APPENDIX D1

FRESHWATER FISH of CONSERVATION CONCERN: SNH & JNCC ADVICE for HRA

Introduction

Habitats Regulations Appraisal (HRA) is the process which applies to any plan or project with the potential to affect the qualifying interests of a Natura site. As SNH and JNCC advised in scoping responses and previous advice on HRA reports, the qualifying fish interests of the following SACs need to be addressed under HRA for the Forth & Tay offshore windfarm proposals – Neart na Gaoithe, Seagreen phase 1 and Inch Cape:

- **River South Esk** designated for its populations of Atlantic salmon (*Salmo salar*) and freshwater pearl mussel (*Margaritifera margaritifera*).
- **River Tay** designated for its populations of the following fish species – Atlantic salmon, brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*); and for otter (*Lutra lutra*) and clear water lochs.
- **River Teith** designated for its populations of the following fish species – Atlantic salmon, brook lamprey, river lamprey and sea lamprey.

Following advice from the Association of Salmon Fisheries Boards (ASFB), a further two SACs have been assessed by each of the Forth & Tay developers:

- **River Dee** designated for its populations of Atlantic salmon, freshwater pearl mussel & otter.
- **River Tweed** designated for its populations of the following fish species – Atlantic salmon, brook lamprey, river lamprey and sea lamprey; and for otter and Annex 1 habitats.

SNH advice for Habitats Regulations Appraisal

We provide the following HRA advice for an appraisal of the cumulative impacts of these proposed offshore wind developments on the freshwater fish interests of the SACs listed above, including the River Dee and River Tweed.

1. Are the Forth & Tay windfarm proposals connected with or necessary for conservation management of the above SACs?

The Forth & Tay offshore wind proposals are not directly connected with, or necessary for, the conservation management of these SACs.

2. Are the Forth & Tay windfarm proposals likely to have a significant effect on the qualifying interests of the SACs either alone or in combination?

- **Atlantic salmon**

We advise **likely significant effect** from the proposals on Atlantic salmon due to the possibility that the fish could be disturbed by construction noise and / or possible effects of electro-magnetic fields (EMF) arising from installed cables. We confirm that we have considered the location of the export cable routes and proposed landfall points for each proposal[1] and are satisfied that construction work associated with this cable installation would not result in likely significant effects to salmon.

We are satisfied that operational noise from wind turbines would <u>not</u> result in likely significant effects to salmon.

- **Freshwater pearl mussel**

Atlantic salmon (and other salmonids) are integral to the life cycle of freshwater pearl mussel (FWPM), therefore any impacts to Atlantic salmon that prevent them from returning to their natal rivers may have a resulting effect on FWPM populations. We therefore advise **likely significant effect** from the proposals on FWPM, so potential indirect impacts to this species will need to be considered in appropriate assessment.

- **Sea lamprey**

  We advise **likely significant effect** from the proposals on sea lamprey due to the possibility that they could be disturbed by construction noise and / or possible effects of electro-magnetic fields (EMF) arising from installed cables. We confirm that we have considered the location of the export cable routes and proposed landfall points (see end note) and are satisfied that associated construction work would not result in likely significant effects to sea lamprey.

  We are satisfied that operational noise would not result in likely significant effects to this species.

- **Other Qualifying Interests**

  As advised in our scoping advice and in response to the HRA screening reports from Seagreen and Inch Cape, there is no connectivity between the Forth & Tay windfarm proposals and other qualifying interests of these freshwater SACs, so therefore there are no likely significant effects.

3. Can it be ascertained that the Forth & Tay windfarm proposals will not adversely affect the integrity of the SACs, either alone or in combination?

This step is termed **appropriate assessment**, and it is to be undertaken by Marine Scotland, based on available information with advice from ourselves. It considers the implications of proposals for the (relevant) conservation objectives relating to the SAC qualifying species of concern. Please refer to http://www.snh.org.uk/snhi/ for a full list of these conservation objectives as we only discuss those that are relevant.

- **Atlantic salmon**

  The relevant conservation objective to consider is whether or not the FTOWDG windfarm proposals (Neart na Gaoithe, Seagreen phase 1 and Inch Cape) would alone or in combination result in any impacts on the viability of Atlantic salmon populations supported by the above SACs.

  Our key concern is the **underwater noise** that results from piling foundations for wind turbines and offshore substation platforms. However, due to lack of knowledge concerning demographic parameters, population ecology and migratory movements of Atlantic salmon in Scottish waters, we will not be able to ascertain whether any noise disturbance to individual salmon could result in population level effects at SACs. It will, however, be possible to avoid any such effects by agreement of working practice and mitigation via conditions on any consents, as follows:

  > Soft start for piling work could be expected to help mobile fish species move out of the area and thereby assist in mitigating against noise disturbance to individuals during construction.
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  > Piling schedules and construction programmes should be further discussed, post-consent, between Marine Scotland; ASFB; SNH and developers once windfarm layouts and foundation choices and have been confirmed. We note that the zone of predicted noise impacts for Atlantic salmon is based on a 'worst case' scenario for six piling events occurring simultaneously on the three proposed windfarm sites (two events at each site), which is highly unlikely to occur.
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  > Marine Scotland are undertaking, and have proposed, strategic monitoring and research[2], to be part-funded by marine renewables developers. This will help to improve the knowledge base on salmon population ecology and migratory movements in Scottish waters and may help inform mitigation proposals.

