decade ago, it was estimated that Norway had a weighted discard rate of 3.9% (Valdemarsson & Nakken,

[94] Vold, A., Saltsk å r, J and Huse, I., 2010. Crowding in purse seine can kill half the catch of North Sea herring. Marine News 6–2010. IMR Bergen. http://www.imr.no/filarkiv/2010/08/hi_nytt_06_web.pdf/en

[95] Valdemarsen, J. W. 2010. A CRISP approach to sustainable fish capture. Marine News 11–2010. IMR Bergen. http://www.imr.no/filarkiv/2010/08/hi_nytt_11_web.pdf/en

[96] http://www.imr.no/crisp/a_crisp_approach_to_sustainable_fish_capture/en

[97] Kelleher, K., 2005. Discards in the world's marine fisheries: an update. FAO Fisheries Technical Paper 470. ftp://ftp.fao.org/docrep/fao/008/y5936e/y5936e00.pdf

2002).[98] More recently, an independent FAO-sponsored assessment of compliance in Norwegian fisheries gives the discard rate across all fisheries as 2–8% (Skaret & Pitcher, 2006).[99] The consensus of opinion among those interviewed (NFVOA, IMR, DoF, MFCA) during this MSC assessment exercise, however, is that the saithe fishery is less problematic (not least because saithe are not caught until they are 3+ years of age and generally above the minimum acceptable size) and that any commercial species discarding will be at a lesser rate than this industry-wide level of 3.9%. This view is endorsed by ICES, which accepts that the annual saithe stock assessments are not adversely biased by the "low level" of discarding in Norwegian fisheries ($ACOM_{NEAsaithe}$, 2012;[100] $ACOM_{NSsaithe}$, 2012)[101] and supported by the compliance review which scored 8.5 (where 10 is good and 1 is poor) for control of discarding (Skaret & Pitcher, 2006). Nevertheless, the MFCA is conscious that there is a need to update this assessment and has commissioned IMR to undertake a new discard assessment exercise across the Norwegian fishing fleet (MFCA, pers comm.).

Beyond the discarding of commercial species, there is also the question of non-commercial species, both fish and non-fish that may be taking in the course of fishing and not retained for landing. The only data available on this topic are those gathered by observers on reference-fleet vessels, data that are almost certainly not truly representative of the fleet as a whole because the presence of the observers can bias fishing behaviour. The list of commercial species recorded, retained and landed by reference-fleet vessels include all the species published in the official landing statistics (Table 10) and a wide variety of other species that comprise the 'Other fishes' category (Table 16). The presence but not numbers of other species taken by inshore reference fleet vessels have also been recorded (Table 20).

[98] Valdemarsson, J.M. & Nakken, O. 2002. *Utkast I norske fiskerier*. Workshop om utkast I nordiske fiskerier. Sophienberg Slot, Rungsted, Denmark. http://www.imr.no/__data/page/3926/Rapport_om_utkast_av_fisk_i_norske_farvann.pdf

[99] Skaret, G. & Pitcher , T. J., 2006. An estimation of compliance of the fisheries of Norway with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing. Pramod, G. & Pitcher, T. J. 2006. An Estimation of Compliance of the Fisheries of The Faeroes with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing . In Evaluations of Compliance with the FAO (UN) Code of Conduct for Responsible Fisheries (Pitcher, T.J., Kalikoski, D. & Pramod, G. eds). Fisheries Centre Research Reports 14 (2); University of British Columbia. ftp://ftp.fisheries.ubc.ca/CodeConduct/CountriesCodePDF/Norway-CCRF.pdf

[100] $ACOM_{NEAsaithe}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-arct.pdf

[101] $ACOM_{NSsaithe}$, 2012. Ecoregion: Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-3a46.pdf

Common name	Scientific name	Common name	Scientific name
Invertebrates		**Elasmobranchs**	
Green shore crab	*Carcinus maenas*	Velvet belly	*Etmopterus spinax*
Hermit crabs	Paguridae	Basking shark	*Cetorhinus maximus*
Red crab	*Geryon trispinosus*	Black-mouthed dogfish	*Galeus melastomus*
Squat lobster	*Munida* sp.	Sandy ray	*Leucoraja circularis*
Stone and king crabs	Lithodidae	Lesser spotted dogfish	*Scyliorhinus canicula*
Swimming crab	*Macropipus dupurator*	Starry skate	*Amblyraja radiata*
Squid and octopus	Cephalopoda	Long-nosed skate	*Dipturus oxyrinchus*
Edible sea urchin	*Echinus esculentus*	Norwegian skate	*Dipturus nidarosiensis*
		Rabbitfish	*Chimaera monstrosa*
Birds		Sail-ray	*Dipturus linteus*
Black guillemot	*Cepphus grylle*	Tope shark	*Galeorhinus galeus*
Black-legged kittiwake	*Rissa tridactyla*		
Common eider	*Somateria mollissima*	**Bony fishes**	*Stichopus tremulus*
Common guillimot	*Uria aalge*	Alfonsino	*Beryks decadactylus*
Cormorants	*Phalacrocorax* spp.	Blue whiting	*Micromesistius poutassou*
Great black-backed gull	*Larus marinus*	Bullheads and sculpins	*Cottidae*
Northern fulmar	*Fulmarus glacialis*	Butterfish	*Pholis gunnellus*
Razorbill	*Alca torda*	Cuckoo wrasse	*Labrus mixtus*
		European eel	*Anguilla anguilla*
Mammals		Fifteen-spined stickleback	*Spinachia spinachia*
American mink	*Mustela vison*	Four-bearded rockling	*Rhinonemus cimbrius*
Common harbour seal	*Phoca vitulina*	Greater weever	*Trachinus draco*
European otter	*Lutra lutra*	Long rough dab	*Hippoglossoides platessoides*
Harbour porpoise	*Phocoena phocoena*	Norway pout	*Trisopterus esmarkii*
Pilot whale	*Globicephala melas*	Norway redfish	*Sebastes viviparus*
White-beaked dolphin	*Lagenorhynchus albirostris*	Pipefish and seahorses	*Syngnathidae*
Grey seal	*Halichoerus grypus*	Poor cod	*Trisopterus minutus*
		Ray's bream	*Brama brama*
Fishes		Red mullet	*Mullus surmuletus*
Agnatha		Sandeels	*Ammodytidae*
Hagfishes and lampreys	Petromyzontiformes	Scorpion fish	*Scorpaeniformes*
		Sea trout	*Salmo trutta*
		Small-rayed wrasse	*Acantholabrus palloni*
		White anglerfish	*Lophius budegassa*

Table 20: Species recorded in the catches (2010) of the inshore demersal reference fleet but discarded rather than retained for sale (Bowering et al., 2011)

For the offshore vessels, the number of samples in which each species has been recorded and the number of individuals of each species taken in those samples are also known (Bowering et al., 2011). During the course of 2010 the offshore reference fleet recorded 16 067 positive samples (where one trawl haul can contain more than one positive sample) containing a total of 281 886 individuals of 83 species of groups of species. These ranged from 1693 samples containing a total of 43 962 cod to one sample each containing one specimen each of Arctic rockling *Onogadus argentatus,* longnose velvet dogfish *Centroscymnus crepidater,* polar sculpin *Cottunculus microps* and the Red List shagreen ray *Leucoraja fullonica*. From these total samples, 1091 samples comprised 15 221 individuals of species or groups (Table 21) not retained for landing and sale, i.e. discarded. Thus, the reference fleet provides a simple all-gears estimate of the discard level in the offshore demersal fleet: 16,067/281,886 = 5.7%. There were no records of non-commercial invertebrates, seabirds or mammals taken by the offshore reference fleet (Bowering et al., 2011). The small numbers of commercial species such as herring (c. 16 sample^{-1}) and mackerel (c. 8 sample^{-1}) recorded as discards were, presumable too few to justify landing commercially.

Common name	Scientific name	Total individuals	Total samples
Elasmobranchs			
Leafscale gulper shark	*Centrophorus squamosus*	54	4
Lesser spotted dogfish	*Scyliorhinus canicula*	16	6
Smooth-hound	*Mustelus mustelus*	4	1
Longnose velvet dogfish	*Centroscymnus crepidater*	1	1
Shagreen ray	*Leucoraja fullonica*	1	1
Unidentified ray	Euselachii	1	1
Bony fishes			
Long rough dab	*Hippoglossoides platessoides*	9,280	536
Norway pout	*Trisopterus esmarkii*	1,573	51
Norwegian spring spawning herring	*Clupea harengus*	1,025	70
Blue-mouth redfish	*Helicolenus dactylopterus*	922	50
Mackerel	*Scomber scombrus*	671	84
Norway redfish	*Sebastes viviparus*	556	124
Esmark's eelpout	*Lycodes esmarkii*	512	85
Atlantic herring	*Clupea harengus*	202	8
Scorpionfishes	Scorpaenidae	166	14
Atlantic gurnards	Triglidae	61	2
Horse mackerel	*Trachurus trachurus*	59	17
Tub gurnard	*Chelidonichthys lucernus*	41	7
Ray's bream	*Brama brama*	36	9
John dory	*Zeus faber*	14	4
Threespot eelpout	*Lycodes rossi*	9	3
Cuckoo ray	*Leucoraja naevus*	7	4
Scaldfish	*Arnoglossus laterna*	4	4
Vahl's eelpout	*Lycodes gracilis*	2	2
Spanish mackerel	*Scomber colias*	2	1
Arctic rockling	*Onogadus argentatus*	1	1
Polar sculpin	*Cottunculus microps*	1	1
	Total	15,221	1,091

Table 21: Species recorded in the catches (2010) of the offshore demersal reference fleet but discarded rather than retained for sale (Bowering et al., 2011). No non-commercial invertebrates, seabirds or mammals were recorded.

A consolidated list of the bycatch species (excluding all species described earlier as retained or ETP species) is given in Table 22. The list is broken down into 'Invertebrates' and 'Fishes' with the fishes further divided into elasmobranchs, pelagic bony fishes and demersal bony fishes, including four exotic demersal species. Their status is described under each of these headings.

Common name	Scientific name	Common name	Scientific name
Invertebrates			
Green shore crab	*Carcinus maenas*	Stone and king crabs	Lithodidae
Hermit crabs	Paguridae	Swimming crab	*Macropipus dupurator*
Red crab	*Geryon trispinosus*	Squid and octopus	Cephalopoda
Squat lobster	*Munida* sp.	Edible sea urchin	*Echinus esculentus*
Fishes			
Agnatha			
Hagfishes and lampreys	Petromyzontiformes		
Elasmobranchs			
Black-mouthed dogfish	*Galeus melastomus*	Rabbitfish	*Chimaera monstrosa*
Cuckoo ray	*Leucoraja naevus*	Sail-ray	*Dipturus linteus*
Leafscale gulper shark	*Centrophorus squamosus*	Sandy ray	*Leucoraja circularis*
Lesser spotted dogfish	*Scyliorhinus canicula*	Smooth-hound	*Mustelus mustelus*
Longnose velvet dogfish	*Centroscymnus crepidater*	Starry skate	*Amblyraja radiata*
Long-nosed skate	*Dipturus oxyrinchus*	Velvet belly	*Etmopterus spinax*
Norwegian skate	*Dipturus nidarosiensis*		
Bony fishes			
Pelagic fishes			
North sea herring	*Clupea harengus*	**Exotic demersal fishes**	
Norwegian spring spawning herring	*Clupea harengus*	Alfonsino	*Beryx decadactylus*
Blue whiting	*Micromesistius poutassou*	John dory	*Zeus faber*
Horse mackerel	*Trachurus trachurus*	Ray's bream	*Brama brama*
Mackerel	*Scomber scombrus*	Red mullet	*Mullus surmuletus*
Sandeels	*Ammodytidae*	Greater weever	*Trachinus draco*
Spanish mackerel	*Scomber colias*	White anglerfish	*Lophius budegassa*
Demersal fishes			
Arctic rockling	*Onogadus argentatus*	Pipefishes	Syngnathidae
Blue-mouth redfish	*Helicolenus dactylopterus*	Polar sculpin	*Cottunculus microps*
Bullheads and sculpins	Cottidae	Poor cod	*Trisopterus minutus*
Butterfish	*Pholis gunnellus*	Scaldfish	*Arnoglossus laterna*
Cuckoo wrasse	*Labrus mixtus*	Scorpion fishes	Scorpaenidae
Esmark's eelpout	*Lycodes esmarkii*	Small-rayed wrasse	*Acantholabrus palloni*
Fifteen-spined stickleback	*Spinachia spinachia*	Threespot eelpout	*Lycodes rossi*
Four-bearded rockling	*Rhinonemus cimbrius*	Tub gurnard	*Chelidonichthys lucernus*
Long rough dab	*Hippoglossoides platessoides*	Vahl's eelpout	*Lycodes gracilis*
Norway pout	*Trisopterus esmarkii*		

Table 22: Consolidated list of 'Bycatch' species taken by the inshore and offshore demersal reference fleets in 2010 (data from Bowering et al., 2010)

3.4.8.1 Invertebrates

The reference fleet invertebrate bycatch comprises six species and one group of crustaceans and the cephalopods (squid and octopus). Of these species, the red crab is a deep-water shelf-edge species while the green crab is a shallow-water inshore species. None of the crustaceans is rare and all are widely distributed throughout the NE Atlantic. Similarly, there are no rare cephalopods in the NE Atlantic and all the indigenous species are widely distributed.

3.4.8.2 Agnatha

The hagfishes (Myxinidae) and lampreys (Petromyzontidae) are slender, eel-like animals unlikely to be retained in anything other than small-mesh nets unless they are caught while still attached to another fish; both groups are parasitic. Although they are widely distributed throughout the coastal waters of the NE Atlantic they are rarely abundant. Hagfish are restricted to shallow-water areas of soft mud substratum; lampreys spawn in freshwater. The IUCN Red List classifies both the north

European lamprey, *Petromyzon marinus* (Freyhof & Kottelat, 2011)[102] and the hagfish *Myxine glutionosa* (IUCN, 2012)[103] as of least concern.

3.4.8.3 Elasmobranchs

As a group, the elasmobranchs invariable raise concern because of their general characteristics of slow growth, low fecundity and relatively high age of first maturity. For these reasons, a great many of the elasmobranchs have been assessed against the conservation criteria of the IUCN; the Norwegian bycatch elasmobranchs fall into four of these conservation categories:

Vulnerable (VU) – a taxon is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term;

Near threatened (NT) – a taxon is near threatened when it has been evaluated against the criteria but does not qualify for critically endangered, endangered or vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future;

Least concern (LC) – a taxon is least concern when it has been evaluated against the criteria and does not qualify for critically endangered, endangered, vulnerable or near threatened. Widespread and abundant taxa are included in this category.

Not evaluated (NE) – a taxon is not evaluated when it is has not yet been assessed against the IUCN conservation criteria;

Of the 13 elasmobranchs listed in the Norwegian reference-fleet bycatch there are only four that give immediate cause for concern, judging by the IUCN criteria: Leafscale gulper shark, sandy ray, smooth-hound and starry skate (Table 23). Of these, the most abundant (54 individuals), the leafscale gulper shark was only recorded in four reference-fleet samples; other species were either much less abundant or merely recorded as present in inshore samples. Whichever is the case, the numbers caught are too low for the Norwegian saithe fishery to have any measurable implications for stock status for species which are widely distributed throughout the NE Arctic, if not the NE Atlantic.

[102] Freyhof, J. & Kottelat, M. 2011. Petromyzon marinus. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/16781/0

[103] IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/search

Common name	Scientific name	IUCN classification	IUCN Red List of Threatened Species. Version 2012.1. (IUCN, 2012)
Leafscale gulper shark	*Centrophorus squamosus*	VU	White, W.T. (SSG Australia & Oceania Regional Workshop, March 2003) 2003. *Centrophorus squamosus*. http://www.iucnredlist.org/details/41871/0
Sandy ray	*Leucoraja circularis*	VU	Ungaro, N., Serena, F., Ellis, J., Dulvy, N., Tinti, F., Bertozzi, M., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja circularis*. http://www.iucnredlist.org/details/161464/0
Smooth-hound	*Mustelus mustelus*	VU	Serena, F., Mancusi, C., Clò, S., Ellis, J. & Valenti, S.V. 2009. *Mustelus mustelus*. http://www.iucnredlist.org/details/39358/0
Starry skate	*Amblyraja radiata*	VU	Kulka, D.W., Sulikowski, J., Gedamke, J., Pasolini, P. & Endicott, M. 2009. *Amblyraja radiata*. http://www.iucnredlist.org/details/161542/0
Long-nosed skate	*Dipturus oxyrinchus*	NT	Ungaro, N., Serena, F., Dulvy, N.K.D., Tinti, F., Bertozzi, M., Mancusi, C., Notarbartolo di Sciara, G & Ellis, J.E. 2007. *Dipturus oxyrinchus*. http://www.iucnredlist.org/details/63100/0
Norwegian skate	*Dipturus nidarosiensis*	NT	Stehmann, M.F.W. 2009. *Dipturus nidarosiensis*. *http://www.iucnredlist.org/details/161729/0*
Rabbitfish	*Chimaera monstrosa*	NT	Dagit,D.D., Hareide, N. & Clò, S. 2007. *Chimaera monstrosa*. http://www.iucnredlist.org/details/63114/0
Longnose velvet dogfish	*Centroscymnus crepidater*	NE	Void
Black-mouthed dogfish	*Galeus melastomus*	LC	Serena, F., Mancusi, C., Ungaro, N., Hareide, N.R., Guallart, J.,Coelho, R. & Crozier, P. 2009. *Galeus melastomus*. http://www.iucnredlist.org/details/161398/0
Cuckoo ray	*Leucoraja naevus*	LC	Ellis, J., Ungaro, N., Serena, F., Dulvy, N.K., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja naevus*. http://www.iucnredlist.org/details/161626/0
Lesser spotted dogfish	*Scyliorhinus canicula*	LC	Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T. & MacKenzie, K. 2009. *Scyliorhinus canicula*. http://www.iucnredlist.org/details/161399/0
Sail ray	*Dipturus linteus*	LC	Kulka, D.W., Orlov, A. & Stenberg, C. 2009. *Dipturus linteus*. http://www.iucnredlist.org/details/161377/0
Velvet belly	*Etmopterus spinax*	LC	Coelho, R. Blasdale, T., Mancusi, C., Serena, F., Guallart, J., Ungaro, N., Litvinov, F., Crozier, P. & Stenberg, C. 2009. *Etmopterus spinax*. http://www.iucnredlist.org/details/161388/0

Table 23: Elasmobranch bycatch recorded by the inshore and offshore reference fleets in 2010 (Bowering et al., 2011) with the IUCN assessment of their conservation status (LC, least concern; NT, near threatened; VU, vulnerable; NE, not evaluated)

3.4.8.4 Pelagic fishes

Of the pelagic species, the Spanish mackerel was probably taken off west coast of Norway where it might still be in the warm waters of the North Atlantic Drift. Certainly, the two specimens caught (Table 21) in 2010 were at the northernmost extreme of their normal distribution and beyond any point where Norwegian fisheries would affect their spawning stock status. Each of the other pelagic species is subject to an ICES analytical assessment.

3.4.8.4.1 North Sea herring

The current spawning stock biomass is almost as high as it has been at any time since before the stock collapsed in the late 1960s; it is well above biological reference levels, including MSY $B_{trigger}$, and fishing mortality rates are well below reference levels, including F_{MSY}. ICES is satisfied that the stock retains full reproductive capacity ands that it is being exploited sustainably in accordance with the ICES endorsed internationally agreed management plan ($ACOMN_{Sherring}$, 2010).[104]

[104] $ACOM_{NSherring}$, 2012. Ecoregion: North Sea – Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). ICES Advice Book 6.4.16. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-47d3.pdf

3.4.8.4.2 Norwegian spring-spawning herring

Following two exceptionally strong year classes in 2002 and 2004 the spawning stock biomass peaked at c. 9 million tonnes in 2009 but is now declining as recruitment continues at a more typically low level. Nevertheless, SSB remains above MSY $B_{trigger}$ and fishing mortality has fluctuated around F_{MSY}, consistent with the ICES endorsed internationally agreed management plan, for the past decade. ICES is satisfied that the stock is being exploited consistent with the MSY and precautionary approach and that the stock retains full reproductive potential ($ACOM_{NSSH}$, 2012)[105].

3.4.8.4.3 Blue whiting

Following a sustained period of excessive fishing mortality rates and declining SSB, an international management plan was agreed under the auspices of NEAFC and endorse by ICES in 2008 as being consistent with the MSY and precautionary approach. Since then SSB has stabilised and begun to build once more, although it never fell below MSY $B_{trigger}$, and current fishing mortality rates are well below F_{MSY}. ICES is satisfied that the stock is being exploited sustainably and that the stock retains full reproductive capacity ($ACOM_{BW}$, 2010)[106].

3.4.8.4.4 Horse mackerel

Although the stock is subject to an analytical age-based assessment, the status of the stock has not been established with great confidence. At present, the stock appears to going through a period of decline, not least because of sustained very low recruitment, and fishing mortality (F = 0.16) has risen above $F_{MS}Y$ (= 0.13; the only biological reference level) for the first time in a decade. The EU allocates TAC quotas among its member states on the bais of an ICES endorsed (with qualifications) management plan but, as yet, Norway has not accepted the plan as the basis for management of this stock ($ACOM_{scad}$, 2012)[107]. The Norwegian average annual catch 2009 – 2011 of c. 28.5 kt represents c. 14% the total international catch.

3.4.8.4.5 Mackerel

Currently, the NE Atlantic mackerel SSB is above MSY $B_{trigger}$ even though the fishing mortality rate has been above F_{MSY} for the past twenty years. Around 2001 – 2003 fishing mortality exceeded F_{lim} (0.42) but fell rapidly through to 2007 when it began to rise once more as Iceland and the Faroe Islands began to fish in excess of the TAC set according to the ICES endorsed management plan previously agreed between the EU, Norway and the Faroe Islands. These excessive catches have brought SSB down from its peak value of c. 3 Mt in 2009 to its current level of c. 2.5 Mt. Fishing mortality reached a low point of 0.26 in 2006 and had risen to c. 0.30 in 2011 ($ACOM_{mack}$, 2012)[108]. In the absence of an agreed management plan and the continued fishing excess to F_{target} (0.20–0.22) it is probable that the mackerel stock will fall below MSY $B_{trigger}$ (2.2 Mt) within the next two years. The Norwegian three annual average catch 2009 – 2011 was c. 188 kt, equivalent to c. 22% the international catch.

3.4.8.4.6 Sandeels

[105] $ACOM_{NSSH}$, 2012. Ecoregion: Widely distributed and migratory stocks – Herring in the Northeast Atlantic (Norwegian spring-spawning herring). ICES Advice Book 9.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-noss.pdf

[106] $ACOM_{BW}$, 2010. Ecoregion: Widely distributed and migratory stocks – Blue whiting in Subareas I–IX, XII, and XIV. ICES Advice Book 9.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whb-comb.pdf

[107] $ACOM_{scad}$, 2012. Ecoregion: Widely distributed and migratory stocks – Horse mackerel (*Trachurus trachurus*) in Divisions IIa, IVa, Vb, VIa, VIIa–c,e–k, and VIIIa–e (Western stock). ICES Advice Book 9.4.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hom-west.pdf

[108] $ACOM_{mack}$, 2012. Ecoregion: Widely distributed stocks – Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/mac-nea.pdf

ICES assessments of sandeels are area based; sandeel area 3 (SA3) includes the waters of southern Norway and SA5 (Bergen and Viking Banks) includes the waters off the southern west coast (northern) North Sea. The Norwegian fishery in SA3 is subject to a national management plan that has yet to be evaluated by ICES. Over the past decade, the SSB has gone from above MSY $B_{escapement}$ (195 kt) to less than B_{lim} (100 kt) and back to more than MSY $B_{escapement}$ again. Currently it is just below MSY $B_{escapement}$ at c. 150 kt ($ACOM_{sandeel}$, 2012)[109]. Fishing mortality is erratic but has followed a falling trend over the past decade. Current advice is for no directed fishing; the quantities of sandeels caught in directed saithe fisheries will have no significant bearing on SA3 stock status. In recent years there has been neither directed fishery nor stock assessment in SA5; indeed, the quantities of sandeels taken from this area have been virtually zero for more than the past decade. The quantities of sandeels caught in directed saithe fisheries will have no significant bearing on SA5 stock status.

3.4.8.5 Exotic demersal species

Alfonsinos, John dory, Ray's bream, red mullet, greater weever and white-bellied anglerfish are all species associated with more southerly warmer waters than are prevalent around Norway. They are all at the northern limit of their distribution and their stock status will be unaffected by the occasional individual that might be taken in directed saithe fisheries. This year (2012) ICES has offered advice on alfonsinos for the first time; this advice is based on a catch trends-based assessment and is only of relevance to the directed fisheries of the Azores and Iberian Peninsula ($ACOM_{alf}$, 2012)[110].

3.4.8.6 Demersal species

The 20 species of demersal species (Table 22) recorded by the inshore and offshore reference fleets include a wide variety of species from the commercially worthless but relatively abundant (Table 21) long rough dab to ubiquitous intertidal species such as butterfish, sticklebacks and pipefish. Among these species, only Norway pout is subject to ICES assessment. The remainders are widespread and not caught in the saithe fishery with sufficient regularity or in sufficient numbers to give cause for concern.

3.4.8.7 Norway pout

Norway pout are taken in a directed fishery in the northern North Sea. Quantities taken vary enormously from year to year with less than 10 kt in 2010 but more than 150 kt in 2009; typically, Norway takes 50–60 % the total international catch. The stock is subject to an ICES age-based assessment with biological reference points for SSB but, as might be expected in a short-lived species fishery, no fishing mortality rate reference points. Although fishing mortality rate varies from year to year, it has shown a declining trend since the late 1980s but the SSB has fluctuated around MSY Btrigger (150 kt) over the same period. Current SSB is slightly above B and ICES considers the stock to retain full reproductive capacity ($ACOM_{NP}$, 2012)[111].

3.5 Principle Three: Management System Background

3.5.1 Area of operation of the fishery, jurisdiction

Saithe (*Pollachius virens*) is distributed along the Norwegian coast and in the North Sea (Figure 42). The majority of the fishery is in Norwegian waters. Small amounts are taken in the Russian zone. In

[109] $ACOM_{sandeel}$, 2012. Ecoregion: North Sea - Sandeel in the Central Eastern North Sea (SA 3). ICES Advice Book 6.4.21.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/san-34.pdf

[110] $ACOM_{alf}$, 2012. Ecoregion: Widely distributed stocks – Alfonsinos/Golden eye perch (*Beryx* spp.) in the Northeast Atlantic. ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Alfonsinos.pdf

[111] $ACOM_{NP}$, 2012. Ecoregion North Sea – Norway pout in Subarea IV (North Sea) and Division IIIa (Skagerrak–Kattegat). ICES Advice Book 6.4.20. http://www.ices.dk/committe/acom/comwork/report/2012/2012/nop-34%20june.pdf

the North Sea, the distribution extends into the EU zone, and saithe is fished by EU member countries in their own and in the Norwegian zone.

Two stocks are recognized, North-East arctic (NEA) saithe north of 62°N and North Sea saithe in the North Sea, south of 62°N, extending into ICES Subarea VI to the West of Scotland. The North Sea stock juveniles are located at the Norwegian coast, largely inshore, and migrate out in the North Sea when they mature around age 3.

The NEA saithe is managed as a domestic Norwegian stock under Norwegian jurisdiction, while the North Sea saithe is managed as a shared stock between Norway and EU.

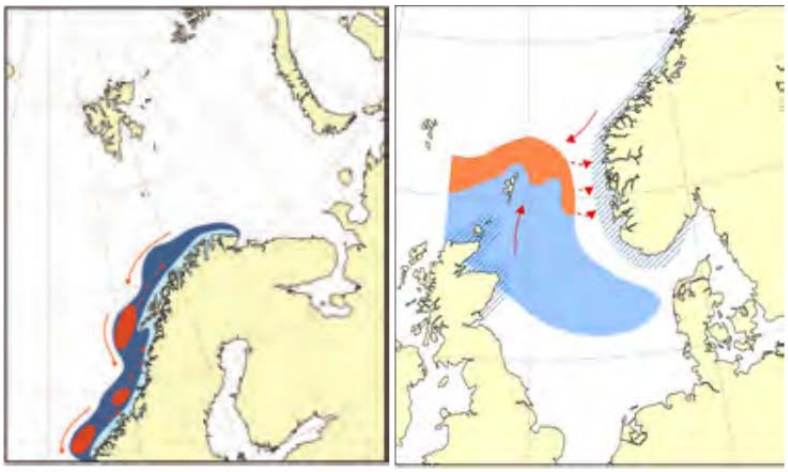

Figure 42: Distribution of Saithe: Left: NEA stock, Right: North Sea stock, with arrows indicating the juvenile distribution. Red: Spawning areas, Blue: Feeding areas, Light blue: Juvenile areas. (Havforskningsrapporten 2012. Fisken og havet, særnr. 1-2012)

Other stocks are located around the Faroe Islands and around Iceland and to the West of Ireland. There may be some exchange between the stocks, mostly in terms of emigration from Norwegian waters, according to old tagging studies. The exchange is not considered to be of practical importance for management. Between the NEA saithe and the North Sea saithe, more exchange is likely, in particular in the areas near 62°N. Hence, management of each of these may have some influence on the other, although the impact of this exchange is not known to the extent that the effect may be quantified.

The fishery takes place all throughout the distribution area of the stock. The large majority of Norwegian catches are taken in the Norwegian zone. Occasional catches are taken in the Russian zone, but only small quantities. In recent years Norway has got a small quota in ICES Division Via, which so far has not been fully utilized.[112]

3.5.2 Groups with interests in the fishery

The saithe fishery is conducted by a variety of vessel groups. The majority of the catches are taken by trawlers, the next in importance is purse seiners. Other fleet segments (gill net, long line, Danish seine and hand line) only take a minor part of the catches in both areas.

112 Aglen A., Bakketeig I.E., Gjøsæter H., Hauge M., Loeng H., Sunnset B.H. og Toft K.Ø. (red.) 2012. Havforskningsrapporten 2012. Fisken og havet, særnr. 1–2012. http://www.imr.no/publikasjoner/andre_publikasjoner/havforskningsrapporten/nb-no

The trawlers mostly deliver their catch frozen. These are large vessels fishing sometimes for saithe, but also for cod and haddock, and (depending on permits) for other species as well. They operate outside the coast as trawling is generally not permitted inside the 6 nm border. There has recently been a development in the direction of operating the trawl as a pelagic trawl with light ground gear, to reduce costs and risk of damage to the gear. This is permitted when fishing south of 64°N.

The seiners are smaller vessels, operating inshore of close to the coast, mostly in the southern part of the Norwegian zone North of 62°N.

In the North Sea, trawlers dominate the Norwegian fishery (as well as that by other nations). Small quantities are taken by purse seine and other gears. The fisheries by EU nations are mostly by trawlers, in particular by France, Scotland, Germany and Denmark.[112]

3.5.3 Management plan consultations

The management plan for the North Sea was agreed by Norway and EU in their regular negotiations. These negotiations are closed to the public, but the major Norwegian stakeholders organizations are represented in the Norwegian delegation at the negotiations. The management plan was subsequently evaluated by ICES and found to be in accordance with the precautionary approach. The plan for the North Sea saithe is currently under revision.

For the Norwegian management plan for NEA saithe, the plan was formulated in a dialogue between the Ministry, fishermen's organizations and IMR over several years. A management strategy was drafted by The Fisheries Directorate (FDIR) and was sent on a public hearing in December 2004.Most governmental organizations and some NGOs were positive to the suggestion. The Institute of Marine Research (IMR) also supported the strategy. A few local community organizations and most stakeholder organizations were more critical. They found the strategy too rigid and wanted more room for quota adjustments (level out total quotas) when the quotas of NEA cod and haddock and North Sea saithe are low. Another concern was that having a large saithe stock, the costs in form of consumption of other fish species, in particular herring, may be considerable. With the current knowledge, they found it unwise to suggest such a low exploitation level as the Directorate of Fisheries did.

After long discussions it was concluded that the exploitation level should probably be in the upper half of the interval giving high yield with low risk, which was F between the values of 0.15 (F0.1) and 0.35 (Fpa). Accordingly, the target interval of F would be between 0.25 and 0.35. Included in these discussions were extensive biological and economic evaluations of the impact of saithe as predator on herring. FDIR and IMR recommended that ICES should evaluate the rule for exploitation levels 0.25, 0.30 and 0.35 and limits for annual change in TAC of 10 and 25 %. It was further recommended that the trigger point for reduction in F was set independent of exploitation level since all alternatives were at or below Fpa for stock sizes above Bpa. IMR developed the software to perform the required simulations, which were then evaluated by ICES. ICES found that the management plan was in accordance with the precautionary approach.[113, 114, 115]

113 Sigbjørn Mehl, Åge Fotland, Bjarte Bogstad, Knut Korsbrekke and Harald Gjøsæter
Evaluation of the proposed harvest control rule for Northeast Arctic saithe – background, population model, parameters, data and preliminary analyses. Working Document No. 4, Arctic Fisheries Working Group, Vigo 18 – 27 April 2007
http://brage.bibsys.no/imr/handle/URN:NBN:no-bibsys_brage_5830

114 AGREED RECORD OF FISHERIES CONSULTATIONS BETWEEN NORWAY AND THE EUROPEAN UNION FOR 2012. BERGEN, 2 DECEMBER 2011 - ANNEX III).

115 Record of Fisheries Consultations between the European Union and Norway on the Review and Possible Revision of Long-Term Management Plans for Cod, Saithe and Herring in the North Sea, Kirkwall, Orkney – 8 June 2012)

3.5.4 Consultations with interest groups

Consultations with interest groups take place both in regular fora, according to legislation, and by formal and informal contact between interest parties and the Ministry and/or the Directorate. All major regulations require a hearing before decisions are made. All relevant parties are involved in that process.

There is a forum for regular meetings on resource allocation and fisheries regulations. This normally takes place twice yearly. The meetings are open to all relevant interested parties and are advertised widely. Such parties include organizations representing fishermen, vessel owners, land industry, scientific institutes, coast guard and NGOs. The law (Marine resources act, § 8) opens for the establishment of a formal Reguleringsråd (Advisory Board for Fisheries Regulations) with a largely similar function and participation. The main difference is that presentations to that forum would make hearings unnecessary. So far, the present arrangement is considered more practical and fills the function that was intended for Reguleringsrådet.

Main interest parties (Fishermen, vessel owners and land industry organizations) are represented in the Norwegian delegation at negotiations with other countries (including EU for the North Sea saithe). In addition, interested parties are free to approach the ministry on upcoming issues, and do so. For example, the organizations frequently take up issues in terms of letters to the Ministry.

3.5.5 Coordination with other users or activities

Relevant users include

- Fish farming industry
- Oil and gas industry
- Offshore windmill parks
- Ship traffic
- and in a few cases Mining industry

With regard to the saithe fishery, the most likely sources of conflict are limitations of access to fishing grounds where other installations are located. There is also some concern that pollution from such industries may influence stock reproduction and survival. The main instrument for balancing the interests are the approved management plans for the Norwegian Sea and the Barents Sea. A similar plan is under development for the North Sea.

3.5.6 Decision-making processes and recognized participants

The system for interactions in the decisions process for fisheries regulations is described on the official website www.fisheries .no as 'The regulatory chain', illustrated below (Figure 43). This web page is provided by the Norwegian Ministry of Fisheries and Coastal Affairs in cooperation with the Directorate of Fisheries, the Norwegian Food Safety Authority, the Institute of Marine Research and the National Institute of Nutrition and Seafood Research.

Figure 43: The regulatory chain as presented on www.fisheries.no

Relevant stakeholders are invited to the Advisory Board for Fisheries Regulations: Representatives from the Norwegian Fishermen's Association, Federation of Norwegian Fishing Industries, the Norwegian Seamen's Union, The Norwegian Food and Allied Workers' Union, The Sami Parliament, environmental NGOs, the regional counties, as well as recreational fishermen.

The regulatory chain is described as an interactive and iterative process based on incremental changes. This process ensures that all relevant parties are consulted in the decision process. ICES quota recommendations and all proposals presented to the Advisory board are public, and easily available to the public on the respective websites of ICES and the Fisheries Directorate. The Regulatory Board discusses and makes suggestions on

- when to start and stop the fishing
- technical regulations
- size of by-catch
- criteria for participating in various fisheries.

The Directorate of Fisheries recommends the following year's fisheries regulations to the Ministry of Fisheries and Coastal Affairs. The Ministry bases its final decision on outcomes from the quota negotiations with other states, discussions from the open meeting, the recommendation from the Directorate of Fisheries, as well as input from various fisheries industry organizations.

All regulations regarding rigging and use of fishing gear and as well as by-catch rules are formulated in LOV 1999-03-26 nr 15: Lov om retten til å delta i fiske og fangst (deltakerloven), and regulations mandated in that law, the currently valid version of the regulation is J-123-2012. The Civil Service Act states strict rules for consulting stakeholders, and ensures that all relevant stakeholders have the right to be heard in all law making processes.

3.5.7 Objectives for the fishery

The overall objectives are stated in the Marine Resources Act as: "The purpose of this Act is to ensure sustainable and economically profitable management of wild living marine resources and genetic material derived from them, and to promote employment and settlement in coastal communities."

Section 7 in that law: "Principle for management of wild living marine resources and fundamental considerations" states objectives for the fisheries in more detail:

The Ministry shall evaluate which types of management measures are necessary to ensure sustainable management of wild living marine resources.
Importance shall be attached to the following in the management of wild living marine resources and genetic material derived from them:

a) a precautionary approach, in accordance with international agreements and guidelines,
b) an ecosystem approach that takes into account habitats and biodiversity,
c) effective control of harvesting and other forms of utilization of resources,
d) appropriate allocation of resources, which among other things can help to ensure employment and maintain settlement in coastal communities,
e) optimal utilization of resources, adapted to marine value creation, markets and industries,
f) ensuring that harvesting methods and the way gear is used take into account the need to reduce possible negative impacts on living marine resources,
g) ensuring that management measures help to maintain the material basis for Sami culture.

A summary of current objective and priorities is presented in the document National framework for fishery and conservation management in Norway by the Directorate of Fisheries.

- Increase the economic output through improvements in exploitation patterns and reduction in all forms of incidental and unwanted mortality from fishing
- Further optimize the long-term economic yield through possible revisions of management strategies and harvest control rules
- As new scientific knowledge becomes available, additional ecosystem considerations are gradually incorporated in management; including multispecies interactions, effects of fishing on benthic habitats, effects of by-catch of fish, seabirds and marine mammals, etc.

