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MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Annex 6.1 to the Applicant's response to Written Representations from MMO at Deadline 3: Cod spawning period

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Image of an offshore wind farm

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Glossary

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Morgan Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, scour protection, cable protection and offshore substation platforms (OSPs) forming part of the Morgan Offshore Wind Project: Generation Assets will be located.
Morgan Offshore Wind Project: Generation Assets	This is the name given to the Morgan Generation Assets project as a whole (includes all infrastructure and activities associated with the project construction, operations and maintenance, and decommissioning).
The Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.

Acronyms

Acronym	Description
MMO	Marine Management Organisation
TTS	Temporary Threshold Shift
UWN	Underwater Noise
WR	Written Representations

Units

Unit	Description
SELcum	Cumulative Sound Exposure Level

1 ANNEX 6.1 TO THE APPLICANT'S RESPONSE TO WRITTEN REPRESENTATIONS FROM MMO AT DEADLINE 3: COD SPAWNING PERIOD

1.1 Introduction

1.1.1.1 This document has been prepared in response to the submission of the MMO (REP3-037) at Deadline 3. The MMO responses relate to the ongoing discussion between the MMO and the Applicant with regard to the spawning period of cod, which relates to a request made by the MMO for the Applicant to consider a seasonal piling restriction which it deems is merited to mitigate the potential for adverse noise effects on this receptor. The MMO had indicated that it considered the spawning period to be January to April (inclusive), whereas the Applicant's view is that it would be more appropriate to focus on the peak spawning period, which it considers to be February to March (as agreed by NRW for the adjacent Mona project in REP4-047).

1.1.1.2 The Applicant has considered the detailed response from the MMO below and has provided a response that gives evidence to support the refinement of the peak spawning period for cod in the east Irish Sea. This detail provides additional context to the baseline information on cod spawning provided in Volume 4, Annex 3.1: Fish and shellfish ecology technical report (APP-051) to allow more specific targeting of potential mitigation measures which could be incorporated into the Outline Underwater Sound Management Strategy (UWSMS; APP-068). The Applicant clarifies that the information provided below does not change the overall conclusions of the impact assessment on cod spawning presented in Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.1.1.3 In summary, it remains the Applicant's position that the UWSMS (APP-068) is the appropriate mechanism to determine what, if any, mitigation is needed to manage piling impacts on fish receptors, with specific consideration of herring and cod spawning. However, if when developing that strategy it is clear that the levels of piling expected in the final project design pose a significant risk to cod or herring spawning due to a potential timing overlap with the key fish spawning periods, then seasonal restrictions will be considered as a potential mitigation amongst other options, as set out in section 1.8 of the outline UWSMS (APP-068). With regard to cod, if such a restriction is considered necessary, then it is the Applicant's position that discussion of any such restriction should be focused on the peak spawning period only (as that is when the receptor is most likely to be spawning in sufficient densities for any potentially significant effect to materialise). Based on the Applicant's consideration of the evidence provided by the MMO below, this peak spawning period remains February to March. Spawning restrictions have the potential to materially impact on project schedule and therefore, it is of critical importance that they are only considered for the period for which the measure will deliver tangible benefit to reducing any potential significant effect. Furthermore, and importantly it is also critical that the final scheme design can inform any discussion around restrictions as the location and duration (both for individual piles and the overall piling duration for all piles) will have a material impact on how a restriction may be most appropriately framed in practice. Hence, why the Applicant considers this is best dealt with post consent when this detail will be available.

1.2 Summary of MMO Submission

1.2.1.1 The submission from the MMO states amongst other things:

1.2.1.2 [Paragraph 4.5.4] The MMO directs the Applicant to Maxwell *et al*., (2012) and Armstrong *et al*., (2012) to support their discussion of peak months for cod spawning in the Irish Sea. Maxwell *et al*., (2012) used ichthyoplankton survey data from 2008 for Irish Sea plaice, cod and haddock to estimate annual egg production during the 2008 spawning season using advanced generalized additive models (GAM). As part of this study, spatial patterns of modelled and observed egg production for cod were included. For cod, there were clear hot spots for egg production in the east and west Irish Sea. The authors also correlated spatial patterns of modelled and observed egg production with the timing of the ichthyoplankton surveys to examine when cod egg production for the 2008 spawning season peaked.

