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DFPO and DPPO North Sea, Skagerrak and Kattegat sandeel, sprat and Norway pout fishery

Notification of RBF Consultation

MRAG Americas announces a 30-day stakeholder consultation on the results of a desk-based Risk Based Framework (RBF) qualitative and semi-quantitative assessment of the following Units of Assessment in the DFPO and DPPO North Sea, Skagerrak and Kattegat sandeel, sprat, and Norway pout fishery:

- Sandeel (*Ammodytes marinus*) in Sandeel Fishing Area 4 (North and Central North Sea)
- Sandeel (*A. marinus*) in Sandeel Fishing Area 6 (Kattegat)
- Other sandeel species in all Sandeel Fishing Areas under assessment, including Lesser sandeel (*Ammodytes tobianus*), Corbin's sandeel (*Hyperoplus immaculatlus*), Smooth sandeel (*Gymnammodytes semisquamatus)*, and Greater sandeel (*Hyperoplus lanceolatus*)

Background

MRAG Americas has been carrying out an MSC full assessment of the abovementioned fisheries, an assessment site visit for which was held in June, 2015. Following the site visit, we determined that two of the sandeel substocks under assessment (Areas 4 and 6) and several minor sandeel species that are practicably indistinguishable from the target species (*A. marinus*) are lacking stock assessments and reference points, and therefore are data-deficient. We therefore requested and were granted permission from MSC to vary the Certification Requirements, allowing the assessment team to use the MSC's RBF assessment approach designed for data-deficient fisheries, even though this was not anticipated at the time the assessment began.

The variation request response can be found here:
https://www.msc.org/track-a-fishery/fisheries-in-the-program/in-assessment/north-east-atlantic/dfpo-and-dppo-north-sea-skagerrak-and-kattegat-sandeel-sprat-and-norway-pout/assessment-downloads-1/20159411_VAR_RES_SAN533.pdf

This 30-day consultation is part of the modified RBF process agreed to by MSC.

Consultation

The following pages of this document are the results of the RBF process undertaken by the assessment team, using information gathered at and shortly after the site visit. **MRAG Americas is now providing all interested stakeholders 30 days to consider the**

information presented below, and to provide the assessment team with any comments relevant to the outcome of the RBF process.
Stakeholders may provide written or verbal comments and/or questions to Amanda Stern-Pirlot at MRAG Americas using the contact information below. The deadline for submission is 5p.m. GMT on 13 February, 2016.

More information about the fishery and MSC assessment process can be found here: https://www.msc.org/track-a-fishery/fisheries-in-the-program/in-assessment/north-east-atlantic/dfpo-and-dppo-north-sea-skagerrak-and-kattegat-sandeel-sprat-and-norway-pout

More information about the MSC's Risk Based Framework for data-deficient fisheries can be found here:
https://www.msc.org/about-us/standards/fisheries-standard/msc-risk-based-framework

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Appendix 1.2 Risk Based Framework (RBF) Outputs

Appendix 1.2.1 Consequence Analysis (CA) for Principle 1

Table 1.2.1.a: Principle 1 CA Scoring Template - Target Species

	Scoring element	Consequence subcomponents	Consequence Score
PRINCIPLE ONE: Stock status outcome	**Sandeel in Subarea 4**	**Population size**	100
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
Rationale for most vulnerable subcomponent	Sandeel fishing is not selective for size, sex or species, and sandeel life history factors include early maturation, relatively high fecundity, and high natural mortality. Consequently population size should be very sensitive to effects of fishing. Geographc range, fecundity, age and size structure are expected to show high interannually variation from natural causes and thus be less sensitive indicators of fishery impacts.		
Rationale for consequence score	No analytical assessment or short-term forecast is available for this stock. The ICES framework for category 3 stocks was applied based on a combined abundance index for the ages 0 and 1 from the dredge survey of the Firth of Forth (ICES, 2012). This index is estimated to have increased by more than 20% between 2010–2013 (four-year average) and 2014. The exploitation on the stock is considered to be very low; therefore, no additional precautionary buffer was applied (ICES 2015a). There is no commercial TAC for sandeel in Area 4—only a monitoring TAC for the purposes of establishing a sufficient data set for an analytical assessment in the future. In addition, the entire UK coastal zone is closed to sandeel fishing in Area 4. In 2012 and 2014, monitoring TACs of 5000 t were implemented for this stock. Since the monitoring TAC was established, sandeel catches in Area 4 have been below the catch corresponding to ICES advice. ICES emphasizes the importance of obtaining sufficient sampling from the monitoring fishery. Historically, The sandeel catch in area 4 has been as high as 170 thousand t (in 1997), and routinely in the range of 30-60 thousand t per year, which is well above the current monitoring TAC		