The law has no specific reference to Maximum Sustainable yield as a target for exploitation. Rather, it emphasizes the ecosystem approach and the optimal utilization of resources, adapted to marine value creation, markets and industries, within the bounds of the precautionary approach. According to the Ministry, the general policy is to apply harvest rules that, in addition to be expected to lead to long term yield near the maximum, shall serve other objectives like stability of catches from year to year, concerns for other stocks and a fair distribution between fleet segments and interests.

The management plan for North Sea saithe as agreed by EU and Norway: states the objective of that plan specifically as: "which is consistent with a precautionary approach and designed to provide for sustainable fisheries and high yields." The plan for NEA saithe does not have a similar formal statement, but the considerations in the development process should be illustrative of the objectives and the trade-offs between them.[116, 117, 118]

[116] Forskrift om endring av forskrift om utøvelse av fisket i sjøen: j-123-2012
http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-123-2012

[117] LOV 2008-06-06 nr 37: Lov om forvaltning av viltlevande marine ressursar (havressurslova)
http://www.lovdata.no/all/hl-20080606-037.html
English translation: http://www.fiskeridir.no/english/fisheries/regulations/acts/the-marine-resources-act

[118] National framework for fishery and conservation management in Norway
http://www.fiskeridir.no/fiske-og-fangst/forvaltningsprinsippet

3.5.8 Fleet types participating in the fishery

The main fleet types fishing for saithe north of 62°N are trawlers and purse seiners. The trawlers are ocean-going vessels that mostly land the catch frozen. The seiners are smaller vessels, that mostly land the catch fresh.

The last 10 years, trawlers have taken about 40%, seiners about 25%, gillnets and long-lines about 20% of the catch north of 62°N, while about 15% has been taken by other gears. (Havforskningsrapporten). South of 62°N, the majority of the catches are taken by trawl, including trawl operated as pelagic trawl. Some are taken with seine and other gears.[119]

3.5.9 Rights of access to the fishery

Access to fisheries in Norway is limited to vessels having appropriate licenses. The licensing system is regulated by the law which specifies rules for participation in fisheries. Regulations regarding the performance of fisheries, including gear requirements, supplement this law.

Fisheries for saithe can be conducted under several licenses: Each type of license permits fishery by one or more gears, in certain areas and for certain species. The licenses are allocated by the Fisheries directorate on behalf of the Fisheries Ministry to vessels that fulfills specified conditions. The number of licenses of each type is fixed (Table 24). If the number is extended, new licenses are announced publicly. Licenses are linked to the vessel and the owner. It can only be transferred under specific conditions, as when a new vessel substitutes an old one, or a vessel is lost. Quotas are linked to the licenses.

For smaller vessels operating mainly in coastal and inshore waters, other rules apply. Here, the vessels are allocated to one of several groups, some of which have permission to fish for saithe. The main condition is that the vessel and owner has had a similar license last year. Each group is allocated a quota. There are limitations to the amount each vessel can take, which in sum exceeds the total group quota. However, when the group quota is exceeded, the fishery for the group is stopped. If it turns out that a goup is not going to take its quota, parts of it can be transferred to other groups.[120]

Licence		Number of vessels
Torsketrål/	***Cod trawl***	40
Seitrål/	***Saithe trawl***	6
Nordsjøtrål	***North Sea trawl***	6
Avgrensa nordsjøtrål	***Limited North Sea trawl***	128
Pelagisk trål	***Pelagic trawl***	33
Anna, inkl. seinot	***Others (incl purse seine for saithe)***	43

Table 24: The main licence types relevant for saithe, and the number of licences per type.

119 Aglen A., Bakketeig I.E., Gjøsæter H., Hauge M., Loeng H., Sunnset B.H. og Toft K.Ø. (red.) 2012. Havforskningsrapporten 2012. Fisken og havet, særnr. 1–2012.
http://www.imr.no/publikasjoner/andre_publikasjoner/havforskningsrapporten/nb-no

120 http://www.fiskeridir.no/statistikk/fiskeri/fiskere-fartoey-og-tillatelser/opplysninger-om-konsesjoner-og-deltakeradganger

3.5.10 Regulation of fishing

The main instruments for regulating the removals by the fishery are access control, quotas, gear restrictions and by-catch rules, including ban on discards.

Access control: To participate in the fishery, the owner will need a general permission (erhvervstillatelse) for the owner to conduct professional fishery, linked to each specific vessel, and a license to participate in specific fisheries.

Quotas: The overall quotas are derived from the management plans. The management plans have explicit reference points for biomass and fishing mortality and rules for action to be taken related to the currently estimated state of the stock relative to these reference points. ICES has approved the plans and provides advice according to the plan. The effect of the plans is monitored through the annual assessments by ICES giving estimates of current and past stock biomass and fishing mortality.

Vessels will be allocated a specific quota for each species, including saithe, which is the maximum that vessel is allowed to take. For smaller vessels, the sum of individual quotas exceeds the total quota. Therefore each such vessel will belong to a group, which has a group quota. When the group quota is exhausted, all vessels in the group have to stop the fishery, even if their individual quota still is not exhausted. The sum of the group quotas equals the national quota. If towards the end of the fishing season some group quotas have not been fully utilized, the remainder may be transferred to other groups. The current (for 2012) quotas by vessel type and size can be found in j-167-2012.

Technical measures are specified in “Forskrift om utøvelse av fisket i sjøen” (regulations on performance of sea fisheries), which specifies the technical measure in detail. This regulation includes *inter alia*, rules for

- Mesh size and mesh design. The mesh size in the trawl fisheries which include saithe is 135mm North of 64^{o}N, and 120 mm south of 64^{o}N. In the EU zone in the North Sea it is 110 mm. Sorting grid is mandatory North of 62^{o}N
- Ban on fishery for certain species at certain times and restrictions on use of various gears. Trawling is prohibited inside the 6 NM (in some areas 12NM) zone, with exceptions that do not include saithe fisheries.
- By-catch regulations
- Ban on discards, including exception rules
- Minimum landing size. For saithe this is at present: North of 62^{o}N: 45cm, south of 62^{o}N: 40cm. Some fisheries, in particular inshore has lower minimum size. A certain percentage undersized fish is permitted. If that percentage is exceeded, the vessel has to move to anouther area. Areas with small fish are abundant can be - and does get - closed on short notice.
- Trawl free zones
- Rules to protect coral reefs - ban on towed gears with bottom contact in specified areas.
- Marking of gear and other safety measures

The law gives the Ministry and the Directorate a wide mandate to change regulations on short notice. Such changes are published widely in terms of 'J-meldinger' from the Directorate of Fisheries. This enables the management system to be both adaptive and to take immediate action in case of emergencies.[121,122,123,124,125]

[121] Access control: LOV 1999-03-26 nr 15: Lov om retten til å delta i fiske og fangst (deltakerloven).

3.5.11 Monitoring, control and surveillance and enforcement

The implementation of the rules is by inspections at sea, inspections at landing. The main instrument to monitor the amounts fished is sales slips. Log-books are mandatory for all vessels, but are used mostly for control.

The marine resources act gives wide mandates for the Coast Guard and the Fisheries Directorate on monitoring and inspection. The control measures have two main elements, extensive inspections at sea by the Coast Guard and inspections and control of landing by inspectors belonging to the Fisheries Directorate.

The coast guard inspects vessels at sea, in close cooperation with the Fisheries Directorate, with control of fishing practice, gear, licenses, and catch vs quotas and vs. log book data. It has a limited police authority, with opportunity to issue fines and to arrest vessels and bring them to harbor. The coast guard is part of the Royal navy, and as such part of the military defense. Its activity and mandate is regulated by law (kystvaktloven). One key task is to control that laws related to fisheries and other marine activities are adhered to, both by Norwegian and foreign vessels.

In 2011, the Coast Guard had 1314 inspections at sea in the Norwegian Economic Zone. In 128 cases the inspection revealed irregularities, leading to reactions from warnings (104 cases) to prosecution and ordering vessels to harbor. The Coast Guar is present on all major fishing grounds as well as inshore. The inspections are to some extent random, but also directed towards where problems are expected.

The fisheries directorate performs i*nter alia* landings control, with regional inspectors, who control vessels and gears as well as quota control at landings. The main monitoring of the catches in relation to quotas is through the sales slips, which are the formal documentation of the transaction between fisher and buyer. Log-books are mandatory, but used mostly for control purposes.

Reactions to violations can be warnings, fines, and withdrawal of catch and/or gear. In severe cases, the Fisheries Director also has the authority to withdraw fishing permits. The legal authority is given by the Marine Resources act and 'deltakerloven'.

One example of how reactions work is the trawler ‘Hekktind’ that lost its licence for 7 months after systematic dumping of fish in 2010. In addition, skipper and owner were fined and catch was confiscated. According to media, the case has been brought to court these days by the owner, who disputes the proofs. The vessel has been sold abroad in the meantime.[126,127,128,129]

http://www.lovdata.no/all/hl-19990326-015.html

122 J-164-2012: Forskrift om endring av forskrift 2. desember 2011 nr. 1178 om adgang til å delta I kystfartøygruppens fiske for 2012 (deltakerforskriften) http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-164-2012

123 Vessel quotas: http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-167-2012

124 Technical measures: Forskrift om utøvelse av fisket i sjøen: http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-123-2012

125 Updated regulations http://www.fiskeridir.no/fiske-og-fangst/j-meldinger

126 Hekktind: http://www.fiskeridir.no/fiske-og-fangst/aktuelt/2012/0212/sanksjon-mot-alvorlig-fiskedumping

127 Coast guard: LOV 1997-06-13 nr 42: Lov om Kystvakten (kystvaktloven). http://www.lovdata.no/all/hl-19970613-042.html

128 LOV 2008-06-06 nr 37: Lov om forvaltning av viltlevande marine ressursar (havressurslova) http://www.lovdata.no/all/hl-20080606-037.html

3.5.12 Planned education and training for interest groups

The public school system can give basic education for fishermen, and to qualify them for obtaining necessary certificates. Universities have studies in marine and fisheries biology and in aquaculture. There are also studies at university level in fisheries economy and fisheries legislation.

3.5.13 Date of next review and audit of the management plan

The management plan for North Sea saithe is presently being revised. There are no dates set for revision of the management plan for the North East arctic saithe.

English translation: http://www.fiskeridir.no/english/fisheries/regulations/acts/the-marine-resources-act

[129] LOV 1999-03-26 nr 15: Lov om retten til å delta i fiske og fangst (deltakerloven). http://www.lovdata.no/all/hl-19990326-015.html

4 EVALUATION PROCEDURE

4.1 Harmonised Fishery Assessment

In order to ensure an acceptable degree of harmonization, assessment of Norway NEA and NS saithe fisheries were harmonized with results of already certified / in assessment relevant overlapping fisheries as listed in Table 25.

Fishery	Assessment status	FAO	ICES
Euronor saithe	Certified	Area 27	I, II and IV
UK Fisheries Ltd/DFFU/Doggerbank Northeast Arctic cod, haddock and saithe	Certified	Area 27	I and II
Scapêche and Compagnie de Pêche de St. Malo saithe	Certified	Area 27	IIIa, IV, VI, VII, I, IIa & IIb
UK Fishseries Ltd/DFFU/Doggerbank Group Saithe	Certified	Area 27	IV, VI & IIa
DFPO Denmark North Sea & Skagerrak saithe	Certified	Area 27	IV, IIIa,b,c,d
Scottish Fisheries Sustainable Accreditation Group (SFSAG) saithe	Certified	Area 27	IIa, IIIa, IV and VI
Germany North Sea saithe trawl	Certified	Area 27	IIa, IIIa, IIIbcd, IV

Table 25: List of relevant overlapping fisheries and current status with the MSC programme.

The assessment team concluded that the reports for the Euronor Saithe , UK Fisheries Ltd/DFFU/Doggerbank Northeast Arctic doc, haddock and saithe, UK Fisheries Ltd/DFFU/Doggerbank Group Saithe & Scapêche and Compagnie de Pêche de St. Malo saithe focus on historic events rather than practice. Germany North Sea saithe trawl fishsery was certified in 2008 and did not use the default assessment tree.

The ICES advice of June 2011 raised some concerns which were expressed by Marine Stewardship Council to the various Certification bodies involved with the different certifications of the North Sea saithe fisheries. These CB's have been coordinating their actions with respect to re-scoring Principle 1.
The last discussion between CBs was held on 6 January 2012 and it was agreed during this discussion that CBs should re-score PIs 1.1.1 and score PI 1.1.3 for North Sea saithe, and ensure on this basis that their fisheries were still eligible for MSC certification. The ICES advice of June 2012 estimates SSB in 2012 to be 30% higher than estimated in November 2011, and fishing mortality in 2010 is estimated to be 25% lower. The same management plan is the basis for the latest advice as the change was caused mainly by the revision of age distribution in the Norwegian catches.

This report is based on the latest ICES advice of June 2012. The assessment team does not find any reason to score PI 1.1.1 or score PI 1.1.3 based on the ICES advice of January 2012**.**

4.2 Previous assessments

The fisheries were assessed and certified in June 2008. The full assessments were based on assessment tree defined by the responsible CAB and had 3 conditions for the North Sea saithe fishery and 4 conditions and 1 recommendation for the North East Arctic saithe fishery. All conditions and recommendations from the full assessment are fully met (Table 26).

Condition	Closed? (Y/N)	Justification
NORTH SEA SAITHE		
Condition 1: uncertainties in assessment relating to estimation of recruitment and the effect of migration in and out of the stoc	Y	Condition closed 2010
Condition 2: need for more detailed data on the by-catch of all species and a need for sampling programmes to estimate consequences on the stock and ecosystem	Y	Norwegian legislation now requires that all fish species caught are recorded and landed, and all bird and mammal interactions should also be recorded. Although the system is not yet fully operational, it will contribute to meeting the aims of this condition. Also, IMR observers embarked on reference-fleet vessels record any occurrence of marine mammal (ETP) by-catch and henceforth will also record bird (ETP) by-catch. No specific problems relating to retained or by-catch species have been identified. The client is on schedule to meet the obligations of this condition
Condition 3: promotion of rebuilding of the North Sea cod stock through separate recordings of all catches of cod in saithe-directed fisheries, and evaluation in terms of its contribution to fishery effects on cod stocks	Y	Given that Norwegian North Sea cod by-catch are included within the TACs for the saithe stock, and hence included within the assessment and management process, adherence with the overall TACs set should lead to a recovery of the stock. Thus, the client fleet is meeting the requirements of this condition through compliance with current legislation and regulations and supporting IMR data-gathering initiatives.
North East Arctic saithe fishery		
Condition 1: uncertainties in assessment relating to estimation of recruitment and the effect of migration in and out of the stock	Y	Condition closed 2010
Condition 2: need for more detailed data on the by-catch of all species and a need for sampling programmes to estimate consequences on the stock and ecosystem;	Y	Norwegian legislation now requires that all fish species caught are retained, recorded and reported. IMR observers embarked on reference-fleet vessels record any occurrence of marine mammal (ETP) by-catch and henceforth will also record bird (ETP) by-catch. The client was encouraged to introduce an ETP recording scheme across the entire fleet to

		augment the data collected by IMR. No specific problems relating to retained or by-catch species have been identified. During the audit meeting, both IMR and DoF expressed the view that this fishery is highly compliant and raises no specific concerns with respect to by-catch–ecosystem interactions. The client is on schedule in meeting the obligations of this condition.
Condition 3: promotion of rebuilding of the North Sea cod stock through separate recordings of all catches of cod in saithe–directed fisheries, and evaluation in terms of its contribution to effects on cod stocks	Y	The Norwegian scientific and management authorities are actively pursuing a strategy to minimise coastal cod by-catch and to optimise conditions that will facilitate stock recovery and rebuilding. The NFVOA supports these efforts and vessels are compliant with the corresponding controls. Information on other retained species is also gathered to the standard required by law and agreed in the client action plan. The client vessels are meeting their data recording targets required by Condition 3. However, this strategy is currently being confounded by the 'Autumn fishery fresh-cod scheme'. **Consequently, it is recommended that the client should provide evidence in 2013 that it has engaged with the national fishery management authorities to develop additional effective means for further reductions in the total annual catch (i.e. including recreational catches) of coastal cod.**
Condition 4: an assessment of potential effect of saithe directed fishing within the coral protection areas and identification and implementation of appropriate management measures to prevent adverse effects if found to be significant	Y	DoF and IMR (pers. comm.) acknowledge the support that NFVOA is giving to support the MAREANO programme and its efforts to safeguard coral reefs and other sensitive marine habitats. The client is complying fully with the terms of Condition 4.
Recommendation 1: It is suggested that there be an evaluation as to whether the areas of coral currently protected are sufficient, in terms of population and habitat requirements to provide adequate protection for associated biodiversity	Y	The Norwegian MFCA continues to fund IMR to maintain the MAREANO programme, a primary objective of which is to map sensitive marine habitats in Norwegian waters and to identify further prime areas that merit protection from, inter alia, fishing. There is a general prohibition on fishing below 1000 m. The NFVOA support the MFCA and IMR, not least through its participation in the associated working group.

Table 26 Summary of Previous Assessment Conditions

4.3 Assessment Methodologies

MSC FISHERY ASSESSMENT REPORT

The basis for the MSC-certification is the standard denoted as the "MSC Principles and Criteria for Sustainable Fisheries", organised in three main principles. Principle 1 concentrates on the need to maintain the target stock at a sustainable level; Principle 2 draws attention to maintaining the ecosystem in which the target stock exists, and Principle 3 addresses the requirement for an effective fishery management system in order to fulfil Principles 1 and 2. In addition Principle 3 takes into account national and international regulations. The Principles 1-3, with pertaining criteria, are presented below.

The assessment team used the default assessment tree as defined in the MSC Certification Requirements v1.2 without any modifications. The MSC Full Assessment Reporting Template V1.2 is used for this report.

PRINCIPLE NUMBER 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery[130]:

Intent:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

PRINCIPLE NUMBER 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent:

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

[130] The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

PRINCIPLE NUMBER 3:

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent:

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

Part A: Management System Criteria

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.
3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.
4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.
5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system[131].
6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.

[131] Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.
8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.
9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.
10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
    - Setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species.
    - Identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
    - Providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames.
    - Mechanisms in place to limit or close fisheries when designated catch limits are reached.
    - Establishing no-take zones where appropriate.
11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

Part B: Operational Criteria

Fishing operation shall:

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.
13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
14. Not use destructive fishing practices such as fishing with poisons or explosives.
15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.
16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.
17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

The MSC Principles and Criteria presented above set the requirements for the fishery that undergoes certification. MSC's certification methodology is based on a structured hierarchy of *Sub-criteria* and *Performance indicators*. The overall performance is decided on the basis of the scoring criteria that the fishery gets during assessment. These sub-criteria and performance indicators have been developed by the MSC in the form of a default assessment tree.

When a fishery is evaluated the performance indicators (normally specific statements or questions) are checked out, and each performance indicator has three different "scoring guideposts" that can be defined. MSC characterises these scoring points as follows:

- Perfect practice, representing the level of performance that would be expected in a theoretically 'perfect' fishery (100 points).
- Exemplary or best practice (80 points).
- Minimum sustainable practice (60 points).

An overview of the assessment methodology is given in Marine Stewardship Council Certification requirements v 1.2 and Guidance to the MSC certification requirements v 1.1. This guidance illustrates how the MSC Principles and Criteria give a basis for sub-criteria and performance indicators defined by DNV, resulting in various scores for the fishery.

4.4 Evaluation Processes and Techniques

Site visits to the fishery were performed by the certification body (here DNV) and the assessment team and consultations were done with interested stakeholders. The performance indicators and the pertaining scoring systems were evaluated, and it was judged if the fishery meets the requirements for MSC certification.

In order to fulfil the requirements for certification the following minimum scores are required:

- The fishery must obtain a score of 80 or more for each of the three MSC Principles, based on the weighted aggregate scores for all Performance Indicators under each Criterion in each Principle.
- The fishery must obtain a score of 60 or more for each Performance Indicator under each Criterion in each Principle.

Even though a fishery fulfils the criteria for certification, there may still be some important potential risks to future sustainability that are revealed during assessment. These are performance indicators that score less than 80, but more than 60. In order to be granted a MSC fishery certificate the client must agree to further improvements to raise the score to 80. The certification body (here DNV) then sets a timescale for the fishery to improve the relevant areas, so that the certification process can continue.

Default performance indicators and the scorings allocated in the evaluation are enclosed in chapter 6.2.

4.4.1 Site Visits

Relevant stakeholders were visited in September 2012 as outlined in Table 27. Information gathered is presented in this report and in the enclosed scoring tables.

Name	Affiliation	Date / Location	Key issues
Sigbjørn Mehl Tore Jakobsen Jan Helge Vølstad	Institute for Marine Research (IMR)	25.9.2012 / IMR offices	1. Changes to the scientific base of information in regards to saithe stocks under re-assessment 2. Level of slipping/discards in saithe fisheries. 3. Results from biological sampling programs conducted by IMR in 2011/2012 in regards to saithe fisheries. Level of by-catch (composition of species, quantities) 4. Status on reference fleet program and development of all inclusive, gear specific catch recording of all species taken in saithe fisheries. What progress has been made and what are the results. 5. Extent of North Sea cod catches in the North Sea saithe fisheries. 6. Development of rigorous monitoring program for ETP species - Status. Can extent of interactions with ETP species be quantified? 7. Coral-reef mapping program – status regarding assessment of fishing effort and effects of fishing gear on protected areas.
Thorbjørn Thorvik	Directorate of Fisheries	25.9.2012 / IMR offices	1. Changes in control, surveillance and monitoring routines/regulations in Norway since june 2012 2. Electronic Logbooks: recording of non-commercial species 3. Significant discrepancies found at landing control for saithe fisheries in 2011/2012. 4. Total TACs, Norwegian TACs and level of catches for saithe fisheries in 2011, 2012. 5. Update on Norwegian fleet (type/number of vessels) targeting saithe. 6. Changes in fishing patterns (gear used, fishing area, number of boats, fishing season). 7. Level of slipping/discards in saithe fisheries. 8. Fishermen's compliance with laws and regulations. 9. Abandoned fishing gear recovery program.
Jan Ivar Maråk Beate Nørvåg	Norwegian Fishing Vessel Owners Association	26.9.2012 / Hotel Clarion, Oslo	1. Review of fishing operations: • Fishing season • fishing area • list of vessels with registration numbers, per gear type • Quotas per gear type, for the last 3 years • Catches per gear type, for the last 3 years 2. Review of impact on ecosystem:

			• List of all by-catch of fish species per gear type: (species and quantities) • By-catch of marine mammals, ETP species, birds. • List of commercial/non-commercial species which are usually discarded (quantities/if known) • Loss of fishing gear 3. Compliance with rules and regulaions • Disputes with national/ international authorities for the last 5 years. • Records of sanctions and penalties in 2011, 2012 (if any). 4. Chain of Custody start: • Review of traceability system on board and at landing • Labelling of products • First point of landing • First point of sale • Main products 5. Main markets
Sverre Johansen Marie Bjørland Helga Marie Johansen	Ministry of Fisheries and Coastal Affairs (MFCA)	26.9.2012 / MFCA offices	1. Fisheries Management (Harvest Strategy) and TACs 2. Review of regulations for North Sea saithe and North-East Arctic saithe 3. Strategy for minimising or eliminating ETP by-catch 4. Strategy in scientific research. Research programmes for saithe fisheries under re-assessment 5. Strategy and plans for protection of sensitive habitats

Table 27 Site visits conducted and key issues discussed.

4.4.2 Consultations

Several stakeholders have been identified and contacted in connection with the assessment of the Norway NEA and NS saithe fishery assessment. Relevant stakeholders were interviewed in September 2012 as outlined in Table 27. Information gathered is presented in this report and in the enclosed scoring tables. Information was also made publicly available at different stages of the assessment as outlined in Table 28.

Date	Information	Media
18th July 2012	Notification of Full assessment	Direct E-mail/letter Notification on MSC website
18th July 2012	Notification of Assessment Team	Direct E-mail Notification on MSC website
7th August 2012	Confirmation of Assessment Team	Direct E-mail Notification on MSC website
7th August 2012	Announcement of default assessment tree	Direct E-mail Notification on MSC website

Ultimo August 2012	Advertisement of certification + Invitation to contribute to assessment process	Advertisement on www.intrafish.com and in "Fiskeribladet Fiskaren" (week 35)
23rd August 2012	Stakeholder Notification: Site Visit scheduled	Direct E-mail Notification on MSC website
18th September 2012	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
11th October 2012	Notification of Confirmed Peer Reviewers	Direct E-mail Notification on MSC website
	Notification of Public Comment Draft Report	Direct E-mail Notification on MSC website
	Notification of Final Report	Direct E-mail Notification on MSC website

Table 28 Consultations at different stages of the assessment

4.4.3 Evaluation Techniques

The full assessment was publicly announced on www.intrafish.com and advertised in Fiskeribladet Fiskaren, a Norwegian industry sector publication widely read by fishery stakeholders in Norway.

Site visits to the fishery were performed by the certification body (here DNV) and the assessment team and consultations were done with interested stakeholders as listed in Table 27. The performance indicators and the pertaining scoring systems were evaluated jointly by the assessment team and all scoring was based on unanimous conclusions by the entire team.

In order to fulfill the requirements for certification the following minimum scores are required:

- The fishery must obtain a score of 80 or more for each of the three MSC Principles, based on the weighted aggregate scores for all *Performance Indicators* under each *Criterion* in each *Principle*.
- The fishery must obtain a score of 60 or more for each *Performance Indicator* under each *Criterion* in each *Principle*.

Even though a fishery fulfills the criteria for certification, there may still be some important potential risks to future sustainability that are revealed during assessment. These are performance indicators that score less than 80, but more than 60. In order to be granted a MSC fishery certificate the client must agree to do some further improvements regarding these points. The certification body (here DNV) sets a timescale for the fishery to improve the relevant areas, so that the certification process can continue.

The Norwegian North Sea and North East Arctic saithe fisheries achieved a score of 80 or more for each of the three MSC Principles, and did not score under 60 for any of the set MSC Criteria. The assessment team therefore recommends the certification of the Norwegian North Sea and North East Arctic saithe fisheries for the clients Norwegian Fishing Vessel Owners Association and Norwegian Seafood Council.

Default performance indicators and the scorings allocated in the evaluation are enclosed in chapter 6.2.

4.4.4 Risk Based Framework

The RBF has not been used for the assessment of the Norwegian North Sea and North East Arctic saithe fisheries.

5 TRACEABILITY

5.1 Eligibility Date

(REQUIRED FOR PCR ONLY)

1. The report shall include:

a.	The actual eligibility date.
b.	The rationale for any difference in this date from the target eligibility date

The target eligibility date is 15. June 2013, the expiry date of the certificates granted after the initial certification of the Norwegian North Sea and North East Arctic saithe fisheries.

5.2 Traceability within the Fishery

The information on saithe catches taken by Norwegian fleet is recorded electronically by means of electronic log-books. All vessels report to authorities before leaving the port and then before entry to the fishing area and at the start of the fishing activities. It is a requirement that all details on fishing activities are reported every 24 hours. When the fishing trip is finished it should also be reported. In addition to that, landing information should be reported to the respective sales organisations. All countries are required to report their landings of saithe to the appropriate authorities. This includes all by-catches of saithe in other targeted fisheries and in particular the cod fishery where a by-catch of saithe can be expected. According to fishermen themselves, the reporting is a continuous process and it is strictly followed in order to ensure compliance with the regulations. The entire Norwegian fleet is part of the UOC for the Norwegian saithe fishery and as other Norwegian fisheries which are already MSC certified, are subject to the same extensive reporting requirements ensuring that all Norwegian catches of saithe taken in ICES areas I, II and IV are properly reported and recorded.

The main instrument to monitor the amounts fished is sales slips. Log-books are mandatory for all vessels, but are used mostly for control.

Fishing outside the unit of certification is generally not an issue as all fishing activities are carried out according to the licences. Moreover catch details are logged real time and exact catch locations are easily identifiable in the logs. Catch locations are part of the labelling system and thereby avoid any opportunity for substitution of certified fish with non-certified fish prior to and at the point of landing.

At sea processing on the Norwegian vessels from these fisheries is mainly the production of whole chilled fish, headed and gutted, frozen block, etc.

There is no transhipment at sea activities involved in the Norwegian saithe fisheries. All catches are subject to controls at landing.

5.3 Eligibility to Enter Further Chains of Custody

The conclusion of this re- assessment is in agreement with the conclusion of the full assessment which was that product landed by Norwegian vessels from these fisheries, irrespective of the processed form at the time of landing (whole, headed and gutted, frozen block etc) is being

accurately recorded and identified through the Directorate of Fisheries and Sales Organisations. Accordingly, the extent of the Fishery Certification is to the point of landing and sale of saithe (and resulting products) at registered ports where recording and reporting of landings (by Directorate and appropriate Sales Organisation) takes place. To be eligible to carry the MSC logo, these fish must then enter into separate Chain of Custody certifications.

This certification includes the entire Norwegian saithe fishery harvesting in the north east Arctic in ICES areas I & II and the North Sea in ICES area IV with the fishing gears trawl, gill-net, purse-seine, Danish seine and handline (including electronic winches – multiple hooks with lures).

Norges Råfisklag covers the sales from these fisheries from the boundary with Russia to the North to Nordmøre, a coastline of roughly 2.000 kilometres. To the south of that, several smaller sales organisations have a corresponding role. About 4.500 vessels operate in the region of Norges råfisklag, and 215 buyers of fish are approved. The latter gives an indication of the number of possible landing sites for fish in the region.

5.4 Eligibility of Inseparable or Practically Inseparable (IPI) stock(s) to Enter Further Chains of Custody

Inseparable or practically inseparable stock is not involved in this assessment.

6 EVALUATION RESULTS

6.1 Principle Level Scores

Area	North Sea		North East Arctic	
Gear	Trawl	Purse seine, Gill nets, Hand line, Danish Seine, Long line and others:	Trawl	Purse seine, Gill nets, Hand line, Danish Seine, Long line and others:
Principle 1 - Target species	91,3	91,3	92,5	92,5
Principle 2 - Ecosystem	88,7	90,0	88,7	90,0
Principle 3 - Management	98,0	98,0	98,0	98,0

Table 29 Final Principle Scores

6.2 Summary of Scores

Summary of scores are provided in tables below; per geographical region and per gear type (trawl / other gear).

MSC FISHERY ASSESSMENT REPORT

Fishery Assessment Scoring Worksheet version 1 - effective November 14, 2011

Norway North Sea Saithe Re- assessment — **TRAWL**

Note: Scores are to be entered in the green-shaded cells in column K

Columns G, H and L apply in fisheries where the stock rebuilding PI (1.1.3) is NOT triggered

Columns I, J and M give the Principle 1 Outcome score contributions in fisheries where the stock rebuilding PI (1.1.3) is triggere

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in			Score	Contribution to Principle Score	
						Either		Or			Either	Or
One	1	Outcome	0,5	1.1.1	Stock status	0,5	0,25	0,333	0,1667	100	25,00	16,67
				1.1.2	Reference points	0,5	0,25	0,333	0,1667	80	20,00	13,33
				1.1.3	Stock rebuilding			0,333	0,1667			0,00
		Management	0,5	1.2.1	Harvest strategy	0,25	0,125			100	12,50	12,50
				1.2.2	Harvest control rules & tools	0,25	0,125			90	11,25	11,25
				1.2.3	Information & monitoring	0,25	0,125			90	11,25	11,25
				1.2.4	Assessment of stock status	0,25	0,125			90	11,25	11,25
Two	1	Retained species	0,2	2.1.1	Outcome	0,333	0,0667			85	5,67	5,67
				2.1.2	Management	0,333	0,0667			80	5,33	5,33
				2.1.3	Information	0,333	0,0667			80	5,33	5,33
		Bycatch species	0,2	2.2.1	Outcome	0,333	0,0667			80	5,33	5,33
				2.2.2	Management	0,333	0,0667			90	6,00	6,00
				2.2.3	Information	0,333	0,0667			80	5,33	5,33
		ETP species	0,2	2.3.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.3.2	Management	0,333	0,0667			95	6,33	6,33
				2.3.3	Information	0,333	0,0667			85	5,67	5,67
		Habitats	0,2	2.4.1	Outcome	0,333	0,0667			80	5,33	5,33
				2.4.2	Management	0,333	0,0667			95	6,33	6,33
				2.4.3	Information	0,333	0,0667			85	5,67	5,67
		Ecosystem	0,2	2.5.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.5.2	Management	0,333	0,0667			100	6,67	6,67
				2.5.3	Information	0,333	0,0667			95	6,33	6,33
Three	1	Governance and policy	0,5	3.1.1	Legal & customary framework	0,25	0,125			100	12,50	
				3.1.2	Consultation, roles &	0,25	0,125			100	12,50	
				3.1.3	Long term objectives	0,25	0,125			100	12,50	
				3.1.4	Incentives for sustainable fishing	0,25	0,125			100	12,50	
		Fishery specific management system	0,5	3.2.1	Fishery specific objectives	0,2	0,1			100	10,00	
				3.2.2	Decision making processes	0,2	0,1			80	8,00	
				3.2.3	Compliance & enforcement	0,2	0,1			100	10,00	
				3.2.4	Research plan	0,2	0,1			100	10,00	
				3.2.5	Management performance	0,2	0,1			100	10,00	

Overall weighted Principle-level scores - North Sea Trawl		Either	Or
Principle 1 - Target species	Stock rebuilding PI not scored	91,3	
	Stock rebuilding PI scored		76,3
Principle 2 - Ecosystem		88,7	
Principle 3 - Management		98,0	

MSC FISHERY ASSESSMENT REPORT

Fishery Assessment Scoring Worksheet version 1 - effective November 14, 2011

Norway North Sea Saithe Re- assessment -Purse seine, Gill nets, Hand line, Danish Seine, Long line and others

Note: Scores are to be entered in the green-shaded cells in column K

Columns G, H and L apply in fisheries where the stock rebuilding PI (1.1.3) is NOT triggered

Columns I, J and M give the Principle 1 Outcome score contributions in fisheries where the stock rebuilding PI (1.1.3) is triggered

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in			Score	Contribution to Principle Score	
						Either		Or			Either	Or
One	1	Outcome	0,5	1.1.1	Stock status	0,5	0,25	0,333	0,1667	100	25,00	16,67
				1.1.2	Reference points	0,5	0,25	0,333	0,1667	80	20,00	13,33
				1.1.3	Stock rebuilding			0,333	0,1667			0,00
		Management	0,5	1.2.1	Harvest strategy	0,25	0,125			100	12,50	12,50
				1.2.2	Harvest control rules & tools	0,25	0,125			90	11,25	11,25
				1.2.3	Information & monitoring	0,25	0,125			90	11,25	11,25
				1.2.4	Assessment of stock status	0,25	0,125			90	11,25	11,25
Two	1	Retained species	0,2	2.1.1	Outcome	0,333	0,0667			85	5,67	5,67
				2.1.2	Management	0,333	0,0667			80	5,33	5,33
				2.1.3	Information	0,333	0,0667			80	5,33	5,33
		Bycatch species	0,2	2.2.1	Outcome	0,333	0,0667			80	5,33	5,33
				2.2.2	Management	0,333	0,0667			90	6,00	6,00
				2.2.3	Information	0,333	0,0667			80	5,33	5,33
		ETP species	0,2	2.3.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.3.2	Management	0,333	0,0667			95	6,33	6,33
				2.3.3	Information	0,333	0,0667			85	5,67	5,67
		Habitats	0,2	2.4.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.4.2	Management	0,333	0,0667			95	6,33	6,33
				2.4.3	Information	0,333	0,0667			85	5,67	5,67
		Ecosystem	0,2	2.5.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.5.2	Management	0,333	0,0667			100	6,67	6,67
				2.5.3	Information	0,333	0,0667			95	6,33	6,33
Three	1	Governance and policy	0,5	3.1.1	Legal & customary framework	0,25	0,125			100	12,50	
				3.1.2	Consultation, roles &	0,25	0,125			100	12,50	
				3.1.3	Long term objectives	0,25	0,125			100	12,50	
				3.1.4	Incentives for sustainable fishing	0,25	0,125			100	12,50	
		Fishery specific management system	0,5	3.2.1	Fishery specific objectives	0,2	0,1			100	10,00	
				3.2.2	Decision making processes	0,2	0,1			80	8,00	
				3.2.3	Compliance & enforcement	0,2	0,1			100	10,00	
				3.2.4	Research plan	0,2	0,1			100	10,00	
				3.2.5	Management performance	0,2	0,1			100	10,00	

Overall weighted Principle-level scores - North sea Danish Seine, Purse Seine & gil-net		Either	Or
Principle 1 - Target species	Stock rebuilding PI not scored	91,3	
	Stock rebuilding PI scored		76,3
Principle 2 - Ecosystem		90,0	
Principle 3 - Management		98,0	

MSC FISHERY ASSESSMENT REPORT

Fishery Assessment Scoring Worksheet version 1 - effective November 14, 2011

Norway North East Arctic Saithe Re- assessment - Trawl

Note: Scores are to be entered in the green-shaded cells in column K

Columns G, H and L apply in fisheries where the stock rebuilding PI (1.1.3) is NOT triggered

Columns I, J and M give the Principle 1 Outcome score contributions in fisheries where the stock rebuilding PI (1.1.3) is triggered

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3) Either	Weight in	Or		Score	Contribution to Principle Score Either	Or
One	1	Outcome	0,5	1.1.1	Stock status	0,5	0,25	0,333	0,1667	95	23,75	15,83
				1.1.2	Reference points	0,5	0,25	0,333	0,1667	90	22,50	15,00
				1.1.3	Stock rebuilding			0,333	0,1667			0,00
		Management	0,5	1.2.1	Harvest strategy	0,25	0,125			100	12,50	12,50
				1.2.2	Harvest control rules & tools	0,25	0,125			90	11,25	11,25
				1.2.3	Information & monitoring	0,25	0,125			90	11,25	11,25
				1.2.4	Assessment of stock status	0,25	0,125			90	11,25	11,25
Two	1	Retained species	0,2	2.1.1	Outcome	0,333	0,0667			85	5,67	5,67
				2.1.2	Management	0,333	0,0667			80	5,33	5,33
				2.1.3	Information	0,333	0,0667			80	5,33	5,33
		Bycatch species	0,2	2.2.1	Outcome	0,333	0,0667			80	5,33	5,33
				2.2.2	Management	0,333	0,0667			90	6,00	6,00
				2.2.3	Information	0,333	0,0667			80	5,33	5,33
		ETP species	0,2	2.3.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.3.2	Management	0,333	0,0667			95	6,33	6,33
				2.3.3	Information	0,333	0,0667			85	5,67	5,67
		Habitats	0,2	2.4.1	Outcome	0,333	0,0667			80	5,33	
				2.4.2	Management	0,333	0,0667			95	6,33	
				2.4.3	Information	0,333	0,0667			85	5,67	
		Ecosystem	0,2	2.5.1	Outcome	0,333	0,0667			100	6,67	
				2.5.2	Management	0,333	0,0667			100	6,67	
				2.5.3	Information	0,333	0,0667			95	6,33	
Three	1	Governance and policy	0,5	3.1.1	Legal & customary framework	0,25	0,125			100	12,50	
				3.1.2	Consultation, roles &	0,25	0,125			100	12,50	
				3.1.3	Long term objectives	0,25	0,125			100	12,50	
				3.1.4	Incentives for sustainable fishing	0,25	0,125			100	12,50	
		Fishery specific management system	0,5	3.2.1	Fishery specific objectives	0,2	0,1			100	10,00	
				3.2.2	Decision making processes	0,2	0,1			80	8,00	
				3.2.3	Compliance & enforcement	0,2	0,1			100	10,00	
				3.2.4	Research plan	0,2	0,1			100	10,00	
				3.2.5	Management performance	0,2	0,1			100	10,00	

Overall weighted Principle-level scores - NEA Trawl		Either	Or
Principle 1 - Target species	Stock rebuilding PI not scored	92,5	
	Stock rebuilding PI scored		77,1
Principle 2 - Ecosystem		88,7	
Principle 3 - Management		98,0	

MSC FISHERY ASSESSMENT REPORT

Fishery Assessment Scoring Worksheet version 1 - effective November 14, 2011

Norway North East Arctic Saithe Re- assessment - Purse seine, Gill nets, Hand line, Danish Seine, Long line and others

Note: Scores are to be entered in the green-shaded cells in column K

Columns G, H and L apply in fisheries where the stock rebuilding PI (1.1.3) is NOT triggered

Columns I, J and M give the Principle 1 Outcome score contributions in fisheries where the stock rebuilding PI (1.1.3) is triggered

Prin-ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in			Score	Contribution to Principle Score	
						Either		Or			Either	Or
One	1	Outcome	0,5	1.1.1	Stock status	0,5	0,25	0,333	0,1667	95	23,75	15,83
				1.1.2	Reference points	0,5	0,25	0,333	0,1667	90	22,50	15,00
				1.1.3	Stock rebuilding			0,333	0,1667			0,00
		Management	0,5	1.2.1	Harvest strategy	0,25	0,125			100	12,50	12,50
				1.2.2	Harvest control rules & tools	0,25	0,125			90	11,25	11,25
				1.2.3	Information & monitoring	0,25	0,125			90	11,25	11,25
				1.2.4	Assessment of stock status	0,25	0,125			90	11,25	11,25
Two	1	Retained species	0,2	2.1.1	Outcome	0,333	0,0667			85	5,67	5,67
				2.1.2	Management	0,333	0,0667			80	5,33	5,33
				2.1.3	Information	0,333	0,0667			80	5,33	5,33
		Bycatch species	0,2	2.2.1	Outcome	0,333	0,0667			80	5,33	5,33
				2.2.2	Management	0,333	0,0667			90	6,00	6,00
				2.2.3	Information	0,333	0,0667			85	5,67	5,67
		ETP species	0,2	2.3.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.3.2	Management	0,333	0,0667			95	6,33	6,33
				2.3.3	Information	0,333	0,0667			80	5,33	5,33
		Habitats	0,2	2.4.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.4.2	Management	0,333	0,0667			95	6,33	6,33
				2.4.3	Information	0,333	0,0667			85	5,67	5,67
		Ecosystem	0,2	2.5.1	Outcome	0,333	0,0667			100	6,67	6,67
				2.5.2	Management	0,333	0,0667			100	6,67	6,67
				2.5.3	Information	0,333	0,0667			95	6,33	6,33
Three	1	Governance and policy	0,5	3.1.1	Legal & customary framework	0,25	0,125			100	12,50	
				3.1.2	Consultation, roles &	0,25	0,125			100	12,50	
				3.1.3	Long term objectives	0,25	0,125			100	12,50	
				3.1.4	Incentives for sustainable fishing	0,25	0,125			100	12,50	
		Fishery specific management system	0,5	3.2.1	Fishery specific objectives	0,2	0,1			100	10,00	
				3.2.2	Decision making processes	0,2	0,1			80	8,00	
				3.2.3	Compliance & enforcement	0,2	0,1			100	10,00	
				3.2.4	Research plan	0,2	0,1			100	10,00	
				3.2.5	Management performance	0,2	0,1			100	10,00	

Overall weighted Principle-level scores - NEA Danish Seine, Purse Seine & gill-net		Either	Or
Principle 1 - Target species	Stock rebuilding PI not scored	92,5	
	Stock rebuilding PI scored		77,1
Principle 2 - Ecosystem		90,0	
Principle 3 - Management		98,0	

6.3 Summary of Conditions

The fisheries did not achieve a score of below 80 on any scoring indicators; hence no conditions are required for the Norway North Sea and North East Arctic saithe fisheries.

