



Marine
Management
Organisation

Marine Licensing Team T +44 (0)300 123 1032
Lancaster House www.gov.uk/mmo
Hampshire Court
Newcastle upon Tyne
NE4 7YH

Hornsea 4 Project Team
Planning Inspectorate
HornseaProjectFour@planninginspectorate.gov.uk
(By email only)

Planning Inspectorate Reference: EN010098
MMO Reference: DCO/2018/00014
Identification Number: 20029896

10 May 2022

Dear Jo Dowling,

Planning Act 2008 - Application by Ørsted Hornsea Project Four (UK) Limited (“Ltd”) for an Order Granting Development Consent for Hornsea Project Four Offshore Wind Farm

Deadline 4 Submission

On 4 November 2021, the Marine Management Organisation (the “MMO”) received notice under Section 56 of the Planning Act 2008 (the “PA 2008”) that the Planning Inspectorate (“PINS”) had accepted an application made by Orsted Hornsea Project Four (UK) Ltd (the “Applicant”) for a development consent order (the “Application”).

The Application seeks authorisation to construct, operate and maintain Hornsea Project Four offshore wind farm, comprising of up to 180 offshore wind turbines together with associated offshore and onshore infrastructure and all associated development (the “Project”).

The MMO submits the following as part of our Deadline 4 submission:

- 1. Post-hearing submissions including written summaries of oral case put at any of the hearings held during w/c 25 April 2022 and 2 May 2022**
- 2. An updated version of the draft DCO in clean and tracked versions**
- 3. Comments on any submissions received at Deadline 3**
- 4. Any further information requested by the ExA under Rule 17 of the Examination Procedure Rules**



This written representation is submitted without prejudice to any future representation the MMO may make about the Application throughout the examination process. This representation is also submitted without prejudice to any decision the MMO may make on any associated application for consent, permission, approval or any other type of authorisation submitted to the MMO either for the works in the marine area or for any other authorisation relevant to the proposed development.

Yours Sincerely



Gregg Smith
Marine Licencing Case Officer



Contents

1. Post-hearing submissions including written summaries of oral case put at any of the hearings during the w/c 25 April 2022 and 2 May 2022.....	4
Issue Specific Hearing 2 (ISH2).....	4
Issue Specific Hearing 3 (ISH3).....	4
Issue Specific Hearing 4 (ISH4).....	4
Issue Specific Hearing 5 (ISH5).....	6
Issue Specific Hearing 6 (ISH6).....	6
2. An updated version of the draft DCO in clean and tracked versions	6
3. Comments on any submissions received at Deadline 3	6
4. Any further information requested by the ExA under Rule 17 of the Examination Procedure Rules.....	10
References	11
Annex 1: IHLS larval abundance table and bubble plot from ICES 2020.....	12



1. Post-hearing submissions including written summaries of oral case put at any of the hearings during the w/c 25 April 2022 and 2 May 2022

Issue Specific Hearing 2 (ISH2)

- 1.1. The MMO has no comments to make on the matters addressed at ISH2 on onshore environmental matters on Tuesday 26 April 2022. This is due to our remit lying below Mean High Water Springs.

Issue Specific Hearing 3 (ISH3)

- 1.2. The MMO has reviewed the transcript and Action Points (AP) for ISH3 held on Tuesday 26 April 2022 that addressed offshore environmental matters and has the following comments to make.

- 1.3. AP 9: *“Natural England and MMO to confirm if they are fully satisfied with the inclusion at Deadline 4 in the draft DCO as proposed by the Applicant of a definition and adjustment factor referencing HAT as a datum as well as LAT; and if not, why not.”*

The MMO notes that we requested the DML's be updated to use “highest astronomical tide” (HAT), in opposed to “lowest astronomical tide” (LAT). The MMO outlined this request was because, when discussing ornithological compensation, it would be more efficient to use HAT as this can clearly show the minimum clearance rate and amendments to the rate for compensation. The MMO notes the Applicant's response to this suggestion and their comments made at the Hearing, we also note the responses from Trinity House, and the Maritime Coastguard Agency on this topic. The MMO concurs that the data should be standard throughout the document, and where both are used it should be clearly distinct. The MMO has no issues with the Applicant's suggested compromise of having the definition of HAT and confirm the adjustment factor that's required in relation to references to LAT dimensions within the Development Consent Order (DCO), we would request however, if this is adopted, that it is also included within the Deemed Marine Licences (DMLs). The MMO will review Natural England's comments on the matter and will revise this position in line with the deadline set for a response at Deadline 5 if we feel it necessary.

