Association of Salmon Fishery Boards

Response to the marine licence application for the Beatrice Offshore Wind Farm project June 2012

Introduction

The Association of Salmon Fishery Boards is the representative body for Scotland's 41 District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), which have a statutory responsibility to protect and improve salmon and sea trout fisheries. The Association and Boards work to create the environment in which sustainable fisheries for salmon and sea trout can be enjoyed. Conservation of fish stocks, and the habitats on which they depend, is essential and many DSFB's operate riparian habitat enhancement schemes and have voluntarily adopted 'catch and release' practices, which in some cases are made mandatory by the introduction of Salmon Conservation Regulations. ASFB creates policies that seek where possible to protect wider biodiversity and our environment as well as enhancing the economic benefits for our rural economy that result from angling. An analysis completed in 2004 demonstrated that freshwater angling in Scotland results in the Scottish economy producing over £100 million worth of annual output, which supports around 2,800 jobs and generates nearly £50million in wages and self-employment into Scottish households, most of which are in rural areas.

We have significant concerns relating to the proposed development, particularly with regard to the uncertainty surrounding the potential negative effects on Atlantic salmon and sea trout and the integrity of a number of Special Areas of Conservation for Atlantic salmon.

Overarching Comments

1. Designated Species

As highlighted in the Environmental Statement a number of rivers in the area are designated as Special Areas of Conservation (SAC), part of the Natura 2000 network – a series of internationally important wildlife sites throughout the European Union. The conservation objectives for these sites are set out below[1].

> *To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and*
>
> *To ensure for the qualifying species that the following are maintained in the long term:*
>
> - *Population of the species, including range of genetic types for salmon, as a viable component of the site*
> - *Distribution of the species within site*
> - *Distribution and extent of habitats supporting the species*
> - *Structure, function and supporting processes of habitats supporting the species*
> - *No significant disturbance of the species*
> - *Distribution and viability of freshwater pearl mussel host species*
> - *Structure, function and supporting processes of habitats*

The Habitats Directive (article 6) requires that *Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.*

It also states: *In the light of the conclusions of the [appropriate] assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only*

[1] http://gateway.snh.gov.uk/sitelink/index.jsp

after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

If this is not the case and there are no alternative solutions, the proposal can only be allowed to proceed if there are imperative reasons of overriding public interest.

The conservation status of the Atlantic salmon qualifying interest for the various SACs (First Assessment Cycle) are set out in Table 1 below. In addition, a number of these SACs are also designated for FW pearl mussel.

SAC	Qualifying Interest	Conservation Status
River Borgie	Atlantic salmon	unfavourable recovering
River Naver	Atlantic salmon	unfavourable recovering
River Thurso	Atlantic salmon	unfavourable recovering
Berriedale & Langwell Waters	Atlantic salmon	unfavourable recovering
River Oykel	Atlantic salmon	unfavourable recovering
River Moriston	Atlantic salmon	unfavourable recovering
River Spey	Atlantic salmon	unfavourable recovering
River Dee	Atlantic salmon	favourable maintained

Table 1*: Conservation status of SACs for Atlantic salmon in the area of the development.*

In all cases, with the exception of the Berriedale and Langwell Waters SAC, the Salmon rod catch trends in these SACs as analysed by Marine Scotland Science, show that the spring stock component is in decline. The second assessment cycle is nearing completion, and the results of this assessment must be taken into account in the licensing decision. We believe that the assessment is likely to show that the early running spring component of many of these Atlantic salmon populations continues to deteriorate.

In addition, District Salmon Fishery Boards have a statutory obligation to protect sea trout. The marine phases of both Atlantic salmon and sea trout have also been included on the draft list of Priority Marine Features drawn together by SNH - the habitats and species of *greatest conservation importance* in inshore waters.

2. Climate Change Mitigation and Adaptation

As for many other species, climate change has been identified as a threat to Atlantic salmon. The species' developmental rate is directly related to water temperature, and increasing temperature in freshwater may result in smolts developing more rapidly and entering the ocean at a suboptimal time in relation to their planktonic food sources.

In addition, as air temperatures warm, much of the snow that feeds the river systems is expected to melt earlier. This will lead to a reduction in the flow of many rivers in the spring and summer, which will increase water temperatures further and may reduce the overall optimal habitat available to the Atlantic salmon. It is also clear that survival of salmon and sea trout during their marine migration phase has fallen over the last 40 years. Some of this reduced survival can be explained by changes in sea surface temperature and subsequent contraction of feeding grounds.