6.3.1 Recommendations:

The assessment team identified 3 recommendations.

1. PI 1.2.3: "Relevant information is collected to support the harvest strategy" for both North Sea and North East Arctic saithe fisheries. Based on comments and recommendations of the ICES working groups, the client is recommended to explore ways in which they could help directly to improve the level of sampling for both saithe fisheries.

2. PI.2.1.2: There is a formally defined and ICES assessed management plan for the coastal cod stock and its fishery. However, this strategy is currently being confounded by the 'Autumn fishery fresh-cod scheme'. Consequently, it is recommended that the client should provide evidence in 2013 that it has engaged with the national fishery management authorities to develop additional effective means for further reductions in the total annual catch (i.e. including recreational catches) of coastal cod.

3. PI 2.2.2: The strategy for managing and minimising by-catch has not been tested explicitly for the saithe fisheries and it is some years since there has been an explicit exercise to assess just what the discard rates are across Norwegian fisheries. The client is recommended to enable the assessment of discard rates in the Norwegian saithe fisheries.

6.4 Determination, Formal Conclusion and Agreement

(REQUIRED FOR FR AND PCR)

1. The report shall include a formal statement as to the certification determination recommendation reached by the Assessment Team about whether or not the fishery should be certified.*(Reference: CR 27.16)*

(REQUIRED FOR PCR)

2. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

The Norwegian North Sea and North East Arctic saithe fisheries achieved a score of 80 or more for each of the three MSC Principles, and did not score under 60 for any of the set MSC Criteria.

The assessment team therefore recommends the certification of the Norway North Sea saithe fishery and Norway North East Arctic saithe fishery for the clients Norwegian Fishing Vessel Owners Association (Fiskebåt) and Norwegian Seafood Council (Norges Sjømatråd).

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APPENDICES

APPENDIX 1 SCORING AND RATIONALES

Appendix 1.1 Performance Indicator Scores and Rationale

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Norway North –East Arctic saithe

Evaluation Table PI 1.1.1

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	It is **likely** that the stock is above the point where recruitment would be impaired.
			The SSB is currently well above the management plan and precautionary approach reference points and has been consistently above that level since 1995. ICES is satisfied that the stock retains full reproductive capacity.
80	**a**	**Y**	It is **highly likely** that the stock is above the point where recruitment would be impaired.
			MSY B trigger is not defined but B lim is set at the change point in the regression of SSB vs recruitment. This is equivalent to the biomass of 136,000t. This is well above the lowest observed value of SSB in the time series of 85,000t in 1987. Current SSB is 314,684t and it is therefore highly likely that the current level of the spawning stock does not impair future recruitment.
	b	**Y**	The stock is at or fluctuating around its target reference point.
			Maximum sustainable yield biomass and fishing mortality targets have not been defined for this stock. The stock is managed on the basis of management plan targets which ICES accepts are consistent with a precautionary approach. Fishing mortality has been consistently below the management plan target since 1996 although in 2010 and 2011 it has crept up to that level. SSB has been above the management plan target since 1995 and is currently well above it. By these criteria the stock is above its target reference point and ICES notes that it is being harvested sustainably.
100	**a**	**Y**	There is a **high degree of certainty** that the stock is above the point where recruitment would be impaired.
			SSB has been steadily decreasing since 2005 and fishing mortality has crept up to the management plan level for the last two years although still well below Flim. Annual recruitment has fluctuated over recent years with good, poor and average year classes an on-going feature. The recent pattern of recruitment, over the past ten years is very much a reflection of the historic pattern dating back to 1960. There was a period between 1985 and 1993 when the SSB was well below the current Blim level and there were some signs of impaired recruitment. However even during that period some above average year classes were produced and the SSB recovered. Taking these factors into account, and the current level of SSB, well above Blim, there is a high degree of certainty that the stock is currently above a point where recruitment might be impaired.
	b	**Y**	There is a **high degree of certainty** that the stock has been fluctuating around its target reference point, or has been above its target reference point, **over recent years**.
			Current evidence supports a high degree of certainty that SSB is above any level that should give cause for concern. SSB is currently at 314,684t and is therefore well above the management plan / precautionary approach target level of 220,000t and has been above that level since 1995. ICES is satisfied that the stock retains full reproductive capacity. Current estimates of F = F_{pa}, the target reference level, consistent with the internationally agreed management plan. Nevertheless, there are residual uncertainties in the current assessment; consequently the current estimate for F lacks the high degree of certainty that it is at F_{pa}, hence the reduced score.
References			ICES, 2012a; ICES 2012c; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.

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PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
Target reference point	Bmp / Bpa Fmp / Fpa	220,000t Spawning stock biomass 0.35	SSB 2012: 314,684t 2011: F 0.35
Limit reference point	Blim Flim	136,000t Spawning stock biomass 0.58	SSB 2012: 314,684t F 2011: 0.35
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 1.1.2

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.
			Biological reference points for spawning biomass and fishing mortality have been defined and agreed as a part of the current management plan.
80	**a**	**Y**	Reference points are appropriate for the stock and can be estimated.
			The reference points have been agreed by ICES and are compliant with international standards and a precautionary approach to management.
	b	**Y**	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.
			The SSB limit reference point is consistent with the ICES precautionary approach. It is set at 136,000t and is based on the change point in the stock and recruitment relationship. It is set well above B loss the lowest level of SSB in the time series, 85,000t. There have been no signs of impaired recruitment at levels of SSB above the current Blim. At the 2010 benchmark assessment the working group carried out a re-appraisal of reference points. The resultant biomass limit point was 118,542t which was not considered to be significantly different from the current Blim and it was therefore decided not to recommend any changes.
	c	**Y**	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.
			MSY biomass and fishing mortality targets have not been defined for this stock. Instead there are management plan reference levels for SSB and F which are both precautionary and consistent with MSY principles for maintaining full reproductive capacity and a sustainable harvest at a high level. These reference points form an integral part of the management plan and the ICES advice on the exploitation of the stock. They are designed to maintain SSB at or above the management plan target of 220,000t and to keep F at or below the management plan level of 0.35.
	d	**N/A**	Key low trophic level species, the target reference point takes into account the ecological role of the stock.
			It's not a key low trophic level species. Trophic level 4.4 (Where low trophic level species are <3.5; www.fishbase.org).
100	**b**	**Y**	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of **precautionary issues**.
			The biomass limit point is set well above the lowest level of SSB in the time series and at a level above which there have been no appreciable signs of impaired recruitment. At the 2010 benchmark assessment the working group carried out a re-appraisal of reference points. The resultant biomass limit point was 118,542t. However it was subsequently decided, based on precautionary issues, not to recommend any changes and the current Blim of 136,000t was retained.
	c	**N**	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a **higher level**, and takes into account relevant precautionary issues such as the ecological role of the stock with a **high degree of certainty.**

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PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			MSY biomass and fishing mortality targets have not been defined for this stock. Instead there are management plan targets for SSB and F which are both precautionary and consistent with MSY principles for maintaining full reproductive capacity and a sustainable harvest. These reference points form an integral part of the management plan and the ICES advice on the exploitation of the stock. They are designed to maintain SSB at or above the management plan target of 220,000t and to keep F at or below the management plan level of 0.35. Nevertheless, although Norwegian fishery legislation requires ecosystem-trophic-biodiversity issues to be given full consideration, the current status of ecosystem modelling does not enable these aspirations to be met in full. Consequently the ecological role of the stock is not recognized with a high degree of certainty with respect to reference points.
References			ICES, 2005; ICES, 2010a; ICES, 2012c; Site meeting: Fisheries Directorate, Bergen. 25 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 1.1.3

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**A**		Where stocks are depleted rebuilding strategies which have a reasonable expectation of success are in place.
	B		A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.
	C		Monitoring is in place to determine whether they are effective in rebuilding the stock within a **specified** timeframe.
80	**A**		Where stocks are depleted rebuilding strategies are in place.
	B		A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or **2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.
	C		There is **evidence** that they are rebuilding stocks, or it is **highly likely** based on simulation modelling or previous performance that they will be able to rebuild the stock within a **specified** timeframe.
100	**A**		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete **within the specified timeframe**.
	B		The shortest practicable rebuilding timeframe is specified which does not exceed **one generation** time for the depleted stock.
References			
OVERALL PERFORMANCE INDICATOR SCORE:			**N/A**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.1

PI 1.2.1		There is a robust and precautionary harvest strategy in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**A**	**Y**	The harvest strategy is **expected** to achieve stock management objectives reflected in the target and limit reference points.
			The current strategy is to set an annual quota based on managing the stock in accordance with the management plan based reference points for SSB and F. This is backed by a series of biological and technical measures.
	B	**Y**	The harvest strategy is **likely** to work based on prior experience or plausible argument.
			Quota control linked with technical and biological measures and appropriate monitoring and enforcement has been working effectively in this fishery for many years evidenced by the current stock status.
	C	**Y**	Monitoring is in place that is expected to determine whether the harvest strategy is working.
			Norway accounts for over 90% of the North-east Arctic saithe catch. Their landings are monitored at all Norwegian landings ports, initially from the sales notes, by gear and by area. Landings from the fishery are checked and verified against the log book records from the Directorate of Fisheries. Landings are checked against TAC uptake to ensure that this is not overshot. The saithe landings by other countries are all appropriately monitored against TAC uptake. All the landings data are checked and verified against the official catch reported to ICES. Catches are sampled to determine relevant biological parameters and an assessment of stock status is carried out annually by ICES. This annual assessment provides the evidence on whether or not the harvest strategy is working.
80	**a**	**Y**	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving management objectives reflected in the target and limit reference points.
			The current annual quota based management system is firmly based on an annual assessment of the status of the stock in terms of both spawning biomass and fishing mortality. The system is embedded in an agreed management plan which has been evaluated by ICES in 2007 and again in 2011 as being consistent with the precautionary approach and MSY principles. The plan has target and limit levels for both SSB and F which drive the resultant annual advice from ICES on the appropriate level of exploitation.
	b	**Y**	The harvest strategy may not have been fully tested but monitoring is in place and evidence exists that it is achieving its objectives.
			The harvest strategy, in the form of the agreed management plan was fully evaluated by ICES in 2007 and accepted as being in accordance with a precautionary approach. As a result of some changes made to the plan, following a benchmark assessment of the stock in 2010, ICES re-evaluated the plan in 2011. Again it was accepted as being in accordance with the precautionary approach. Annual monitoring of the status of the stock confirms that levels of SSB and F have been in line with the management plan since 1996. This provides evidence that the harvest strategy is achieving its objectives.
100	**a**	**Y**	The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in the target and limit reference points.
			The harvest strategy contains three basic elements. - The annual TAC is set for three years based on the current assessment of the status of the stock and the management plan fishing mortality of F 0.35. - Each year the TAC is re-calculated for the following three years but the TAC must not be changed by more than +/- 15% compared with the

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PI 1.2.1		There is a robust and precautionary harvest strategy in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			previous year. - Finally, if the SSB is below the management plan target (220,000t) then the TAC for that year is based on a fishing mortality which is linearly reduced in line with the estimated SSB. In that situation the +/- limit on change to the TAC is suspended. This type of harvest strategy is firmly linked to the state of the stock and can rapidly respond to annual changes indicated by the stock assessment. It is clearly designed to achieve the management plan targets for SSB and F and promote stable levels of exploitation.
	b	**Y**	The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
			The performance of the harvest strategy is evaluated annually against the outcome of the annual assessment of the status of the stock. That assessment is carried, out and agreed, by the ICES working group comprising international experts in stock assessment. The results of the assessment are reviewed and endorsed by the ICES advisory committee (ACOM). The stock has been harvested at levels consistent with the management plan since 1996. Since 1996 fishing mortality has been below the management plan target (F0.35) and spawning stock biomass has been above the management plan reference level (220,000t). This provides ample evidence that the harvest strategy is achieving its objectives and that it is clearly able to maintain stocks at target levels.
	d	**Y**	The harvest strategy is periodically reviewed and improved as necessary.
			The harvest strategy, in the form of a management plan, was reviewed and evaluated by ICES in 2007. After some changes, following the 2010 benchmark assessment of the stock in 2010, ICES re-evaluated the strategy in 2011. On each occasion it was found to be in accordance with the precautionary approach. In addition, the strategy has been subject to scrutiny by both the NFVOA and MFCA have raised the question as to whether the current exploitation and reference levels should be set at more precautionary levels than currently advocated by ICES. These views have yet to be expressed formally or subject to review and testing by ICES.
References			ICES, 2007; ICES, 2010a; ICES, 2012a; ICES 2012c; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Generally understood** harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.
			The overarching harvest control rule is the estimation of the annual TAC firmly linked to the management plan. This is supported by a raft of biological and technical measures. These measures are targeted at specific areas and gears and are fully explained on the Norwegian Ministry of Fisheries and Coastal Affairs website
	c	**Y**	There is **some evidence** that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.
			The annual TAC has not been exceeded since 2007 when the first management plan was introduced. This provides evidence that the monitoring and control of catch levels is effective in achieving the required level of exploitation advised by ICES.
80	**a**	**Y**	**Well defined** harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.
			The harvest strategy has clear rules which effectively reduce the annual TAC if target and limit reference points for SSB are approached. The strategy is clearly designed to set the annual TAC at a level consistent with maintaining the SSB above, and the fishing mortality below, the management plan targets. Fishing mortality has been below the management plan target (F0.35) over the same period.
	b	**Y**	The **selection** of the harvest control rules takes into account the **main** uncertainties.
			The main uncertainties affecting the harvest control rule are the reliability of the annual stock assessment and the lack of information about incoming year-classes. These have been taken into account when selecting the current harvest rules. Also, the assessment does not include an estimate of discarding or slippage as these data are not available but the consensus of opinion is that they are of minor importance.
	c	**Y**	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.
			The principle tools are quota management and a raft of biological and technical measures including minimum sizes, mesh and grid regulations, permanent and real-time closures. These tools have been used in Norwegian fishery management for many years and have been shown to be appropriate and effective in achieving the exploitation levels required under the harvest control rules. The annual quota agreed between Norway and other countries has not been exceeded since 2007 when the first management plan was introduced. The fluctuating pattern of annual recruitment of 3yr old fish is consistent over the historic time series suggesting that the measures to protect juveniles are effective. This provides evidence that the monitoring and control of catch levels and other conservation measures are effective in achieving the required level of exploitation advised by ICES and implemented within the management plan rules.
100	**b**	**N**	The **design** of the harvest control rules takes into account a **wide range** of uncertainties.
			The design of the harvest rule is adapted to a plausible range of the main uncertainties, which include the reliability of the annual stock assessment and the lack of information about incoming year-classes. Other sources of uncertainty (changes in natural mortality, unaccounted mortalities, environmental regime shifts, and failure of compliance) have not been taken into account. The current harvest control rule does not have provisions for taking into account such a wide range of

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PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			uncertainties.
	c	**Y**	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
			The stock is considered to be at full reproductive capacity and recruitment has been fluctuating around the mean since 2007 providing clear evidence that the measures to protect juveniles are proving effective. Furthermore, the annual TAC set by Norway has not been exceeded since 2007, when the first management plan was introduced. Similarly, fishing mortality has been below or close to the target level over this period. This provides clear evidence that the harvest control rule combined with monitoring and control of catch levels and other measures are effective in achieving the required level of exploitation advised by ICES and implemented within the management plan rules.
References			ICES, 2007; ICES, 2010a; ICES, 2012a; ICES 2012c; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.3

PI 1.2.3		Relevant information is collected to support the harvest strategy	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.
			IMR maintains a biological sampling programme for this fishery and stock. All catches are retained, recorded and reported to the appropriate national and international organisations
	b	**Y**	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.
			Basic catch data from the North-east Arctic saithe fishery are collected by all participating countries with more comprehensive biological data collected by the two main fleets of Norway and Russia which covered 97% of the landings in 2011.The ICES assessment working group considered the available data in 2011 to be sufficient to carry out the analytical aged-based stock assessment. This assessment generates the ICES advice on which the annual TAC is based.
80	**a**	**Y**	**Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.
			The complex pattern of distribution, spawning habitats, and migration of saithe in the North Atlantic is well known and described by numerous authors. There is considerable mixing between adjacent populations. The saithe occurring in the North-east Arctic, ICES Sub-areas I and II, are regarded as a separate stock and this is considered to be adequate for management purposes. It is generally recognised that some mixing may occur between populations in the northern North Sea, and to a lesser extent the Faroe Islands and Iceland. Accurate and verifiable catch and landings data are collected by the Norwegian authorities and supplied to ICES for use in the annual stock assessment process which underpins the harvest strategy. Information on maturity and growth rates is routinely collected as part of the sampling process for catches by the Norwegian fleet. Changes in the maturity have been noted in recent years. This is an important element in the calculation of SSB and the updated data are used in the stock assessment. The ICES assessment working group has noted that the sampling of the Norwegian commercial catch has been less precise since a port sampling programme was abandoned in 2009. This has caused some problems in the assessment in relation to the age structure of the catches in the past but the situation has improved in 2011. Sampling by the 'reference fleet' has been increased together with the number of participating vessels. However there is still a lack of sampling from some gears in some areas and the working group recommended that this should be improved. Norway generates over 90% of the landings of North -east Arctic saithe. The composition of the fleets operating within the Norwegian and Russian EEZ is well known and consists of gill netters fishing mainly in the winter, pursers mainly in the summer and trawlers all the year round. Reliable information on the fleets is important in relation to the allocation of annual quota which is apportioned according to vessel type, size and gear. Research projects over recent years relate to studies on the distribution and migration in relation to stock identity, environmental factors affecting changes in growth rates and maturity and environmental links affecting the variability of annual recruitment. The Ministry indicated that they are keen to encourage relevant research projects related both to current management issues and also to their

PI 1.2.3		Relevant information is collected to support the harvest strategy	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			ecosystem approach to management of the marine environment generally. They mentioned the possibility of Norwegian participation in studies on saithe diet and also the need for firm scientific data to better define and support minimum size regulations. Studies of the variable annual inflow of Atlantic water to the Norwegian coastal area have indicated tentative links between reduced inflow rates and poorer recruitment of saithe. The range of information detailed above is considered to be both relevant and sufficient to support the harvest strategy.
	b	**Y**	Stock abundance and fishery removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule**, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.
			The landings of North–east Arctic saithe are considered to be well monitored internationally. With a ban on discarding in Norwegian waters the landings data are considered to be a fair reflection of the actual catches. However the ICES assessment working group has suggested that there may be some discarding and misreporting of saithe mainly by non-Norwegian vessels but this has not been substantiated. The Norwegian Ministry are continuing to keep a careful watch on the potential for some discarding by the deployment of seagoing inspectors. They recognise that, in spite of the regulation, some discarding probably still occurs. This is sometimes for safety reasons when a trawler accidentally catches more than it can safely haul on board. The intention of the Ministry is to remain vigilant and they believe that current saithe discarding rates are less than 2%. Real time monitoring and surveillance of the fishery allows effective action to be taken in relation to both quota uptake and conservation measures A fishery independent assessment of stock abundance is obtained from an acoustic survey carried out annually, since 1992, in October / November. The survey covers a wide area of the Norwegian coast up to the Russian border in the north. The survey is aimed at supporting the stock assessment with fishery independent data particularly on the abundance of 3 to 6 yr olds. There are concerns at present regarding discrepancies between the acoustic survey and cpue data from the directed trawl fishery.
	c	**Y**	There is good information on all other fishery removals from the stock.
			All countries are required to report their landings of saithe to the appropriate authorities. This includes all by-catches of saithe in other targeted fisheries and in particular the cod fishery where a by-catch of saithe can be expected.
100	**a**	**Y**	A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
			Accurate and verifiable catch and landings data are collected by the Norwegian authorities and supplied to ICES for use in the stock assessment process which supports the harvest strategy. Earlier problems with IUU fisheries have been resolved and are no longer giving cause for concern. The IMR maintains a comprehensive biological sampling programme (see SG 80a above) including environmental information, which underpins an analytical annual stock assessment, undertaken in partnership with ICES with a time series dating back to 1960.

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PI 1.2.3			Relevant information is collected to support the harvest strategy
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			The Norwegian fisheries authorities maintain the comprehensive record of fleet structure, fishing distribution and activity and up to date records of all vessel landings.
	b	**N**	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty.
			Although all the fundamental data required to inform the stock assessment process and support the harvest strategy are available in great detail, some uncertainties inevitably exist. The Norwegian sampling of commercial catches is less extensive than ICES believes it should be, because a port sampling programme was terminated in 2009. This has caused problems in the estimation of the catch of the oldest age fish. This problem persists and continues to generate some uncertainty with a lack of adequate sampling of some gears and some areas. There is still some uncertainty related to whether or not any discarding and misreporting is occurring in this fishery. Uncertainty in the assessment and forecasts for the future is generated by the lack of reliable recruitment estimates. Discrepancies between the acoustic survey and the commercial trawl cpue data is currently under investigation. The reasons for the differences are not yet clearly understood, but have implications for estimates of stock abundance.
References			ICES, 1965; ICES, 2007; ICES, 2012a; Jakobsen, 1986; Jakobsen, 1987; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**b**	**Y**	The assessment estimates stock status relative to reference points.
			The stock is assessed annually by the ICES AFWG Working Group and subsequently reviewed and endorsed by the Advisory Committee of ICES (ACOM). The 2012 assessment was an update assessment; the last benchmark assessment was in 2010. The annual advice promulgated by ACOM is expressed in terms of precautionary approach and management plan target reference points.
	c	**Y**	The assessment **identifies major sources** of uncertainty.
			The annual ICES advice clearly identifies the major sources of uncertainties
80	**a**	**Y**	The assessment is appropriate for the stock and for the harvest control rule.
			The assessment model used by the Working Group is an extended survivor's analysis (XSA) commonly used within ICES and considered appropriate for many demersal stocks. The whole assessment process is conducted within a multi-national ICES working group and the results reviewed and endorsed by the ICES advisory committee on management (ACOM).
	c	**Y**	The assessment **takes uncertainty into account**.
			The annual ICES advice identifies the major sources of uncertainty and takes these into account in the assessment and subsequent advice. The lack of information on recruitment prior to age 3yr old fish is a systemic problem with all saithe stock assessments. Only a single fishery independent survey is used in the assessment together with a commercial trawl cpue index and these are currently generating divergent signals which is a known source of uncertainty in the assessment.
	e	**Y**	The assessment of stock status is subject to peer review.
			An internal review of the process is carried out annually by a panel of scientists comprising the ICES advisory committee on management (ACOM). This is a well-established routine part of the process before any advice can be given.
100	**a**	**Y**	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
			The stock assessment is made by use of a standardized set of ICES assessment procedures which meet internationally recognised standards of reliability and quality control with respect to this species and stock. The assessment generates advice in the form of a range of management options based on SSB and fishing mortality reference points, including TAC corresponding to the harvest control rule. The specific assessments and the ICES methodologies are subject to periodic bench-mark review with appropriate updating. Such benchmark exercises always include active participation by independent experts. The North-east Arctic saithe assessment was last subjected to a benchmark review in 2010 (WKROUND) followed by the 2010 benchmark assessment by the working group.
	c	**N**	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way.
			The annual ICES advice identifies the major sources of uncertainty in the assessment process. The lack of information on recruitment prior to age 3yr old fish is a systemic problem with all saithe stock assessments. While there is confidence in the overall status of the stock, the assessment itself has not been a subject to a probabilistic analysis in relation to reference points.
	d	**Y**	The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.

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PI 1.2.4		There is an adequate assessment of the stock status	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			At 2010 benchmark workshop (WKROUND) problems of the unsatisfactory retrospective patterns were investigated and solutions explored. As a result some changes were made to the input data in particular a date split at 2002 for both the acoustic survey and cpue trawl indices. This was because of a distinct, but unexplained, change in the catchability at age around 2002. The benchmark workshop also confirmed a decision taken by the working group in 2006 to abandon a purse seine cpue index because of unacceptably strong year effects. It had been noted by the assessment working group that, since 2000, the numbers of older fish, those in the 11+ group, had increased. This feature is well known to cause problems with VPA models. The benchmark workshop investigated this problem and recommended that the catch at age matrix should be extended to a 15+ group. After thorough testing and with the implementation of the recommended changes the benchmark workshop in 2010 considered the XSA model to be entirely appropriate and robust for the stock. In the recent past other assessment models (ICA and ADAPT) have been tested and the results compared with XSA. It was concluded that there were no improvements to be gained from a change to the model.
	e	**N**	The assessment has been **internally and externally** peer reviewed.
			The assessment is subject to regular review by the IMR and ICES, and subject to periodic external review through the ICES benchmark protocols. The assessment is also subject to review by non-scientific interested parties, not the least of which is the Norwegian fishing industry. However critical this procedure may be it is accepted that it falls short of what might normally be accepted as a true external peer review.
References			Darby and Flatman, 1994; ICES, 2010a; ICES 2012a; Site meetings: Fisheries Directorate, Bergen. 25 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Norway North Sea saithe
Evaluation Table PI 1.1.1

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	It is **likely** that the stock is above the point where recruitment would be impaired.
			The SSB is currently above the management plan, MSY $B_{trigger}$ and precautionary approach reference points and has been consistently above that level since 1997. ICES is satisfied that the stock retains full reproductive capacity and is being harvested sustainably.
80	**a**	**Y**	It is **highly likely** that the stock is above the point where recruitment would be impaired.
			B lim is defined on the basis of Bloss, (estimated in 1998), the lowest point in the time series dating back to 1967. This is equivalent to a biomass of 106,000t. Current SSB is 217,000t. The biomass precautionary approach level of 200,000t is set at a level which affords a high probability of maintaining SSB above Blim. It is therefore highly likely that the current level of the spawning stock is above the point where recruitment would be impaired.
	b	**Y**	The stock is at or fluctuating around its target reference point.
			Management plan, maximum sustainable yield and precautionary approach biomass and fishing mortality reference points have all been defined for this stock. The stock is managed on the basis of agreed management plan targets which ICES accepts are consistent with a precautionary approach. Fishing mortality has fluctuated around the MSY and management plan target since 1997 although it crept marginally above it in 2008 and 2009. SSB has been above the management plan target and MSY $B_{trigger}$ level since 1997.
100	**a**	**Y**	There is a **high degree of certainty** that the stock is above the point where recruitment would be impaired.
			SSB has been steadily decreasing since 2006 and fishing mortality has crept up to the management plan and MSY target level. However SSB is still well above Blim and fishing mortality is well below Flim (0.6) a level which is estimated to lead to the stock falling below Blim in the long term. SSB is currently above the biomass precautionary approach level of 200,000t. This is set at a level which affords a high probability of maintaining SSB above Blim. The current levels of SSB and F afford a high degree of certainty that the current level of the spawning stock is above the point where recruitment would be impaired.
	b		There is a **high degree of certainty** that the stock has been fluctuating around its target reference point, or has been above its target reference point, **over recent years**.
			Fishing mortality has fluctuated around the MSY and management plan targets since 1997 although it crept marginally above it in 2008 and 2009. SSB has been above the management plan target and MSY B trigger level since 1997. By these criteria there is a high degree of certainty that the stock is above its target reference point and has been consistently above that point over recent years. ICES notes that the stock is being harvested sustainably and has full reproductive capacity.
References			ICES, 2012b; ICES, 2012d; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.

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PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing			
Stock Status relative to Reference Points				
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**	
Target reference point	MSY B trigger SSB management plan Bpa	} } 200,000t } }	216,941t (2012)	
Limit reference point	Blim Flim	106,000t F 0.6	216,941t (2012) F 0.284 (2011)	
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				

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Evaluation Table: PI 1.1.2

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.
			Biological reference points, including MSY reference points, for spawning biomass and fishing mortality have been defined and agreed as a part of the current EU / Norway management plan.
80	**a**	**Y**	Reference points are appropriate for the stock and can be estimated.
			The reference points have been agreed by ICES and are compliant with international standards, MSY and a precautionary approach to management.
	b	**Y**	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.
			The biomass limit point is set at Bloss the lowest level of SSB in the time series dating back to 1967 and around which there was no sign of impaired recruitment. The fishing mortality limit level of F0.6 is also based on the lowest level in the time series, a level which is estimated would lead to the SSB falling below Blim in the long term.
	c	**Y**	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.
			The MSY B trigger level has been established for this stock at 200,000t. It is the same as the target SSB in the management plan
	d	**Y**	Key low trophic level species, the target reference point takes into account the ecological role of the stock.
			It's not a key low trophic level species. Trophic level 4.4 (Where low trophic level species are <3.5; www.fishbase.org
100	**b**	**N**	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of **precautionary issues**.
			The biomass limit point is set at the lowest level of SSB in the time series and at a level above which there have been no appreciable signs of impaired recruitment. In the absence of recruitment estimates, the assessment utilises a long-term geometric mean. Inevitably this introduces uncertainty, not least with respect to the low recruitment levels over the past 6 years, and low growth rates in the stock. As a consequence the ICES assessment working group are seeking a re-evaluation of the management plan reference points which would include a re-evaluation of both Blim and Flim. In the light of this uncertainty it is clear that the current level is not set with due consideration of all the precautionary issues (reduced recruitment, low growth rates).
	c	**N**	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a **higher level**, and takes into account relevant precautionary issues such as the ecological role of the stock with a **high degree of certainty.**
			The MSY B trigger level has been established for this stock at 200,000t. It is the same as the target SSB in the management plan and the precautionary approach level Bpa. These reference points form an integral part of the management plan and the ICES advice on the exploitation of the stock. They are designed to maintain SSB at or above the management plan target of 200,000t and to keep F at or below the management plan level of 0.3. However it is not clear how the reference points take into account the ecological role of the stock, or the current reduced

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PI 1.1.2			Limit and target reference points are appropriate for the stock
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			productivity and low growth rates with a high degree of certainty. This type of ecosystem approach to the management of fisheries is an explicit part in the long term plans of the Ministry for the management of the marine environment generally.
References			ICES, 2011a; ICES 2012d; ; Site meetings: Fisheries Directorate, Bergen. 25 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 1.1.3

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**		Where stocks are depleted rebuilding strategies which have a reasonable expectation of success are in place.
	b		A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.
	c		Monitoring is in place to determine whether they are effective in rebuilding the stock within a **specified** timeframe.
80	**a**		Where stocks are depleted rebuilding strategies are in place.
	b		A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or **2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.
	c		There is **evidence** that they are rebuilding stocks, or it is **highly likely** based on simulation modelling or previous performance that they will be able to rebuild the stock within a **specified** timeframe.
100	**a**		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete **within the specified timeframe**.
	b		The shortest practicable rebuilding timeframe is specified which does not exceed **one generation** time for the depleted stock.
References			
OVERALL PERFORMANCE INDICATOR SCORE:			**NA**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.1

PI 1.2.1		There is a robust and precautionary harvest strategy in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	The harvest strategy is **expected** to achieve stock management objectives reflected in the target and limit reference points.
			The current strategy is to set an annual TAC, based on managing the stock in accordance with the agreed EU / Norway management plan. The ICES advice on the annual TAC is firmly based on the target and limit reference points for SSB and F. This TAC-based harvest strategy is backed by a series of conservation measures.
	b	**Y**	The harvest strategy is **likely** to work based on prior experience or plausible argument.
			TAC control linked with conservation measures and appropriate surveillance and monitoring has been working effectively in this fishery for many years evidenced by the current stock and fishing mortality levels in line with MSY targets.
	c	**Y**	Monitoring is in place that is expected to determine whether the harvest strategy is working.
			Landings are monitored at all landings ports in accordance with Norwegian and EU common fisheries policy requirements. Landings records are checked against the log book records and are checked and verified against the official catch reported to ICES. Catches are appropriately sampled to determine relevant biological parameters and a robust assessment of stock status is carried out annually by ICES. This annual assessment provides the evidence on whether or not the harvest strategy is working.
80	**a**	**Y**	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving management objectives reflected in the target and limit reference points.
			The current annual TAC based management system is firmly based on an annual assessment of the status of the stock in terms of both spawning biomass and fishing mortality. The system is embedded in an agreed EU / Norway management plan (2005) which was updated and then evaluated by ICES in 2008. ICES have endorsed the plan as being consistent with the precautionary approach. The plan has target and limit levels for both SSB and F which are also expressed in MSY terms. The plan is scheduled for a further review in December 2012. That process began in the Spring of 2012 with a series of EU/ Norway meetings and is currently progressing according to plan.
	b	**Y**	The harvest strategy may not have been fully tested but monitoring is in place and evidence exists that it is achieving its objectives.
			The harvest strategy, in the form of the EU / Norway agreed management plan was fully evaluated by ICES in 2008 and accepted as being in accordance with a precautionary approach. Annual monitoring of the status of the stock confirms that levels of SSB and F have been in line with the management plan / MSY and precautionary approach reference points since 1997. ICES confirm that the stock is being harvested sustainably and has full reproductive capacity. This provides evidence that the harvest strategy is achieving its objectives.
100	**a**	**Y**	The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in the target and limit reference points.
			The harvest strategy is firmly based on the agreed EU / Norway management plan which is designed to be able to respond annually to changes in the state of the stock. Levels of exploitation (TACs) are set according to very clear rules on the state of the stock in relation to MSY reference points. At levels of SSB above the MSY B trigger level the stock can be harvested at FMSY with a restriction on annual TAC change to +/- 15%. At levels below MSY B trigger but above Blim exploitation