- 1.4. AP 10: *“Submit comments on the revised draft DCO [REP3-007] and whether this version addresses their outstanding concerns.”*

The MMO acknowledges the Applicant's position put forward at ISH3, that *“all matters that were capable of being accepted from our point of view were taken into the draft at the last deadline. So we're waiting to see how the MMO responds to that, to see if there's any outstanding matters.”* The MMO were not aware of this position prior to the hearing, therefore, will review the DML's and provide its outstanding comments on the Applicant's latest DMLs at Deadline 5.

Issue Specific Hearing 4 (ISH4)



- 1.5. The MMO has reviewed the transcript and APs for ISH4 held on Wednesday 27 April 2022 that addressed the marine environment (excluding ornithology) and has the following comments to make.
- 1.6. The MMO notes the discussion had at the hearing regarding the disposal site coordinates. The MMO has now checked the revised coordinates for the Hornsea 4 disposal site and can confirm that they no longer overlap with the Dogger Bank A and B disposal sites. The MMO is therefore content with the coordinates of the limits for the Hornsea 4 disposal site.
- 1.7. The MMO also notes the discussion had on the sampling requirement condition, and the Applicant's position that *"All offshore construction will be completed by 2029, so within five years from the commencement of offshore works and as such, sampling of the dredge area is unlikely to be required."* The MMO firstly advises that sampling is required either every 3 years, or every 5, depending on the results of the sediment sample analysis. The MMO are currently awaiting clarifications regarding the sampling before it is able to advise on the outcome of the results. Secondly, the MMO requests that the Applicant, in light of their position, provides clarity as to how OSPAR requirements will be adhered to, and how it would be secured, should there be a delay in the construction. We suggest that should the Applicants suggestion of *"dredging disposal activities will be provided in both the Construction Method Statement and the Construction Environmental Management and Monitoring Plans. And the Applicant considers that this mechanism will ensure that regulators can approve details in relation to the dredge and disposal activities"* be carried forward, that the OSPAR sampling requirements are clearly outlined as a matter to be included, and requiring sign off, within the DMLs.
- 1.8. AP 6: *"Provide update on agreement with Marine Management Organisation (MMO) of suitability of dredged sediment for disposal and validation of the laboratories used, through the SoCG process."*
The MMO confirms that we received an update on this matter from the Applicant on 29 April 2022. They clarified that the laboratory used for the sediment sample analysis for both the Array and the export cable corridor was in fact "SOCOTEC", who are a validated MMO laboratory. However, the Applicant outlined that they are still waiting for the certificates for the hydrocarbon analysis, which the MMO has also requested, and require for the review of the analysis results. The MMO believe these are due to be submitted at Deadline 4, and so the MMO will provide an update on our position on this matter at Deadline 5.
- 1.9. AP 10: *"Provide clarification of concerns regarding exclusion of SELcum impact ranges in the approach to Marine Mammal Mitigation Protocol following Applicant's response [REP1-038] to [RR-020-4.3.4] and discussions at ISH4"*.
The MMO are currently seeking technical advice on this matter, and so shall provide a response at Deadline 5.
- 1.10. AP 13: *"Submit promised response to Applicant's clarification note regarding mitigation of noise impacts on herring spawning."*



The MMO has provided its response to the clarification note regarding mitigation of noise impacts on herring spawning within Section 3.1 of this Submission.

Issue Specific Hearing 5 (ISH5)

1.11. The MMO has no comments to make on the matters addressed at ISH5 held on Thursday 28 April 2022 that addressed marine and coastal ornithology.

Issue Specific Hearing 6 (ISH6)

1.12. The MMO has reviewed the transcripts for ISH6 held on Friday 29 April 2022 that addressed the Habitats Regulations Assessment, and the following APs:

- AP 1: *“Respond to each agenda item that is relevant to your remit, as raised by the Examining Authority and responded to by the Applicant during ISH6.”*
- AP 10: *“Provide a summary of your current position regarding project alone and in-combination HRA effects, including Adverse Effect on Integrity, whether a derogation case is robustly made, and if the necessary and without prejudice compensatory measures are sufficiently robust scientifically, and capable of being secured and delivered, if required.”*

1.13. The MMO defers to Natural England regarding the Habitat Regulations Assessment and therefore have no comments to make at this time. However, we will continue to review submissions and may raise comments at a later Deadline.