	of 5,000t. Given that much of the sandeel habitat area in Area 4 is unfished due to closed areas and the small monitoring TAC, the team has judged the fishing impact currently to generate an insignificant change to pouluation size or growth rate, and any change is unlikely to be detectable against natural variability for this population.

PRINCIPLE ONE: **Stock status outcome**	**Scoring element**	**Consequence subcomponents**	**Consequence Score**
	Sandeel in Subarea 6	**Population size**	60
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
Rationale for most vulnerable subcomponent	Sandeel fishing is not selective for size, sex or species, and sandeel life history factors include early maturation, relatively high fecundity, and high natural mortality. Consequently population size should be more sensitive to effects of fishing that geographc range or fexcundity age and size structure are expected to show high interannually variation from natural causes and thus be a less sensitive indicator of fishery impacts.		

Raionale for consequence score	Only catch history is known for this substock of sandeel in the Kattegat. In the absence of more information, ICES bases it's advice on the average catch of the three previous years, and applies a precautionary buffer of 20% (ICES 2015b). ICES has been providing TAC advice on this basis since 2013, and the catch each year since then has always been below the TAC advice of ICES. This sandeel bank is only fished by smaller Danish trawlers who report no detectible changes in population size or density during fishing activities in recent years. An experienced Danish sandeel fisherman reported the following (Dan Harding Pedersen pers. comm.) • The sandeel caught in the Kattegat are on average large/old (compared to the other areas), except in very few extraordinary years (1986, 1993) where there seemed to be a temporary massive influx of lots of small/young sandeel (presumably from the North Sea) on every single bank in the Kattegat. The 'normal' Kattegat sandeel occur in high abundance on certain banks (two north of Læsø, one west of Anholt etc.) every year, and more erratically on other banks. • • For these 'safe' banks, the catch rates have been stable throughout the 40-year period that he has been fishing. There will always be sandeel on the other banks as well – but only some of them, so you have to search. This was possible in former times when the quotas and number of vessels were higher. But with the current low quota (last year fished by just two vessels), there are enough fish on the safe banks – so no one will waste time looking for fish on the others. • • He also explained that the low water depth and the fact that it was older/larger fish, meant that no matter how many fish you would see on the sonar when you arrived at a bank, once you had fished on them for a day, the rest would have dispersed so widely that it would take several days for them to come back in large enough densities to make fishing worthwhile – a behavior he felt offered them a kind of natural protection against overfishing. If the fishery at its current scale were depleting thed stock some decline in CPUE might be experienced, and this has not generally been the case. Decreases in catches since the 1990s have been due to additional regulations applied to the fisheries both inside UK jurisdiction and in EU jurisdiction. However, with no positive evidence that the catches are sustainable, score of 60 was awarded for the Consequence Analysis. This corresponds with a potential full exploitation rate but no adverse impacts on recruitment dynamics

PRINCIPLE ONE: **Stock status outcome**	**Scoring element**	**Consequence subcomponents**	**Consequence Score**
	Other sandeel species; all areas: Lesser sandeel (*Ammodytes*	**Population size**	60