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PI 1.2.1		There is a robust and precautionary harvest strategy in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			must be linearly reduced in line with the estimate of SSB. If the SSB falls below Blim exploitation must be reduced to fishing mortalities of no more than F0.1. The restriction on TAC change does not apply when the SSB is below MSY B trigger. It is clear that this type of harvest strategy is firmly linked to the state of the stock and can rapidly respond to annual changes indicated by the stock assessment. It is clearly designed to achieve the management plan targets for SSB and F.
	b	**Y**	The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
			The performance of the harvest strategy is evaluated annually against the outcome of the annual assessment of the status of the stock. That assessment is carried, out and agreed, by the ICES working group comprising international experts in stock assessment. The results of the assessment are reviewed and endorsed by the ICES advisory committee (ACOM). The stock has been harvested at levels consistent with the agreed management plan since it was established in 2008. Since 1997 fishing mortality has been below Fmsy (F0.3) and spawning stock biomass has been above MSY B trigger (220,000t). This provides ample evidence that the harvest strategy is achieving its objectives and that it is clearly able to maintain stocks at target levels.
	d	**Y**	The harvest strategy is periodically reviewed and improved as necessary.
			The harvest strategy, in the form of the agreed EU / Norway management plan (2005), was reviewed and evaluated by ICES in 2008 and was found to be in accordance with the precautionary approach. It is scheduled for a further review in December 2012 It is anticipated that some changes will have to be made to improve the plan in the light of the ICES recommendation to re-evaluate reference points.
References			ICES, 2011a; ICES, 2012b; ICES 2012d; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Generally understood** harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.
			The overarching harvest control rule is the allocation of the annual TAC firmly linked to the EU / Norway management plan. This is supported by a raft of conservation measures for minimum mesh size, minimum landing size and gear. The annual TAC is set separately for ICES Sub-area IV and IIIa, and Sub-area VI for administrative, monitoring and surveillance purposes.
	c	**Y**	There is **some evidence** that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.
			The annual TAC for ICES Sub-area IV and Division IIIa is set by agreement following EU / Norway negotiations. The TAC has not been exceeded since 2001. The annual quota for ICES Sub-area VI is set by the EU and has not been exceeded since 1999. This provides evidence that the monitoring and control of catch levels is effective in achieving the required level of exploitation advised by ICES.
80	**a**	**Y**	**Well defined** harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.
			The TAC control rules and other conservation measures have maintained the SSB, of the North Sea saithe stock, above the EU / Norway management plan target of 200,000t since 1997. Fishing mortality has fluctuated around the management plan target (F0.3) over the same period. The harvest strategy has clear rules which effectively reduce the annual TAC if target and limit reference points for SSB are approached. The strategy is clearly designed to set the annual TAC at a level consistent with maintaining the SSB above, and the fishing mortality below, the management plan and MSY targets.
	b	**Y**	The **selection** of the harvest control rules takes into account the **main** uncertainties.
			The main uncertainty related to the harvest control rule is the reliability of the annual stock assessment which drives the annual advice on the precautionary exploitation of the stock. There is a second element of uncertainty in relation to recruitment level of the stock. Potential discarding and slippage are not taken into account in the annual stock assessment process but are regarded as minimal and highly unlikely to affect the quality of the data input. Exploitation levels in the North Sea saithe fishery are inextricably linked to the North Sea cod recovery programme and new (2012) ICES advice on mixed demersal fisheries. Vessels fishing for saithe in the North Sea are subject to the same effort control related to engine power and days at sea which reduces their potential to catch their saithe quota. There is also a raft of conservation measures which address a wide range of potential uncertainty in relation to minimising the catches of immature saithe. These measures include area dependent, minimum mesh size and minimum landing size regulations.
	c	**Y**	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.
			The annual TAC for ICES Sub-area IV and Division IIIa is set by agreement following EU / Norway negotiations. The TAC has not been exceeded since 2001. Since 2009 the EU fleets have been subject to the effort regime of the EU cod recovery programme. This has undoubtedly affected their ability to catch their entire

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PI 1.2.2		There are well defined and effective harvest control rules in place	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			saithe quota. The annual TAC for ICES Sub-area VI is set by the EU and has not been exceeded since 1999. This provides evidence that the monitoring and control of catch levels and the conservation measures are effective in achieving the required level of exploitation advised by ICES and implemented within the management plan rules.
100	**b**	**N**	The **design** of the harvest control rules takes into account a **wide range** of uncertainties.
			The design of the harvest rule is adapted to a plausible range of the main uncertainties, which include the reliability of the annual stock assessment and the lack of information about incoming year-classes. Other sources of uncertainty (changes in natural mortality, unaccounted mortalities, environmental regime shifts, and failure of compliance) have not been taken into account. The current harvest control rule does not have provisions for taking into account such a wide range of uncertainties.
	c	**Y**	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
			The annual TAC, set by the EU / Norway for ICES Sub-area IV and Division IIIa and by the EU for Sub-area VI have not been exceeded since 2005 when the first long term management plan was introduced. There are also a wide variety of other conservation measures to safeguard juvenile fish. The stock is considered to be at full reproductive capacity and is being harvested sustainably. This provides clear evidence that the monitoring and control of catch levels, has been effective in achieving the required level of exploitation advised by ICES and implemented within the management plan rules.
References			ICES, 2011a; ICES, 2012b; ICES 2012d; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.3

PI 1.2.3		Relevant information is collected to support the harvest strategy	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.
			Sufficient information is available to support the designation of saithe, occurring in ICES Sub-areas IV and VI and Division IIIa, as a single stock, the North Sea stock. Landings are recorded separately for the two TAC areas. The level of biological sampling of the landings across the fleets is considered by ICES to be adequate.
	b	**Y**	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.
			All catches by Norwegian vessels are retained, recorded and reported to the appropriate national and international organisations. All catches by EU vessels are recorded in the on board log books and landings are monitored at all registered landings ports Catch and landings at age data for the fishery on the North Sea saithe stock are collected by all participating countries. These data are supplied to the ICES assessment working group. The working group considers the available data to be sufficient to carry out the analytical aged-based stock assessment. This assessment has been carried out since 1987 and generates the ICES advice on which the annual TAC is based.
80	**a**	**Y**	**Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.
			The saithe occurring in the ICES Sub-area IV, Division IIIa and Sub-area VI are regarded as a separate stock and this is considered to be appropriate for management purposes. It is generally recognised that some mixing may occur between adjacent populations in ICES Division IIa (North-east Arctic stock) and the Faroese and Icelandic stocks. Changes in the proportions mature at age have been noted in recent years but the long fixed maturity ogive could not be rejected on statistical grounds and continues to be used for the stock assessment. This is an important element in the calculation of SSB and changes to the ogive must be very carefully considered. There are five countries which between them take over 95% of the catch from the North Sea saithe stock. Each of those countries undertakes a biological sampling programme for saithe and provide information on catch at age. The composition of the fleets of these countries is well known and kept under review by the ICES assessment working group. The range of information detailed above is considered to be both relevant and sufficient to support the harvest strategy.
	b	**Y**	Stock abundance and fishery removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule**, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.
			Accurate and verifiable catch and landings data are collected. All catches by Norwegian vessels are retained, recorded and reported to the appropriate national and international organisations. All catches by EU vessels are recorded in the on board log books and landings are monitored at all registered landings ports Catch and landings at age data for the fishery on the North Sea saithe stock are collected by all participating countries. Norway has a self-sampling programme in operation involving vessels in the 'high seas' and 'coastal' fleets. All these data are supplied to the ICES assessment working group. Real time monitoring and surveillance of the fishery allows effective action to be taken in relation to both quota uptake and conservation measures

PI 1.2.3			Relevant information is collected to support the harvest strategy
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			There are three fishery independent surveys which provide information on stock abundance and are used as indices in the stock assessment process. The working group considers the available data to be sufficient to carry out the analytical aged-based stock assessment. This assessment has been carried out since 1987 and generates the ICES advice on which the annual TAC is based
	c	**Y**	There is good information on all other fishery removals from the stock.
			All countries are required to report their landings of saithe to the appropriate authorities. This includes all by-catches of saithe in other targeted fisheries and in particular the cod fishery where a by-catch of saithe can be expected. ICES considers saithe discards to be low.
100	**a**	**Y**	A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
			The information listed in 80a above is considered to be comprehensive in range and fully supports the harvest strategy. Discards are not included in the stock assessment process, but are considered to be low (less than 5%). The stock is currently experiencing a period of low recruitment to the fishable stock at three years old. There is little information on why this is happening or whether additional conservation measures would be effective to address the problem. This is due to the inshore distribution of juvenile fish. Research projects over recent years relate to studies on the distribution and migration in relation to stock identity, environmental factors affecting changes in growth rates and maturity and environmental links affecting the variability of annual recruitment.
	b	**N**	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty.
			Although all the fundamental data required to inform the stock assessment process and support the harvest strategy are available in great detail, some uncertainties inevitably exist. Norway takes almost 50% catch from the North Sea saithe stock. They do have a self-sampling scheme in operation involving both their 'high seas' and 'coastal' fleets. Whilst the ICES WG has commented that "the Norwegian sampling effort in the North Sea is below a responsible level and this is reflected in the catch at age estimates", this concern has not been endorsed by ACOM. This sampling problem inevitably generates some uncertainty in the stock assessment process. This problem should generate a specific recommendation related to Norway. There is still some uncertainty related to the level of discarding in this fishery. Whereas discarding is considered to be low in the Norwegian fishery, it is known to be significant in the Scottish fleet. This fleet is not considered to be typical; estimates of discarding are not included in the assessment. Uncertainty in stock forecasts is generated by the lack of reliable recruitment estimates.
References			ICES, 1965; ICES, 2012b; ICES, 2012d; Jakobsen, 1986; Jakobsen, 1987; Site meetings: Fisheries Directorate, Bergen. 25 September; Client meeting NFVOA, Oslo 26 September; Norwegian Ministry of Fisheries, Oslo 26 September.

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PI 1.2.3		Relevant information is collected to support the harvest strategy	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**b**	**Y**	The assessment estimates stock status relative to reference points.
			The stock is assessed annually by the ICES WGNSSK Working Group and subsequently reviewed and endorsed by the Advisory Committee of ICES (ACOM). The 2012 assessment was an update assessment; the last benchmark assessment was in January 2011. The annual advice promulgated by ACOM is expressed in terms of the EU / Norway management plan target reference points.
	c	**Y**	The assessment **identifies major sources** of uncertainty.
			The annual ICES advice clearly identifies the major sources of uncertainties. They concern the age structure of the stock. Estimating recruitment to the fishery at age 3yrs. Adequacy of the biological sampling programmes and the fishery dependent and independent stock indices.
80	**a**	**Y**	The assessment is appropriate for the stock and for the harvest control rule.
			The assessment model used by the Working Group is an extended survivor's analysis (XSA) commonly used within ICES and considered appropriate for many demersal stocks. The whole assessment process is conducted within a multi-national ICES working group and the results reviewed and endorsed by the ICES advisory committee on management (ACOM).
	c	**Y**	The assessment **takes uncertainty into account**.
			The annual ICES assessment process identifies the major sources of uncertainty, listed in 60c, and takes these into account in the assessment and subsequent advice. The revision of the age distribution in the Norwegian catch data, in 2010, has influenced the subsequent biomass estimates and the advice on the management of the stock. The estimate of SSB in the 2012 assessment was 30% higher than the November 2011 updated assessment and the fishing mortality was 25% lower. Problems with the influence of the commercial cpue indices used to tune the whole age matrix (3-9yrs) was addressed by changing the age range to 6-9yrs for these indices thus excluding the younger fish which were considered not to be properly sampled by the commercial fleet. However this decision was reversed in the 2011 update of the assessment and retained in 2012. The lack of information on recruitment prior to age 3yr old fish is a systemic problem with all saithe stock assessments
	e	**Y**	The assessment of stock status is subject to peer review.
			An internal review of the process is carried out annually by a panel of scientists comprising the ICES advisory committee on management (ACOM). This is a well-established routine part of the process before any advice can be given on options to exploit the stock sustainably.
100	**a**	**Y**	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
			The stock assessment is made by use of a standardized set of ICES assessment procedures which meet internationally recognised standards of reliability and quality control with respect to this species and stock. The specific assessments and the ICES methodologies are subject to periodic bench-mark review with appropriate updating. Such benchmark exercises always include active participation by independent experts. The North Sea saithe stock assessment was last subjected to a benchmark review in 2011 (WKBENCH) followed by the benchmark assessment by the working group in June 2011 which was subsequently updated in November 2011.
	c	**N**	The assessment takes into account uncertainty and is evaluating stock status relative

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PI 1.2.4		There is an adequate assessment of the stock status	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			to reference points in a **probabilistic** way.
			The annual ICES advice identifies the major sources of uncertainty in the assessment process. The lack of information on recruitment prior to age 3yr old fish is a systemic problem with all saithe the stock assessments. While there is confidence in the overall status of the stock, the assessment itself has not been a subject to a probabilistic analysis in relation to reference points.
	d	**Y**	The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
			The 2011 benchmark workshop (WKBENCH) examined all the input data for this assessment. The six survey indices used to tune the assessment, three commercial fishery cpue surveys and three fishery independent surveys (2 acoustic and 1 bottom trawl), were rigorously explored. As a result changes were recommended to the assessment working group on the appropriate age ranges for each of the surveys. This is an on-going process which is addressed at each annual assessment working group when due consideration can be given to down weighting the influence of any data set. As a consequence potential problems are regularly addressed and the robustness of the assessment maintained. After thorough testing and with the implementation of the recommended changes the benchmark workshop in 2011 (WKBENCH) considered the XSA model to be entirely appropriate and robust for the stock. There is no evidence from the recent ICES working group reports or from the 2011 benchmark assessment that any alternative modelling procedures were explored in any detail.
	e	**N**	The assessment has been **internally and externally** peer reviewed.
			The assessment is subject to regular review by the IMR and ICES, and subject to periodic external review through the ICES benchmark protocols. The assessment is also subject to review by non-scientific interested parties, not the least of which is the Norwegian fishing industry. However critical this procedure may be it is accepted that it falls short of what might normally be accepted as a true external peer review.
References			Darby and Flatman, 1994; ICES, 2011a; ICES, 2012b; Site meeting: Fisheries Directorate, Bergen. 25 September; Norwegian Ministry of Fisheries, Oslo 26 September.
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.1.1

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			As discarding is prohibited; all fish are retained and appear below except for species listed on the Norwegian Red List which appear in P2.3 – ETP species.
60	**a**		**Main retained species** are **likely** to be within biologically based limits (if not, go to scoring issue d below).
		Y	**NEA Cod**: Stock currently well in excess of MSY $B_{trrigger}$ and F << F_{MSY}. SSB_{MP} = MSY $B_{trigger}$ = B_{pa} = 460kt; B_{lim} = 220 kt F_{MP} = F_{MSY} = F_{pa} = 0.40; F_{lim} = 0.74
		Y	**NEA Haddock**: Stock currently well in excess of MSY $B_{trrigger}$ and F at or about F_{MSY}. SSB_{MP} = MSY $B_{trigger}$ = B_{pa} = 80kt; B_{lim} = 50 kt F_{MP} = F_{MSY} = 0.35; F_{pa} = 0.47; F_{lim} = 0.77
		See below	**Coastal cod**: Biological reference points not defined, stock subject to qualitative assessment (see below).
		See below	**NS Cod**: Following a 3–4 years of stock recovery, SSB now c. Blim; F has been falling for c. 10 years and is currently F < F_{pa} but F > F_{MSY} (see below). SSB_{MP} = MSY $B_{trigger}$ = B_{pa} = 150kt; B_{lim} = 70 kt F_{MP} = 0.4; F_{MSY} = 0.19; F_{pa} = 0.65; F_{lim} = 0.86
		Y	**NS Haddock**: Stock currently in excess of MSY $B_{trrigger}$ and F at or about F_{MSY}. SSB_{MP} = 100 kt; MSY $B_{trigger}$ = B_{pa} = 140 kt; B_{lim} = 100 kt F_{MP} = F_{MSY} = 0.35; F_{pa} = 0.7; F_{lim} = 1.0
	c		If **main retained species** are outside the limits there are **measures** in place that are **expected** to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.
		Y	**Coastal Cod**: A management plan is in place; stock has stabilised in recent years (as has F) and there may be nascent signs of recovery.
		Y	**NS Cod**: There is an ICES endorsed management plan which has resulted in a sustained fall in F and signs of stock recovery.
	d		If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.
		Y	Coastal Cod: The management plan is based on rational argument and previous practice elsewhere and is showing signs of success.
		Y	NS Cod: The management plan is based on rational argument and previous practice elsewhere and is showing signs of success.
80	**a**		**Main retained species** are **highly likely** to be within biologically based limits (if not, go to scoring issue c below).
		Y	**NEA Cod**: There is robust evidence that the stock is certainly within biologically based limits.
		Y	**NEA Haddock**: There is robust evidence that the stock is certainly within biologically based limits.
		See below	Coastal cod: As there are no biologically based limits for this component of stock.
		See below	NS Cod: The stock is currently outside biologically based limits.
		Y	NS Haddock: High stock level provides robust evidence that the stock is certainly within biologically based limits.
	c		If **main retained species** are outside the limits there is a **partial strategy** of **demonstrably effective** management measures in place such that the fishery does not hinder recovery and rebuilding.

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PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			As discarding is prohibited; all fish are retained and appear below except for species listed on the Norwegian Red List which appear in P2.3 – ETP species.
		Y	Coastal cod: There is an ICES endorsed management plan that is showing signs of effectiveness and the associated cod fishery has received MSC certification from which it can be inferred that the fishery does not hinder recovery and rebuilding.
		Y	NS Cod: There is an ICES endorsed management plan in place that is showing distinct signs of effectiveness. A key feature of the plan is the real-time closures aimed at minimising catches of cod.
100	**a**		There is a **high degree of certainty** that **retained species** are within biologically based limits **and** fluctuating around their target reference points.
			NE Arctic
		Y	Cod: There is robust evidence that the stock is certainly within biologically based limits and fluctuating around their target reference points..
		Y	Haddock: There is robust evidence that the stock is certainly within biologically based limits and fluctuating around their target reference points..
		N	Coastal cod: the exact status of the stock is far from certain.
		N	Tusk, ling, Greenland halibut: the exact status of the stock is far from certain
		N	Anglerfish: ICES trend-based assessment with no biological reference points. Falling trend in abundance indices for northern NS area.
		N	Catfish, halibut: no assessment made
			North Sea
		N	Cod: The stock is at a very low level and only recently has it shown sings of recovery.
		Y	Haddock: There is robust evidence that the stock is certainly within biologically based limits and fluctuating around their target reference points..

		Y	Plaice: The NS plaice stock is currently well in excess of MSY $B_{trigger}$ and F is at or about F_{MSY}. There is an EU mangement plan that is not formally agreed by Norway. ICES is evaluating the plan. SSB_{MP} = MSY $B_{trigger}$ = B_{pa} = 230 kt; B_{lim} = 160 kt F_{MP} = 0.3, F_{MSY} = 0.25, F_{lim} = 0.74, F_{pa} = 0.60
		Y	Hake: SSB has almost trebled since 1998 (to a previously unrecorded c. 160 kt) in response to a sustained fall in F to its current level (possibly still falling) c. 0.35. $SSB_{MP,}$ MSY $B_{trigger,}$ $B_{pa,}$ B_{lim} not defined F_{MSY} = 0.24, F_{MP}, F_{lim}, F_{pa} not defined
		Y	Whiting: Low-quality ($ACOM_{whit}$) age-based assessment indicating current F < Fmsy with SSB relatively stable in recent years, if not showing signs of increase. Norwegian catches (average 125 t) are trivial (<) with respect to the international catch from the same areas. Continuation of this practice should ensure that the saithe fishery is not causing the bycatch species to be outside biologically based limits or hindering recovery. $SSB_{MP,}$ MSY $B_{trigger,}$ $B_{pa,}$ B_{lim} not defined F_{MSY} = 0.3, F_{MP}, F_{lim}, F_{pa} not defined
		N	Pollack: No assessment, qualitative advice to minimise catches.
	b		Target reference points are defined for **retained species**.
		NE Arctic	
		Y	NEA Cod: Target reference points are defined (see above).
		Y	NEA Haddock: Target reference points are defined (see above).
		N	Coastal cod: there are no defined reference points.
		N	Tusk, ling, Greenland halibut, anglerfish, catfish, halibut: there are no defined reference points
		North Sea	
		Y	NS Cod: Target reference points are defined (see above).
		Y	NS Haddock: Target reference points are defined (see above).
		Y	Plaice: Target reference points are defined (see above).
		Y	Hake: Target reference points are defined (see above).
		Y	Whiting: fishery assessed with respect to F_{msy}; F currently <F_{msy}.
		N	Pollock: there are no defined reference points
References			DoF, 2012. Economic and biological figures from Norwegian fisheries 2011. Directorate of Fisheries, Bergen. http://www.fiskeridir.no/english/statistics/norwegian-fisheries/economic-and-biological-key-figures $ACOM_{NEAcod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.1. www.ices.dk/committe/acom/comwork/report/2012/2012/Cod-arct.pdf $ACOM_{NEAhad}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Haddock in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.3.www.ices.dk/committe/acom/comwork/report/2012/2012/had-arct.pdf $ACOM_{NEA\ cocod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Norwegian coastal waters cod). ICES Advice Book 3.4.2 http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-coas.pdf $ACOM_{GrHal}$ 2012. Ecoregion: Barents Sea and Norwegian Sea – Greenland halibut in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ghl-arct.pdf $ACOM_{Tusk}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Tusk (*Brosme brosme*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.12.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Tusk%20in%20I%20II.pdf $ACOM_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf $ACOM_{NScod}$, 2012. Ecoregion: Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.2.

	www.ices.dk/committe/acom/comwork/report/2012/2012/cod-347.pdf ACOM$_{NShad}$, 2012. Ecoregion: Haddock in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.3. www.ices.dk/committe/acom/comwork/report/2012/2012/had-34.pdf Hauge, M & Michalsen, K. 2012. Halibut grow slowly and undertake long migrations. Marine Research News No. 3 – 2012. http://www.imr.no/filarkiv/hi_nytt_3_2012_til_web.pdf_1/en ACOM$_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf ACOM$_{NSpla}$, 2012. Ecoregion: North Sea – Plaice in Subarea IV (North Sea). ICES Advice Book 6.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ple-nsea.pdf ACOM$_{NShake}$, 2012. Ecoregion: Widely distributed and migratory stocks – Hake in Division IIIa, Subareas IV, VI, and VII, and Divisions VIIIa,b,d (Northern stock). ICES Advice Book 9.4.1. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hke-nrth.pdf ACOM$_{NSpoll}$, 2012. Ecoregion: North Sea – Pollack in Subarea IV and Division IIIa. ICES Advice Book 6.4.32. http://www.ices.dk/committe/acom/comwork/report/2012/2012/pol-nsea.pdf ACOM$_{NSmonk}$, 2012. Ecoregion: Celtic Sea and West of Scotland + North Sea – Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Division IIIa, and Subareas IV and VI. ICES Advice Book 5.4.29. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ang-ivvi.pdf ACOM$_{NSwhit}$, 2012. Ecoregion: North Sea – Whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel). ICES Advice Book 6.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whg-47d.pdf
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	

Evaluation Table: PI 2.1.2

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**		There are **measures** in place, if necessary, that are expected to maintain the **main retained species** at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.
		Y	**NE Arctic cod & haddock**: There are management plans and extensive and comprehensive management measures (TAC, quotas, minimum mesh & fish sizes, mesh and grid regulations, real-time closures) to safeguard the stocks of main retained species.
		Y	**North Sea cod & haddock**: There are management plans and extensive and comprehensive management measures (TAC, quotas, minimum mesh & fish sizes, mesh and grid regulations, real-time closures) to safeguard the stock.
	b		The measures are considered **likely** to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).
		Y	**NE Arctic cod & haddock**: There are management plans and extensive and comprehensive management measures (TAC, quotas, minimum mesh & fish sizes, mesh and grid regulations, real-time closures) to safeguard the stocks of main retained species. They have been shown to work over all the principal NEA stocks over a number of years.
		Y	**North Sea cod & haddock**: There are management plans and extensive and comprehensive management measures (TAC, quotas, minimum mesh & fish sizes, mesh and grid regulations, real-time closures) to safeguard the stock. They have been shown to work over all the principal NS stocks over a number of years.
80	**a**		There is a **partial strategy** in place, if necessary that is expected to maintain the **main retained species** at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.
		Y	**NE Arctic cod & haddock**: There are numerous stock management plans in place that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.
		Y	**North Sea cod & haddock**: There are stock management plans in place, including a specific cod recovery plan, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.
	b		There is some **objective basis for confidence** that the partial strategy will work, based on some information directly about the fishery and/or species involved.
		Y	**NE Arctic cod & haddock**: The evidence from the past decade is that the robust enforcement of the management strategy is working and is based on an abundance of data of immediate relevance to the stocks concerned.
		Y	**North Sea cod & haddock**: The evidence from the past decade is that the enforcement of the EU–Norway management strategy is working for haddock and there are early signs that it is beginning to yield the desired results for cod. Both are based on an abundance of data of immediate relevance to the stocks concerned.
	c		There is **some evidence** that the partial strategy is being **implemented successfully.**
		Y	**NE Arctic cod & haddock**: the current robust state of both stocks and fishing mortalities at or lower than target reference levels is evidence that the management strategy is being implemented successfully.

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
		Y	**NS Cod**: Falling levels of F over the past decade and early signs of stock recovery over the past 3–4 years provide some evidence that the partial strategy is being implemented successfully.
		Y	**NS Haddock**: the current healthy state of the stock and F at or about target reference levels provides evidence that the partial strategy is being implemented successfully.
100	**a**		There is a **strategy** in place for managing **retained species**.
			NE Arctic
		Y	Cod & haddock: Both NEA cod and haddock stocks are subject to internationally agreed management plans that have been endorse as being consistent with the precautionary and, or the MSY approach.
		Y	Coastal cod: there is a formally defined and ICES assessed management plan for the coastal cod stock and its fishery. However, this strategy is currently being confounded by the 'Autumn fishery fresh-cod scheme'. **Consequently, it is recommended that the client should provide evidence in 2013 that it has engaged with the national fishery management authorities to develop additional effective means for further reductions in the total annual catch (i.e. including recreational catches) of coastal cod.**
		N	Tusk, ling, Greenland halibut, anglerfish, catfish: there are no formal management plans other than to minimise catches of these species in the directed saithe fishery.
		N	Halibut: there is no formal management plan other than to minimise catches in the directed saithe fishery and to ensure that all halibut <80 cm are returned to the sea alive.
		North Sea	
		Y	Cod, haddock, plaice, hake and whiting stocks are subject to internationally agreed management plans that, with the exception of whiting, have been endorse as being consistent with the precautionary and, or the MSY approach. ICES believes that the whiting plans needs reevalutaion
		N	Pollock: there is no management plan for this species
	b		**Testing** supports **high confidence** that the strategy will work, based on information directly about the fishery and/or species involved.
			NE Arctic
		Y	Cod & Haddock: annual JNRFC & ICES stock assessments showing sustained healthy state of these stocks supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
		N	Coastal cod: the strategy is minimise the catch of coastal cod through restrictions aimed primarily aimed at limiting coastal waters access for trawlers, Danish and purse seiners re are no defined reference points.
		Y	Tusk, ling: quota limits on catch levels are having the desired effect; both stocks showing signs of increase.
		N	Greenland halibut, anglerfish, catfish, halibut: Status of stocks uncertain.
			North Sea
		N	Cod: An internationally agreed cod recovery – management plan has been in force for some time anf it has only recently halted the decline in stock; it is too soon to say whether this plan will result in recovery to levels consistent with MSY levels of exploitation.

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PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
		Y	Haddock: ICES stock assessments showing sustained healthy state of these stocks supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
		Y	Plaice & hake: Both stocks are assessed with respect to biological reference points and are subject to management plans. Both stocks are increasing which provides high confidence that the management strategy is working
		N	Whiting and Pollock: the exact status of these stocks is uncertain and there is no specific strategy to manage the stocks.
	c		There is clear evidence that the strategy is being implemented successfully.
			NE Arctic
		Y	Cod & haddock: annual JNRFC & ICES stock assessments showing sustained healthy state of these stocks and appropriate levels of F provide clear evidence that the strategy is being implemented successfully.
		N	Coastal cod: While there is some evidence that the strategy is delivering the desired result it does not provide a high level of confidence.
		N	Other retained species: tusk, ling, Greenland halibut: of the qualitative assessments made of these stocks, only ling and tuck are showing positive trends in available data. The status and success of the strategy for other stocks is far from certain.
		North Sea	
		N	Cod: There is clear evidence that the strategy has established a sustained downward trend in F, as intended, but it is too soon to suggest that there is clear evidence of stock recovery.
		Y	Haddock: Both stock and F provide clear evidence that the strategy is being implemented successfully.
		Y	Plaice: the stock is within safe biological limits and SSB is at a 50-year high, which provide clear evidence that the strategy is being implemented successfully.
		Y	Hake: Sine an international plan was agreed, F has been declining and is now only a little above FMSY and SSB is increasing; which provide clear evidence that the strategy is being implemented successfully.
		N	Whiting & Pollock: although Pollock catch levels have been stable for many years, the status of both stocks is uncertain.
	d		There is some evidence that the strategy is achieving its overall objective.
			NE Arctic
		Y	Cod & haddock: annual JNRFC & ICES stock assessments showing sustained healthy state of these stocks and appropriate levels of F provide clear evidence that the strategy is achieving its overall objective.
		N	Coastal cod: Stability in stock abundance indices and estimates of F provide some weak evidence that the strategy is holding the line but has yet to achieving its overall objective of rebuilding stock.
		N	Other retained species: tusk, ling, golden redfish, Greenland halibut: of the qualitative assessments made of these stocks, only ling is showing a positive trend in available data, indicating that the strategy is achieving its overall objective. The status and success of the strategy for other stocks is far from certain.
			North Sea

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PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
		N	**Cod**: There is clear evidence that the strategy has established a sustained downward trend in F, as intended, but it is too soon to suggest that there is clear evidence of stock recovery, which is the overall objective.
		Y	**Haddock, plaice, hake:** ICES stock assessments show sustained healthy state of the stock and appropriate level of F; these provide clear evidence that the strategy is achieving its overall objective.
		N	**Pollock, whiting:** while the strategy is being met with respect to F_{MSY}, the whiting stock continues to decline; pollock landings are stable but stock status in uncertain**.**
References		DoF, 2012. Economic and biological figures from Norwegian fisheries 2011. Directorate of Fisheries, Bergen. http://www.fiskeridir.no/english/statistics/norwegian-fisheries/economic-and-biological-key-figures $ACOM_{NEAcod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.1. www.ices.dk/committe/acom/comwork/report/2012/2012/Cod-arct.pdf $ACOM_{NEAhad}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Haddock in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.3.www.ices.dk/committe/acom/comwork/report/2012/2012/had-arct.pdf $ACOM_{NEA\ cocod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Norwegian coastal waters cod). ICES Advice Book 3.4.2 http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-coas.pdf $ACOM_{GrHal}$ 2012. Ecoregion: Barents Sea and Norwegian Sea – Greenland halibut in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ghl-arct.pdf $ACOM_{Tusk}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Tusk (*Brosme brosme*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.12.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Tusk%20in%20I%20II.pdf $ACOM_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf $ACOM_{NScod}$, 2012. Ecoregion: Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.2. www.ices.dk/committe/acom/comwork/report/2012/2012/cod-347.pdf $ACOM_{NShad}$, 2012. Ecoregion: Haddock in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.3. www.ices.dk/committe/acom/comwork/report/2012/2012/had-34.pdf Hauge, M & Michalsen, K. 2012. Halibut grow slowly and undertake long migrations. Marine Research News No. 3 – 2012. http://www.imr.no/filarkiv/hi_nytt_3_2012_til_web.pdf_1/en $ACOM_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf $ACOM_{NSpla}$, 2012. Ecoregion: North Sea – Plaice in Subarea IV (North Sea). ICES Advice Book 6.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ple-nsea.pdf $ACOM_{NShake}$, 2012. Ecoregion: Widely distributed and migratory stocks – Hake in Division IIIa, Subareas IV, VI, and VII, and Divisions VIIIa,b,d (Northern stock). ICES Advice Book 9.4.1. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hke-nrth.pdf $ACOM_{NSpoll}$, 2012. Ecoregion: North Sea – Pollack in Subarea IV and Division IIIa. ICES Advice Book 6.4.32. http://www.ices.dk/committe/acom/comwork/report/2012/2012/pol-nsea.pdf $ACOM_{NSmonk}$, 2012. Ecoregion: Celtic Sea and West of Scotland + North Sea – Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Division IIIa, and Subareas IV and VI. ICES Advice Book 5.4.29. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ang-ivvi.pdf $ACOM_{NSwhit}$, 2012. Ecoregion: North Sea – Whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel). ICES Advice Book 6.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whg-47d.pdf	
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant): RECOMMENDATION 2 (REF 100a)			

Evaluation Table: PI 2.1.3

PI 2.1.3			Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**		**Qualitative information** is available on the amount of **main retained species** taken by the fishery.
		Y	All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. There is a comprehensive biological sampling programme of cod and haddock
	b		Information is adequate to qualitatively assess outcome status with respect to biologically based limits.
		Y	The comprehensive set of data gathered on cod and haddock is adequate to *quantitatively* assess outcome status with respect to biologically based limits.
	c		Information is adequate to support **measures** to manage **main** retained species.
		Y	The comprehensive set of data gathered on cod and haddock is support measures to manage these main retained species.
80	**a**		Qualitative information and some quantitative information are available on the amount of **main retained species** taken by the fishery.
		Y	All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. There is a comprehensive biological sampling programme of cod and haddock.
	b	**Y**	Information is sufficient to estimate outcome status with respect to biologically based limits.
		Y	The comprehensive set of data gathered on cod and haddock is sufficient to estimate outcome status with respect to biologically based limits.
	c		Information is adequate to support a **partial strategy** to manage **main** retained species.
		Y	The comprehensive set of data gathered on cod and haddock is support a comprehensive strategy to manage these main retained species.
	d		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)
		Y	The comprehensive set of data gathered in an ongoing programme on cod and haddock is sufficient to detect any increase in risk level to the future sustainability of the stock
100	**a**		Accurate and verifiable information is available on the catch of **all retained species** and the consequences for the status of affected populations.
		Y	Cod, including coastal and North Sea cod, haddock, plaice and hake: All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet. There is a comprehensive biological sampling programme, which informs analytical assessments of the consequences for the status of these stocks and their fisheries.
		Y	Ling, tusk, Greenland halibut, whiting: All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet. There is a comprehensive biological sampling programme, which informs qualitative, trends-based assessments of the consequences for the status of these stocks and their fisheries
		N	Anglerfish, catfish, halibut & pollock: All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme, which includes biological sampling

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			(weights, lengths, sex and maturity) and more detailed data from a reference fleet. The total quantity if data, however, are insufficient to provide consistent indicators for the status of affected populations
	b		Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
		Y	Cod, including coastal and North Sea cod, haddock, plaice and hake: All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet. There is a comprehensive biological sampling programme of these species, which is sufficient to quantitatively estimate outcome status with a high degree of certainty.
		N	Ling, tusk, Greenland halibut, whiting: species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet and biological sampling programme. However, the data are insufficient to quantitatively estimate outcome status with a high degree of certainty.
		N	Anglerfish, catfish, halibut & pollock: data are insufficient to assess the consequences for the status of affected populations
	c		Information is adequate to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective
		Y	Cod, including coastal and North Sea cod, haddock, plaice and hake All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet. There is a comprehensive biological sampling programme of these species, which is adequate to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
		N	Ling, tusk, Greenland halibut, whiting: species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet and biological sampling programme. However, the data are insufficient to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
		N	Anglerfish, catfish, halibut & pollock: data are insufficient to assess the consequences for the status of affected populations
	d		Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
		Y	Cod, including coastal and North Sea cod, haddock, plaice and hake All commercial fish species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet. There is a comprehensive biological sampling programm ongoing mortally rates mortalities to all retained species.
		N	Ling, tusk, Greenland halibut, whiting: species must be retained, recorded and landed. All records are subject to scrutiny at sea and on landing. This is complemented by an observer programme and more detailed data from a reference fleet and biological sampling programme. Nevertheless, these data are insufficient to

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PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			assess reliably assess ongoing mortally rates to all retained species.
		N	Anglerfish, catfish, halibut & pollock: data are insufficient to assess the assess ongoing ongoing mortally rates to all retained species.
References			DoF, 2012. Economic and biological figures from Norwegian fisheries 2011. Directorate of Fisheries, Bergen. http://www.fiskeridir.no/english/statistics/norwegian-fisheries/economic-and-biological-key-figures $ACOM_{NEAcod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.1. www.ices.dk/committe/acom/comwork/report/2012/2012/Cod-arct.pdf $ACOM_{NEAhad}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Haddock in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.3.www.ices.dk/committe/acom/comwork/report/2012/2012/had-arct.pdf $ACOM_{NEA\ cocod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Norwegian coastal waters cod). ICES Advice Book 3.4.2 http://www.ices.dk/committe/acom/comwork/report/2012/2012/cod-coas.pdf $ACOM_{GrHal}$ 2012. Ecoregion: Barents Sea and Norwegian Sea – Greenland halibut in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ghl-arct.pdf $ACOM_{Tusk}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Tusk (*Brosme brosme*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.12.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Tusk%20in%20I%20II.pdf $ACOM_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf $ACOM_{NScod}$, 2012. Ecoregion: Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.2. www.ices.dk/committe/acom/comwork/report/2012/2012/cod-347.pdf $ACOM_{NShad}$, 2012. Ecoregion: Haddock in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak) . ICES Advice Book 6.4.3. www.ices.dk/committe/acom/comwork/report/2012/2012/had-34.pdf Hauge, M & Michalsen, K. 2012. Halibut grow slowly and undertake long migrations. Marine Research News No. 3 – 2012. http://www.imr.no/filarkiv/hi_nytt_3_2012_til_web.pdf_1/en $ACOM_{Ling}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Ling (*Molva molva*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.10.1 www.ices.dk/committe/acom/comwork/report/2012/2012/Ling%20in%20I%20II.pdf $ACOM_{NSpla}$, 2012. Ecoregion: North Sea – Plaice in Subarea IV (North Sea). ICES Advice Book 6.4.7. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ple-nsea.pdf $ACOM_{NShake}$, 2012. Ecoregion: Widely distributed and migratory stocks – Hake in Division IIIa, Subareas IV, VI, and VII, and Divisions VIIIa,b,d (Northern stock). ICES Advice Book 9.4.1. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hke-nrth.pdf $ACOM_{NSpoll}$, 2012. Ecoregion: North Sea – Pollack in Subarea IV and Division IIIa. ICES Advice Book 6.4.32. http://www.ices.dk/committe/acom/comwork/report/2012/2012/pol-nsea.pdf $ACOM_{NSmonk}$, 2012. Ecoregion: Celtic Sea and West of Scotland + North Sea – Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Division IIIa, and Subareas IV and VI. ICES Advice Book 5.4.29. http://www.ices.dk/committe/acom/comwork/report/2012/2012/ang-ivvi.pdf $ACOM_{NSwhit}$, 2012. Ecoregion: North Sea – Whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel). ICES Advice Book 6.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whg-47d.pdf	
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.2.1

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Main bycatch species are **likely** to be within biologically based limits (if not, go to scoring issue b below).
			All invertebrates and bony fishes are likely to be within safe biological limits, as are blackmouth dogfish, cuckoo rays, lesser spotted dogfish, longnose velvet dogfish, sail ray and velvet belly.
	b	**Y**	If main bycatch species are outside biologically based limits there are mitigation **measures** in place that are **expected** to ensure that the fishery does not hinder recovery and rebuilding.
			Status of agnatha, leafscale gulper shark, sandy ray, smooth hound, starry skate is uncertain but low overall discard rates and very low (rare) catches of these species in the saithe fishery will ensure that the fishery does not hinder recovery and rebuilding.
	c	**Y**	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.
			Status of agnatha, leafscale gulper shark, sandy ray, smooth hound, starry skate is uncertain but low overall discard rates and very low (rare) catches of these species in the saithe fishery will ensure that the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.
80	**a**	**Y**	Main bycatch species are **highly likely** to be within biologically based limits (if not, go to scoring issue b below).
			All invertebrates and bony fishes are likely to be within safe biological limits, as are blackmouth dogfish, cuckoo rays, lesser spotted dogfish, longnose velvet dogfish, sail ray and velvet belly.
	b	**Y**	If main bycatch species are outside biologically based limits there is a **partial strategy** of **demonstrably effective** mitigation measures in place such that the fishery does not hinder recovery and rebuilding.
			Saithe are taken in the targeted cod fishery and targeted saithe fisheries. These fisheries aim to minimise catches of non-target species and discards. Discard rates are low (<5%); most bycatch species are taken in very small numbers occasionally or rarely. This approach ensures that the fishery does not hinder recovery and rebuilding.
100	**a**	**N**	There is a **high degree of certainty** that bycatch species are within biologically based limits.
			There is a high degree of certainty that the pelagic species are within biologically based limits as they are subject to analytical assessment. The status of most bony fishes by inference from their ubiquity and widespread distribution. The status of some elasmobranchs is vulnerable.