2. An updated version of the draft DCO in clean and tracked versions

- 2.1. The MMO has noted the Applicant’s updated positions on the draft DMLs within the DCO. The MMO were only made aware that this version was the Applicant’s intended final position on the DML’s on 26 April 2022 during ISH3.
- 2.2. The MMO will therefore review the DMLs and provide its outstanding comments at Deadline 5.
- 2.3. The MMO also confirms that we are content to engage in discussions on the DMLs with the Applicant this month, in line with the request from the Examiners to expedite discussions.

3. Comments on any submissions received at Deadline 3

3.1. Clarification Note on Peak Herring Spawning Period and Seasonal Piling Restriction [REP2-032]

3.1.1. The MMO has reviewed the clarification note on the Peak Herring Spawning period and seasonal piling restrictions [REP2-032] along with our scientific advisors at the Centre for Environment Fisheries & Aquaculture Science



(CEFAS) and wish to make the following comments. Please note that all references to Sections, Figures and Tables relate to the clarification note [REP2-032], unless otherwise specified.

- 3.1.2. The MMO notes, and welcomes the additional clarification set out in Section 2.2 regarding the timings of IHLS survey. The Clarification Note now acknowledges that no IHLS survey was undertaken in 2017.
- 3.1.3. Regarding Section 2.2.1.2, in respect of 2018 IHLS survey data, it states that *“In 2018, the survey was undertaken for the Shetland stock only and is therefore not applicable for use within the back-calculations for the Banks stock (the stock of relevance for Hornsea Four).”*
- 3.1.4. The MMO notes that larval data for the Central North Sea (i.e. Banks stock) in 2018 are available. However, also notes the bold text taken from ICES 2020: *“Four survey areas were covered within the framework of the International Herring Larval Surveys in the North Sea during the sampling period 2018/2019. They monitored the abundance and distribution of newly hatched herring larvae in the Orkney/Shetlands area, in the Buchan area and the central North Sea (CNS) in the second half of September and in the southern North Sea (SNS) in the second half of December 2018 (figure 1.1). **The German survey contribution around the Orkneys started as scheduled, but after one day of sampling the research vessel had to face severe technical problems. There was no opportunity to conduct a safe journey any further, thus the survey had to be stopped after 28 plankton hauls.**”* (...) *“As a consequence, the estimate for the Orkney/Shetland area is very low and biased due to the low area coverage, and no estimate for the Downs components is available in January 2019. **The survey contribution of The Netherlands in September 2018 were as planned and covered the Buchan and the central North Sea.**”* Please see Annex 1, Table 1 and Figure 1 of this submission for information extracted from ICES (2020).
- 3.1.5. The MMO notes in Section 2.3 that the larval length in survey sample data (catch length) has been increased to 10mm, which we support for the purpose of undertaking a precautionary assessment.
- 3.1.6. The MMO also notes in Section 2.4.1.4 that larval length hatch sizes of 5mm (most conservative length) and 6mm (minimum length identified in meaningful numbers within the IHLS data) have now been included as a scenario for the back-calculation, which we also support as an additional conservative approach to the assessment.
- 3.1.7. The MMO appreciates the presentation of the mean temperature data at sampling depths for sampling stations as shown in Figure 4 of the Clarification Note, as this provides a helpful visual depiction of sea temperatures at each sample location which can be used to determine typical durations of egg development and yolk absorption, depending on location. Whilst we recognise that the data depicted in Figure 4 shows mean temperatures at maximum sampling depth of 12°C or higher at the Flamborough Head spawning ground,



we note that lower temperatures ranging from 8-12°C were recorded in the vicinity of Flamborough Head when the individual years of data are viewed in Figures 6 – 17 in Appendix C. With this in mind, the MMO maintains our previous comment that a conservative approach should be taken which considers the maximum durations for egg development and yolk absorption, i.e., the minimum temperatures recorded.