The first priority in mitigating these effects is to control atmospheric concentrations of greenhouse gases and we note that the Scottish Government has committed to meeting a stated target of 50% of Scotland's electricity demand from renewable sources by 2020. However, with further climate change inevitable in the short to medium term, attention is now focusing on the development of accommodation and adaptation strategies, through which adverse effects on species or ecosystems can be minimized. Some of the key needs with respect to developing adaptation strategies for rivers and their biodiversity were summarised by Ormerod (2009 – *Aquatic Conserv: Mar. Freshw. Ecosyst.* 19: 609–613).We would highlight the following key point in particular: *to minimize the adverse effects on river biodiversity of actions taken to mitigate climate change*.

3. Potential Negative Effects of Offshore Renewable Devices

Offshore renewable developments have the potential to directly and indirectly impact anadromous fish such as Atlantic salmon and sea trout. We would therefore expect developers to assess the potential impacts of deployed devices on such fish during the deployment, operation and decommissioning phases. Such potential impacts have been highlighted by Marine Scotland Science and could include:

- Avoidance (including exclusion from particular rivers and subsequent impacts on local populations);
- Disorientation effects that could potentially affect behaviour, susceptibility to predation or by-catch; and
- Impaired ability to locate normal feeding grounds or river of origin; and delayed migration

ASFB therefore recommend to our members that careful consideration should be given to the following activities:

i. *Subsea noise during construction*
   A recent review commissioned by SNH[2] states that 'Marine renewable energy devices that require pile driving during construction appear to be the most relevant to consider, in addition to the time scale over which pile driving is carried out, for the species under investigation'.

ii. *Subsea noise during operation*

iii. *Electromagnetic fields (EMFs) arising from cabling*
   The SNH-commissioned review (cited above) has shown that EMFs from subsea cables have the potential to interact with European eels and possibly salmonids if their migration or movement routes take them over the cables, particularly in shallow waters (<20m). Marine Scotland Science are currently undertaking a research programme which aims to investigate electro-magnetic force impacts on salmonids. We would hope to have some results from this work later in 2012. It is vital that all cables are appropriately shielded to ensure that EMF effects are below any threshold of effect for salmonids.

iv. *EMFs arising from operation of devices*
   It is important to ensure that such effects are quantified and assessed in the Environmental Statement.

v. *Disturbance or degradation of the benthic environment (including secondary effects on prey species)*
   It is important to ensure that such effects are quantified and assessed in the Environmental Statement.

vi. *Aggregation effects*
   Whilst the aggregation of prey items around physical structures might be seen as a positive effect, possible negative effects might include the associated aggregation of predators.

4. General Comments on the Application

Guidance issued by Marine Scotland Science relating to information requirements on diadromous fish of freshwater fisheries interest states that an Environmental Statement should provide information on the use of the development area by such fish and that if such information was lacking then a suitable monitoring strategy should be devised. Indeed, Marine Scotland Science regard the monitoring undertaken at existing offshore developments such as Robin Rigg as being inadequate. No monitoring strategy is set out in the application and indeed, the ES states, '*In the absence of detailed information on the migratory routes of salmon and sea trout it is assumed that they transit the Wind Farm as part of their normal migration. In addition, they are assumed to transit the site as part of their foraging activity (particularly sea trout)*'. We therefore believe that the lack of meaningful monitoring in the present proposal is extremely disappointing and completely inadequate. We note that Section 11.6 states that BOWL will work with key stakeholders and Marine Scotland to identify any future

[2] 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. Available at: http://www.asfb.org.uk/wp-content/uploads/2011/06/SNH-EMF-Report1.pdf

monitoring programmes considered necessary. We welcome this undertaking, but we would emphasise that any monitoring strategies must include pre-construction monitoring in order that baseline information on salmon and sea trout movement, abundance, swimming depth, feeding behaviour etc. can be collected.

We also note that it is very difficult to assess risk to migratory salmonids as there is little detailed information on: the likely size of the scheme; the type of devices to be deployed; and the degree of confidence attached to the assessment of impacts.

Specific comments

Our specific comments relate to the potential effects highlighted in Section 3 above.

11.4.1 Construction/Decommissioning

We note that the comments attributed to Marine Scotland in Annex 5A, state that '*a monitoring strategy was required if impacts are uncertain*'. It is clear, throughout the ES, that potential impacts on migratory fish carry a great deal of uncertainty and there for we are surprised and disappointed not to see a clear monitoring strategy laid out in the accompanying documentation.

11.4.1.1. Increased Suspended Sediment Concentrations and Sediment Re-deposition

This section appears to be based on a single study by Bertwell (1999) which only assesses the effects of sediment on fish in freshwater. We are unclear of the relevance of this study to the effect of sediments in the marine environment.