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
Biological reference points for bycatch species subject to ICES assessment			

Biological reference point	Blue whiting	Horse mackerel	Mackerel	North Sea herring	Norwegian spring-spawning herring	Sandeels SA3	Norway pout
Management plan							
SSB	2250		2200		5000		
F_{MP}	0.18		0.20–0.22		0.125		
MSY approach							
MSY $B_{trigger}$	2250	ND	2200	ND	5000		
F_{MSY}	0.18	0.13	0.22	0.25	0.15	ND	ND
MSY $B_{escapement}$						195	150
Precautionary approach							
B_{lim}	1500		1670	800	2500	100	90
B_{pa}	2250		2300	1300	5000	195	150
F_{lim}	ND		0.42	ND	ND	ND	ND
F_{pa}	ND		0.23	0.25	0.15	ND	ND
Current level							
F	0.04	0.18	0.31	0.1	0.14	0.4	>0.0
SSB	3600	1700	2500	2000	6000	160	155

All weights '000 tonnes; ND, not defined.

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PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			(Skagerrak–Kattegat). ICES Advice Book 6.4.20. http://www.ices.dk/committe/acom/comwork/report/2012/2012/nop-34%20june.pdf White, W.T. (SSG Australia & Oceania Regional Workshop, March 2003) 2003. *Centrophorus squamosus.* http://www.iucnredlist.org/details/41871/0 Ungaro, N., Serena, F., Ellis, J., Dulvy, N., Tinti, F., Bertozzi, M., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja circularis.* http://www.iucnredlist.org/details/161464/0 Serena, F., Mancusi, C., Clò, S., Ellis, J. & Valenti, S.V. 2009. *Mustelus mustelus.* http://www.iucnredlist.org/details/39358/0 Kulka, D.W., Sulikowski, J., Gedamke, J., Pasolini, P. & Endicott, M. 2009. *Amblyraja radiata*. http://www.iucnredlist.org/details/161542/0. Ungaro, N., Serena, F., Dulvy, N.K.D., Tinti, F., Bertozzi, M., Mancusi, C., Notarbartolo di Sciara, G & Ellis, J.E. 2007. *Dipturus oxyrinchus.* http://www.iucnredlist.org/details/63100/0 Stehmann, M.F.W. 2009. *Dipturus nidarosiensis. http://www.iucnredlist.org/details/161729/0* Dagit,D.D., Hareide, N. & Clò, S. 2007. *Chimaera monstrosa*. http://www.iucnredlist.org/details/63114/0 Serena, F., Mancusi, C., Ungaro, N., Hareide, N.R., Guallart, J.,Coelho, R. & Crozier, P. 2009. *Galeus melastomus*. http://www.iucnredlist.org/details/161398/0 Ellis, J., Ungaro, N., Serena, F., Dulvy, N.K., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja naevus.* http://www.iucnredlist.org/details/161626/0 Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T. & MacKenzie, K. 2009. *Scyliorhinus canicula.* http://www.iucnredlist.org/details/161399/0 Kulka, D.W., Orlov, A. & Stenberg, C. 2009. *Dipturus linteus.* http://www.iucnredlist.org/details/161377/0 Coelho, R. Blasdale, T., Mancusi, C., Serena, F., Guallart, J., Ungaro, N., Litvinov, F., Crozier, P. & Stenberg, C. 2009. *Etmopterus spinax.* http://www.iucnredlist.org/details/161388/0
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.2.2

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.
			Norwegian fisheries are covered by a general ban on discarding (commercial) fish, which influences the distribution of fishing activity to minimise the capture of small (target) fish. This policy is backed up by mesh regulations, including square mesh and sorting grid regulations, that maximise the opportunity for small fish to escape. These measures are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.
	b	**Y**	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).
			The measures that have been in place for many years are known to be effective and their general acceptability is reinforced by the absence of specific criticism from (international) NGOs, IUCN or ICES about the operation or management of the Norwegian saithe fishery.
80	**a**	**Y**	There is a **partial strategy** in place, if necessary, for managing bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.
			Norwegian fisheries are covered by a general ban on discarding (commercial) fish, which influences the distribution of fishing activity to minimise the capture of small (target) fish. This policy is backed up by mesh regulations, including square mesh and sorting grid regulations, that maximise the opportunity for small fish to escape, plus the move-on and real-time closure strategy for target and ETP species. Indirectly, this strategy will help safeguard and manage bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.
	b	**Y**	There is **some objective basis for confidence** that the partial strategy will work, based on some information directly about the fishery and/or the species involved.
			Independent reviews of discarding across the Norwegian fisheries are satisfied that discard levels are low. Prime facie evidence from reference fleet catch records indicates that is no less true for the offshore demersal fleet and the consensus of opinion is that the saithe fisheries tend to be among the cleaner (i.e. lower discard) fisheries. Thus there is an objective basis underpinning confidence that the partial strategy will work.
	c	**Y**	There is **some evidence** that the partial strategy is being implemented successfully.
			The fishery management regime in Norway is enforced with rigour and is probably among the most robust regimes anywhere. The technical and biological conservation measures are all enforced, not least the general ban on discarding commercial species. The lack of criticism of Norway from NGO bodies that monitor fishery management regimes around the world is also evidence that the strategy is being implemented successfully.
100	**a**	**Y**	There is a **strategy** in place for managing and minimising bycatch.
			The strategy is to optimise the opportunity and probability of catching the target species whilst minimising the capture of non-target (commercial, non-commercial and ETP) species. There are technical and biological conservation measures with rigorous enforcement to support this strategy with ongoing research (CRISP) to develop further improvements for all Norwegian fisheries, including the saithe fishery.
	b	**N**	**Testing** supports **high confidence** that the strategy will work, based on information

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			directly about the fishery and/or species involved.
			The strategy has not been tested explicitly for the saithe fishery and it is some years since there has been an explicit exercise to assess just what the discard rates are across Norwegian fisheries.
	c	**N**	There is **clear evidence** that the strategy is being implemented successfully.
			The evidence that the strategy is being implemented successfully is either indirect (low prosecution levels for infringement of technical and biological conservation measures) or inferred (lack of criticism from NGO, IUCN, ICES)
	d	**Y**	There is some **evidence** that the strategy is achieving its objective.
			The analysis of demersal reference fleet catches in 2010 provides evidence that overall discard rates are low (<6%) and that the overwhelming majority of the discard species are caught in very low numbers on relatively few occasions.
References			Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/enValdemarsen, J. W. 2010. A CRISP approach to sustainable fish capture. Marine News 11–2010. IMR Bergen. http://www.imr.no/filarkiv/2010/08/hi_nytt_11_web.pdf/en http://www.imr.no/crisp/a_crisp_approach_to_sustainable_fish_capture/en Kelleher, K., 2005. Discards in the world's marine fisheries: an update. FAO Fisheries Technical Paper 470. ftp://ftp.fao.org/docrep/fao/008/y5936e/y5936e00.pdf Valdemarsson, J.M. & Nakken, O. 2002. *Utkast I norske fiskerier*. Workshop om utkast I nordiske fiskerier. Sophienberg Slot, Rungsted, Denmark. http://www.imr.no/__data/page/3926/Rapport_om_utkast_av_fisk_i_norske_farvann.pdf Skaret, G. & Pitcher , T. J., 2006. An estimation of compliance of the fisheries of Norway with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing. FAO, Rome. ftp://ftp.fisheries.ubc.ca/CodeConduct/CountriesCodePDF/Norway-CCRF.pdf $ACOM_{NEAsaithe}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-arct.pdf $ACOM_{NSsaithe}$, 2012. Ecoregion: Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-3a46.pdf Freyhof, J. 2011. *Lampetra fluviatilis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/11206/0 IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/search $ACOM_{NSherring}$, 2012. Ecoregion: North Sea – Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). ICES Advice Book 6.4.16. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-47d3.pdf $ACOM_{NSSH}$, 2012. Ecoregion: Widely distributed and migratory stocks – Herring in the Northeast Atlantic (Norwegian spring-spawning herring). ICES Advice Book 9.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-noss.pdf $ACOM_{BW}$, 2010. Ecoregion: Widely distributed and migratory stocks – Blue whiting in Subareas I–IX, XII, and XIV. ICES Advice Book 9.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whb-comb.pdf $ACOM_{scad}$, 2012. Ecoregion: Widely distributed and migratory stocks – Horse mackerel (*Trachurus trachurus*) in Divisions IIa, IVa, Vb, VIa, VIIa–c,e–k, and VIIIa–e (Western stock). ICES Advice Book 9.4.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hom-west.pdf $ACOM_{mack}$, 2012. Ecoregion: Widely distributed stocks – Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/mac-nea.pdf $ACOM_{sandeel}$, 2012. Ecoregion: North Sea - Sandeel in the Central Eastern North Sea (SA 3). ICES Advice Book 6.4.21.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/san-34.pdf $ACOM_{alf}$, 2012. Ecoregion: Widely distributed stocks – Alfonsinos/Golden eye perch (*Beryx* spp.) in the Northeast Atlantic. ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Alfonsinos.pdf $ACOM_{NP}$, 2012. Ecoregion North Sea – Norway pout in Subarea IV (North Sea) and Division IIIa (Skagerrak–Kattegat). ICES Advice Book 6.4.20. http://www.ices.dk/committe/acom/comwork/report/2012/2012/nop-34%20june.pdf White, W.T. (SSG Australia & Oceania Regional Workshop, March 2003) 2003. *Centrophorus*

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PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			squamosus. http://www.iucnredlist.org/details/41871/0 Ungaro, N., Serena, F., Ellis, J., Dulvy, N., Tinti, F., Bertozzi, M., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja circularis.* http://www.iucnredlist.org/details/161464/0 Serena, F., Mancusi, C., Clò, S., Ellis, J. & Valenti, S.V. 2009. *Mustelus mustelus.* http://www.iucnredlist.org/details/39358/0 Kulka, D.W., Sulikowski, J., Gedamke, J., Pasolini, P. & Endicott, M. 2009. *Amblyraja radiata*. http://www.iucnredlist.org/details/161542/0. Ungaro, N., Serena, F., Dulvy, N.K.D., Tinti, F., Bertozzi, M., Mancusi, C., Notarbartolo di Sciara, G & Ellis, J.E. 2007. *Dipturus oxyrinchus.* http://www.iucnredlist.org/details/63100/0 Stehmann, M.F.W. 2009. *Dipturus nidarosiensis. http://www.iucnredlist.org/details/161729/0* Dagit,D.D., Hareide, N. & Clò, S. 2007. *Chimaera monstrosa*. http://www.iucnredlist.org/details/63114/0 Serena, F., Mancusi, C., Ungaro, N., Hareide, N.R., Guallart, J.,Coelho, R. & Crozier, P. 2009. *Galeus melastomus*. http://www.iucnredlist.org/details/161398/0 Ellis, J., Ungaro, N., Serena, F., Dulvy, N.K., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja naevus.* http://www.iucnredlist.org/details/161626/0 Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T. & MacKenzie, K. 2009. *Scyliorhinus canicula.* http://www.iucnredlist.org/details/161399/0 Kulka, D.W., Orlov, A. & Stenberg, C. 2009. *Dipturus linteus.* http://www.iucnredlist.org/details/161377/0 Coelho, R. Blasdale, T., Mancusi, C., Serena, F., Guallart, J., Ungaro, N., Litvinov, F., Crozier, P. & Stenberg, C. 2009. *Etmopterus spinax.* http://www.iucnredlist.org/details/161388/0
OVERALL PERFORMANCE INDICATOR SCORE:			**90**
CONDITION NUMBER (if relevant): RECOMMENDATION 3 (REF 100b)			

Evaluation Table: PI 2.2.3

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Qualitative information** is available on the main bycatch species affected by the fishery.
			A comprehensive list of bycatch species is recorded by vessels in the demersal reference fleet.
	b	**Y**	Information is **adequate** to **broadly understand** outcome status with respect to biologically based limits
			The data are sufficient to indicate which species are caught that might give cause for concern with respect to biologically based limits.
	c	**Y**	Information is adequate to support **measures** to manage bycatch.
			The data are subject to review and inform research (CRISP) and discussion on the need for specific management measures.
80	**a**	**Y**	**Qualitative information and some quantitative information** are available on the amount of main bycatch species affected by the fishery.
			Quantitative information if gathered from the offshore and qualitative information from the inshore demersal reference fleet.
	b	**Y**	Information is **sufficient to estimate** outcome status with respect to biologically based limits.
			The data published are sufficient to give a clear indication of the effect of the saithe fishery on the outcome status with respect to biologically based limits – negligible.
	c	**Y**	Information is adequate to support a **partial strategy** to manage main bycatch species.
			The information gathered by the reference fleets is sufficient to identify and highlight any individual or group of species that might be at specific risk through being bycatch in the saithe fishery.
	d	**Y**	Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).
			The reference-fleet programme is ongoing with a probability of more vessels being recruited to the scheme. The total catch species data collected by these vessels is sufficient data continue to be collected to detect any increase in risk to main bycatch species.
100	**a**	**N**	**Accurate and verifiable information** is available on the amount of all bycatch and the consequences for the status of affected populations.
			Only qualitative data are gathered by the inshore refernce fleet. The size of vessels, including many one-man operations, mean that it is unrealistic to anticipate any significant change.
	b	**N**	Information is **sufficient** to quantitatively estimate outcome status with respect to biologically based limits with a **high degree of certainty**.
			For the vast majority of species there is no prospect of anyone making quantitative estimates with respect to biologically based limits of species such as pipefish or four-bearded rockling, for example. Such assessment can only be made by inference rom their ubiquity and wide distribution.
	c	**Y**	Information is adequate to support a **comprehensive strategy** to manage bycatch, and **evaluate** with a **high degree of certainty** whether a strategy is **achieving its objective**.
			In essence, the strategy is to minimise the catch of non-target fish, including undersize target species. The information gathered by the offshore demersal reference fleet is of sufficient quantitative quality to evaluate with a high degree of certainty whether a strategy is achieving its objective.

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
	d	**N**	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species. Monitoring of bycatch is limited to a small number of reference fleet vessels, which may or may not be truly representative of the fleet as a whole and general practice across the fleet.
References			Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/enValdemarsen, J. W. 2010. A CRISP approach to sustainable fish capture. Marine News 11–2010. IMR Bergen. http://www.imr.no/filarkiv/2010/08/hi_nytt_11_web.pdf/en http://www.imr.no/crisp/a_crisp_approach_to_sustainable_fish_capture/en Kelleher, K., 2005. Discards in the world's marine fisheries: an update. FAO Fisheries Technical Paper 470. ftp://ftp.fao.org/docrep/fao/008/y5936e/y5936e00.pdf Valdemarsson, J.M. & Nakken, O. 2002. *Utkast I norske fiskerier*. Workshop om utkast I nordiske fiskerier. Sophienberg Slot, Rungsted, Denmark. http://www.imr.no/__data/page/3926/Rapport_om_utkast_av_fisk_i_norske_farvann.pdf Skaret, G. & Pitcher , T. J., 2006. An estimation of compliance of the fisheries of Norway with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing. FAO, Rome. ftp://ftp.fisheries.ubc.ca/CodeConduct/CountriesCodePDF/Norway-CCRF.pdf $ACOM_{NEAsaithe}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-arct.pdf $ACOM_{NSsaithe}$, 2012. Ecoregion: Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-3a46.pdf Freyhof, J. 2011. *Lampetra fluviatilis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/11206/0 IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/search $ACOM_{NSherring}$, 2012. Ecoregion: North Sea – Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). ICES Advice Book 6.4.16. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-47d3.pdf $ACOM_{NSSH}$, 2012. Ecoregion: Widely distributed and migratory stocks – Herring in the Northeast Atlantic (Norwegian spring-spawning herring). ICES Advice Book 9.4.5. http://www.ices.dk/committe/acom/comwork/report/2012/2012/her-noss.pdf $ACOM_{BW}$, 2010. Ecoregion: Widely distributed and migratory stocks – Blue whiting in Subareas I–IX, XII, and XIV. ICES Advice Book 9.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/whb-comb.pdf $ACOM_{scad}$, 2012. Ecoregion: Widely distributed and migratory stocks – Horse mackerel (*Trachurus trachurus*) in Divisions IIa, IVa, Vb, VIa, VIIa–c,e–k, and VIIIa–e (Western stock). ICES Advice Book 9.4.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/hom-west.pdf $ACOM_{mack}$, 2012. Ecoregion: Widely distributed stocks – Mackerel in the Northeast Atlantic (combined Southern, Western, and North Sea spawning components). ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/mac-nea.pdf $ACOM_{sandeel}$, 2012. Ecoregion: North Sea - Sandeel in the Central Eastern North Sea (SA 3). ICES Advice Book 6.4.21.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/san-34.pdf $ACOM_{alf}$, 2012. Ecoregion: Widely distributed stocks – Alfonsinos/Golden eye perch (*Beryx* spp.) in the Northeast Atlantic. ICES Advice Book 9.4.2. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Alfonsinos.pdf $ACOM_{NP}$, 2012. Ecoregion North Sea – Norway pout in Subarea IV (North Sea) and Division IIIa (Skagerrak–Kattegat). ICES Advice Book 6.4.20. http://www.ices.dk/committe/acom/comwork/report/2012/2012/nop-34%20june.pdf White, W.T. (SSG Australia & Oceania Regional Workshop, March 2003) 2003. *Centrophorus squamosus.* http://www.iucnredlist.org/details/41871/0 Ungaro, N., Serena, F., Ellis, J., Dulvy, N., Tinti, F., Bertozzi, M., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja circularis.* http://www.iucnredlist.org/details/161464/0 Serena, F., Mancusi, C., Clò, S., Ellis, J. & Valenti, S.V. 2009. *Mustelus mustelus.* http://www.iucnredlist.org/details/39358/0 Kulka, D.W., Sulikowski, J., Gedamke, J., Pasolini, P. & Endicott, M. 2009. *Amblyraja radiata*. http://www.iucnredlist.org/details/161542/0. Ungaro, N., Serena, F., Dulvy, N.K.D., Tinti, F., Bertozzi, M., Mancusi, C., Notarbartolo di Sciara, G & Ellis, J.E. 2007. *Dipturus oxyrinchus.* http://www.iucnredlist.org/details/63100/0 Stehmann, M.F.W. 2009. *Dipturus nidarosiensis.* http://www.iucnredlist.org/details/161729/0	

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PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			Dagit,D.D., Hareide, N. & Clò, S. 2007. *Chimaera monstrosa*. http://www.iucnredlist.org/details/63114/0 Serena, F., Mancusi, C., Ungaro, N., Hareide, N.R., Guallart, J.,Coelho, R. & Crozier, P. 2009. *Galeus melastomus*. http://www.iucnredlist.org/details/161398/0 Ellis, J., Ungaro, N., Serena, F., Dulvy, N.K., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja naevus.* http://www.iucnredlist.org/details/161626/0 Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T. & MacKenzie, K. 2009. *Scyliorhinus canicula.* http://www.iucnredlist.org/details/161399/0 Kulka, D.W., Orlov, A. & Stenberg, C. 2009. *Dipturus linteus.* http://www.iucnredlist.org/details/161377/0 Coelho, R. Blasdale, T., Mancusi, C., Serena, F., Guallart, J., Ungaro, N., Litvinov, F., Crozier, P. & Stenberg, C. 2009. *Etmopterus spinax.* http://www.iucnredlist.org/details/161388/0
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.3.1

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**		Known effects of the fishery are **likely** to be within limits of national and international requirements for protection of ETP species.
		Y	Known effects of the fishery on Red List (RL) fish, seabirds and marine mammals are likely to be within limits of national and international requirements for protection of ETP species.
	b	**Y**	Known direct effects are **unlikely** to create **unacceptable impacts** to ETP species.
			Known direct effects fishery on RL fish, seabirds and marine mammals are unlikely to create unacceptable impacts to ETP species.
80	**a**		The effects of the fishery are known and are **highly likely** to be within limits of national and international requirements for protection of ETP species.
		Y	Seabirds and marine mammal populations are monitored in Norway. The numbers of seabirds taken in fisheries have been estimated and even in those fisheries (not the saithe fishery) where relatively high numbers are taken, they are small relative to the population size.
		Y	All fish species must be retained, recorded and landed. With the exception of golden redfish (10kt), blue ling (400 t) and spurdog (c. 200 – 250 t), for which there are move-on and real-time closure measures, RL fish tend to be caught rarely and as individuals. The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.
	b		Direct effects are **highly unlikely** to create **unacceptable impacts** to ETP species.
		Y	Seabirds and marine mammal populations are monitored in Norway. The numbers of seabirds taken in fisheries have been estimated and even in those fisheries (not the saithe fishery) where relatively high numbers are taken, they are small relative to the population size. No agency has raised specific concerns with respect to the Norwegian saithe fishery and direct effects are highly unlikely to create unacceptable impacts to ETP species.
		Y	All fish species must be retained, recorded and landed. With the exception of golden redfish (10kt), blue ling (400 t) and spurdog (c. 200 – 250 t), for which there are move-on and real-time closure measures, RL fish tend to be caught rarely and as individuals. The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species. No agency has raised specific concerns with respect to the Norwegian saithe fishery and direct effects on RL fish are highly unlikely to create unacceptable impacts to ETP species.
	c		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.
		Y	The principal indirect effect is competition for resources, i.e. the removal of fish that might otherwise be eaten by ETP species. With over half a century of monitoring and analysis of exploitation data from the NE Atlantic area all the indicators are that it is unlikely that such competition has caused unacceptable effects.
100	**a**	**Y**	There is a **high degree of certainty** that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
			Seabirds and marine mammal populations are monitored in Norway. The numbers of seabirds taken in fisheries have been estimated and even in those fisheries (not

			the saithe fishery) where relatively high numbers are taken, they are small relative to the population size. Similarly, all fish must be retained, recorded and landed. These data are monitored in quasi real time and, where necessary, real-time protection measures implemented. No agency has raised specific concerns with respect to the Norwegian saithe fishery. Consequently, There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	b		There is a **high degree of confidence** that there are no significant **detrimental direct effects** of the fishery on ETP species.
		Y	Norwegian agencies (e.g NINA and IMR) monitor the status of all the major ETP species (seabirds, marine mammals and RL fish) within Norwegian waters and take due account of potential fishery interactions. As no specific concerns have ever been identified or concerns raised, there is a high degree of confidence that there are no significant detrimental direct effects of the saithe fishery on ETP species.
	c		There is a **high degree of confidence** that there are no significant **detrimental indirect effects** of the fishery on ETP species.
		Y	Norwegian agencies (e.g NINA and IMR) monitor the status of all the major ETP species (seabirds, marine mammals and RL fish) within Norwegian waters and take due account of potential fishery interactions. In addition, considerable research effort is invested in developing ecosystem management models to ensure that no one part of the ecosystem is disadvantaged or put at risk relative to another, as required by the Marine Management Act. This modelling work underpins the Norwegian waters management plans aimed at safeguarding all aspects of the marine environment, its resources and populations. Consequently, there is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
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OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

Evaluation Table: PI 2.3.2

PI 2.3.2			The fishery has in place precautionary management strategies designed to: • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species.
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**		There are **measures** in place that minimise mortality, and are expected to be **highly likely to achieve** national and international requirements for the protection of ETP species.
		Y	Norway is a signatory to key international conventions affecting ETP species, including CITES and the UN code for responsible fishing. The Marine Resources Act explicitly requires an ecosystem approach to marine environmental management. Surveillance and enforcement measures throughout the saithe fishery are rigorous. These measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species.
	b		The measures are **considered likely** to work, based on **plausible argument** (e.g., general experience, theory or comparison with similar fisheries/species).
		Y	As no specific concerns have been raised with respect to the saithe fishery; on past experience there is every reason to believe that these measures will continue to meet international standards.
80	**a**		There is a **strategy** in place for **managing the fishery's impact** on ETP species, including measures to minimise mortality, that is designed to be **highly likely to achieve** national and international requirements for the protection of ETP species.
		Y	The strategy is set out in the Norwegian Marine Resources Act, which explicitly requires an ecosystem approach to marine environmental management. It also requires that all fish species are retained, recorded and landed and that vessels equipped with elogbooks must record interactions with seabirds and marine mammals. Primarily, measures are designed to minimise contact with ETP species, including RL fish.
	b	**Y**	There is an **objective basis for confidence** that the strategy will work, based on **information** directly about the fishery and/or the species involved.
			Populations of fish, seabirds and marine mammals are monitored. Scientists from IMR and NINA participate in appropriate NAMMCO, ICES and IUCN working groups and have not identified any specific cause for concern relating to the saithe fishery. By inference, therefore, the strategy is effective and there are minimal interactions
	c	**Y**	There is **evidence** that the strategy is being implemented successfully.
			Numbers of ETP species (excluding redfish, blue ling and spurdog) reported from the reference-fleet observer programmes are small. The lack of explicit concern expressed in NAMMCO, ICES or comparable reports is implicit evidence that the strategy is being implemented successfully. Monitoring of the redfish, blue ling and spurdog stocks does not indicate any adverse link with the saithe fishery.
100	**a**		There is a **comprehensive strategy** in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to achieve **above** national and international requirements for the protection of ETP species.
		Y	The strategy is set out in the Norwegian Marine Resources Act and the regional seas management plans, which explicitly requires an ecosystem approach to marine environmental management. The act also requires that all fish species are retained, recorded and landed and that vessels equipped with elogbooks must record interactions with seabirds and marine mammals. Primarily, measures are designed to minimise contact with ETP species, including RL fish. Norwegian fishery and conservation agencies monitor the fishery, bird and mammal populations. Where there is deemed to be cause for concern, e.g. relatively high catches of redfish or spurdogs, specific measures are implemented, e.g. move on and real-time closures. There are

PI 2.3.2			The fishery has in place precautionary management strategies designed to: • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species.
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			permanent and seasonal closures of inshore waters in the vicinity of key seabird nesting sites.
	b		The strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
		N	Data collected from the fishery are available but there is no quantitative analysis.
	c		There is **clear evidence** that the strategy is being implemented successfully.
		Y	Marine mammal and seabird stock monitoring and abundance estimates are made by IMR and NINA. The absence of any specific concerns with respect to these populations and the saithe fishery is clear evidence that the strategy is being implemented successfully. There are specific fishery management measures, e.g. move-on and real-time closures, to safeguard RL species. These measures are robustly enforced and implemented successfully.
	d		There is evidence that the strategy is achieving its objective.
		Y	All seabird and marine mammal populations are monitored; currently, none are deemed to be specific cause for concern, least of all with respect to the saithe fishery. Catch data for the RL fish species shows that quantities or numbers involved for species other than redfish and spurdog are low and not a cause for concern. Monitoring of the redfish and spurdog populations indicates that the strategy is achieving its objectives.
References			http://www.imr.no/forskning/faggrupper/sjopattedyr/en ACOM$_{dog}$, 2011. Ecoregion: Widely Distributed and Migratory Stocks – Spurdog in the Northeast Atlantic. ICES Advice Book 9.4.6. http://www.ices.dk/committe/acom/comwork/report/2011/2011/Spurdog%20NEA.pdf ACOM$_{Gold}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Beaked redfish (*Sebastes mentella*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.6. http://www.ices.dk/committe/acom/comwork/report/2012/2012/smr-arct.pdf ACOM$_{Bling}$, 2012. Ecoregion: Widely distributed and migratory stocks – Blue ling (*Molva dypterygia*) in Divisions IIIa and Iva, and Subareas I, II, VIII, IX, and XII. ICES Advice Book 9.4.11.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Blue%20ling%20in%20IIIa%20IVa%20I%20II%20VIII%20IX%20XII.pdf ACOM$_{seabirds}$, 2012. Ecoregion: General advice – EcoQO for seabird populations in OSPAR regions II and III. ICES Advice Book 1.5.5.1 http://www.ices.dk/committe/acom/comwork/report/2012/Special%20Requests/OSPAR_EcoQO_for_seabird_populations.pdf Albert, O. T., 2012. Spiny dogfish. Institute of Marien Research, Bergen. http://www.imr.no/temasider/fisk/hai/piggha/piggha/en Barth E.K. 1978. Lundetragedien på Røst. Fauna (Oslo) 31: 273-274. Anker-Nilssen T. 1992. Food supply as a determinant of reproduction and population devel-opment in Norwegian Puffins *Fratercula arctica*. Dr. scient. thesis terr. ecology, Univ. Trondheim. Barrett, B., Anker-Nilssen, T., Bustnes, J. O., Christensen-Dalsgaard,, S., Descamps, S., Erikstad, K.-E., Lorentsen, S.-H., Strøm, H. & Systad, G.H., 2012. Key-site monitoring in Norway 2011. Seapop Short Report 1–2012. NINA, Oslo. http://www.seapop.no/no/files/short-reports/2012/seapop-short-report-1-2012.pdf BirdLife Workshop on Seabird Bycatch in Gillnet Fisheries. Symposium proceedings. http://www.birdlife.org/eu/pdfs/20120703_GillnetSeabirdBycatchWorkshopREPORT.pdf Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no Bjørge, A., Lydersen, C., Skern-Mauritzen, M. & Wiig, Ø. (Eds), 2010. Marine Mammals. Fisken og havet, special edition 2–2010. http://www.imr.no/filarkiv/2011/05/sjoens_pattedyr_web.pdf/en

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PI 2.3.2			The fishery has in place precautionary management strategies designed to: • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species.
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/en Dulvy, N.K., Notarbartolo di Sciara, G., Serena, F., Tinti, F. & Ungaro, N., Mancusi, C. & Ellis, J. 2006. *Dipturus batis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/39397/0 Ellis, J., Ungaro, N., Serena, F., Dulvy, N., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja fullonica*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/161461/0/print Erikstad, K.E., T.K., Barrett, R.T, Vikebø, F. & SANDVIK, H., (in press). Temporal variations in fish abundance affects seabird populations: cod – guillemot interactions in the Barents Sea. Proceedings of the Annual Larval Fish Conference 2013. Miami Florida. http://www.larvalfishcon.org/Conf_Abstracts.asp?ConferenceCode=36th&AbstractID=1531 Fangel, K., Wold, L.C, Aas, Ø., Christensen-Dalsgaard, S., Qvenild, M. & Anker-Nilssen, T. 2011. Bycatch of seabirds in Norwegian coastal fisheries. A mapping and methodology study with focus on gillnet and longline fisheries. NINA Report 719. http://www.nina.no/archive/nina/PppBasePdf/rapport/2011/719.pdf Fowler, S. L. 2005. *Cetorhinus maximus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1 http://www.iucnredlist.org/details/4292/0Lid G. 1981. Reproduction of the Puffin on Røst in the Lofoten Islands in 1964-1980. Fauna Norvegica C 4: 30–39. Greenstreet S.P.R., Becker P.H., Barrett R.T., Fossum P. & Leopold M.F. 1999. Consumption of pre-recruit fish by seabirds and the possible use of this as an indicator of fish stock recruitment. In: Furness R.W. & Tasker M.L. (eds) Diets of seabirds and consequences of changes in food supply: pp. 6-17. ICES Cooperative Research Report 232. Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf Kulka, D.W., Orlov, A.M., Devine, J.A., Baker, K.D., & Haedrich. R.L. 2009. *Bathyraja spinicauda*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/summary/161366/0 Kyne, P.M., Sherrill-Mix, S.A. & Burgess, G.H. 2006. *Somniosus microcephalus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/60213/0 Skaret, G. & Pitcher , T. J., 2006. An estimation of compliance of the fisheries of Norway with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing. FAO, Rome. ftp://ftp.fisheries.ubc.ca/CodeConduct/CountriesCodePDF/Norway-CCRF.pdf Stevens, J., Fowler, S.L., Soldo, A., McCord, M., Baum, J., Acuña, E., Domingo, A. & Francis, M. 2006. *Lamna nasus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/11200/0 PGNAPES, 2009. Report of the Planning Group on Northeast Atlantic Pelagic Ecosystem Surveys (PGNAPES). ACOM ICES CM 2009/RMC:06 Vader W., Anker-Nilssen T., Bakken V., Barrett R. & Strann K.B. 1989. Regional and temporal differences in breeding success and population development of fisheating seabirds in Norway after collapses of herring and capelin stocks. Trans. 19th IUGB Congress, Trond-heim 1989: 143-150. Walker, T.I., Cavanagh, R.D., Stevens, J.D., Carlisle, A.B., Chiaramonte, G.E., Domingo, A., Ebert, D.A., Mancusi, C.M., Massa, A., McCord, M., Morey, G., Paul, L.J., Serena, F. & Vooren, C.M. 2006. *Galeorhinus galeus*. In: IUCN 2012. IUCN Red List of Threatened Species. http://www.iucnredlist.org/details/39352/0 WGMME, 2011. Report of the Working Group on Marine Mammal Ecology (WGMME). ICES CM 2011/ACOM:25. http://www.ices.dk/reports/ACOM/2011/WGMME/wgmme_2011_final.pdf
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.3.3

PI 2.3.3			**Relevant information is collected to support the management of fishery impacts on ETP species including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.
			Data on seabirds and marine mammals has been monitored through the reference fleet; data on RL fish is collected from every commercial fishing vessel. This is sufficient to qualitatively estimate the fishery related mortality of ETP species.
	b	**Y**	Information is **adequate** to **broadly understand** the impact of the fishery on ETP species.
			Data on seabirds and marine mammals has been monitored through the reference fleet; data on RL fish is collected from every commercial fishing vessel. This is adequate to broadly understand the impact of the fishery on ETP species.
	c	**Y**	Information is adequate to support **measures** to manage the impacts on ETP species.
			Data on seabirds and marine mammals has been monitored through the reference fleet; data on RL fish is collected from every commercial fishing vessel. This is adequate to support the statutory conservation measures to manage the effects on ETP species.
80	**a**	**Y**	**Sufficient data** are available to allow fishery related mortality and the impact of fishing to be **quantitatively** estimated for ETP species.
			Data on seabirds and marine mammals has been monitored through the reference fleet. These data are sufficient to enable a quantitative assessment that the low numbers involved across the fleet, not just the saithe fishery, are insufficient to raise cause for concern. The data on RL fish allow fishery related mortality and the impact of fishing to be quantitatively estimated explicitly for redfish and spurdog. Low numbers of other RL fish taken in the saithe fishery are sufficient to indicate that the fishery does not raise cause for concern.
	b	**Y**	Information is **sufficient** to determine whether the fishery may be a threat to protection and recovery of the ETP species.
			Data on seabirds and marine mammals has been monitored through the reference fleet. These data are sufficient to determine that the saithe fishery does not pose a threat to protection nor recovery to these ETP groups. More detailed information on RL fish, which must all be retained, recorded and landed, is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.
	c	**Y**	Information is sufficient to measure trends and support a full **strategy** to manage impacts on ETP species.
			In addition to monitoring the numbers of seabird and marine mammal interaction aboard the reference fleet, the total populations of these groups across Norwegian waters are also monitored and fishery effects assessed. The same if true for spurdog and redfish but stock status of other RL fish is not monitored to the same degree, principally because catch numbers are too low. In the event that their populations, and catches, were greater the same conservation strategy would be applied in full, e.g catch-level threshold and move-on policy, real-time closures, stock assessments. Thus, overall, information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.
100	**a**	**Y**	Information is **sufficient** to **quantitatively** estimate outcome status of ETP species with a high degree of certainty.
			All RL fish must be retained, recorded and landed. Redfish and spurdog stocks are subject to annual assessment and results published with a high degree of certainty.