- 3.1.8. In addition, whilst the mean temperatures in the vicinity of Flamborough Head are >12°C, mean temperatures in the area to the north and northeast of Flamborough Head are lower at 10-11°C, so when considering piling noise propagation, it is essential to understand how far the effects of piling noise would extend in this area. With this in mind, we request that the Applicant presents Figure 4 with the modelled noise contours overlaid, based on the maximum hammer energy for monopiling. Noise contours should be presented based on a stationary receptor, for a fish with a swim bladder involved in hearing, and for eggs and larvae, based on the thresholds described in Popper *et al.* (2014); Mortality and potential mortal injury, recoverable injury, and Temporary Threshold Shift (TTS). In addition, we request that the noise contour for the received levels of the 135dB single strike sound exposure level (SELss) at the herring spawning ground are also presented for consideration of behavioural responses in herring based on the findings in Hawkins *et al.* (2014).
- 3.1.9. The Applicant should also note that in past cases where the method of determining a “peak spawning” period has been applied for the purpose of refining/reducing a piling restriction, additional work was done to look at noise spread in the context of larval size, using the modelled noise contours and IHLS data. This was undertaken to estimate a migration period for herring to reach the spawning grounds before spawning. For example, at Rampion Offshore Wind Farm this was 8 days ahead of start of estimated earliest hatch date.
- 3.1.10. The MMO supports the presentation of details of the literature sources for daily growth rates in larvae shown in Table 2. However, having reviewed this information, the MMO maintains its previous comment that a calculated growth rate of 0.46 mm d⁻¹ is high and is not conservative or precautionary for the purpose of the back-calculation. As Heath (1993) acquired growth rates from the field in the North Sea, for Autumn (and spring) spawners, it can be argued that these rates are likely the most appropriate and comparable data to use to inform the back-calculation. Other growth rates listed in Table 2 are either for other stocks or are for reared herring rather than field-observed growth rates. Accordingly, we recommend that the Applicant adopts an assumed growth rate of 0.25mm d⁻¹ to ensure a precautionary approach to back-calculation of spawning.
- 3.1.11. The Applicant maintains that a peak spawning period of 1st September – 16th October is appropriate to avoid population impacts on herring, however the proposal to have a seasonal piling restriction based on these dates cannot be supported as it does not allow for any period of time prior to the ‘peak’ of spawning for herring to migrate to the spawning grounds before spawning takes place. Hence the need for underwater noise modelling, as outlined in points



3.1.8 and 3.1.9. Upon review of the additional information requested, there will be greater confidence to determine a more appropriate restriction period.

3.1.12. The MMO appreciates the actioning of our previous comments and the provision of data we have requested. Whilst we are pleased to note that some of our recommendations for a precautionary approach to back-calculation have been incorporated into the revised Clarification Note, we do still have concerns regarding some of the values and data selected for use in the back-calculation and have requested some further evidence as specified below:

- The Applicant should revisit IHLS data for 2018 – see points 3.1.3 and 3.1.4.
- The Applicant should present modelled noise contours as described in points 3.1.8 and 3.1.9.
- The MMO strongly believe that a calculated larval growth rate of 0.46mm d⁻¹ is not conservative or precautionary and recommend that the Applicant adopts an assumed growth rate of 0.25mm d⁻¹ to ensure a precautionary approach to back-calculation of spawning.

3.1.13. Once the MMO have had sight of the additional information, we will be in a better position to consider a refinement to a seasonal piling restriction.

3.2. **Clarification note: marine processes supplementary work update [REP3-038]**

3.2.1. The MMO has reviewed the clarification note on the marine processes supplementary work update [REP3-038] along with our scientific advisors at CEFAS and wish to make the following comments.

3.2.2. The report is a holding note to describe the procedures that the Applicant will undertake to answer questions about the sensitivity and receptor status of both Smithic Bank and the Flamborough Front.

3.2.3. Whilst the MMO support the use of Expert Geomorphological Assessment (EGA) to assess the potential impacts on Smithic Bank, we understand there are no Guidance/Best Practice documents for this. EGA varies in quality depending on the detailed scope of work (which has not yet been not supplied), the time available and the expert group assembled. As this stage, the quality and outcomes can't be assessed.

3.2.4. Regarding the Flamborough front, it is surprising to see that Historic Trends Analysis is not available, as historic satellite images are available in various archives, for example in ESA Sentinel 3 imagery for Infra-red parameters (section 2.1.1.1), we advise that this will be a useful resource.

3.2.5. The MMO notes that these “Scope of Works” documents help identify a process where coastal processes issues still outstanding in the DCO process can be addressed. We advise the approach is logical and if explored in depth it is hoped that these new reports will these outstanding issues.