1.2.1.3 [Paragraph 4.5.5] Armstrong *et al*., (2012) then summarised the results of applications of annual egg production methodologies (including those used by Maxwell *et al*., 2012) to estimate the spawning stock biomass of cod and other species in the Irish Sea in 1995, 2000, 2006, 2008, and 2010. Armstrong *et al*., (2012) expanded the GAM analyses to present the spatial patterns of daily egg production of cod for the years 2006 to 2010. Armstrong *et al*., (2012) also examines the seasonal patterns in egg production fitted by the GAM for spawning in the East and West of the Irish Sea.

1.2.1.4 [Paragraph 4.5.6] Maxwell *et al*., (2012) and Armstrong *et al*., (2012) are appropriate sources for informing discussions on temporal refinement of the recommended piling restriction but, given the age of these publications, it would strengthen the Applicant's position for a refinement if updated data were presented in a similar format. This data may take the form of ichthyoplankton data for the Irish Sea to indicate areas of higher or lower cod larval abundance, or Northern Irish Ground Fish data (NIGFS) which could be filtered to separate out female cod caught within each trawl per year and the maturity classes of interest (spawning and spent fish) taken as a subset to characterize where spawning-ready and post-spawning adult female cod are located. The MMO directs the Applicant to the Agri-Food and BioSciences Institute (AFBI) in Northern Ireland to find out what survey data is available for this purpose.

1.3 Applicant's Response

1.3.1.1 The Applicant welcomes the MMO highlighting these data sources which may aid in the refinement of the cod spawning period and has summarised the main points below.

1.3.1.2 Specifically, the Maxwell *et al*. (2012) analysed the data from five ichthyoplankton and larvae surveys which sampled from approximately 100 stations each across the entire Irish Sea during the end of January to end of April 2008 spawning period for cod (they also sampled for plaice, and haddock). The dates for the surveys were: Survey 1: 28/1-6/2; Survey 2: 18/2-28/2; Survey 3: 5/3-15/3; Survey 4: 25/3-3/4, and Survey 5: 14/4-22/4. Analysis of the cod larvae abundance and distribution indicated the presence of two key spawning sites, in the west and east of the Irish Sea. The west spawning site was located off the east coast of Ireland, and the east spawning site coincided with the Morgan Offshore Wind Project: Generation Assets and the surrounding area, extending to north Wales. The data identified that cod spawning peaked between Surveys 2-4 in both spawning sites, with a date range in which spawning was occurring of 18/02-03/04. Peak spawning within this period was refined with relatively high accuracy to 23/02-10/03. The largest amount of spawning was noted in the western location, off the east coast of Ireland. This was confirmed as a significant hotspot for

spawning through sampler deployment and subsequent plankton sample data analysis.

1.3.1.3 However, it should be noted that Maxwell *et al*. (2012) was only a snapshot of the Irish Sea cod spawning in 2008. A time series of data from five large scale surveys from 1995-2010 across the Irish Sea were analysed and presented by Armstrong *et al*. (2012), which included the 2008 survey assessed in Maxwell *et al*. (2012). The analysis of the time series data showed cod spawning grounds regularly occurring in the same west and east locations as in Maxwell *et al*. (2012). Armstrong *et al*. (2012) noted peak cod spawning occurring in the mid-February to mid-March period over the 2006-10 period. There was a slight delay of approximately a week noted in the peak of the west spawning population in 2010 compared to the east spawning population, but both still spawned within this same mid-February to mid-March period. At both spawning sites for all years investigated, a small amount of spawning occurred at the end of January and in April, but this was outside of the peak spawning period of February to March in all cases. This noted a significant drop in eggs in 2010, with an 80% reduction in the east location, and a 50% reduction in the west location; the west Irish Sea (where the decrease was less pronounced) is subject to a cod spawning fisheries closure between mid-February to the end of April.

1.3.1.4 More up-to-date information specifically about cod spawning is scarce, but a range of data sources are available to help characterise the broader cod population distribution and temporal trends within the Irish Sea. Specifically, catches of cod from the annual Northern Irish Groundfish Survey (NIGFS) in the peak spawning period of February-April between 2012 and 2022 have been collated by the Applicant from ICES Division 7.a within the Irish Sea. The data over this time period was analysed to calculate the overall abundance of both male and female immature, maturing, spawning, and spent cod for each year in order to detect any patterns in the data which might indicate peak spawning periods for this species. The data analysed showed a peak in abundance in 2015 which was considerably higher than the preceding years of data. This was followed by a decline in abundance to below pre-2015 levels, up to and including 2022 (ICES, 2022).