PI 2.3.3			**Relevant information is collected to support the management of fishery impacts on ETP species including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			Data for other RL species, seabirds and marine mammals are all at such a low level that they verge on zero and the quantitative outcome of a zero variable is zero. This information from the saithe fishery is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty
	b	**N**	**Accurate and verifiable information** is available on the **magnitude of all impacts, mortalities and injuries** and the **consequences for the status** of ETP species.
			All RL fish must be retained, recorded and landed. All fishing activity is subject to monitoring and enforcement measures at sea, on land and by air. It is reasonable to conclude, therefore that the information available is a**ccurate and verifiable for** the **magnitude of all impacts, mortalities and injuries** and the **consequences for the status** of RL fish species. At present the data on seabirds and marine mammals is limited to that gathered from the reference fleet and extrapolation – a practice that does not necessarily provide accurate results.
	c	**N**	Information is adequate to support a **comprehensive strategy** to manage impacts, minimise mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
			The information on RL fish is adequate to support a **comprehensive strategy** to manage impacts, minimise mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives. The same will only be true for seabirds and marine mammals once the elogbook recording system is fully operational and producing verifiable information.
References			http://www.imr.no/forskning/faggrupper/sjopattedyr/en ACOM$_{dog}$, 2011. Ecoregion: Widely Distributed and Migratory Stocks – Spurdog in the Northeast Atlantic. ICES Advice Book 9.4.6. http://www.ices.dk/committe/acom/comwork/report/2011/2011/Spurdog%20NEA.pdf ACOM$_{Gold}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Beaked redfish (*Sebastes mentella*) in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.6. http://www.ices.dk/committe/acom/comwork/report/2012/2012/smr-arct.pdf ACOM$_{Bling}$, 2012. Ecoregion: Widely distributed and migratory stocks – Blue ling (*Molva dypterygia*) in Divisions IIIa and Iva, and Subareas I, II, VIII, IX, and XII. ICES Advice Book 9.4.11.3. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Blue%20ling%20in%20IIIa%20IVa%20I%20II%20VIII%20IX%20XII.pdf ACOM$_{seabirds}$, 2012. Ecoregion: General advice – EcoQO for seabird populations in OSPAR regions II and III. ICES Advice Book 1.5.5.1 http://www.ices.dk/committe/acom/comwork/report/2012/Special%20Requests/OSPAR_EcoQO_for_seabird_populations.pdf Albert, O. T., 2012. Spiny dogfish. Institute of Marien Research, Bergen. http://www.imr.no/temasider/fisk/hai/piggha/piggha/en Barth E.K. 1978. Lundetragedien på Røst. Fauna (Oslo) 31: 273-274. Anker-Nilssen T. 1992. Food supply as a determinant of reproduction and population devel-opment in Norwegian Puffins *Fratercula arctica*. Dr. scient. thesis terr. ecology, Univ. Trondheim. Barrett, B., Anker-Nilssen, T., Bustnes, J. O., Christensen-Dalsgaard,, S., Descamps, S., Erikstad, K.-E., Lorentsen, S.-H., Strøm, H. & Systad, G.H., 2012. Key-site monitoring in Norway 2011. Seapop Short Report 1–2012. NINA, Oslo. http://www.seapop.no/no/files/short-reports/2012/seapop-short-report-1-2012.pdf BirdLife Workshop on Seabird Bycatch in Gillnet Fisheries. Symposium proceedings. http://www.birdlife.org/eu/pdfs/20120703_GillnetSeabirdBycatchWorkshopREPORT.pdf Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no Bjørge, A., Lydersen, C., Skern-Mauritzen, M. & Wiig, Ø. (Eds), 2010. Marine Mammals. Fisken og havet, special edition 2–2010. http://www.imr.no/filarkiv/2011/05/sjoens_pattedyr_web.pdf/en Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/en Dulvy, N.K., Notarbartolo di Sciara, G., Serena, F., Tinti, F. & Ungaro, N., Mancusi, C. & Ellis, J. 2006. *Dipturus batis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1.

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PI 2.3.3		Relevant information is collected to support the management of fishery impacts on ETP species including: • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			http://www.iucnredlist.org/details/39397/0 Ellis, J., Ungaro, N., Serena, F., Dulvy, N., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Notarbartolo di Sciara, G. 2009. *Leucoraja fullonica*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/161461/0/print Erikstad, K.E., T.K., Barrett, R.T, Vikebø, F. & SANDVIK, H., (in press). Temporal variations in fish abundance affects seabird populations: cod – guillemot interactions in the Barents Sea. Proceedings of the Annual Larval Fish Conference 2013. Miami Florida. http://www.larvalfishcon.org/Conf_Abstracts.asp?ConferenceCode=36th&AbstractID=1531 Fangel, K., Wold, L.C, Aas, Ø., Christensen-Dalsgaard, S., Qvenild, M. & Anker-Nilssen, T. 2011. Bycatch of seabirds in Norwegian coastal fisheries. A mapping and methodology study with focus on gillnet and longline fisheries. NINA Report 719. http://www.nina.no/archive/nina/PppBasePdf/rapport/2011/719.pdf Fowler, S. L. 2005. *Cetorhinus maximus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1 http://www.iucnredlist.org/details/4292/0Lid G. 1981. Reproduction of the Puffin on Røst in the Lofoten Islands in 1964-1980. Fauna Norvegica C 4: 30–39. Greenstreet S.P.R., Becker P.H., Barrett R.T., Fossum P. & Leopold M.F. 1999. Consumption of pre-recruit fish by seabirds and the possible use of this as an indicator of fish stock recruitment. In: Furness R.W. & Tasker M.L. (eds) Diets of seabirds and consequences of changes in food supply: pp. 6-17. ICES Cooperative Research Report 232. Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf Kulka, D.W., Orlov, A.M., Devine, J.A., Baker, K.D., & Haedrich. R.L. 2009. *Bathyraja spinicauda*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/summary/161366/0 Kyne, P.M., Sherrill-Mix, S.A. & Burgess, G.H. 2006. *Somniosus microcephalus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/60213/0 Skaret, G. & Pitcher , T. J., 2006. An estimation of compliance of the fisheries of Norway with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing. FAO, Rome. ftp://ftp.fisheries.ubc.ca/CodeConduct/CountriesCodePDF/Norway-CCRF.pdf Stevens, J., Fowler, S.L., Soldo, A., McCord, M., Baum, J., Acuña, E., Domingo, A. & Francis, M. 2006. *Lamna nasus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. http://www.iucnredlist.org/details/11200/0 PGNAPES, 2009. Report of the Planning Group on Northeast Atlantic Pelagic Ecosystem Surveys (PGNAPES). ACOM ICES CM 2009/RMC:06 Vader W., Anker-Nilssen T., Bakken V., Barrett R. & Strann K.B. 1989. Regional and temporal differences in breeding success and population development of fisheating seabirds in Norway after collapses of herring and capelin stocks. Trans. 19th IUGB Congress, Trond-heim 1989: 143-150. Walker, T.I., Cavanagh, R.D., Stevens, J.D., Carlisle, A.B., Chiaramonte, G.E., Domingo, A., Ebert, D.A., Mancusi, C.M., Massa, A., McCord, M., Morey, G., Paul, L.J., Serena, F. & Vooren, C.M. 2006. *Galeorhinus galeus*. In: IUCN 2012. IUCN Red List of Threatened Species. http://www.iucnredlist.org/details/39352/0 WGMME, 2011. Report of the Working Group on Marine Mammal Ecology (WGMME). ICES CM 2011/ACOM:25. http://www.ices.dk/reports/ACOM/2011/WGMME/wgmme_2011_final.pdf
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 2.4.1
Danish seine

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery is **unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			If fishing posed a significant risk of reducing habitat structure and function to a point where there would be serious or irreversible harm, it would have been during the early and middle decades of the 20th C when fishing was unrestricted, more intense and far greater us of gear with a heavier footprint than Danish seine. The fact that habitat structure and function has been relatively constant suggests that there has been no serious or irreversible harm in the last quarter century, least of all as a result of Danish seining.
80	**a**	**Y**	The fishery is **highly unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The principal habitats of nature conservation interest and concern in the offshore environment are sponge communities and cold-water coral reefs, principally but not only *Lophelia pertusa.* The principle coral reefs are within statutory closed areas. Sponge communities are widespread and their locations known to skippers. Danish seine skippers endeavour to avoid these areas for self-interest as a seine would quite probably become anchored to the seabed in areas where sponges were abundant and corals would shred the lightweight gear. The Norwegian authorities are contributing to international efforts to map *Lophelia* reefs throughout the NE Atlantic and have established a chain of coral reef marine protected areas in which towed gear is prohibited. Enforcement of such zones is rigorous. Thus, the current generation of fishing vessels does not pose the threat of earlier generations and the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
100	**a**	**Y**	There is **evidence** that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The critical habitats vulnerable to demersal fishing gear are cold water coral reefs (not only, but particularly *Lophelia pertusa*), which are distributed at similar depths to the saithe fishery, and widespread sponge communities. Fishing on or near these habitats would be anathema to Danish seine skippers as their gear would be at too great a risk of significant damage. The distribution of Danish seine fishing effort provides evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
References		http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian	

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PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
			coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*	
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; Danish seiners actively seek to avoid all known coral and sponge communities. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).
			These measures are what are required by OsPar to protect sensitive marine habitats; the measures are observed and closed areas rigorously enforced.
80	**a**	Y	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; Danish seiners actively seek to avoid all known coral and sponge communities. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	There is some **objective basis for confidence** that the partial strategy will work, based on **information directly about the fishery and/or habitats** involved.
			Real-time (VMS) monitoring of fishing activity and regular aerial and maritime surveillance patrols ensure that the closed areas are observed and that the sensitive habitats within them are safeguarded.
	c	Y	There is **some evidence** that the partial strategy is being implemented successfully.
			The Norwegian enforcement agencies are satisfied that incursions into the closed areas are rare and certainly do not represent a systemic failure of fishery enforcement or malpractice among the Danish seiners.
100	**a**	Y	There is a **strategy** in place for managing the impact of the fishery on habitat types.
			The strategy is to monitor the fishery closely and to ensure that all species and habitat protection measures are complied with in full. The MAREANO mapping programme is ongoing and there are regional seas management plans that include monitoring sensitive habitats. The annual status reports of each of the regional seas are presented to Parliament. Additionally, the Marine Resources Act requires an ecosystem approach to safeguarding biodiversity in addition to managing exploited resources.
	b	Y	**Testing** supports **high confidence** that the strategy will work, based on **information directly about the fishery and/or habitats** involved.
			In addition to monitoring the fishery, methods and gear, seabed habitats continue to be monitored and mapped through the MAREANO programme. This work has not identified any habitat concerns with respect to the Danish seine saithe fishery.
	c	**N**	There is **clear evidence** that that strategy is being implemented successfully.
			There is 'clear evidence' in that the authorities record or prosecute few instances of incursions into protected areas. Commercial self- interest encourages skippers to avoid sponge communities and non-protected coral areas. This evidence, however, is all derived by inference from the established fishing practice.
	d	**Y**	There is some evidence that the strategy is achieving its objective.

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PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			The on-going MAREANO and regional seas monitoring programmes provide some evidence that the strategy is providing overall protection to sensitive habitats and therefore achieving its objectives. But more generally, evidence is derived by inference from the established fishing practice of Danish seiners that have a light environmental footprint and actively avoid coral and sponge communities.
References			WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0 &KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0 &KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*	
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	Y	There is **basic understanding** of the types and distribution of main habitats in the area of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries.
	b	Y	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.
			The potential effect of trawling on coral and sponge communities is understood. The MAREANO programme has identified some areas where fishing has had an effect in the past on the seabed and seabed habitats; these are associated with trawl (door) tracks rather than Danish seine.
80	**a**	Y	The nature, distribution and **vulnerability** of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries. This mapping has identified the distribution of the upright benthic species, which are most vulnerable to interaction with towed fishing gear. Areas in which mobile fishing activity is least intense are the areas in which vulnerable species are most abundant.
	b	Y	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
			The MAREANO programme has identified some areas where trawling has had an effect on the seabed and seabed habitats in the past; closed areas have been established to protect habitats and communities in selected areas. Danish seiners also know where non-protected areas are to be found and actively avoid them in order to avoid unnecessary damage to the gear (with concomitant loss of time and catch). The distribution and intensity of fishing activity relative to sensitive areas is known and can be monitored through VMS.
	c	Y	Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
			The distribution and intensity of fishing activity is monitored through VMS; habitat mapping and monitoring is ongoing; there is provision for introducing new protection measures if needed.
100	**a**	**Y**	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
			The MAREANO programme has developed very detailed maps of seabed habitats across many of the principal fishing grounds in Norwegian waters. Critically sensitive habitats are protected from towed gear (i.e. including Danish seine) fishing by closed areas and also within the 12 mile territorial sea. There is also a prohibition on all bottom-contact fishing at depths greater than 1000 m.
	b	**N**	The physical impacts of the gear on the habitat types have been quantified fully.
			There has been limited work carried out which has found sponge and coral abundance has been reduced in areas of sustained long term demersal trawling but there are no data specifically elating to Danish seine. These issues have not been

			quantified.
	c	N	Changes in habitat distributions over time are measured.
			Habitats are monitored, but changes in distribution are not measured.
References			WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0 &KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0 &KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* http://www.mareano.no - Select page: Maps –Vulnerable Habitats.
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.1
Gill Nets

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery is **unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			Gill nets have a very low environmental footprint with negligible effects. The saithe gillnet fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
80	**a**	**Y**	The fishery is **highly unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			Gill nets have a very low environmental footprint with negligible effects, certainly in sponge areas. Although gillnets are fished on and near coral reefs, and the occasional snag might result in more fragile extremities of coral branches snapping the cumulative effect of the saithe gillnet fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
100	**a**	**Y**	There is **evidence** that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The critical habitats vulnerable to demersal fishing gear are cold water coral reefs (not only, but particularly *Lophelia pertusa*), which are distributed at similar depths to the saithe fishery, and widespread sponge communities. Gillnetters fish these areas but with no demonstrable effect on sponge communities. Habitat monitoring by the MAREANO programme has raised concerns about past and potential effects of trawling but has not raised concerns that the saithe gillnet fishery might reduce habitat structure and function to a point where there would be serious or irreversible harm. Even the loss of nets and ghost fishing is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
References			http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0 &KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0 &KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese

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PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
			shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).
			These measures are what are required by OsPar to protect sensitive marine habitats; the measures are observed and closed areas rigorously enforced.
80	**a**	Y	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; closed areas are enforced with the same rigour that is applied to all fishery regulations. There is an annual programme to recover lost gill nets, not least to minimise potential adverse effects on coral reefs and other benthic habitats.
	b	Y	There is some **objective basis for confidence** that the partial strategy will work, based on **information directly about the fishery and/or habitats** involved.
			The MAREANO programme has not identified and specific areas or instances of concern relating to the (saithe) gillnet fishery.
	c	Y	There is **some evidence** that the partial strategy is being implemented successfully.
			The Norwegian enforcement agencies are satisfied that incursions into the closed areas are rare and certainly do not represent a systemic failure of fishery enforcement or malpractice among gillnetters.
100	**a**	Y	There is a **strategy** in place for managing the impact of the fishery on habitat types.
			The strategy is to monitor the fishery closely and to ensure that all species and habitat protection measures are complied with in full. The strategy also includes an annual programme to recover lost fishing gear (gillnets) to minimise potential adverse environmental effects. The MAREANO mapping programme is ongoing and there are regional seas management plans that include monitoring sensitive habitats. The annual status reports of each of the regional seas are presented to Parliament. Additionally, the Marine Resources Act requires an ecosystem approach to safeguarding biodiversity in addition to managing exploited resources.
	b	Y	**Testing** supports **high confidence** that the strategy will work, based on **information directly about the fishery and/or habitats** involved.
			In addition to monitoring the fishery, methods and gear, seabed habitats continue to be monitored and mapped through the MAREANO programme. This work has not identified any habitat concerns with respect to the saithe fishery.
	c	**N**	There is **clear evidence** that that strategy is being implemented successfully.
			There is 'clear evidence' in that the authorities record or prosecute few instances of incursions into protected areas and MAREANO has not identified any specific concerns relating to the (saithe) gillnet fishery. This evidence, however, is all derived by inference from the established fishing practice.

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PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
	d	**Y**	There is some evidence that the strategy is achieving its objective. The on-going MAREANO and regional seas monitoring programmes provide some evidence that the strategy is providing overall protection to sensitive habitats and therefore achieving its objectives. But more generally, evidence is derived by inference from the established fishing practice.
References			*Dof, 2012. Marine life – our common responsibility. Directorate of Fisheries, Bergen. www.fiskeridir.no/english/content/download/.../about-dir-2010.pdf* http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*	
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	Y	There is **basic understanding** of the types and distribution of main habitats in the area of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries.
	b	Y	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.
			The potential effect of gill netting on coral and sponge communities are understood to be minimal. The MAREANO programme has identified some areas where fishing has had an effect in the past on the seabed and seabed habitats.
80	**a**	Y	The nature, distribution and **vulnerability** of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries. This mapping has identified the distribution of the upright benthic species, which are most vulnerable to interaction with towed fishing gear and by comparison, of low sensitivity with respect to static gear fishing.
	b	Y	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
			The MAREANO programme has identified some areas where fishing has had an effect on the seabed and seabed habitats in the past; closed areas have been established to protect habitats and communities in selected areas. Skippers also know where non-protected areas are to be found and choose to avoid them in order to avoid unnecessary damage to the gear (with concomitant loss of time and catch). The distribution and intensity of fishing activity relative to sensitive areas is known and can be monitored through VMS.
	c	Y	Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
			The distribution and intensity of fishing activity is monitored through VMS; habitat mapping and monitoring is ongoing; there is provision for introducing new protection measures if needed.
100	**a**	**Y**	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
			The MAREANO programme has developed very detailed maps of seabed habitats across many of the principal fishing grounds in Norwegian waters. Critically sensitive habitats are protected from towed gear fishing by closed areas and also within the 12 mile territorial sea. There is also a prohibition on all bottom contact Fishing, including static-gear fishing, at depths greater than 1000 meters.
	b	**N**	The physical impacts of the gear on the habitat types have been quantified fully.
			There has been limited work carried out which has found sponge and coral abundance has been reduced in areas of sustained long term demersal trawling. Although the reduction probably occurred some time ago, any continued trawling on such habitats would limit species and habitat recovery. Neither the effects of towed nor static gears have been quantified.

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	c	**N**	Changes in habitat distributions over time are measured.
			Habitats are monitored, but changes in distribution are not measured.
References			http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* http://www.mareano.no - Select page: Maps –Vulnerable Habitats.
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 2.4.1
Purse seine

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery is **unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			If fishing posed a significant risk of reducing habitat structure and function to a point where there would be serious or irreversible harm, it would have been during the early and middle decades of the 20th C when fishing was unrestricted, more intense and used gear with a heavier footprint than is the case for purse seiners. Indeed, purse seiners have very little bottom contact. The fact that habitat structure and function has been relatively constant suggests that there has been no serious or irreversible harm in the last quarter century.
80	**a**	**Y**	The fishery is **highly unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The principal habitats of nature conservation interest and concern in the offshore environment are sponge communities and cold-water coral reefs, principally but not only *Lophelia pertusa.* The principle coral reefs are within statutory closed areas. Sponge communities are widespread and their locations known to skippers. Any direct contact between a purse seine pursing line and a sponge community would have minimal adverse effect is its action would tend to be more up and down that dragging across the seabed. Although the same is true in principal for coral areas, there is a greater risk of snagging with concomitant damage to both coral and purse seine. Consequently, skippers endeavour to avoid these areas for self-interest; damage to the gear can be difficult to repair at sea, resulting in loss of time and catch. The Norwegian authorities are contributing to international efforts to map *Lophelia* reefs throughout the NE Atlantic and have established a chain of coral reef marine protected areas in which mobile gear, including purse seine, is prohibited. Enforcement of such zones is rigorous. Thus, the current generation of fishing vessels does not pose the threat of earlier generations and the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
100	**a**	**Y**	There is **evidence** that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The critical habitats vulnerable to demersal fishing gear are cold water coral reefs (not only, but particularly *Lophelia pertusa*), which are distributed at similar depths to the saithe fishery, and widespread sponge communities. Coral habitats can cause significant (costly) damage to the gear by tearing; consequently, skippers do all that they can to avoid seabed contact in these areas. Habitat monitoring by the MAREANO programme has raised concerns about past and potential effects of trawling but has not raised concerns with respect to the saithe purse-seine fishery. The nature of purse-seine operation with limited seabed contact is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
References		http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs	

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PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
			Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; vessels are expected to avoid all known coral areas and purse seining tends to be away from the most sensitive areas, including sponge communities. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).
			These measures are what are required by OsPar to protect sensitive marine habitats; the measures are observed and closed areas rigorously enforced.
80	**a**	Y	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; vessels are expected to avoid all known coral areas and purse seining tends to be away from the most sensitive areas. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	There is some **objective basis for confidence** that the partial strategy will work, based on **information directly about the fishery and/or habitats** involved.
			Real-time (VMS) monitoring of fishing activity and regular aerial and maritime surveillance patrols ensure that the closed areas are observed and that the sensitive habitats within them are safeguarded.
	c	Y	There is **some evidence** that the partial strategy is being implemented successfully.
			The Norwegian enforcement agencies are satisfied that incursions into the closed areas are rare and certainly do not represent a systemic failure of fishery enforcement or malpractice among the trawlers.
100	**a**	Y	There is a **strategy** in place for managing the impact of the fishery on habitat types.
			The strategy is to monitor the fishery closely and to ensure that all species and habitat protection measures are complied with in full. The MAREANO mapping programme is ongoing and there are regional seas management plans that include monitoring sensitive habitats. The annual status reports of each of the regional seas are presented to Parliament. Additionally, the Marine Resources Act requires an ecosystem approach to safeguarding biodiversity in addition to managing exploited resources.
	b	Y	**Testing** supports **high confidence** that the strategy will work, based on **information directly about the fishery and/or habitats** involved.
			In addition to monitoring the fishery, methods and gear, seabed habitats continue to be monitored and mapped through the MAREANO programme. This work has not identified any habitat concerns with respect to the saithe fishery.
	c	**N**	There is **clear evidence** that that strategy is being implemented successfully.
			There is 'clear evidence' in that the authorities record or prosecute few instances of incursions into protected areas. Commercial self- interest encourages skippers to avoid sponge communities and non-protected coral areas. This evidence, however, is derived by inference from the established fishing practice.

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PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
	d	**Y**	There is some evidence that the strategy is achieving its objective. The on-going MAREANO and regional seas monitoring programmes provide some evidence that the strategy is providing overall protection to sensitive habitats and therefore achieving its objectives. But more generally, evidence is derived by inference from the established fishing practice.
References			http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	Y	There is **basic understanding** of the types and distribution of main habitats in the area of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries.
	b	Y	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.
			The potential effect of trawling on coral and sponge communities is understood. The MAREANO programme has identified some areas where fishing has had an effect in the past on the seabed and seabed habitats.
80	**a**	Y	The nature, distribution and **vulnerability** of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries. This mapping has identified the distribution of the upright benthic species, which are most vulnerable to interaction with towed fishing gear and by comparison, of low sensitivity with respect to static gear fishing.
	b	Y	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
			The MAREANO programme has identified some areas where fishing has had an effect on the seabed and seabed habitats in the past; closed areas have been established to protect habitats and communities in selected areas. Skippers also know where non-protected areas are to be found and choose to avoid them in order to avoid unnecessary damage to the gear (with concomitant loss of time and catch). The distribution and intensity of fishing activity relative to sensitive areas is known and can be monitored through VMS.
	c	Y	Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
			The distribution and intensity of fishing activity is monitored through VMS; habitat mapping and monitoring is ongoing; there is provision for introducing new protection measures if needed.
100	**a**	**Y**	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
			The MAREANO programme has developed very detailed maps of seabed habitats across many of the principal fishing grounds in Norwegian waters. Critically sensitive habitats are protected from towed gear fishing by closed areas and also within the 12 mile territorial sea. There is also a prohibition on all bottom contact Fishing, including static-gear fishing, at depths greater than 1000 meters.
	b	**N**	The physical impacts of the gear on the habitat types have been quantified fully.
			There has been limited work carried out which has found sponge and coral abundance has been reduced in areas of sustained long-term demersal trawling. Although the reduction probably occurred some time ago, any continued trawling on such habitats would limit species and habitat recovery. These issues have not been

			quantified.
	c	N	Changes in habitat distributions over time are measured.
			Habitats are monitored, but changes in distribution are not measured.
References	http://www.imr.no/coral/fishery_impact.php WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. www.vliz.be/imisdocs/publications/217806.pdf http://www.mareano.no - Select page: Maps –Vulnerable Habitats.		
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

MSC FISHERY ASSESSMENT REPORT

Evaluation Table: PI 2.4.1
TRAWLERS

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery is **unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			If fishing posed a significant risk of reducing habitat structure and function to a point where there would be serious or irreversible harm, it would have been during the early and middle decades of the 20th C when fishing was unrestricted, more intense and used gear with a heavier footprint than has been the case in recent decades. The fact that habitat structure and function has been relatively constant suggests that there has been no serious or irreversible harm in the last quarter century.
80	**a**	**Y**	The fishery is **highly unlikely** to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The principal habitats of nature conservation interest and concern in the offshore environment are sponge communities and cold-water coral reefs, principally but not only *Lophelia pertusa.* The principle coral reefs are within statutory closed areas. Sponge communities are widespread and their locations known to skippers. Skippers endeavour to avoid these areas for self-interest; it is possible to fill a trawl with sponges and crush the fish to pulp if not burst the trawl with sponges. The location of major coral reefs are also known and avoided as they too can damage the gear, resulting in loss of time and catch. The Norwegian authorities are contributing to international efforts to map *Lophelia* reefs throughout the NE Atlantic and have established a chain of coral reef marine protected areas in which towed gear is prohibited. Enforcement of such zones is rigorous. Thus, the current generation of fishing vessels does not pose the threat of earlier generations and the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
100	**a**	**N**	There is **evidence** that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
			The critical habitats vulnerable to demersal fishing gear are cold water coral reefs (not only, but particularly *Lophelia pertusa*), which are distributed at similar depths to the saithe fishery, and widespread sponge communities. Any of these habitats can cause significant (costly) damage to the gear (coral by tearing, and the deadweight of sponges crushing the catch and bursting the trawl); consequently, skippers do all that they can to avoid seabed contact (and the semi-pelagic have virtually no sea-bed contact) and it is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. The saithe fishery tends to be in areas other than those in which coral and sponges are most abundant. Nevertheless, 'evidence' is indirect and circumstantial.
References			WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa***

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PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis and function	
SG	**Issue**	**Met? (Y/P/N)**	**Justification/Rationale**
			(Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; vessels are expected to avoid all known coral areas and trawling tends to be away from the most sensitive areas, including sponge communities. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).
			These measures are what are required by OsPar to protect sensitive marine habitats; the measures are observed and closed areas rigorously enforced.
80	**a**	Y	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.
			The MAREANO programme is aimed at surveying, monitoring and protecting all aspects of the Norwegian marine environment, ecosystem and habitats. Coral garden closed areas have been established; vessels are expected to avoid all known coral areas and trawling tends to be away from the most sensitive areas. With the exception of the derogation for small (shrimp) trawlers, trawling is prohibited throughout the 12' territorial sea and closed areas. Closed areas are enforced with the same rigour that is applied to all fishery regulations.
	b	Y	There is some **objective basis for confidence** that the partial strategy will work, based on **information directly about the fishery and/or habitats** involved.
			Real-time (VMS) monitoring of fishing activity and regular aerial and maritime surveillance patrols ensure that the closed areas are observed and that the sensitive habitats within them are safeguarded.
	c	Y	There is **some evidence** that the partial strategy is being implemented successfully.
			The Norwegian enforcement agencies are satisfied that incursions into the closed areas are rare and certainly do not represent a systemic failure of fishery enforcement or malpractice among the trawlers.
100	**a**	Y	There is a **strategy** in place for managing the impact of the fishery on habitat types.
			The strategy is to monitor the fishery closely and to ensure that all species and habitat protection measures are complied with in full. The MAREANO mapping programme is ongoing and there are regional seas management plans that include monitoring sensitive habitats. The annual status reports of each of the regional seas are presented to Parliament. Additionally, the Marine Resources Act requires an ecosystem approach to safeguarding biodiversity in addition to managing exploited resources.
	b	Y	**Testing** supports **high confidence** that the strategy will work, based on **information directly about the fishery and/or habitats** involved.
			In addition to monitoring the fishery, methods and gear, seabed habitats continue to be monitored and mapped through the MAREANO programme. This work has not identified any habitat concerns with respect to the saithe fishery.
	c	**N**	There is **clear evidence** that that strategy is being implemented successfully.
			There is 'clear evidence' in that the authorities record or prosecute few instances of incursions into protected areas. Commercial self- interest encourages skippers to

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PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			avoid sponge communities and non-protected coral areas. This evidence, however, is all derived by inference from the established fishing practice.
	d	**Y**	There is some evidence that the strategy is achieving its objective.
			The on-going MAREANO and regional seas monitoring programmes provide some evidence that the strategy is providing overall protection to sensitive habitats and therefore achieving its objectives. But more generally, evidence is derived by inference from the established fishing practice.
References			WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf*	
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	Y	There is **basic understanding** of the types and distribution of main habitats in the area of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries.
	b	Y	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.
			The potential effect of trawling on coral and sponge communities is understood. The MAREANO programme has identified some areas where fishing has had an effect in the past on the seabed and seabed habitats.
80	**a**	Y	The nature, distribution and **vulnerability** of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.
			The MAREANO programme has developed very detailed maps of seabed habitats throughout extensive areas of the Norwegian territorial sea. More generally, seabed habitat information has been built up with information from the fishing and offshore oil industries. This mapping has identified the distribution of the upright benthic species, which are most vulnerable to interaction with towed fishing gear. Areas in which mobile fishing activity is least intense are the areas in which vulnerable species are most abundant.
	b	Y	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.
			The MAREANO programme has identified some areas where fishing has had an effect on the seabed and seabed habitats in the past; closed areas have been established to protect habitats and communities in selected areas. Skippers also know where non-protected areas are to be found and choose to avoid them in order to avoid unnecessary damage to the gear (with concomitant loss of time and catch). The distribution and intensity of fishing activity relative to sensitive areas is known and can be monitored through VMS.
	c	Y	Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
			The distribution and intensity of fishing activity is monitored through VMS; habitat mapping and monitoring is ongoing; there is provision for introducing new protection measures if needed.
100	**a**	**Y**	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
			The MAREANO programme has developed very detailed maps of seabed habitats across many of the principal fishing grounds in Norwegian waters. Critically sensitive habitats are protected from towed gear fishing by closed areas and also within the 12 mile territorial sea. There is also a prohibition on all bottom contact fishing at depths greater than 1000 meters.
	b	**N**	The physical impacts of the gear on the habitat types have been quantified fully.
			There has been limited work carried out which has found sponge and coral abundance has been reduced in areas of sustained long term demersal trawling. Although the reduction probably occurred some time ago, any continued trawling on such habitats would limit species and habitat recovery. These issues have not been

			quantified.
	c	N	Changes in habitat distributions over time are measured.
			Habitats are monitored, but changes in distribution are not measured.
References			WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped http://www.mareano.no/kart/viewer.php?language=en&bbox=592707.1,7846700.0,802279.9,7952140.0&KARTBILDE_ID=115 http://www.mareano.no/kart/viewer.php?language=en&bbox=-1036028.8,6550180.0,1748198.3,7854310.0&KARTBILDE_ID=122 http://www.mareano.no/english/topics/coral_reefs Bruntse, G. & Tendel, O.S. (2001) *Lophelia pertusa* and other cold water corals in the Faroe area. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 22–32. Kaldbak Marine Biological Laboratory, The Faroe Islands. *www.vliz.be/imisdocs/publications/217806.pdf* Jensen, A.& Fredriksen, R. 1992. The fauna associated with the bankforming deepwater coral ***Lophelia pertusa*** (Scleractinaria) on the Faroe shelf. *Sarsia* 77: 53–69. Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. Mortensen, P.B., Hovland, M., Brattegard, T. & Farestveit, R. (1995). Deep water bioherms of the Scleractinian coral *Lophelia pertusa* (L.) at 64° N on the Norwegian shelf: structure and associated megafauna. *Sarsia* 80: 145–158. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a res research submersible. Marine Fisheries Review 63: 7–13. OSPAR, 2010. Background Document for Deep-sea sponge Aggregations. Biodiversity Series, OSPAR, London. http://www.ospar.org/documents/dbase/publications/p00485_deep_sea_sponge_aggregations.pdf Klitgaard, A.B. & Tendal, O.S. "Ostur" – "cheese bottoms" – sponge dominated areas in the Faroese shelf and slope areas. In *Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands* (Bruntse, G. & Tendel, O.S. eds) pp 13–21. Kaldbak Marine Biological Laboratory, The Faroe Islands. www.vliz.be/imisdocs/publications/217806.pdf http://www.mareano.no - Select page: Maps –Vulnerable Habitats.
OVERALL PERFORMANCE INDICATOR SCORE:			**85**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.5.1

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function	
SG	**Issue**	**Met? (Y/P/N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. This is a relatively clean, fishery dominated by the target species. Thus, the fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
80	**a**	**Y**	The fishery is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. This is a relatively clean, fishery dominated by the target species. Thus, the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
100	**a**	**Y**	There is **evidence** that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. IMR has a wide ranging research and stock assessment programme dating back over half a century, much of which is aimed ultimately at developing an ecosystem model for all Norwegian regional seas. While much progress has been made this objective has not yet been attained. As yet these studies have not identified any critical role that saithe may play in the overall stability of the Norwegian Sea marine ecosystem. The saithe prey upon a variety of fish and invertebrate species and, in turn, are prey to larger species such as seals, toothed whales and possibly even some baleen whales (sei whale: sei = saithe). Thus, they have their part to play but there is no evidence that they are a keystone link within the system. The Marine Resources Act makes it an explicit requirement that an ecosystem approach is taken to all aspects of marine resource management. It is highly unlikely therefore that the fishery at the current level will disrupt ecosystem structure or function.
References			ATLANTIS; http://www.imr.no/temasider/modeller/atlantis/atlantis/en NORWECOM.E2E; http://www.imr.no/temasider/modeller/norwecom.e2e/norwecom.e2e/en MFCA, 2012. Integrated Management Plans available at: http://www.fisheries.no/resource_management/Area_management/Integrated_management_plans/ Olsen, E., Gjøsæter, H., Røttingen, I., Dommasnes, A., Fossum, P. & Sandberg, P. 2007. The Norwegian ecosystem-based management plan for the Barents Sea. ICES Journal 0f Marine Science 64: 599–602. MinEnv, 2009. Report No. 37 to the Storting (2008-2009) Integrated Management of the Marine Environment of the Norwegian Sea Report No. 37 (2008 – 2009) to the Storting. Klif, 2012. Integrated management plan for the North Sea and Skagerrak. Norwegian Climate and Pollution Agency, Oslo. http://www.klif.no/english/english/Areas-of-activity/Integrated-management-plan-for-the-North-Sea-and-Skagerrak/ Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf Sparre, P. 1984. A computer programme for estimation of food suitability coefficients from stomach content data and multipsecies VPA. ICES CM 1984/25. WGSAM, 2009. Report of the Working Group on Multispecies assessment Methods. ICES CM 2009/RMC:10. WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126.

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PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
			Freese, J.L. 2001. Trawl-induced damage to sponges observed from a resresearch submersible. Marine Fisheries Review 63: 7–13.
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.5.2

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **measures** in place, if necessary.
			Rigorous quota control management, technical measures, seasonal and permanent area closures, minimum size catch thresholds all contribute to minimising adverse effects of fishing on the ecosystem.
	b	**Y**	The **measures** take into account potential impacts of the fishery on key elements of the ecosystem.
			Rigorous quota control management, technical measures, seasonal and permanent area closures all contribute to minimising adverse effects of fishing on key elements of the ecosystem.
	c	**Y**	The measures are considered likely to work, based on **plausible argument** (e.g., general experience, theory or comparison with similar fisheries/ecosystems).
			Rigorous enforcement of quota control, based on advice from ICES and IMR, and other conservation measures are aimed at ensuring long-term sustainability. Such measures are known to have worked elsewhere, not least in reviving the fortunes of the NEA cod stock.
80	**a**	**Y**	There is a **partial strategy** in place, if necessary.
			There are Norwegian seas management plans and the Marine Resources Act requires an ecosystem approach to environmental management. IMR are maintaining a fishery and biological monitoring programme in support of annual (ICES) stock assessments and reviews aimed at providing the client with advice on exploitation levels consistent with long term sustainability.
	b	**Y**	The partial strategy takes into account **available information and is expected to restrain impacts** of the fishery on the ecosystem so as to **achieve** the Ecosystem Outcome 80 level of performance.
			There are Norwegian seas management plans and the Marine Resources Act requires an ecosystem approach to environmental management. The act also requires regular monitoring and assessment to ensure that objectives are being met. IMR are maintaining a fishery and biological monitoring programme in support of annual (ICES) stock assessments and reviews aimed at providing the Norwegian government with advice on fishing and environmental effects consistent with long term sustainability.
	c	**Y**	The partial strategy is considered likely to work, based on **plausible argument** (e.g., general experience, theory or comparison with similar fisheries/ecosystems).
			Greater intensity of research and enforcement activity in, for example, the Barents Sea has resulted in elimination of IUU and improvements to key stocks such as cod, haddock and Norwegian spring spawning herring. IMR supports ICES with respect to assessing many (if not all) North East Atlantic fish stocks in which Norwegian vessels have an interest. Over time, these assessments provide evidence that this approach has been successful.
	d	**Y**	There is **some evidence** that the measures comprising the partial strategy are being **implemented successfully.**
			MFCA is satisfied that its responsibilities with respect to the Marine Resources Act are being met through the activities of its agencies. The Norwegian enforcement agencies are satisfied that there is a high degree of compliance within the fishery and IMR is satisfied with the relevant ecosystem data being collected to assess the strategy.
100	**a**	**Y**	There is a **strategy** that consists of a **plan**, in place.