4. Any further information requested by the ExA under Rule 17 of the Examination Procedure Rules

- 4.1. The MMO notes the request for further information and written comments under Rule 17 of the Examination Procedure Rules that was published on 03 May 2022.
- 4.2. The MMO is unable to provide the requested information by Deadline 4. This is as we need to review the requests and provide a response which may involve consultation with other bodies and our scientific advisors at CEFAS. The one-week period is insufficient to allow us to accomplish this and provide a robust written response. Therefore, the MMO will defer our response to Deadline 5. The MMO notes, however, that some requests within the Rule 17 letter, are addressed by our comments under Section 1 of this Deadline Submission.

Yours Sincerely

[REDACTED]
Gregg Smith
Marine Licencing Case Officer

[REDACTED]
[REDACTED]



References

Hawkins, A., Roberts, L and Cheesman, S. 2014. Responses of free-living coastal pelagic fish to impulsive sounds. *Acoustical Society of America*.pp. 3101-3116.

Heath, M., 1993. An evaluation and review of the ICES herring larval surveys in the North Sea and adjacent waters. *Bulletin of Marine Science*, 53(2), pp.795-817.

ICES. 2020. ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2019 meeting). *ICES Scientific Reports*. 2:17. 33 pp.

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B., Zeddis, D.G. & Tavolga, W.N. (2014). *Asa S3/Sc1.4 Tr-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/Sc1 a (Springerbriefs in Oceanography)*.



Annex 1: IHLS larval abundance table and bubble plot from ICES 2020

Table 1: Herring Larvae Abundance Time-Series (LAI) of larvae <10mm long (<11mm for the Southern North Sea), by standard sampling area and time periods. The number of larvae are expressed as mean number per ICES rectangle *10⁹

PERIOD/ YEAR	ORKNEY/ SHETLAND		BUCHAN		CENTRAL NORTH SEA			SOUTHERN NORTH SEA		
	1-15 SEP.	16-30 SEP.	1-15 SEP.	16-30 SEP.	1-15 SEP.	16-30 SEP.	1-15 OCT.	16-31 DEC.	1-15 JAN.	16-31 JAN.
1972	1133	4583	30		165	88	134	2	46	
1973	2029	822	3	4	492	830	1213			1
1974	758	421	101	284	81		1184		10	
1975	371	50	312			90	77	1	2	
1976	545	81		1	64	108			3	
1977	1133	221	124	32	520	262	89	1		
1978	3047	50		162	1406	81	269	33	3	
1979	2882	2362	197	10	662	131	507		111	89
1980	3534	720	21	1	317	188	9	247	129	40
1981	3667	277	3	12	903	235	119	1456		70
1982	2353	1116	340	257	86	64	1077	710	275	54
1983	2579	812	3647	768	1459	281	63	71	243	58
1984	1795	1912	2327	1853	688	2404	824	523	185	39
1985	5632	3432	2521	1812	130	13039	1794	1851	407	38
1986	3529	1842	3278	341	1611	6112	188	780	123	18
1987	7409	1848	2551	670	799	4927	1992	934	297	146
1988	7538	8832	6812	5248	5533	3808	1960	1679	162	112
1989	11477	5725	5879	692	1442	5010	2364	1514	2120	512
1990		10144	4590	2045	19955	1239	975	2552	1204	
1991	1021	2397		2032	4823	2110	1249	4400	873	
1992	189	4917		822	10	165	163	176	1616	
1993		66		174		685	85	1358	1103	
1994	26	1179				1464	44	537	595	
1995		8688					43	74	230	164
1996		809		184		564		337	675	691
1997		3611		23				9374	918	355
1998		8528		1490	205	66		1522	953	170
1999		4064		185		134	181	804	1260	344
2000		3352	28	83		376		7346	338	106
2001		11918		164		1604		971	5531	909
2002		6669		1038			3291	2008	260	925
2003		3199		2263		12018	3277	12048	3109	1116
2004		7055		3884		5545		7055	2052	4175
2005		3380		1364		5614		498	3999	4822
2006	6311	2312		280		2259		10858	2700	2106
2007		1753		1304		291		4443	2439	3854
2008	4978	6875		533		11201		8426	2317	4008
2009		7543		4629		4219		15295	14712	1689
2010		2362		1493		2317		7493	13230	8073
2011		3831		2839		17766		5461	6160	1215
2012		19552		5856		517		22768	11103	3285
2013		21282		8618		7354		5	9314	2957
2014		6604		5033		1149				1851
2015		9631		3496		3424		2011	1200	645
2016				3872		3288		20710	1442	1545
2017				5833		3965		10553	5880	
2018		102		1740		1509		1140		