1.3.1.5 The data collated over the 10 year time period demonstrates a consistent trend of highest catches occurring during March; however this should be interpreted with caution due to limited sampling dates in this region per year, with some survey years sampling only in March or April, and limited sampling generally conducted in February (ICES, 2022). The number of individuals caught between February and April over this time period, where available, are presented in Figure 1.1. This data supports the trend of cod abundances generally being highest in the Irish Sea in March, with reduced numbers of spawning cod present in February and April.

1.3.1.6 Data was also available from the NIGFS (ICES, 2022) surveys on the sex and spawning condition of the cod caught. This showed that, for all years (2012-2022), the number of male and female immature and spent cod were similar across the months they were present. The number of maturing female cod exceeded the male maturing cod numbers only slightly in March, with none caught in April for either sex in any year. The major difference noted from the data, as shown in Figure 1.2, was that approximately four times more spawning males than females were present in March and April, and no spawning females were present in February. The data also strongly indicated peak abundances of cod in March, across all categories but particularly individuals in spawning condition. This indicates that spawning is time restricted and mostly occurs in March, supporting the findings of Maxwell *et al*. (2012) and Armstrong *et al*. (2012).

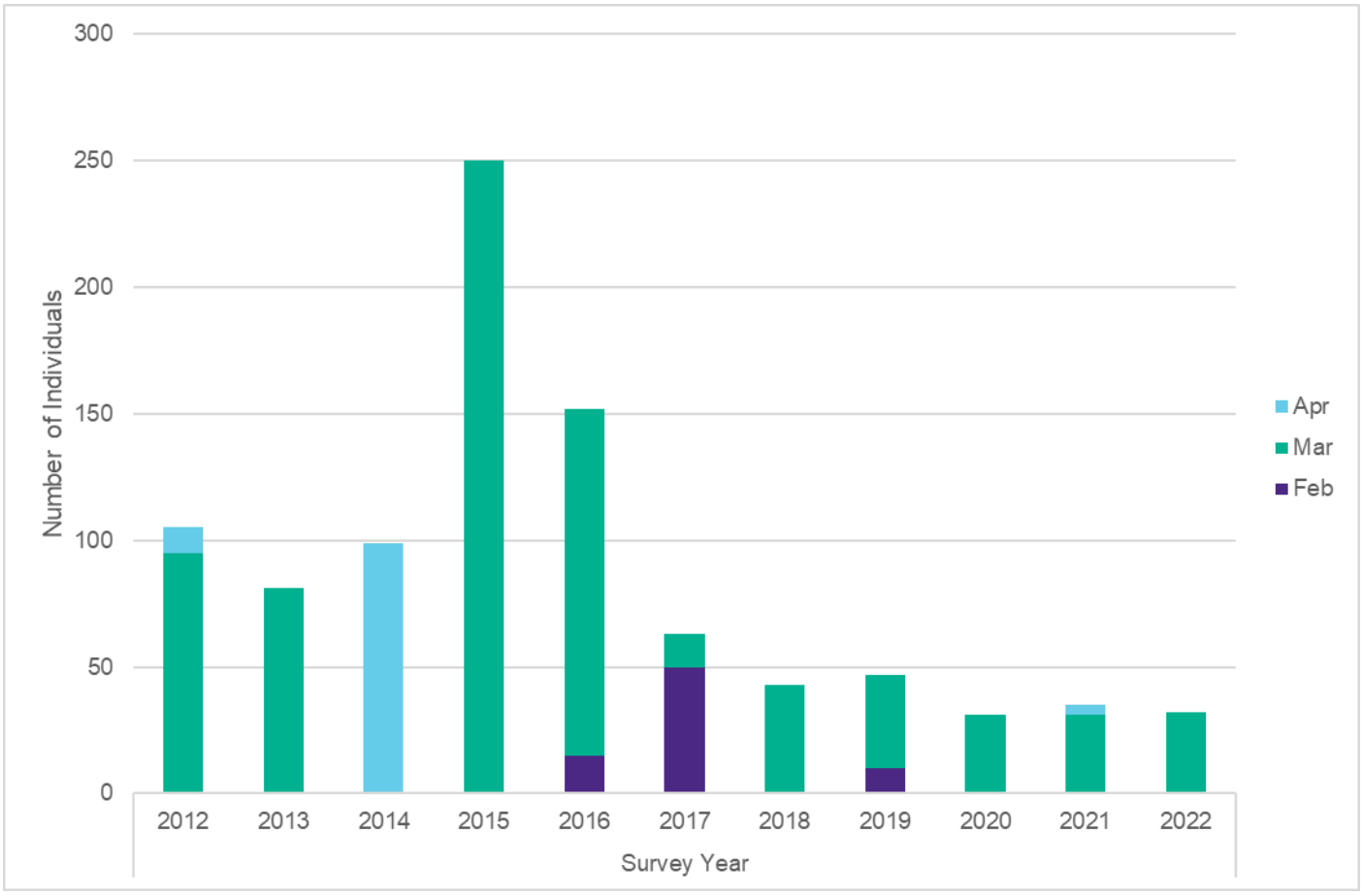

Figure 1.1: Abundance of Cod per Month and Year within the Irish Sea

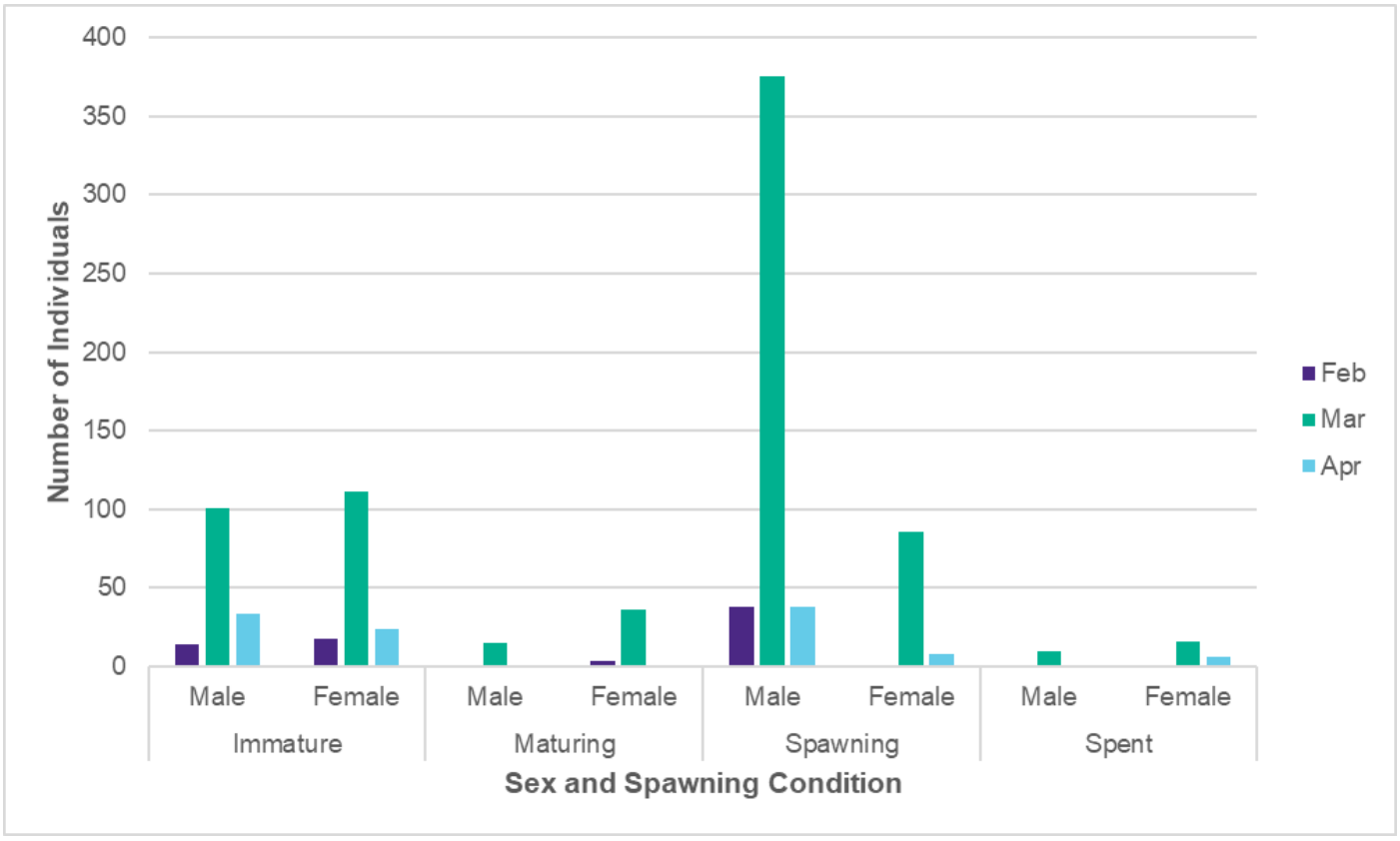

Figure 1.2: Aggregated sex and spawning condition by month across all surveys 2012-2022

2 REFERENCES

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