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			The Norwegian Marine Resources Act has an explicit requirement to take an ecosystem approach to resource management and exploitation. There is a suite of regional seas management plans that are aimed at monitoring and safeguarding the status of the marine environment. It is implicit in the IMR long term objective of developing a Norwegian ecosystem model that there is a plan to manage the fishery and maintain the stocks at levels consistent with the Norwegian strategy for rational utilization of all their marine resources.
	b	**Y**	The **strategy**, which consists of a **plan**, contains measures to **address all main impacts of the fishery** on the ecosystem, and at least some of these measures are in place. The plan and measures are **based on well-understood** functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for **development of a full strategy that restrains impacts** on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
			The Norwegian Marine Resources Act has an explicit requirement to take an ecosystem approach to resource management and exploitation. There is a suite of regional seas management plans that are aimed at monitoring and safeguarding the status of the marine environment. It is implicit in the IMR long term objective of developing a Norwegian ecosystem model that there is a plan to manage the fishery and maintain the saithe stock at levels consistent with the Norwegian strategy for rational utilization of all their marine resources. Measures include the MAREANO mapping programme that monitors, inter alia, anthropogenic interactions with the seabed and informs appropriate management decisions, e.g. coral closed areas. There are fishery biological and technical conservation measures for safeguarding stocks and managing fisheries and the interactions with other animals.
	c	**Y**	The measures are considered likely to work based on **prior experience**, plausible argument or **information** directly from the fishery/ecosystems involved.
			Prior experience from Norwegian waters and elsewhere in the north Atlantic suggests that the Norwegian government's approach is a plausible and acceptable approach to fishery-ecosystem management.
	d	**Y**	There is evidence that the measures are being **implemented successfully**.
			Fishery enforcement is robust and demonstrates its effectiveness through warnings, administrative penalties and court action where appropriate. IMR – ICES stock assessments have shown, and continue to show that the fishery management measures are effective at rebuilding stocks and maintaining them at high levels to sustain high catch levels. The MAREANO programme continues to build a database of Norwegian seabed habitats anthropogenic effects.
References			ATLANTIS; http://www.imr.no/temasider/modeller/atlantis/atlantis/en $ACOM_{NEAcod}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Cod in Subareas I and II (Northeast Arctic cod). ICES Advice Book 3.4.1. http://www.ices.dk/committe/acom/comwork/report/2012/2012/Cod-arct.pdf NORWECOM.E2E; http://www.imr.no/temasider/modeller/norwecom.e2e/norwecom.e2e/en MFCA, 2. Integrated Management Plans available at: http://www.fisheries.no/resource_management/Area_management/Integrated_management_plans/ Olsen, E., Gjøsæter, H., Røttingen, I., Dommasnes, A., Fossum, P. & Sandberg, P. 2007. The Norwegian ecosystem-based management plan for the Barents Sea. ICES Journal 0f Marine Science 64: 599–602. MinEnv, 2009. Report No. 37 to the Storting (2008-2009) Integrated Management of the Marine Environment of the Norwegian Sea Report No. 37 (2008 – 2009) to the Storting. Klif, 2012. Integrated management plan for the North Sea and Skagerrak. Norwegian Climate and Pollution Agency, Oslo. http://www.klif.no/english/english/Areas-of-activity/Integrated-management-plan-for-the-North-Sea-and-Skagerrak/

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PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf Sparre, P. 1984. A computer programme for estimation of food suitability coefficients from stomach content data and multipsecies VPA. ICES CM 1984/25. WGSAM, 2009. Report of the Working Group on Multispecies assessment Methods. ICES CM 2009/RMC:10. WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a resresearch submersible. Marine Fisheries Review 63: 7–13.
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 2.5.3

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Information is adequate to **identify** the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).
			The long-established and long-term research programmes have built a database that ensures that the key elements of the ecosystem are identified.
	b	**Y**	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and **have not been investigated in detail**.
			Direct fishery interactions are reasonably well understood and indirect effects can be inferred.
80	**a**	**Y**	Information is adequate to **broadly understand** the key elements of the ecosystem.
			The individual components of the IMR research and stock assessment programmes all contribute to the institution's long term aim of modelling the marine ecosystem. It is understood implicitly, if not explicitly, that each of the fish stocks plays a role within the ecosystem and variations in abundance of stocks, such as saithe, can and quite probably do influence the status of both prey and predator populations. Whilst not all these interactions have been investigated in detail, they are understood in principle. The research programmes and associated monitoring of the marine environment, primary production, fish stocks, birds and marine mammals all contribute towards detecting any risk or adverse environmental effects.
	b	**Y**	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and **some have been investigated in detail**.
			Direct fishery interactions are reasonably well understood and indirect effects can be inferred, often from direct experience or comparison with similar species and areas elsewhere. Stock–recruitment relationships are a focus of detailed attention in many stocks, including saithe.
	c	**Y**	The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are **known**.
			The long-established and long-term research programmes have built a database that ensures that the main functions of the components in the ecosystem are known and feature in the various ecosystem models being developed.
	d	**Y**	Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.
			The long-established and long-term research programmes have built a database that ensures that interactions with fish, bird and mammal components can be inferred even if they cannot be quantified explicitly. Such information is central to an ecosystem approach, as required by the Marine Resources Act.
	e	**Y**	Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).
			The long-established and long-term research programmes are ongoing and maintain databases appropriate for monitoring the status of key components in the ecosystem (plankton, fish, birds, mammals), including habitats monitored by MAREANO.
100	**b**	**Y**	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and **have been investigated**.

PI 2.5.3			There is adequate knowledge of the impacts of the fishery on the ecosystem
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			Ecosystem modelling is an on-going aspect of IMR investigations. Even those elements for which there are not specific data, many can be inferred particularly with respect to saithe, which is central to the models.
	c	**N**	The impacts of the fishery on target, Bycatch and ETP species are **identified** and the main functions of these Components in the ecosystem are **understood**.
			Not all aspects of fishery–bycatch–ETP interactions have been studied in detail and until fully functioning ecosystem models have been demonstrated to work it would be premature to say that these components of the ecosystem are understood.
	d	**Y**	Sufficient information is available on the impacts of the fishery on the Components **and elements** to allow the main consequences for the ecosystem to be inferred.
			Demersal species have been subject to fishery research for many decades throughout the north Atlantic, not least including the Norwegian saithe fisheries, and virtually all of the ecosystem-based research findings are directly applicable to Norway and this fishery. Consequently the main consequences for the ecosystem can be inferred.
	e	**Y**	Information is sufficient to support the development of strategies to manage ecosystem impacts.
			The long-established and long-term research programmes and their associated databases are undoubtedly sufficient to support the development of strategies to manage ecosystem interactions. The regional seas management plans are de facto examples of such management strategies.
References			ACOM$_{NEAsaithe}$, 2012. Ecoregion: Barents Sea and Norwegian Sea – Saithe in Subareas I and II (Northeast Arctic). ICES Advice Book 3.4.4. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-arct.pdf ACOM$_{NSsaithe}$, 2012. Ecoregion: Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall). ICES Advice Book 6.4.12. http://www.ices.dk/committe/acom/comwork/report/2012/2012/sai-3a46.pdf ATLANTIS; http://www.imr.no/temasider/modeller/atlantis/atlantis/en NORWECOM.E2E; http://www.imr.no/temasider/modeller/norwecom.e2e/norwecom.e2e/en MFCA, 2012. Integrated Management Plans available at: http://www.fisheries.no/resource_management/Area_management/Integrated_management_plans/ Olsen, E., Gjøsæter, H., Røttingen, I., Dommasnes, A., Fossum, P. & Sandberg, P. 2007. The Norwegian ecosystem-based management plan for the Barents Sea. ICES Journal 0f Marine Science 64: 599–602. MinEnv, 2009. Report No. 37 to the Storting (2008-2009) Integrated Management of the Marine Environment of the Norwegian Sea Report No. 37 (2008 – 2009) to the Storting. Klif, 2012. Integrated management plan for the North Sea and Skagerrak. Norwegian Climate and Pollution Agency, Oslo. http://www.klif.no/english/english/Areas-of-activity/Integrated-management-plan-for-the-North-Sea-and-Skagerrak/ Bjørge, Q. 2008. New research programme focusing on coastal and fjord ecosystems. Marine News 3–2008. http://www.imr.no/epigraph/filarkiv/hi_news_3_eng_web.pdf/nb-no Hjøllo, S.S., 2007. EcoFish WP2 workandWind, NAO and ecosystem-selected articles. IMR, Bergen. http://ecofish.imr.no/__data/page/6432/work_and_Wind,_NAO_and_ecosystem-selected_articles080307.pdf Sparre, P. 1984. A computer programme for estimation of food suitability coefficients from stomach content data and multipsecies VPA. ICES CM 1984/25. WGSAM, 2009. Report of the Working Group on Multispecies assessment Methods. ICES CM 2009/RMC:10. WGECO, 2012. Report of the Working Group on Ecosystem Effects of Fishing Activities (WGECO) ICES CM 2012/ACOM:26 http://www.ices.dk/reports/ACOM/2012/WGECO/wgeco_2012.pdf http://www.mareano.no/english/news/seabed_to_be_mapped Husebø, Å., Nøttestad, L., Fosså, J.H., Furevik, D.M. & Jørgensen, S.B. (2002). Distribution and abundance of fish in deep-sea coral habitats. *Hydrobiologia* 471: 91–99. WGDEC, 2012. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 26–30 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:29. Freese, J.L., Auster, P., Heifetz, J., Wing, B.L., 1999. Effects of trawling on seafloor habitat and associated invertebrate taxa in the Gulf of Alaska. Marine Ecology Progress Series 182, 119–126. Freese, J.L. 2001. Trawl-induced damage to sponges observed from a resresearch submersible. Marine Fisheries Review 63: 7–13.

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PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
OVERALL PERFORMANCE INDICATOR SCORE:			**95**
CONDITION NUMBER (if relevant):			

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Evaluation Table: PI 3.1.1

PI 3.1.1			The management system exists within an appropriate legal and/or customary framework which ensures that it: a. Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; b. Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and c. Incorporates an appropriate dispute resolution framework.
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.
			The Norwegian system is consistent with national laws and international standards. There is a national law, Marine Resources Act, which also regulates this fishery. The purpose of this law is 'to ensure sustainable and economically profitable management of wild living marine resources and genetic material derived from them, and to promote employment and settlement in coastal communities'. Fisheries activities are guided by ICES advice.
	b	**Y**	The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.
			Administrative disputes are dealt with by the Fisheries Directorate. All other disputes are dealt with by Norwegian legal system.
	c	**Y**	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability of the fishery.
			Neither the management authority nor the fishery has been subject court challenges in the recent past. Records of all infringements are available annually in the Coast Guard report.
	d	**Y**	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
			There are no people dependent on fishing saithe for food and livelihood that applies to this fishery but Norwegian citizens are free to fish for saithe for recreational purposes.
80	**b**	**Y**	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the fishery.
			The mechanism for resolution of legal disputes is incorporated into the management system is understood by all interested parties and is by nature transparent.
	c	**Y**	The management system or fishery is attempting to comply in a timely fashion within binding judicial decisions arising from any legal challenges.
			The management system is designed to deal with judicial decision in a timely fashion; however no legal challenges have been reported or documented in the recent past.
	D	**Y**	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
			There are no people dependent on fishing saithe for food and livelihood that applies to this fishery but Norwegian citizens are free to fish for saithe for recreational purposes. Similar rights extend to tourists, except they are limited as to the legal quantity they can bring home. Restrictions on commercial coastal fisheries are designed to safeguard the interests of coastal communities, e.g. by restricting access for large offshore vessels or amending catch regulations for the benefit of coastal

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PI 3.1.1		**The management system exists within an appropriate legal and/or customary framework which ensures that it:** **a. Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2;** **b. Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and** **c. Incorporates an appropriate dispute resolution framework.**	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			communities.
100	**B**	**Y**	The management system incorporates or subject by law to a **transparent** mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective**.
			The mechanism for resolution of legal disputes is incorporated into the management system and is by nature transparent. In the first instance, non-compliance can be dealt with by fine or fishing restriction imposed by the authorities. The fisheries directorate can issue a fee, in severe cases the matter is handed over to the police. The Directorate also has the authority to withdraw the fishing licence. If a vessel wishes to dispute the matter, they are able to take their challenge to court for resolution in public. This option is rarely pursued. The management system is being regularly applied.
	c	**Y**	The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.
			"The regulatory system for fisheries management in Norway is an interactive and iterative process based on incremental changes" (www.fisheries.no). The system includes consulting the fishing industry as well as other stakeholders, hence it is transparent.
	d	**Y**	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
			There are no people dependent on fishing saithe for food and livelihood that applies to this fishery nevertheless the rights of all Norwegian citizens are safeguarded through national (Marine Resources Act 2008) and international (European Convention on Human Rights) legislation. If any individual or organization wishes to challenge or seek to amend fishery management legislation they are able to do so through the courts or parliament.
References			http://www.fisheries.no/Publications/guidelines_fisheries_management/
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.1.2

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood.**
			Stakeholders involved in the management of the fisheries are organisations and individuals involved in the management process identified as scientific organisations like ICES, research institutes (IMR), fishery industry organisations (NFVOA), NGOs, regional counties and relevant government bodies.
	b	**Y**	The management system includes consultation processes that obtain **relevant information** from the main affected parties, including local knowledge, to inform the management system.
			The management system requires consultation processes that involve the Fisheries Directorate coordinating relevant issues with a wide variety of identified stakeholders including the NFVOA, Norwegian Fishermen Association.
80	**a**	**Y**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.
			Stakeholders involved in the management of the fisheries are organisations and individuals involved in the management process identified as scientific organisations like ICES, research institutes (IMR), fishery industry organisations (NFVOA), NGOs, regional counties and relevant government bodies. The function, role and responsibility of each of these organizations within the management process are explicitly defined and well understood by all participants. These roles and responsibilities including the consultation process are defined in the legal instruments for the management of the fisheries and implemented through The Regulatory Chain
	b	**Y**	The management system includes consultation processes that **regularly seek and accept relevant** information, including local knowledge. The management system demonstrates consideration of the information obtained.
			The management system requires consultation processes that involve the Fisheries Directorate coordinating relevant issues with a wide variety of identified stakeholders including the NFVOA, Norwegian Fishermen Association. There is a major consultation twice yearly in which all interested parties are engaged. It is during these meetings that significant changes may be discussed or agreed. Other meetings are held as and when required and proposals may be circulated for consultation during the year.
	c	**Y**	The consultation process **provides opportunity** for all interested and affected parties to be involved.
			The consultation process is open for all interested parties and all relevant documents are available on web-site of Directorate of fisheries. Engagement is facilitated by the timely announcement of meeting through various media.
100	**a**	**Y**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.
			Stakeholders involved in the management of the fisheries are organisations and individuals involved in the management process

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PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			identified and the function, role and responsibility of each of these organizations within the management process are explicitly defined and well understood by all participants. E.g. ICES provides independent scientific advice, IMR provides scientific advice to the MFCA, the Norwegian Fishermen Association (which represents the interests and aspirations of the catching sector, NFVOA (which is a member of the Norwegian Fishermen Association and represent the owners of the larger fishing vessels), NGOs and regional bodies represent the interests of the wider public. These roles and responsibilities including the consultation process are defined in the legal instruments for the management of the fisheries. The sequence of consultations is referred to as the Regulatory Chain.
	b	**Y**	The management system includes consultation processes that **regularly seek and accept relevant** information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used**.
			The Civil Service Act §37 states strict rules for consulting stakeholders, and ensures that all relevant stakeholders have the right to be heard in all law making processes. Specifically, fishery legislation requires consultation processes that involve the Fisheries Directorate coordinating relevant issues with a wide variety of identified stakeholders including the NFVOA, Norwegian Fishermen Association and all other major interested parties. There is a formal consultations twice a year in which new scientific information, industry experience, NGO concerns, and management proposals are tabled and discussed. These discussions can lead to amendments to the management regime. Other meetings are held as and when required. All major proposals are subject to hearing by a wide audience of interested parties.
	c	**Y**	The consultation process **provides opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.
			The consultation process is open for all interested parties and all relevant documents are available on web-site of Directorate of fisheries. Engagement is facilitated by the timely announcement of meeting and publication of minutes and decisions through various media.
References			http://www.fisheries.no/Publications/guidelines_fisheries_management/ Civil service act: http://www.lovdata.no/all/nl-19670210-000.html: Lov om behandlingsmåten i forvaltningssaker (forvaltningsloven).
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.1.3

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are **implicit** within management policy
			Long-term, overall goals for fisheries management are set out in legislation and in white papers to the Parliament. These objectives are based upon sustainable management, economic efficiency and regard for regional objectives. Environmental objectives are also in place and observed, e.g. in relation to protection of coral reefs and sea-based management plans (e.g. Norwegian Sea Management Plan and forthcoming plans for the Norwegian North Sea). Ecological quality objectives are also developed through OSPAR cooperation, but fully developed measures to measure environmental performance are not yet in place.
80	**a**	**Y**	**Clear** long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are **explicit** within management policy.
			Long-term sustainability objectives for fish stocks, including saithe, are set out in the fishery legislation and stock management plans. These objectives aim at maintaining a full productivity of the stock by keeping the biomass safely above limit reference points and by applying a fishing mortality at levels that are expected to lead to a high yield in the long term. Also, there are specific measure for the protection of juvenile fish, red list species and prohibition of all discarding. There are regional sea management plans for monitoring status and safeguarding habitats e.g. closed areas for corals.
100	**a**	**Y**	**Clear** long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are **explicit** within **and required by** management policy.
			Explicit long-term sustainability objectives for fish stocks are set out in the fishery legislation and stock management plans, and are consistent with MSC Principles and Criteria and the precautionary approach. For example, there are ICES-endorsed management plans for both saithe stocks. These plans aim to at maintaining a full productivity of the stock by keeping the biomass safely above limit reference points and by applying a fishing mortality at levels that are expected to lead to a high yield in the long term. Also, there are specific measure for the protection of juvenile fish, red list species and prohibition of all discarding. This is all required by the Marine Resources Act, which also aims 'to ensure sustainable and economically profitable management of wild living marine resources and genetic material derived from them, and to promote employment and settlement in coastal communities'. On a broader scale, there is area plans (for the Barents Sea and Norwegian Sea, one for the North Sea is under development) outlining a holistic management and monitoring of the respective areas. There is also legislation applying to the regional sea management plans for monitoring status and safeguarding habitats e.g. closed areas for corals.
References			Marine Resources Act: http://www.lovdata.no/all/nl-20080606-037.html: Lov om forvaltning av viltlevande marine ressursar (havressurslova); White paper from the Government: Report No. 8 (2005–2006) to the Storting: Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands White paper from the Government: Report No. 37 (2008 – 2009) to the Storting: Integrated Management of the Marine Environment of the Norwegian Sea

MSC FISHERY ASSESSMENT REPORT

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
			http://www.ices.dk/advice/icesadvice.asp
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.1.4

PI 3.1.4		The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
60	**a**	**Y**	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.
			The rights-based management (Licence System) for the major part of this fishery provides incentives (penalties for non-compliance) for Norwegian fishermen to conduct saithe fishery in a sustainable manner. Norwegian vessels do not receive subsidies that contribute to unsustainable fishing of saithe. Communication between fishermen and management is effective and reduces information gaps and uncertainties. The consultation process affords support for the management system from fishermen and encourages a sense of stewardship.
80	**a**	**Y**	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure **that perverse incentives** do not arise.
			Under the Marine Resources Act, landing of all catch is mandatory, and vessels are required to move to new fishing grounds if by-catch limits are exceeded. Currently, even viable fish of protected species shall be landed rather than released. Exemptions from these regulations are being considered at present. All major fisheries in Norway are limited to vessels that have a permit to participate. Removal of permits, in the event of serious breaches of management requirements, provides an incentive to promote sustainable fishing. All quotas are allocated to specific groups of vessels. Quotas are allocated to vessels, or there is a maximum quota for what a single vessel can take of its group quota. In addition to the regulations of access and output, conservation regulations also contribute to the achievement of the goals of fishery management: sustainable use and economic efficiency. Procedures to allow for a managed reduction in capacity are established, tested and subject to change by government. Ecosystem concerns are also taken into account: the regulations prohibit fishing in areas with coral reefs with specified gear, allow for closing of areas with high levels of juvenile fish, and prevent discarding. Catches taken in excess to quota can result in fines and will result in loss of sale value so that no economic benefit is gained. These measures will indirectly contribute to sustainable fishing and ecosystem management.
100	**a**	**Y**	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and **explicitly considers** incentives in a **regular review** of management policy or procedures to ensure they not contribute to unsustainable fishing practices.
			The Coast guard produces an annual report that includes a record of non-compliance and any penalties imposed. This information will be reviewed by i.a. the Directorate and the Ministry to see whether variations in the incentives (regulations and penalties) need amending.
References			Marine Resources Act: http://www.lovdata.no/all/nl-20080606-037.html: Lov om forvaltning av viltlevande marine ressursar (havressurslova); Fisheries directorate: J-123_2012: Forskrift om utøvelse av fisket i sjøen: http://www.fiskeridir.no/fiske-og-fangst/j-meldinger/gjeldende-j-meldinger/j-123-2012: Overview: ICES ASC 2012/L:05 Changing attitudes 1970 – 2012. Evolution of the Norwegian management framework to prevent overfishing and to secure long-term sustainability by P Gullestad , A Aglen , Å Bjordal , G Blom , S Johansen , J Krog , O A Misund and I Røttingen

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PI 3.1.4		The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing	
SG	**Issue**	**Met? (Y/P/ N)**	**Justification/Rationale**
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.2.1

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	
SG	**Issue**	**Met? (Y/PN)**	**Justification/Rationale**
60	**a**	**Y**	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery's management system.
			There are ICES-endorsed saithe management plans that are consistent with MSC Principle 1. Compliance with international conventions and national legislation to protect the marine environment manages the fishery with respect to Principle 2.
80	**a**	**Y**	**Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
			There are ICES-endorsed saithe management plans that are consistent with MSC Principles 1. In the short term the management plan responds to current stock status and adjusts fishing mortalities and TAC levels as necessary, these adjustments underpin the long term objectives of sustainable fisheries and high yield. For MSC Principle 2, the fishery is managed in compliance with international conventions and national legislation for the protection of ETP species (red list fish, birds and mammals), habitats, particularly coral areas, and in accordance with the ecosystem approach. This covers MSC Principle 2.
100	**a**	**Y**	**Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
			There are ICES-endorsed saithe management plans that are consistent with MSC Principles 1. On the basis of annual age-based analytical stock assessments the management plan responds, in the short term, to current stock status and adjusts fishing mortalities and TAC levels as necessary. These assessments and adjustments in exploitation rates underpin the long term objectives of sustainable fisheries and high yield. For MSC Principle 2, the fishery is managed in compliance with international conventions and national legislation for the protection of ETP species (red list fish, birds and mammals), habitats, particularly coral areas, and in accordance with the ecosystem approach. The statuses of bird and mammal populations are monitored by NINA and IMR. The information gathered is supplied to appropriate bodies (e.g. ICES Seabird and marine mammals working groups) where the significance of fishery interactions are assessed. The MAREANO programme continues to map and monitor the status of marine habitats and this information is provided to appropriate ICES and OSPAR working groups.
References			Marine Resources Act: Lov om forvaltning av viltlevande marine ressursar (havressurslova);http://www.lovdata.no/all/nl-20080606-037.html
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.2.2

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.
			The process to derive fisheries regulations is an interactive and iterative process based on incremental changes which is termed The Regulatory Chain. All the fisheries regulations are aimed at underpinning the saithe fisheries management plans.
	b	**Y**	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take **some** account of the wider implications of decisions.
			According to the Marine resources act, quotas as well as licences can be applied to regulate the fisheries. This is a general rule with no exceptions for seious issues
80	**a**	**Y**	There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.
			The national legislation requires a process to derive fisheries regulations is an interactive and iterative process based on incremental changes which is termed The Regulatory Chain. The legislation also ensures that fisheries regulations are aimed at underpinning the saithe fisheries management plans. According to the Marine resources act, quotas (§11) as well as licences (§12) can be applied to regulate the fisheries. The authority is delegated to the Ministry of fisheries, where the Directorate of fisheries is the executive body.
	b	**Y**	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
			According to the Marine resources act, quotas (§11) as well as licences (§12) can be applied to regulate the fisheries. The authority is delegated to the Ministry of fisheries, where the Directorate of fisheries is the executive body. The general rule is annual measures, but the decision process is incremental and allows for action to be taken as needed. The other important issues are dealt with through the normal regular and ad hoc consultation processes (described in detail above, PI 3.1.2) which are both timely and adaptive and ensure that the wider implications are taken into account.
	c	**Y**	Decision-making processes use the precautionary approach and are based on best available information.
			The ecosystem and precautionary approach is enshrined in ICES methodologies and national legislation and the best and most recent scientific information is always available during the decision-making processes and ensure that caution is used if information is uncertain, unreliable or inadequate.
	D	**Y**	**Explanations** are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
			ICES includes explanation within its annual advice; annual exploitation levels are based on this advice. Other changes in the management regime are subject to consultation and discussion (described in detail above, PI 3.2.2.80b) during which rationale and explanations can be explored.

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PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
100	**B**	**N**	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
			While many issues may be dealt with in a transparent, timely and adaptive manner it is not the case for **all issues**. For example, ICES has identified that cancellation of the port sampling programme has implications for the quality of the NEA saithe assessment. At present neither the Ministry nor IMR have explicit plans to meet ICES concerns.
	d	**N**	**Formal reporting** to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
			ICES publishes its annual saithe stock assessments. In addition to maintaining a real-time website IMR publishes an annual overview of research findings, including the state of the fish stocks(Aglen & al, 2012). The Coast Guard, Directorate and Ministry also publish annual reports that are distributed to their parent organisations and cooperation parties in the management. There is no formal direct reporting to all stakeholders.
References			Aglen A., Bakketeig I.E., Gjøsæter H., Hauge M., Loeng H., Sunnset B.H. og Toft K.Ø. (red.) 2012. Havforskningsrapporten 2012. Fisken og havet, særnr. 1–2012.
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.2.3

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	Monitoring, control and surveillance mechanisms exist are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.
			There are comprehensive monitoring, control and surveillance systems in place robustly enforced by the Coast Guard and the Directorate's fishery inspectors.
	b	**Y**	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.
			There are a variety of penalties to deal with non-compliance and they are rigorously enforced.
	c	**Y**	Fishers are **generally thought** to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.
			The MFCA is satisfied that there is a high degree of compliance throughout the fishery.
80	**a**	**Y**	A monitoring, control and surveillance **system** has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.
			There are comprehensive monitoring, control and surveillance systems in place to enforce catch quota and conservation measures throughout the fishery. The Coast Guard and the Directorate's fishery inspectors undertake enforcement duties on land, at sea and in the air.
	b	**Y**	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.
			There are a variety of penalties to deal with non-compliance and they are rigorously enforced. The majority are dealt with by administrative actions, but if necessary they can also be dealt with in the court. The level of penalties encourages a high degree of compliance.
	c	**Y**	**Some evidence exists** to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.
			The MFCA is satisfied that there is a high degree of compliance throughout the fishery. In addition to the enforcement officials, observers aboard reference fleet vessels gather a variety of biological and supporting information of importance to the effective management of the fishery.
	d	**Y**	There is no evidence of systematic non-compliance.
			The MFCA is satisfied that there is a high degree of compliance throughout the fishery. The low level of prosecutions resulting from the intensive surveillance is indicative that there are no systemic problems with respect to compliance.
100	**a**	**Y**	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
			There are comprehensive monitoring, control and surveillance systems in place to enforce catch quota and conservation measures throughout the fishery. The Coast Guard and the Directorate's fishery inspectors undertake enforcement duties on land, at sea and in the air. They adopt a risk-based approach aimed at areas, fisheries and vessels thought to pose the greatest risk of non-compliance.

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PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
			In 2011, the Coast Guard carried out 1114 inspections at sea (all fisheries, all nations, in the Norwegian EEZ) of which 128 resulted in actions. Of these, 103 were warnings, 19 cases were referred to the police for prosecution and 6 vessels were ordered into port for further investigation.
	b	**Y**	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
			There are a variety of penalties to deal with non-compliance and they are rigorously enforced. The majority are dealt with by administrative actions, but if necessary they can also be dealt with in the court. The level of penalties can vary from simple fines through to, and including, confiscation of catch and gear, suspension withdrawal of licence. These measures are applied with equal rigour across all vessels which encourage a high degree of compliance.
	c	**Y**	There is a **high degree of confidence** that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
			The MFCA is satisfied that there is a high degree of compliance throughout the fishery. In addition to the enforcement officials, observers aboard reference fleet vessels gather a variety of biological and supporting information of importance to the effective management of the fishery. Every vessel is required to keep up-to-date (real-time) records of fishing activity, location and catch, and to report this on a regular (daily) basis. These records are cross-checked at sea with retained and on landing with sales notes. This enables the authorities to manage the fishery effectively and ensure that quotas and TACs are not exceeded.
References			Coast guard: LOV 1997-06-13 nr 42: Lov om Kystvakten (kystvaktloven). http://www.lovdata.no/all/hl-19970613-042.html LOV 2008-06-06 nr 37: Lov om forvaltning av viltlevande marine ressursar (havressurslova) http://www.lovdata.no/all/hl-20080606-037.html English translation: http://www.fiskeridir.no/english/fisheries/regulations/acts/the-marine-resources-act LOV 1999-03-26 nr 15: Lov om retten til å delta i fiske og fangst (deltakerloven). http://www.lovdata.no/all/hl-19990326-015.html
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			

Evaluation Table: PI 3.2.4

PI 3.2.4		The fishery has a research plan that addresses the information needs of management	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	**Research** is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.
			IMR maintain a biological sampling and research programme consistent with the needs of the annual stock assessment and safeguarding the marine environment.
	b	**Y**	Research results are **available** to interested parties.
			IMR maintain a website on which the results from the most recent research vessel cruises are published in addition to results from longer-term research programmes.
80	**a**	**Y**	A **research plan** provides the management system with a strategic approach to research and **reliable and timely information** sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
			The ICES-endorsed saithe fishery management plan takes a strategic approach to stock sustainability and this is underpinned by the annual and long-term research plans and projects undertaken by IMR. These plans and projects are all consistent with the objectives of MSC Principles 1 and 2.
	b	**Y**	Research results are **disseminated** to all interested parties in a **timely** fashion.
			Research results are made verbally available to officials and the industry as necessary, to the public via the IMR website and to the scientific community through ICES and internationally peer-reviewed publications.
100	**a**	**Y**	A **comprehensive research plan** provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and **reliable and timely information** sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
			The ICES-endorsed saithe fishery management plan takes a strategic approach to stock sustainability and this is underpinned by the annual and long-term research plans and projects undertaken by IMR. These plans include short-term monitoring and long-term research of immediate relevance to the saithe stocks as well as many, if not all, of the non-target species in the saithe fisheries. Research plans and projects also include an eco-system approach for monitoring and assessing the status of the regional seas, sensitive and vulnerable marine habitats. In addition, there are specific programs (e.g. CRISP) that are aimed at investigating the potential for rationalizing and improving specific aspects of management and utilization of resources.
	b	**Y**	Research **plan** and results are **disseminated** to all interested parties in a **timely** fashion and are **widely and publicly available**.
			Details of the IMR research plans and projects appear in their annual report. Research results are made verbally available to officials and the industry as necessary, to the public via the IMR website and to the scientific community through ICES and internationally peer-reviewed publications.
References			Aglen A., Bakketeig I.E., Gjøsæter H., Hauge M., Loeng H., Sunnset B.H. og Toft K.Ø. (red.) 2012. Havforskningsrapporten 2012. Fisken og havet, særnr. 1–2012. http://www.imr.no/publikasjoner/andre_publikasjoner/havforskningsrapporten/nb-no IMR website: www.imr.no Sigbjørn Mehl, Åge Fotland, Bjarte Bogstad, Knut Korsbrekke and Harald Gjøsæter Evaluation of the proposed harvest control rule for Northeast Arctic saithe – background, population model, parameters, data and preliminary analyses. Working Document No. 4, Arctic Fisheries Working Group, Vigo 18 – 27 April 2007

	http://brage.bibsys.no/imr/handle/URN:NBN:no-bibsys_brage_5830 AGREED RECORD OF FISHERIES CONSULTATIONS BETWEEN NORWAY AND THE EUROPEAN UNION FOR 2012. BERGEN, 2 DECEMBER 2011 - ANNEX III).
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

Evaluation Table: PI 3.2.5

PI 3.2.5		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system	
SG	**Issue**	**Met? (Y/N)**	**Justification/Rationale**
60	**a**	**Y**	The fishery has in place mechanisms to evaluate **some** parts of the management system.
			All catches are recorded, retained and reported, conservation measures are enforced, these data all contribute to the evaluation of the management system through the annual stock status assessment.
	b	**Y**	The fishery-specific management system is subject to **occasional internal** review.
			The management system is subject to review through the annual consultation meetings and annual reporting systems of the enforcement authorities.
80	**a**	**Y**	The fishery has in place mechanisms to evaluate **key** parts of the management system
			Key parts of the management system are TAC and quota enforcement, and the protection of juvenile fish. Their effectiveness is evaluated through the annual stock assessment process and status of the stock year-on-year.
	b	**Y**	The fishery-specific management system is subject to **regular internal** and **occasional external** review.
			The system is subject to annual internal review, e.g. through the formal consultation meetings (See PI 3.1.2), and externally through the annual ICES stock assessments and periodic reviews of the management plan.
100	**a**	**Y**	The fishery has in place mechanisms to evaluate **all** parts of the management system.
			Key parts of the management system are TAC and quota enforcement, and the protection of juvenile fish. Their effectiveness is evaluated through the annual stock assessment process and status of the stock year-on-year. Other parts of the management system (e.g. conservation measures, compliance enforcement) are subject to evaluation through the annual reporting and performance review procedures of the relevant research and enforcement bodies.
	b	**Y**	The fishery-specific management system is subject to **regular internal and external review.**
			The system is subject to annual internal review, e.g. through the formal consultation meetings (See PI 3.1.2) and the annual report procedures required by the research and enforcement bodies. In addition, the Ministry's contribution to the annual state budget includes an overview of activities and results, and suggestion for further actions, foreferer approval by the Storting (parliament). The auditor general of Norway performs financial audits , performance audits and corporate control. External reviews of the status of the saithe stocks and their management are undertaken by ICES both through the annual stock assessments and periodic reviews of the management plan.
References			Auditor general of Norway: http://www.riksrevisjonen.no/en/Pages/Homepage.aspx

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

MSC FISHERY ASSESSMENT REPORT

Appendix 1.3 Conditions

No conditions were raised at this re-assessment. All conditions raised at previous assessment are satisfactoriy closed.

3 recommendations were raised at this re-assessment.

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APPENDIX 2. PEER REVIEW REPORTS

Peer Review 1

Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**No**	**Conformity Assessment Body Response**
Justification: The evidence provided in the report supports the majority of scores and outcomes for Principles 1 and 3, but is inadequate to properly judge much of principle 2. This is because there is no distinction in evidence and scoring (apart from 2.4 habitats) between any of the numerous gear types that take saithe or, indeed, the trawl fishery and "other" gears combined. There is a lack of information on the areas fished by the various components of the saithe fishery, and the global treatment of (mainly qualitative) information on fish and other fauna both landed and discarded by the (mainly) offshore demersal reference fleet fails to provide the evidence with which to score many of the elements of P2 for other gears. It would be preferable to identify and provide information for separate, unambiguous, UoCs, split by the two target species (NE Arctic saithe and North Sea saithe) and by the various gear types used to catch them. This approach was used in a recent assessment of North Sea sole and plaice landed from Dutch vessels using three types of towed gear with three mesh sizes, in which P2 scores varied considerably between UoCs. MSC might be encouraged to indicate which treatment is preferable.		With the exception of habitats, the decision was taken jointly by the assessment team to treat the fishery as a single fishery where all gears are equally likely to interact with retained, bycatch and ETP species, unless specified otherwise. As the data on bycatch species is limited (mainly, but not only, from trawlers) this represents a conservative, worst-case approach. As for gear distribution, we know that towed gears are not permitted within fjord closing lines and small vessels work inshore but all gears are used to some extent throughout Norwegian waters.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	**NA**	**Conformity Assessment Body Response**
Justification: There are no conditions raised, and none required.		

If included:

Do you think the client action plan is sufficient to close the conditions raised?	**NA**	**Conformity Assessment Body Response**
Justification: No CAP is required		

MSC FISHERY ASSESSMENT REPORT

General Comments on the Assessment Report (optional)

A general problem with this report is the lack of clarity as to what fishing operations constitute the various UoCs in this assessment. My chief concern is whether certification is being sought for all Norwegian vessels that are permitted to land saithe (bearing in mind that discarding of commercial species is not allowed) or is it intended only to cover fisheries that are specifically directed at saithe. If the latter, a much better definition of the gear being used by each UoC is required, especially with respect to mesh size used, and more specific information is needed on catches/landings of other species from the various components of this fishery. This will provide a means of narrowing down the list of species considered under P2. If the assessment is intended to cover all saithe landings by Norwegian vessels, then it is still necessary to clearly identify the main retained species and by catch species for each UoC. In your **Summary of Scores,** you have distinguished only between trawl and other gears combined, and do not take account of any differences that might arise were purse seines, Danish seines, lines, gill nets etc to be scored separately. This is not a problem for P1 or P3, but there is highly likely to be some substantial differences between the catch composition of these various gears. These have not been considered in scoring P2, where you appear to assume that all fisheries are alike in this respect. This treatment is at odds with that in the recently completed CVO North Sea sole and plaice assessment, where each gear type and mesh size was scored separately, with varying results (a fail in some cases).

Specific comments on the text:

Peer Reviewer 1 Specific comments on the Assessment Report text	Conformity Assessment Body Response
Glossary: this is a long list to have to keep referring back to. Please omit any that do not appear in the report (e.g. NACSO) or that appear only once.	Corrected as per the decision of the assessment team
List of symbols and reference points: there is scope for confusion between Bmsy, which you define as the biomass corresponding to MSY (the peal (sic) value on a domed yield-per-recruit curve); and SSB_{MSY}, defined as the SSB supporting MSY. Are these different values? and doesn't B here stand for SSB?	SSB_{MSY} removed from list as it has not been used in the report either.
List of fish species: it would be useful to make clear here that the two species of redfish dealt with in this report are golden redfish *S. marinus* and beaked redfish *S. mentella* (though this information is duplicated later in the report)	Clarificaiton included in list of fish species.
Under **1.4.1 Strengths**, you include in the fisheries'attributes that the past twenty years has seen a period of mainly good to above average recruitment helping to achieve sustainability. However, this is an historic perspective, and you later note that the declining trend in biomass over the past 5–6 years for the North Sea stock is principally a function of low–average recruitment since the last big year class in 2005, and that there has been a recent negative trend in recruitment in the NE Arctic stock which has resulted in a comparable negative trend in SSB. Furthermore, you later say that the high proportion of immature saithe in the NEA stock, coupled with the decline in SSB since 2005, gives rise to concerns by the Norwegian Fisheries Ministry. This hardly indicates a strong attribute.	No changes made – these are based on different perspectives pertaining to different periods.