	tobianus*; all areas)** **Corbin's sandeel (*Hyperoplus immaculatlus*; all areas)** **Smooth sandeel (*Gymnammodytes semisquamatus*; all areas)** **Greater sandeel (*Hyperoplus lanceolatus)	**Reproductive capacity**	
		Age/size/sex structure	
		Geographic range	
Rationale for most vulnerable subcomponent	Sandeel fishing is not selective for size, sex or species, and sandeel life history factors include early maturation, relatively high fecundity, and high natural mortality. Consequently population size should be more sensitive to effects of fishing that geographc range or fexcundity age and size structure are expected to show high interannually variation from natural causes and thus be a less sensitive indicator of fishery impacts.		
Rationale for consequence score	Without genetic testing or careful taxonomic analysis, Lesser, Corbin's, greater, and smooth sandeel are all indistinguishable from *Ammodytes marinus*, the sandeel species targeted by industrial fisheries. In addition, very little is known about these species, although there is some information about general range and broad habitat preferences.. Lesser sandeel is known to inhabit coastal areas from mid-tide level to around 30m depth in inshore waters with clean and sandy bottoms (van Deurs *et al* 2012). http://www.luontoportti.com/suomi/en/kalat/lesser-sandeel Corbin's sandeel is the most local, least studied and most recently recognized sandeel species. It's distribution is throughout the eastern North Atlantic along all coats of the British Isles, North Sea, English Channel and northern Biscay. It is thought to inhabit inshore and offshore sandeel banks, closely associated with other sandeel species although less gregarious, and juvenilles appear to only occur close inshore. http://species-identification.org/species.php?species_group=fnam&id=1756 Smooth sand*eel (Gymnammodytes semisquamatus)* typically occurs offshore over shell-gravel substrates, and also inshore where shell-gravel beaches occur. It feeds on plankton and is a summer batch spawner (Reay 1986). Spawning occurs from April until July (Lynam *et al.* 2013). Although it thought to be part of the *A. marinus* fishery bycatch in parts of its range, there is a paucity of information available concerning life history, population trends and harvest levels, however, It is likely that *G. semisquamatus* receives some benefit from fisheries management efforts directed towards *A. marinus* which include the establishment of conservation zones and fishing moratoria. http://www.iucnredlist.org/details/18155963/0		

	Greater sandeel is very similar in size and appearance to Corbin's sandeel. It is native to the eastern North Atlantic from Murmansk (70°N) and Spitzbergen (75°N) southwards to Portugal (38°N) including Iceland and the Baltic Sea. It has not been recorded from the Mediterranean Sea or the Barents Sea. It's habitat is from the low water mark down to over 100 m, typically over clean and sandy substrates. It is closely associated with other sandeel species, although probably less gregarious. http://species-identification.org/species.php?species_group=fnam&menuentry=soorten&id=1757&tab=beschrijving In summary, very little is known about the life histories and fishing impact on these sandeel species. However, their habitiat distribution is different from that of *A. marinus* (e.g. more coastal in the case of lesser sandeel, and juvenile habitat appears to be outside the commercial fishing areas for smooth sandeel), and these species are not targeted by the fishery. In addition, the limited information suggests that productivity characteristics of these species are very similar to *A. marinus* (i.e. highly productive). The scoring uses *A. marinus* population status as a reasonable proxy for the the other species, and takes into account that the fishery intends to target on *A. marinus* and those impacts are considered sustainable. Consequenetly it is likely that the fishery targeting *A. marinus* is not impacting the majority of the populations of these other non-targetted sandeel species, and where it does take them incidenlty, there is no cuse to consider the impacts would greater than on the targeted species. Thus, taking a precautionary approach a consequence score of 60 is awarded, corresponding to 'full exploitation rate but no detrimental imapcts on long-term recruitment dynamics.'

Appendix 1.2.2 Productivity-Susceptibility Analysis (PSA)