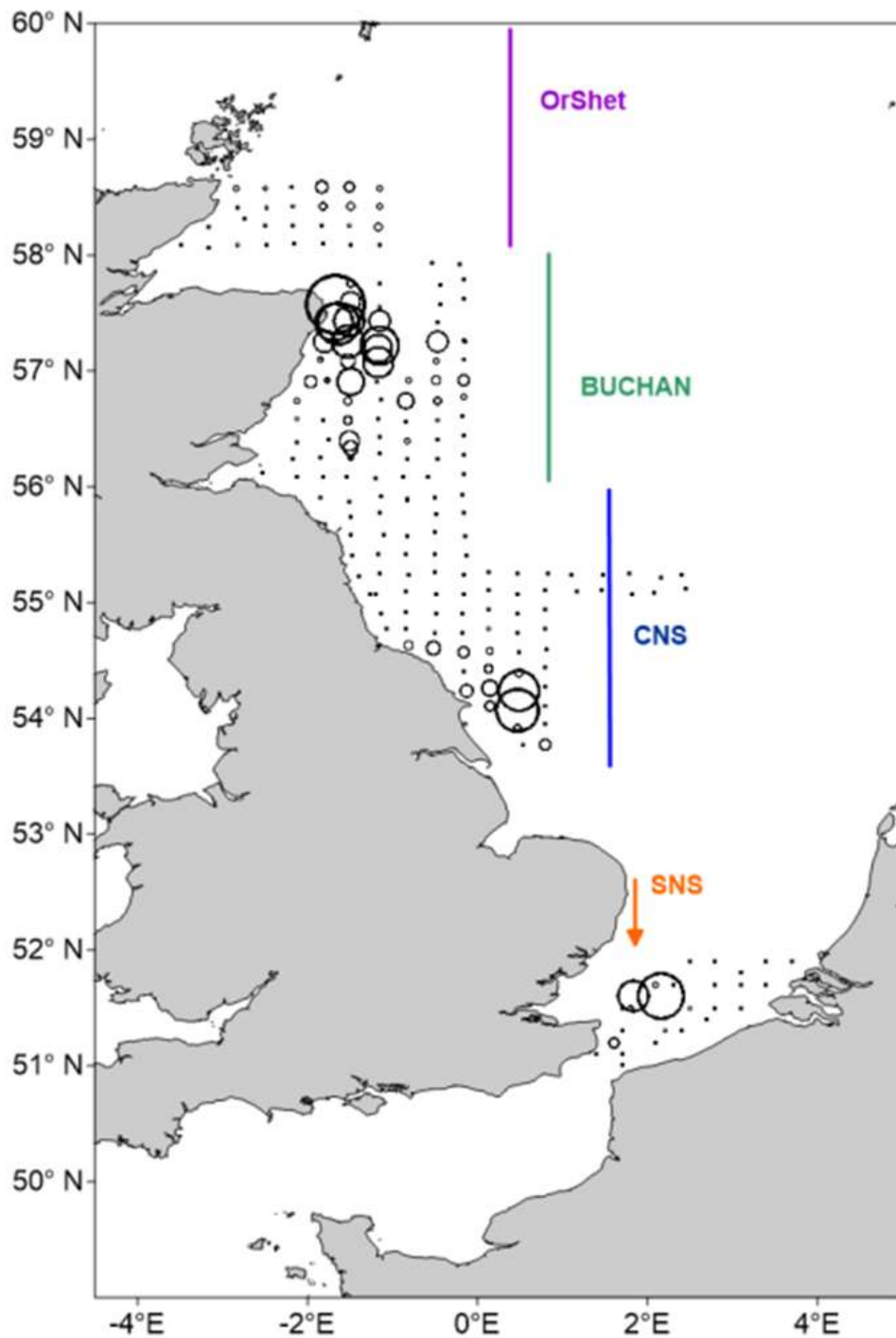


Figure 1: North Sea Herring – Abundance of larvae <10mm (n/m^2) in the Orkney/Shetland, Buchan, Central and Southern North Sea as obtained from the International Herring Larvae Surveys in autumn and winter 2018/2019 (maximum circle size = $3500n/m^2$). The survey around the Orkneys had to be stopped after 28 hauls due to technical problems of the research vessel.