  We are concerned by potential cumulative impacts arising from the **electro-magnetic fields** around intra-array and export cables. All the developers propose to shield / bury cables and we agree that this will help to reduce EMF. This mitigation should be progressed in post-consent discussions between Marine Scotland; ASFB; SNH and developers. For Atlantic salmon, we recommend increasing the burial depth (up to 3m, where possible)[3] of the export cables in shallower water approaching landfall (water depths of up to ~20m). Where cable burial is not possible, rock armouring or a similar protective layer should be considered.

- **Freshwater pearl mussel**

  Potential indirect impacts to freshwater pearl mussel populations in the River South Esk will be addressed via mitigation to avoid population level effects on Atlantic salmon outlined above.

- **Sea lamprey**

  The relevant conservation objective to consider is whether or not the proposals would alone or in combination result in any impacts on the viability of the populations of sea lamprey supported by the SACs listed above. As for Atlantic salmon, it will not be possible to ascertain whether any noise disturbance / EMF effects to individual lamprey could result in population level effects at SACs. The mitigation suggested above will also avoid any population level effects for sea lamprey.

[1] **FTOWDG proposed cable landfall points**

Neart na Gaoithe: Thorntonloch.
Seagreen phase 1: Carnoustie.
Inch Cape: Cockenzie.

[2] Marine Scotland Science: National Strategy for Monitoring and Research for Diadromous Fish and Marine Renewable Energy.

[3] Gill, A.B. & Bartlett, M. (2010). Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel*. Scottish Natural Heritage Commissioned Report No.401*

APPENDIX D2

MARINE FISH & SHELLFISH: SNH & JNCC ADVICE ON CUMULATIVE IMPACTS

Cumulative noise impacts

As noted in preliminary advice, we are particularly concerned about cumulative impacts from the Forth & Tay offshore windfarm proposals on marine fish and shellfish – particularly with regard to **underwater noise during construction** (from pile-driving the foundations for turbines and offshore substation platforms). The marine fish species which need to be addressed are those with a medium / high sensitivity to noise, particularly herring and cod which are likely to be common in the area. The **reference populations** for each species are as follows:

- **Herring:** Buchan spawning stock.
- **Cod:** North Sea stock.

Due to lack of knowledge on behavioural responses of fish to noise, as well as limited information on demographic parameters and population ecology, we will not be able to ascertain whether any noise disturbance to individual fish could result in population level effects. However, as part of a risk-based approach to our appraisal of potential impacts, we consider that any noise impacts that interrupt or otherwise adversely affect spawning activity could be expected to result in an impact to the cohort for that year. Pile-driving activities in successive years may therefore result in a series of weakened cohorts within a population.

We recommend the following mitigation that may help to reduce or avoid population level effects on marine fish species sensitive to noise. We have given particular consideration to herring and cod, but this mitigation would also alleviate pressure on a wide range of species:

- Soft start for piling work could be expected to help mobile fish species move out of the area and thereby assist in mitigating against noise disturbance to individuals during construction.
- Piling schedules and construction programmes should be further discussed, post-consent, between Marine Scotland; SNH and developers once windfarm layouts and foundation choices have been confirmed. We note that the zone of predicted noise impacts for marine fish is based on a 'worst case' scenario for six piling events occurring simultaneously on the three proposed windfarm sites (two events at each site), which is highly unlikely to occur.
- We consider that further discussion of noise mitigation could be progressed via an 'Expert Panel', facilitated by Marine Scotland and involving SNH, developers and relevant experts. This panel could review and consider the merit of any noise-reducing technologies which may be developed in time for construction activity at consented sites.

Impacts on sandeels

None of the Forth & Tay developers have carried out specific sandeel surveys to inform submitted applications, although some of them have recorded the presence of sandeels in their benthic trawls. Further to any consent, we recommend that developers undertake specific sandeel surveys, following MSS guidance on methodology, in order to map sandeel densities across their windfarm sites. The survey method and the distribution of sample locations should be such that it is repeatable during and after the construction phase for the purpose of impact monitoring.

We would welcome further dialogue following pre-construction sandeel survey in order to ascertain whether it is possible to micro-site turbines away from any locations with higher densities of sandeels. We note that piled foundations have a significantly smaller footprint compared to gravity bases in this regard, and we may recommend that gravity bases are not utilised in any key areas recorded for sandeels.

Assessment of sediment release

In our interim advice to Seagreen phase 1 and Neart na Gaoithe, we highlighted the inability to conclude assessment for sediment release arising from 'worst case' scenarios utilising gravity bases. Developers are not currently able to confirm the number, or upper limit, of gravity bases to be used for turbine foundations at proposed windfarm sites. Therefore Marine Scotland have advised developers that if gravity bases are to be used, then this will require a futher application and supporting EIA for the assessment of dredging requirements, sediment release and arrangements for the disposal of dredgings.

We can confirm that there are no significant cumulative impacts across the Forth & Tay windfarm sites arising from the sediment release associated with piled or drilled foundations.

Electro-magnetic fields (EMF)

There continues to be poor scientific understanding of EMFs and associated effects, so some caution is required. We advise that cable burial / shielding should help to reduce potential EMF effects, and we recommend a minimum burial depth of 1m for the intra-array cabling and export cable, but increasing the burial depth up to 3m, where possible, for the export cable in shallower water approaching landfall.