Table 1.2.2.a. PSA Rationale Table

PI number	**1.1.1-Sandeel in Area 6**	
A. Productivity		
Scoring element (species)	Sandeel (*A. marinus*) in subarea 6	
Attribute	**Rationale**	**Score**
Average age at maturity.	For both males and females, average age at maturity is approximately 2.5 years (ICES 2015b), resulting in a high productivity score for this attribute.	**1**
Average maximum age	Maximum age reported for all the sandeel stocks in the North Sea assessments of 10 years (ICES 2015b), with at least 95% of the population ago 5 and younger . Thus the maximum reported age is on the edge between high and medium productivity according to the MSC PSA table, and the average maximum age is below 10. Therefore a high productivity score for this species is given. The maximum age and maximum length reported in Fishbase, taken rom Muus and Nielsen (1999) are consistent with the ICES figures.	**1**
Fecundity	Reported in Fishbase to be around 25 thousand eggs per year, resulting in a high productivity score for this attribute.	**1**
Average maximum size	Maximum size for North Sea sandeel reported in ICES 2015b is less than 25cm, corresponding to a high productivity score for this attribute.	**1**
Average size at maturity	All the sandeel stocks are reported to commence maturity at around at 11cm (ICES 2015b), and most certainly on average it would be less than 40cm, resulting in a high productivity score for this attribute.	**1**
Reproductive strategy	Several studies (Wright and Bailey, 1996; Proctor et al., 1998; Jensen etal., 2001; Munk et al., 2002; Christensen et al., 2008) and in fishbase (citing Reay 1986), sandeels are open-water broadcast spawners, resulting in a high productivity score for this attribute.	**1**
Trophic level	Trophic level reported in Fishbase based on food items is 2.7, resulting in a high productivity score for this attribute.	**1**
B. Susceptibility		
Fishery only where the scoring element is scored cumulatively	[Insert list of all the fisheries impacting the given scoring element, as required in PF4.4.3].	
Attribute	**Rationale**	**Score**
Areal Overlap	This species is the target of the fishery in Area 6. Although some habitat area may be out of reach of the fishery, there are no protected sandeel habitat areas, therefore a high risk score is given for this attribute.	**3**
Encounterability	This is the target species for the fishery, therefore the vertical overlap of the gear with sandeel distribution is likely to be high, therefore a high risk score is given for this attribute.	**3**
Selectivity of gear type	This is the target species for the fishery, therefore the selectivity of the gear for sandeel is likely to be high, and a	**3**

	high risk score is given for this attribute.	
Post capture mortality	This is the target species for the fishery, therefore PCM is absolute, and a high risk score is given for this attribute.	**3**
Catch (weight) only where the scoring element is scored cumulatively	N/A	**n/a**

PI number	**1.1.1-Sandeel in Area 4**	
A. Productivity		
Scoring element (species)	Sandeel (*A. marinus*) in subarea 4	
Attribute	**Rationale**	**Score**
Average age at maturity.	For both males and females, average age at maturity is approximately 2.5 years (ICES 2015a), resulting in a high productivity score for this attribute.	**1**
Average maximum age	Maximum age reported for all the sandeel stocks in the North Sea assessments of 10 years (ICES 2015a), with at least 95% of the population ago 5 and younger . Thus the maximum reported age is on the edge between high and medium productivity according to the MSC PSA table, and the average maximum age is below 10. Therefore a high productivity score for this species is given. The maximum age and maximum length reported in Fishbase, taken rom Muus and Nielsen (1999) are consistent with the ICES figures.	**1**
Fecundity	Reported in Fishbase to be around 25 thousand eggs per year, resulting in a high productivity score for this attribute.	**1**
Average maximum size	Maximum size for North Sea sandeel reported in ICES 2015a is less than 25cm, corresponding to a high productivity score for this attribute.	**1**
Average size at maturity	All the sandeel stocks are reported to commence maturity at around at 11cm (ICES 2015a), and most certainly on average it would be less than 40cm, resulting in a high productivity score for this attribute.	**1**
Reproductive strategy	Several studies (Wright and Bailey, 1996; Proctor et al., 1998; Jensen etal., 2001; Munk et al., 2002; Christensen et al., 2008) and in fishbase (citing Reay 1986), sandeels are open-water broadcast spawners, resulting in a high productivity score for this attribute.	**1**
Trophic level	Trophic level reported in Fishbase based on food items is 2.7, resulting in a high productivity score for this attribute.	**1**
B. Susceptibility		
Fishery only where the scoring element is scored cumulatively	These susceptibility scores are given considering all known fishing impacts on the species.	
Attribute	**Rationale**	**Score**
Areal Overlap	There are large parts of Area 4 that are off limits to sandeel fishing (i.e. the entire UK coastal zone). In addition, the area fished in order to take the very small research TAC for this area is likely to be much smaller than the total sandeel habitat in Area 4, based on what is known about fishing behaviour in this fishery. Based on this information, and historically much higher catches when there was a commercial fishery in this area, the assessment team has	**1**