Under 1.4.2 Weaknesses, what does **"**the ecological role of the stock is not recognized with a high degree of certainty with respect to reference points" mean?	Removed from the report
1.6 Conditions for certification: your second recommendation concerns quantification of discard rates across Norwegian saithe fisheries, but discarding is not permitted in Norwegian waters or by Norwegian vessels (see **3.4.8**). You later say that at-sea observations on reference vessels indicate low frequency and quantities of discarded fish, which are too small to have a significant effect on the reliability of assessments or undermine the management regime. Why is this recommendation necessary?	This is well documented in the scorig comment table PI 2.2.2
3.1.1 Unit of certification, Geographical areas: do Norwegian vessels not fish for saithe in ICES Division IIIa (Skagerrak)? Apart from **Figure 29**, which shows areas of saithe trawling activity based on logbook records of three trawlers, nowhere in the report is there any information on actual areas fished for saithe by the Norwegian fleet. **Harvest methods**: for clarity and consistency, it would be useful to specify Purse seines (as for Danish seines), rather than Seine nets (purse). Later in the report there is considerable scope for confusion as to what gears are actually being used to catch saithe and associated fish species, and some discussion of mesh sizes used in purse seines and gill nets (I assume that all trawls and Danish seines use 120+ mm) would be useful (see **Table 16**, where a number of the species listed would not be caught by mesh sizes used to target saithe). This issue is raised again under **3.5.9 Rights of access to the fishery**, where you say that fisheries for saithe can be conducted under licenses: that permit fishing in certain areas and for certain species, and to which quotas are linked. Do all 256 of the smaller vessels operating in coastal and inshore waters (Table 24) have permission to fish for saithe and, if so, what is distinctive about "saithe trawl"?	ICES division IIIa is not included in the scope of this assessment.The actual fishing areas covered by this assessment are mentioned in chapter 3.1.1 Th gears covered by this assessment are documented in chapter 3.1.1
3.3.1 Saithe Life History and biology: you note that the mean age-at-maturity of NE Arctic saithe has increased in recent years, whilst that for North Sea saithe is also quite variable but considered fixed for assessment purposes. Do these different treatments affect the respective assessments of stock status, or are there implications for stock production and sustainability?	These differences are as reported by ICES in the relevant assessment working group reports and we accept the judgement of these experts. The smoothing technique for the NEA saithe is one commonly used for maturity data in ICES stock assessments. In the case of the North Sea the use of a fixed maturity ogive has been endorsed by an ICES Benchmark workshop, a group of independent experts who review the work of the assessment working group on a regular basis.
3.3.2 The history of the fishery: repeats much information previously given in **3.2.3 The Norwegian saithe fisheries**, which could usefully be merged.	A minor issue of presentation not fact which we prefer to leave.

You note the increasing use of semi-pelagic gear in the offshore saithe trawl fishery (at **3.5.2, Groups with interests in the fishery**, you suggest that this is a recent development), and that this mode of operation is currently only permitted within the Norwegian 200nml EEZ south of 64°N without explaining the reason for its prohibition in the saithe fishery to the north. Since there are considerable differences in the environmental impact of demersal or semi-pelagic use, it would be useful to know what proportion of fishing time (for saithe) is exerted by the two trawl variants (or, indeed , in fully pelagic mode). If the Norwegian industry is "keen to move toward semi-pelagic fishing for saithe", what is restricting it?	The proportion of the catch taken by the different gears in each area is well described in the second paragraph of the History of the Fishery and is also documented in the relevant stock annexes to the ICES working group reports. Issues related to environmental impact of the gear types are dealt with under Principle 2. The current restrictions on the use of the semi-pelagic trawl are explained in the text. Because this gear is new in the saithe fishery its introduction is currently considered to be experimental. Wider use of this gear type in future is dependent on the results of what is in effect a trial fishery principally to look at the average size of the saithe caught. That is all the information we obtained during the site visit. The text report states: "Under current Norwegian fishery regulations, the use of pelagic trawls is prohibited within the Norwegian 200′ fishery zone north of 64° N." This is a statement of fact and does not justify further background any more than giving a detailed explanation as to why the minimum mesh size or minimum retention size are what they are.
3.3.3 North East Arctic saithe, 3.3.3.2 Management plan: it seems odd that the HCR (which ICES views as consistent with a precautionary approach to the fishery's management) requires F to be linearly reduced from Fpa at SSB=Bpa to 0 at SSB = zero (i.e. complete stock collapse), rather than F=0 at Blim. Is this correct, given that you later note (at **3.3.3.3 Biological reference points**) that the management plan targets for SSB and F are precautionary and designed to maintain SSB above the target of 220,000 t. What is the justification (in biological or Y/R terms) for the variation in MLS between gears, areas and TAC proportional uptake?	The harvest control rule was evaluated by ICES in (2007) and again in 2011 due to changes introduced at the 2010 benchmark (ICES, 2010a). ICES concluded that it is consistent with a precautionary approach to the management of the fishery provided that the assessment uncertainty and error are not greater than those calculated from historical data. In addition to the ICES evaluation of the management plan the assessment team consider the approach of starting to reduce F at Bpa rather than at Blim ,which is more usual in management plans, is in fact more precautionary.
3.3.3.3 Biological reference points: it might be useful here to explain what if meant by F bar, why it was changed from 3-6 to 4-7 in 2005, and whether the change in age range in the assessment from 11+ to 15+ years might affect estimation of reference points (or, indeed, perceived stock status).	The term Fbar is standard ICES terminology and has been widely used in numerous MSC reports over the years and is generally well understood. In this report an explanation has been added to the effect that Fbar is the age range of the fish in years for which annual fishing mortality is calculated in the stock assessment model. The reasons for the change and implications of the change are detailed in the relevant ICES working group reports and the overarching benchmark workshop in 2010 all of which are referenced in the report.
3.3.3.4 The assessment model: you note that the Norwegian coast acoustic survey for NE Arctic saithe comprises two indices, covering ages 4 to 8 years for the period 1994 to 2001 and ages 3 to 7 years from 2002 onwards. This suggests that these surveys are accompanied by fishing to obtain age distributions: is this the case?	It is the case in almost all acoustic surveys that regular fish sampling forms an important and integral part of the survey technique. The Norwegian coast acoustic survey is not an exception. Regular fishing on the acoustic traces is required both for biological sampling of the target species and for trace identification.
Figure 10: showing the estimate of SSB of NE Arctic saithe from 1960 to 2012, is redundant, since the same information is presented in **Fig. 12**, which also shows the	Agreed, but Figure 12 shows the SSB in relation to Bpa, Bmp and Blim and we prefer to leave both Figures in the relevant part of the report where they are easily referred to.

biomass reference points and is therefore much more informative. The same comment applies for **Figs 19** and **22**.	Agreed but similarly we prefer to leave both Figures in the report for ease of reference.
You note that saithe in both stocks first appear in the fishery as 3 year olds, but I presume that the numbers of 3-year old fish in the stock are not actually measured but are back-calculated by XSA from numbers of older ages. If so, this explains why predicting recruitment strength for catch forecasts is difficult and why the year classes 2008 and 2009 are assumed average in the 2012 NE Antarctic saithe assessment forecasts.	Agreed
Apart from the recruiting age group (3), it is no surprise that the patterns in **Figures 15** and **16** (and in **25** and **26**) are identical, since the former is derived from the latter. Why present both?	One is numbers in the catch from biological sampling the other numbers in the stock derived from the stock assessment. Yes they are similar but they are referred to separately and we prefer to have both presentations.
3.3.4.2 Management plan: I think that the numbered elements (3 and 4) for the **North Sea saithe** stock plan need to be edited.	Agreed – the text of the Management Plan has been checked and elements 3 and 4 have been corrected.
3.3.4.3 Biological reference points: you say that Blim is set at the lowest observed level of SSB in the historic time series, and that this is a level above which there have been no appreciable signs of impaired recruitment. In fact, it is not known what constitutes impaired recruitment (but NB the recent declines in SSB in both stocks when recruitment has been around or below the long-term average), and there is no information about recruitment below Blim (i.e. it has no biological basis).	This is absolutely right; the mechanisms generating recruitment variability being the great imponderable in the assessment and management of most fish stocks. We have reported the fact that Blim is set at Bloss which the ICES working group also define as the level above which there have been no appreciable signs of impaired recruitment and therefore a level below which it would be unsafe for the stock to fall. These reference points, are and the basis for them, regularly reviewed within the ICES system. The assessment team are not in a position to dispute these facts as presented to them.
The relevant reference points are given and explained in Table 7. Why then confuse the issue by introducing so called “precautionary reference points” F0.1, Fmax, Fmed and Fhigh, which are not used in management ?	We have included them to complete the picture because they are all quoted in the ICES working group report as the full list of reference points derived in 2006.
You note that the benchmark stock assessment carried out in May 2011 excluded ages 3-5 for the commercial tuning indices, a decision that was reversed in an update assessment in November 2011. This dithering by ICES causes some consternation at the time (was the stock still within safe limits? should certification be continued?) and an explanation is required of the change in parameters in November 2011 that was upheld in May 2012 (or refer forward to **3.3.4.6 Uncertainty in the assessment**).	The peer reviewers’ description, of the carefully considered changes in the commercial cpue input data to the stock assessment, as ‘dithering by ICES’ is unreasonable. He is well aware of the rigorous exploration and statistical analysis undertaken before any changes are made to any tuning index input parameters by a working group. The process is described in detail in the 2012 working group report. It is worth pointing out that the results of the assessment, and in particular any protocol changes, are also carefully scrutinised by the ICES advisory committee. The assessment team are satisfied with the results of the 2011 update and the 2012 stock assessments endorsed by ICES ACOM. We have added the ICES working group explanation of the problem, related to age groups covered by the commercial and survey indices, to the section 3.3.4.6 as requested.
Under **3.4.1 Marine Environment Research**, you provide a nice description of IMR’s role in marine environmental research institute, and monitoring, assessment and provision of advice on living marine resources in Norwegian and adjacent waters. This information is	Section on Marine Envirnoment Research has been moved from section 3.4 to end of section 3.2.

relevant to P1 as well as P2, and could usefully be introduced much earlier in the report.	
I think that you need to be careful not to imply that secondary production (and the basis for fish production) in the Norwegian Sea is decreasing: a time series since 1997 is hardly sufficient to show this; and is there any evidence that displacement of *C. helgolandicus* by *C. finmarchicus* is actually affecting recruitment?	If the reviewer reads the relevant paragraph again he will find that it answers all his concerns quite adequately. A fifteen-year time series may be short relative to the 60+ years of cod SSB estimates, for example, but it is still a relevant and meaningful benchmark.
There is a contrast between your statement that the ecosystem in the Norwegian Sea has a relatively low biodiversity (last para. **3.4.2**) and the claim that the deep-water coral reefs are home to incredibly rich biodiversity. A reduction in the number of superlatives used might help to avoid such inconsistencies.	Agreed
3.4.4 Fish communities: you have used a list of fish species recorded by observers and from landing statistics for the demersal reference-fleet to indicate which species might be regarded as by catch. Are these vessels targeting saithe (other fisheries may not be relevant here), and does this include catches taken by semi-pelagic gear and purse seines? (You repeat this at **3.4.8 Retained species**, where you explain that the total catch figures are treated as if all species were by catch in the saithe fishery). If so, only cod and haddock should be considered as "main retained species" (comprising >5% of catch, as you imply in the scoring table), and the other species need not be dealt with here unless there are significant discards ("by catch" in MSC terms) or they are ETP species. I suggest that, in the interest of brevity and relevance, detailed information on ling, tusk, Greenland halibut, anglerfish, catfish, lumpsucker, hake, pollack, halibut, plaice, blue ling and whiting is omitted from this report unless the scale of catches by the saithe fishery is considered non-negligible (in stock terms). Redfish are dealt with under ETP species.	The full list of species given in the present text is retained. If they are deleted someone will complain that the list is incomplete.
3.4.4.1.2 Norwegian coastal cod: you say that ICES' trends-based assessment of coastal cod indicates that the SSB is close to its lowest (historic) value and recruitment has remained low in recent years. There is a Norwegian stock-rebuilding plan that presumably incorporates a suite of inshore gear-related technical conservation measures aimed at minimising catches of coastal cod, including restrictions on trawling and Danish seining in inshore waters. Does this effectively preclude that saithe fishery from taking coastal cod and, if not, are there measures that enable the coastal cod fishery (which would probably fail P1 if considered on its own) to be included in the MSC-certified Norwegian NEA cod fishery which might apply to the saithe fishery?	Coastal cod has been subject to a specific MSC assessment and met the minimum criteria; it now forms part of the Norwegian cod fishery certification. The gear and area restrictions to protect coastal cod affect all demersal fisheries whether directed at cod, saithe or any other demersal species.
3.4.4.16 Other fishes: is this wide range of elasmobranch and bony fishes identified from sales slips and by observers on reference fleet vessels (**Table 16**) representative of by catch taken by all components of the saithe fishery under assessment?	The conservative (i.e. worst-case) option has been to assume that it does.

3.4.5 Seabirds: 1st para. needs editorial attention, in particular ref. black-backed gulls and relevance of Greenstreet *et al.* (1999) to saithe recruitment (what was his answer?).	The paragraph has been changed to include: "Although there was evidence of high consumption of saithe in years with strong recruitment and low consumption in years of low recruitment the relationship was not strong enough for stock assessment purposes."
You state that seabird by catch in the targeted saithe fisheries is too low to justify formulation of an management strategy, but then include a table (**17**) that lists seabird species recorded by inshore demersal reference-fleet vessels. Are these fishing for saithe, and are there any data that help to quantify the relative mortalities implied? The same question arises with **marine mammals** (mink?).	The inshore demersal reference fleet is fishing for demersal species. By treating the data as if it were all from a directed saithe fishery it represents the most conservative (worst-case) interpretation.
Though marine mammal interactions with the saithe fishery appear to be infrequent (how many are implied by *n* per decade and *N* per year?), it is not useful to compare the numbers involved with the numbers killed in the directed Norwegian seal and whale hunts or to the Norwegian perspective of threats to the fishing industry. I strongly suggest limiting this para. to "The fishery–marine mammal interactions recorded on reference-fleet vessels was reviewed during 2011 (Bowering et. al., 2011; WGMME, 2011) and results show that such interactions are infrequent and the numbers involved are certainly trivial in population terms". This does, however, raise the question as to whether the overall mortality of those seal and whale species (taken by the saithe fishery) in Norwegian waters is within acceptable limits (if not, a fail score would result).	AGREED. This does, however, raise the question as to whether the overall mortality of those seal and whale species (taken by the saithe fishery) in Norwegian waters is within acceptable limits (if not, a fail score would result). The assessment team agrees to the PR's comment and has updated the report text accordingly. By treating the data as if it were all from a directed saithe fishery it represents the most conservative (worst-case) interpretation.
Of what relevance is **Fig. 39**?	Figure 39 provides evidence of data collection.
3.4.7 ETP species: note that the MSC define ETP species as those that are recognised by national ETP legislation and those species that are listed in CITES Appendix 1. It would be useful to ensure that your definition tallies with this (there has been some confusion in recent MSC draft assessments).	This is the definition the assessment team has worked on.
3.4.7.1 Golden redfish: without seeing your scoring, it appears that golden redfish, which appears on the Norwegian (but not IUCN) Red List and is highly depleted and subject to relatively high F levels, should be of considerable concern to this assessment unless it can be shown that the saithe fishery is being managed so as not to compromise its recovery. **Blue ling** appears to be a similar, but lesser, concern. Is there any quantitative information on catches of **basking shark, porbeagle, tope, shagreen ray, spiny tail ray or spurdog** by the saithe fleet?	There is a demersal fishing fleet rather than a saithe fleet per se.

3.4.8 Retained Species: NB reference to **Table 19** missing from text. You suggest that the total annual landings of fish by all Norwegian-registered vessels is a more conservative approach to indicating by catch in the saithe fishery than trying to identify precisely what quantities of which species are actually taken in directed saithe fishing. This is not so. The species composition and main retained species (>5% total catch) can vary between fisheries depending on gear used, area fished season and target species. If you don't have saithe-directed data, just say so. This section, incidentally, repeats information presented earlier, and is more suited as comments in the scoring table.	On the contrary, Table 19 is referred to twice in the text. I think that the opening paragraph to the Retained Species section states the interpretation of the fishery quite clearly – overwhelmingly, saithe are taken as part of a mixed gadoid fishery. The assessment team finds that the opening paragraph to the Retained Species section states the interpretation of the fishery quite clearly – overwhelmingly, saithe are taken as part of a mixed gadoid fishery.
3.4.9 By catch: as you explain, by catch (according to MSC) comprises all species that are caught but are then discarded, i.e. not retained onboard. This presents a dilemma in the assessment, since there are no quantitative data available on seabirds or marine mammals caught incidentally (though these have been dealt with under ETP species) and all commercial fish caught by Norwegian-registered vessels must be retained, recorded and landed. Nevertheless, you state that some (unknown) discarding occurs in certain fisheries, but this is irrelevant to an MSC assessment unless it occurs in the fishery being assessed. If it is considered that discarding in the saithe fishery is negligible (are there observer data?), then just say so. Again, which species listed in **Tables 20** or **21** as recorded as discarded from the catches of the inshore and offshore demersal reference fleets are relevant to the saithe fishery (presumably using large mesh nets)?	The assessment team finds that the comment on lack of quantitative data on seabirds and mammals are not relevant for the discussion on by-catch species. Discarding in the saithe fishery is regarded as negligible (Bowering et al., 2011). The data listed in tables 20 and 21 are from the demersal fishing fleet and represent bycatch from vessels catching demersal species, including saithe. By viewing the data as if it all derives from a saithe fishery, we have taken the most conservative (worst-case) view.
Table 22, a consolidated list of the by-catch species (excluding retained or ETP species), and the following review of species' status, do not provide the reader with any further insights without specific reference to their relative contribution to catches taken by the saithe fishery, by gear. This lack of ability to identify the important species (for this assessment) stems from the lack of fishery-specific data, which in turn may be due to the lack of gear-specific details in catch statistics and/or the definition of the units of certification. The list of retained and by-catch (discarded) species might be materially reduced if all saithe fisheries could be assumed to use mesh sizes that select for fish of at least 35 cm.	These data are from the demersal fishing fleet and represent bycatch from vessels catching demersal species, including saithe. By viewing he data as if it all derives from a saithe fishery, we have taken the most conservative (worst-case) view.
3.5.3 Management plan consultations: why is there such a disparity between the	As said in the report, the process for North Sea saithe was a closed process, where little

description of the negotiations on the management plan for North Sea saithe (brief and to the point) and those for NE Arctic saithe (far too detailed for present purposes)? Both were eventually agreed, and evaluated by ICES to be in accordance with the precautionary approach.	information is available. For the NEA saithe, there was an open and very extensive process, which we thought might be worth describing in detail. There is nothing more behind the disparity in description than this.
Under 3.5.4 Consultations with interest groups you mention NGOs, but at **3.5.5 Coordination with other users or activities** you suggest that the most likely sources of conflict are limitations of access to fishing grounds where other installations are located. Is it not likely that MPAs will also limit access to some saithe fishing rounds along the Norwegian coast?	MPAs in the area are coral reefs that are closed for demersal gears. That is generally accepted. There is an ongoing debate about opening new areas for oil activities, and fishermen (and others) are concerned that this will reduce fishing opportunities and endanger the stock. It is not clear as to why consultations with NGOs should be inconsistent with that.
The information given at **3.5.8 Fleet types participating in the fishery** has already been presented at least twice in this report.	Agreed, but we prefer to leave it for easy reference
NE Arctic saithe Condition 3: promotion of rebuilding of the North Sea cod stock should, I think, apply to Norwegian coastal cod. NB, this condition has not yet been closed, which has implications for scoring at 2.1.1.	The condition has been closed now and did apply to the coastal cod.

MSC FISHERY ASSESSMENT REPORT

Performance Indicator Review

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	Yes	Yes	NA	Applies to both saithe stocks	
1.1.2	Yes	No	NA	**For NSea saithe** only. You suggest that uncertainty is introduced because the assessment utilises a long-term mean in the absence of recruitment estimates. However, this does not imply that the limit reference point is not set above the level at which there is an appreciable risk of impairing reproductive capacity, since the mean is only used in catch and SSB forecasts.	This PI has been scored at 80 and each of the 4 scoring issues at SG 80 are well supported by the relevant evidence. There is no discussion on uncertainty and the team are therefore unsure of exactly what point the PR is making here or whether he disagrees with the allocated score.
1.1.3	NA	NA	NA	Applies to both saithe stocks	
1.2.1	Yes	Yes	NA	Applies to both saithe stocks	

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.2	Yes	No		**For NEA stock only**: In the body of the report you state that the HCR requires F to be linearly reduced from Fpa at SSB=Bpa to 0 at SSB = zero (i.e. complete stock collapse). This would not maintain SSB above the management target of 220,000 t.	The details of the HCR are correctly reported in the text of the report. That section on the management plan for the fishery also detals a raft of technical measures in support of the plan.These form an integral part of the overall management strategy. It is this overall strategy which is designed to maintain SSB above the precationary approach / management plan SSB.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.3	Yes	No	NA	**For NS saithe only**. You say there is no explanation for recent low recruitment (there is no relationship between SSB and recruitment), which suggests that there is a lack of information on environmental influences on stock productivity (though recent research has apparently addressed this). Does this also apply to NEA saithe?	Recruitment prediction is a common problem in saithe stocks and has been addressed in response to General comments. Assessment working groups are constantly seeking information on the effects of environmental influences on stock dynamics which can be used in the assessment process. Within the ICES community there are few examples of success in this context but the research goes on. The issue is common to both stocks and the view of the assessment team was that the comprehensive range of relevant information available in support of the assessment and the harvest strategy, fully meets the requirments of SG100a.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.4	Yes	No	NA	**For both stocks**. You should mention here that the main shortcoming in the assessment is its inability to predict recruitment into the fishery, which means that TACs are set without knowing the availability of new recruits to the fishable stock in the coming year (or F in the intermediate year). This suggests that SGs 80c and 100a may not be satisfied.	The problem of surveying and sampling young saithe, up to three years old, is common to all saithe stocks. It is attributable to their inshore, relatively inaccessible, habitat, For North Sea saithe we consider that the uncertainty, which this generates in the assessment process ,is sufficiently well taken into account to meet the requirements of SG80c. The uncertainty generated by the problem of estimating early recruitment is noted and well reflected in the scoring of SG100c (N). Similarly for the North-east Arctic saithe we consider that sufficient account is taken of this recruitment issue to meet the requirments of SG80c. The affect of the recruitment problem on the assessment process, although not specifically mentioned in the scoring comments, has been taken into account in the scoring of SG100c (N)

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1	Yes	No	NA	It would be useful to explain the basis for selecting "main retained" species and which they are for each fishery (and gear type), before discussing their stock status etc. You suggest that, because the associated NE Arctic cod fishery has received MSC certification, it can be inferred that the fishery does not hinder recovery and rebuilding of coastal cod (**2.1.2** indicates that you do not consider this to be a main retained species), but you also note that the client has not yet provided evidence that it has engaged with the national fishery management authorities to develop additional effective means for further reductions in catches of cod in saithe–directed fisheries, and that the existing Condition 3 is not yet closed. This implies that SG 80 c is not satisfied in this respect. It is difficult to see where the overall score of 85 arises, since many of the species listed as being retained do not satisfy the scoring criteria in SG 100a and 100b. Some prioritisation of these species in relation to their catch levels in the various gears would help (applies throughout **2.1**, **2.2** and **2.3**).	Concerns with respect to coastal cod are covered above: all measures for safeguarding coastal cod apply to all fisheries, irrespective of the target species.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.2	Yes	Yes	NA		
2.1.3	No	No	NA	It is difficult to understand the basis for these comments and scores since not only are the main species landed by gear not distinguished, but there is no spilt between NE Arctic and North Sea stocks. That is not to say that the overall score is wrong .	The approach taken has been that as all gears, in all areas have the potnential to catch all retained species to a greater or lesser extent, the fishery is treated as a single fishery with respect to retained species. This is deemed to be the worst-case, i.e. most conservative, view of the fishery.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.1	No	No	NA	It would be useful to explain the basis for selecting "main by catch" species and which they are for each fishery (and gear type), before discussing their stock status etc. However, the only quantitative information presented in the report is on catches of non-commercial fish species in the offshore demersal reference fleet, which may have little bearing on by catch in other gears that take saithe. Of what relevance is the table showing biological reference points for by catch species subject to ICES assessment, when there is no indication of the actual catch of these species in the saithe fisheries?	The data available on bycatch species is derived from a single review document that only differentiated between pelagic, inshore demersal and offshore demersal fisheries. As above, it is deemed that treating all gears in all areas as a single fishery is the worst-case, i.e. most conservative intterpretatiion of the data available. The review document makes it clear that the quantities of bycatch species taken is small. Bowering, R., Storr-Paulsen, M., Tingley, G., Bjørkan, M., Vølstad, J., Gullestad, P. & Lorentsen, E., 2011. Evaluation of the Norwegian Reference Fleet. Institute of Marine Research, Bergen. http://www.imr.no/filarkiv/2011/10/evaluation_of_the_norwegian_reference_fleet_final_report_august_2011_final_rev_logo.pdf/enValdemarsen, J. W. 2010. A CRISP approach to sustainable fish capture. Marine News 11–2010. IMR Bergen. http://www.imr.no/filarkiv/2010/08/hi_nytt_11_web.pdf/en
2.2.2	Yes	Yes	NA	Assuming that all fisheries from which saithe are landed are subject to and conform with this management regime.	

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.3	No	No	NA	It is unlikely that the information provided applies equally to the non-trawl fisheries taking saithe, and that some elements of SG 80 are not satisfied for these gears (unless you have evidence that is not presented here). For example, what is known about by catch in gill nets? For SG 100c, the information gathered by the offshore demersal reference fleet is not sufficient to evaluate with a high degree of certainty whether a strategy is achieving its objective in the other fisheries.	The comments with respect to 100c are valid; it should be N with a revised comment: 'In essence, the strategy is to minimise the catch of non-target fish, including undersize target species; but this does not constitute a comprehensive strategy across the fleet.' The PI score haas been reduced to 80

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.1	Yes	?		It would be useful to explain which are the ETP species likely to be taken in the saithe fisheries before discussing their stock status etc. If data on Red List fish are collected from every commercial fishing vessel (see 2.3.3), why is the information presented in this report limited to the demersal reference fleet? Given that the stock situation of spurdog is so parlous that there is a moratorium on landings (not just directed fishing) of the species in EU fisheries, are the continuing landings of spurdog (c. 200 – 250 t) highly unlikely to create unacceptable impacts?	All demersal red-list fish are vulnerable to capture by one part of the saithe fishery or another, a fishery that is an integral part of the Norwegiandemersal species fisheries. As the fishery is overwhelmingly a mixed species fishery, it is not possible to divvy-up bycatch species among the sectors in a meaningful way. All the catches from the demersal – saithe fleet are discussed in the main text, along with the implications for their respective stocks There is a strategy in place to protect spurdog – no directed fishing. This is one red-list species for which there are quantitative data c. 250 t, a quantity that undoubtedly small relative to the quantitiy of unrecorded spurdog catch discarded elswhere within its range. The EU ban does not mean that is is not caught, merely that it is discarded without record.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.2	Yes	?		Given the stock situation of spurdog, is Norway doing enough to ensure the fishery does not hinder the stocks' recovery?	There is a strategy in place to protect spurdog – no directed fishing. This is one red-list species for which there are quantitative data c. 250 t, a quantity that undoubtedly small relative to the quantitiy of unrecorded spurdog catch discarded elswhere within its range. The EU ban does not mean that is is not caught, merely that it is discarded without record.
2.3.3	Yes	Yes	NA		
2.4.1	Danish seine No Gill net Yes Purse seine Yes Trawl Yes	No Yes Yes Yes	NA	You imply that you know the distribution of Danish seine fishing effort, but this evidence is not provided in the report and SG 100 is not satisfied.	The evidence is implicit in the structure, weight and means of operation of Danish seines. It is a light-weight gear used over flat 'featureless' seabeds. As the distribuition of sensitive marine habitats are well documented (MAREANO), the Danish seiners avoid these areas out of self interest.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.2	Danish seine Yes Gill Net Yes Purse seine No Trawl Yes	Yes Yes No Yes	NA	Much of the commentary against purse seines concerns towed gear.	This was an editorial error. 60a and 80a have been changed to refer to purse seining instead of trawling. Sentence referring to shrimp trawlers has been deleted.
2.4.3	Danish seine Yes Gill net No Purse seine No Trawl Yes	Yes No No Yes	NA	Much of the commentary against gill nets concerns towed rather than static gear. Much of the commentary against purse seines concerns towed gear.	The text of 2.4.3 80a and 100a for gill net and purse seine has been changed to refer to static gear
2.5.1	Yes	Yes	NA		
2.5.2	Yes	Yes	NA		
2.5.3	Yes	Yes	NA		

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.1.1	Yes	Yes	NA		
3.1.2	Yes	Yes	NA		
3.1.3	Yes	Yes	NA		
3.1.4	Yes	Yes	NA		
3.2.1	Yes	Yes	NA		
3.2.2	Yes	Yes	NA		
3.2.3	Yes	Yes	NA		
3.2.4	Yes	Yes	NA		
3.2.5	Yes	Yes	NA		

Comments	Conformity Assessment Body Response

Peer Review 2

Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	Yes/No Yes	Conformity Assessment Body Response
Justification: The assessment team has provided a good overview of the available information on the North East Arctic saithe, the North Sea saithe, the fisheries on the stocks and the interaction between the fisheries, the stocks and the ecosystem. The information was applied appropriately to the indicators and the scoring is in general well justified and supports the conclusion.		

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	Yes/No NA	Conformity Assessment Body Response
Justification: No conditions have been raised		

If included:

Do you think the client action plan is sufficient to close the conditions raised?	Yes/No Not relevant	Conformity Assessment Body Response
Justification:		

General Comments on the Assessment Report (optional)

The report provides a very good presentation of the available knowledge on the North East Arctic and North Sea saithe stocks, the fisheries on the stocks and the interactions with the Norwegian Sea and North Sea ecosystems. The factual basis for the report is scientifically sound, and reflects the large amount of scientific research that has been conducted in the area.

MSY reference points have not been set for NEA saithe and no B_{MSY} has been defined for North Sea saithe. This has not been addressed by the assessment team as prescribed in the MSC Certification Requirements. In absence of explicit MSY biomass reference points the assessment team should clearly describe how the evaluation against the MSY criteria has been made and identify the B_{MSY} proxy applied in the scoring.

The fishery assessed includes five gear types: Danish seine, demersal trawl, hook and lines and purse seine and gill net. The gears are described in general terms in the report (section

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3.3.2) but a section describing the saithe fishery by gear (catch composition, geographical and seasonal distribution) is missing. It would be useful in relation to PI 2 to have gear specific information on how, where and when the fishery is conducted and on the catches taken by gear.

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Performance Indicator Review

North-East Arctic saithe

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	Yes	No	NA	The score is appropriate. The stock target reference point of relevance for this PI is Bmsy (or a proxy). Bmsy is not defined for the stock and the Assement team has not defined a proxy. The rational for the scoring of the SG100 b should address SSB target and not F.	The lack of defined MSY targets for either F or SSB is addressed in comments on 1.1.2 below. The first statement in the scoring comments for SG100b does directly address SSB. The first sentence has now been changed to confirm that at its current level there is a high degree of certainty that it is above the management plan / precautionary target level of 220,000t. Under this PI the team has interpreted issues relating to 'stock' in the wider sense to include fishing mortality as well as biomass. Indeed it is the lack of a high degree of certainty in relation to F which the team has used to reduce the score to 95.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.2	No	No	NA	The score seems appropriate but the rational for the scoring is insufficient. No biomass target reference point has been defined for the stock and an explanation on how the assessment team has defined the implicit stock target reference point and how it is or is not consistent with the MSY approach is missing (see CB2.3.2.of MSC Certification Requirements)	The team has reasonably interpreted the Management plan SSB as a target for the stock and a proxy for Bmsy. It is a point above which the stock is being harvested sustainably with full reproductive capacity and below which management action is triggered. This SSB target and the Management plan F target of 0.35 are considered to be both precautionary and consistent with MSY principles of maintaing full reproductive capacity and a sustainable harvest at a high level. These reference points are kept under regular review by ICES who have accepted that more work needs to be done in order to formally define MSY values for use in any revised harvest control rule. At the last review in 2010 stochastic simulations showed that the highest long term yield, equivalent to MSY, is obtained at fishing mortalities lower than the Management plan target. However operation of the current harvest control rules has ensured that since 2011 F has remained below the Fmp (2012:F.31: 2013 predicted F0.32) and SSB has remained well above the SSBmp. Additional clarification regarding MSY targets has now been aded to the text of the report.

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.3	Yes	No	NA		
1.2.1	Yes	Yes	NA		
1.2.2	Yes	Yes	NA		
1.2.3	Yes	Yes	NA		
1.2.4	Yes	Yes	NA		

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North Sea Saithe

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	Yes	Yes	NA		
1.1.2	Yes	No	NA	Bmsy is not determined for the stock and the justification for the conclusion that the target reference point is such that the stock is maintained at a level consistent with Bmsy or some measures or surrogate with similar intent or outcome (SG80 c) is missing. CB2.3.2.of MSC Certification Requirements).	This PI has been scored at 80 because it does not fully achieve the requirements of SG100 scoring issues b and c. The team is of the firm opinion that the fishery does however meet all the requirements at SG 80 and in particular SG80c. ICES has established MSY reference points for this stock in the form of MSY B trigger and Fmsy. These are embedded in the management plan as targets to maintain the stock in full reproductive capacity and being harvested sustainably. In that context the team considered MSY B trigger, working together with Fmsy to be consistent with MSY principles of maintaing full reproductive capacity and a sustainable harvest.
1.1.3	Yes	Yes	NA		

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Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.1	Yes	Yes	NA		
1.2.2	Yes	Yes	NA		
1.2.3	Yes	Yes	NA		
1.2.4	Yes	Yes	NA		

2.1.1	Yes	Yes	NA		
2.1.2	Yes	Yes	NA		
2.1.3	es	Yes	NA		
2.2.1	Yes	Yes	NA		
2.2.2	Yes	Yes	NA		
2.2.3	Yes	No	NA	The information available for the inshore fleet is inadequate to support a comprehensive strategy and SG100 c is not met. A score of 80 seems more appropriate.	Score has been reduced to 80.
2.3.1	Yes	Yes	NA		
2.3.2	Yes	Yes	NA		
2.3.3	Yes	No	NA		

Danish seine

2.4.1	Yes	Yes	NA		
2.4.2	Yes	Yes	NA		
2.4.3	No	No	NA	VMS data is availble, and it is stated that the distribution and intensity of fishing activity relative to sensitive areas is known. However, the information or referenc to where the information can be found is not provided in the assessment report. I am therefore not convinced that SG 80 b is met.. .	There is frequyent reference to the MAREANO project in the text report, but based on PR comment, reference to the project website and section is included in PI 2.4.3 for all gears. As described in the text, VMS data are available from Directorate of Fisheries
Gill nets					
2.4.1	Yes	Yes	NA		
2.4.2	Yes	Yes	NA		
2.4.3	No	No	NA	VMS data is availble, and it is stated that the distribution and intensity of fishing activity relative to sensitive areas is known. However, the information or referenc to where the information can be found is not provided in the assessment report. I am therefore not convinced that SG 80 b is met.. .	There is frequyent reference to the MAREANO project in the text report, but based on PR comment, reference to the project website and section is included in PI 2.4.3 for all gears. As described in the text, VMS data are available from Directorate of Fisheries

Purse seine					
2.4.1	Yes	No	NA		
2.4.2	Yes	Yes	NA		
2.4.3	No	No	NA	VMS data is availble, and it is stated that the distribution and intensity of fishing activity relative to sensitive areas is known. However, the information or referenc to where the information can be found is not provided in the assessment report. I am therefore not convinced that SG 80 b is met.. .	There is frequyent reference to the MAREANO project in the text report, but based on PR comment, reference to the project website and section is included in PI 2.4.3 for all gears. As described in the text, VMS data are available from Directorate of Fisheries
Trawlers					
2.4.1	Yes	Yes	NA		
2.4.2	Yes	Yes	NA		
2.4.3	No	No	NA	VMS data is availble, and it is stated that the distribution and intensity of fishing activity relative to sensitive areas is known. However, the information or referenc to where the information can be found is not provided in the assessment report. I am therefore not convinced that SG 80 b is met.. .	There is frequent reference to the MAREANO project in the text report, but based on PR comment, reference to the project website and section is included in PI 2.4.3 for all gears. As described in the text, VMS data are available from Directorate of Fisheries

2.5.1	Yes	Yes	NA		
2.5.2	Yes	Yes	NA		
2.5.3	Yes	Yes	NA		
3.1.1	Yes	Yes	NA		
3.1.2	Yes	Yes	NA		
3.1.3	Yes	Yes	NA		
3.1.4	Yes	Yes	NA		
3.2.1	Yes	Yes	NA		
3.2.2	Yes	Yes	NA		
3.2.3	Yes	Yes	NA		
3.2.4	No	Yes	NA	Reference is only made to IMR. Especially for the North Sea saithe research of institutes outside Norway is also of importance.	Other institutes provide routine background data for stock assessments, but the assessment team is not aware of major research projects relevant for saithe at other institutes.
3.2.5	Yes	Yes	NA		

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Any Other Comments

Comments	Conformity Assessment Body Response

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APPENDIX 3. STAKEHOLDER SUBMISSIONS

1. The report shall include:

a. All written submissions made by stakeholders during consultation opportunities listed in CR 27.15.3.1
b. All written and a detailed summary of verbal submissions received during site visits regarding issues of concern material to the outcome of the assessment *(Reference CR 27.15.3.2)*
c. Explicit responses from the team to stakeholder submissions included in line with above requirements *(Reference CR 27.15.3.3)*

(REQUIRED FOR FR AND PCR)

2. The report shall include all written submissions made by stakeholders about the public comment draft report in full, together with the explicit responses of the team to points raised in comments on the public comment draft report that identify:

a. Specifically what (if any) changes to scoring, rationales, or conditions have been made.
b. A substantiated justification for not making changes where stakeholders suggest changes but the team makes no change.

(Reference: CR 27.15.4)

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APPENDIX 4. SURVEILLANCE FREQUENCY

(REQUIRED FOR THE PCR ONLY)

1. The report shall include a rationale for determining the surveillance score.

2. The report shall include a completed fishery surveillance plan table using the results from assessments described in CR 27.22.1

Table A4: Fishery Surveillance Plan

Score from CR Table C3	Surveillance Category	Year 1	Year 2	Year 3	Year 4
[e.g. 2 or more]	[e.g Normal Surveillance]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit & recertification site visit]

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APPENDIX 5. CLIENT AGREEMENT

(REQUIRED FOR PCR)

The report shall include confirmation from the CAB that the Client has accepted the PCR. This may be a statement from the CAB, or a signature or statement from the client.

(Reference: CR: 27.19.2)

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Appendix 5.1 Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)

The report shall include all written decisions arising from an objection.

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