	judged areal overlap in Area 4 to be less than 10% of the sandeel habitat, thus a low risk score was given for this attribute.	
Encounterability	This is the target species for the fishery, therefore the vertical overlap of the gear with sandeel distribution is likely to be high, therefore a high risk score is given for this attribute.	**3**
Selectivity of gear type	This is the target species for the fishery, therefore the selectivity of the gear for sandeel is likely to be high, and a high risk score is given for this attribute.	**3**
Post capture mortality	This is the target species for the fishery, therefore PCM is absolute, and a high risk score is given for this attribute.	**3**
Catch (weight) only where the scoring element is scored cumulatively	N/A	**n/a**

PI number	**1.1.1-Other sandeel species, all areas**	
A. Productivity		
Scoring element (species)	Other sandeel species: Lesser sandeel (*Ammodytes tobianus*; all areas) Corbin's sandeel (*Hyperoplus immaculatlus*; all areas) Smooth sandeel (*Gymnammodytes semisquamatus*; all areas) Greater sandeel (*Hyperoplus lanceolatus*)	
Attribute	**Rationale**	**Score**
Average age at maturity.	For both males and females, average age at maturity for *A. tobianus* is approximately 2.5 years (Fishbase). This is consistent with the maturity age for *A. marinus*, and thought therefore to be approximately the same for the other two sandeel species, resulting in a high productivity score for this attribute.	**1**
Average maximum age	Maximum age reported in Fishbase of 7 years for *A. tobianus*, therefore a high productivity score for this set of species is given, assuming a similar maximum age for the other sandeel species.. Maximum age reported in Fishbase is from Reay (1973)	**1**
Fecundity	Reported in Fishbase to be around 25 thousand eggs per year for *A. marinus*. No information on fecundity is available for the other sandeel species, however it is not expected to be significantly different from *A. marinus*, resulting in a high productivity score for this attribute.	**1**
Average maximum size	Maximum size reported in fishbase is 20cm for *A. tobianus*. This is less than that reported for *A. marinus*, and thought to be representative of the other indistibuishable sandeels as a whole, corresponding to a high productivity score for this attribute. Maximum length reported in Fishbase is from Bauchot (1987).	**1**
Average size at maturity	Reported for *A. tobianus* in fishbase to be 11-15cm, resulting in a high productivity score for this attribute.	**1**
Reproductive strategy	Several studies (Wright and Bailey, 1996; Proctor et al., 1998; Jensen etal., 2001; Munk et al., 2002; Christensen et al., 2008) and in fishbase (citing Reay 1986), sandeels are open-water broadcast spawners, resulting in a high productivity score for this attribute	**1**
Trophic level	Trophic level reported in Fishbase based on food items is 2.7, resulting in a high productivity score for this attribute.	**1**

B. Susceptibility		
Fishery only where the scoring element is scored cumulatively	These susceptibility scores are given considering all known fishing impacts on these species.	
Attribute	**Rationale**	**Score**
Areal Overlap	Although none of these sandeel species share the identical habitat to the target *A. marinus* species, because so little is known about the actual proportion of these other sandeel species in the commercial catches, the team has decided to give a high risk score for this attribute, in order to be precautionary. To increase the specificity of this score would require better information on both the habitat preferences of the minor species and the detailed distribution of fishing effort around habitat types in the area of overlap among the species.	**3**
Encounterability	These are not the target species for the fishery, but, as the target species is also a virtually indistinguishable sandeel, the vertical overlap of the gear with sandeel distribution is likely to be high, therefore a high risk score is given for this attribute.	**3**
Selectivity of gear type	These are not the target species for the fishery, but, as the target species is also a virtually indistinguishable sandeel, the selectivity of the gear for sandeel is likely to be high, and a high risk score is given for this attribute.	**3**
Post capture mortality	These are not the target species for the fishery, however any minor sandeel species that are caught during fishing for *A. marinus* are not released, therefore PCM is absolute, and a high risk score is given for this attribute.	**3**
Catch (weight) only where the scoring element is scored cumulatively	N/A	**n/a**

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