11.4.12. Noise

Paragraph 70 makes reference to soft piling, in order to trigger avoidance reactions in mobile species in the immediate vicinity of piling locations (where the noise levels are likely to be above the tolerance limit of sound and potentially damaging). The underwater noise modelling technical report (Annex 7A) assumes a swim speed of 1.5m/sec. However, no information is provided on the duration of such soft piling, nor has such duration been related to the swimming speeds of fish (at different life stages), in order to assess the possibility of such fish swimming out of the zone of effect. Given that swim speeds for juvenile fish are lower than those of adult fish, the conclusion in paragraph 71 (that juveniles are assessed using the same criteria as adults with regard to hearing) may be incorrect with regard to avoidance responses of different life stages of fish. Indeed, this assertion is based on assumptions from studies on sea bream, damselfishes and labyrinth fish and not on salmonid fish. Given the paucity of information on noise effects, we do not believe that soft piling alone is an appropriate mitigation. The ES sets out a number of options for turbine design (including gravity bases) of which the worst case scenario for noise is impact piling of pin piles. We believe that, given the sensitivity of early running returning spring salmon, and the uncertainty of effects on juvenile fish, that it is appropriate, should consent be granted for the development, that a condition of consent is that no impact pilling occurs during the period from March to June (inclusive). Such a condition is consistent with the precautionary principle and would still allow other forms of construction to continue during this period.

Figure 11.3 demonstrates an expected strong avoidance reaction only in close proximity to the foundations. However, at the lower threshold level of 75 dB_{ht} (representing significant avoidance) the area which salmon would avoid (Figure 11.5) is much greater. Whilst Annex 7A states that the this effect is probably transient and limited by habituation, 85% of fish were found to react to this level of noise, and we believe it is possible that noise at this threshold level has the potential to at least delay smolt migration over a significant proportion of the NW Moray Firth. Such a delay could, for example, make smolts more susceptible to predation. It must also be noted that salmonid smolts are physiologically stressed in adapting to the environmental challenge of movement between freshwater and seawater. Simultaneous challenge from noise, EMFs etc. during this transition will constitute a significant additional stressor. Stress leads to increased plasma levels of the stress hormone cortisol. Corticosteroids cause a range of secondary effects, including hydromineral imbalance and changes in

intermediary metabolism (Wendelaar Bonga, 1997)[3]. In addition, tertiary responses extend to a reduction in the immune response and reduced capacity to tolerate subsequent or additional stressors (Wendelaar Bonga, 1997).

Paragraph 78: Given the acknowledged lack of information as to the migratory routes of Atlantic salmon and the marine habitat of sea trout, we are unclear as to the relevance of the location of SAC rivers with regard to providing an indication of the ecological significance of the predicted effect. During pre-application discussions with the developers we have continually stressed the need for information on migratory routes and habitat usage for migratory salmonids. In the absence of such data (and the ES simply assumes that they are present – paragraph 80), ASFB and DSFBs, in assessing the risks of the development to migratory fish, have no alternative but to assume that the entire run of each river will use the area under development. We note that the comments attributed to Marine Scotland in Annex 5A, state that '*it needs to be categorically established which species are present on the site, and where, before the application is considered for consent*'.

We agree with the statement in Annex A (10.17) when considering relatively low levels of noise: *The significance of the effect requires an understanding of its consequences. For instance, avoidance may be significant if it impedes the migration of a species. However, in other cases the movement of species from one area to another may be of no consequence*. The ES assumes that the displacement and the adoption of avoidance behaviour by individual or aggregations of salmon and sea trout from their original locations as a result of underwater noise has no implications in respect of fitness or survival. We do not believe that this assertion can be substantiated (Please see out comments above relating to stress and increased risks of predation).

11.8.5.2 Cumulative impacts of construction noise

Paragraph 182 makes clear that there is potential for a negative moderate cumulative effect on the SAC populations of Atlantic salmon. Annex 7A, models a number of scenerios whereby differing numbers of different diameter piles driven simultaneously across the BOWL and MORL developments are assessed. However, no information is provided as to the likelihood of these scenarios should these developments be consented. The last page of Annex 7A, states that, "The area of sea affected by noise from simultaneous piling generally is not much greater than if the piling was undertaken at separate times. Indeed, the total area is often less due to the overlap of the insonified areas". However, this is not the case for Atlantic salmon and indeed the area of sea potentially affected by simultaneous piling at the lower threshold level of 75 dB_{ht} (representing significant avoidance) is significantly greater. Whilst we understand that the availability of vessels to undertake this piling work is limited, we would expect to see a clear indication of the number of pilling sites likely to be developed at one time, in order that the possible effects on migratory fish can be assessed. We therefore restate that there should be no impact piling, either in the BOWL or the MORL development during the period from March to June (inclusive). It may also be appropriate to ensure, as a condition of consent, that there is a limit on the number of piling sites that can be used simultaneously during construction.

11.4.2 Operation

11.4.2.1. Loss of Habitat

Paragraph 97 and 98 suggest that, *despite a lack of current data on the distribution of sand eels within the site and the wider area to the spatial scale required for this assessment*, the effect of habitat loss is assessed to be negligible and probable. Given the importance of sandeel as a prey species for a wide range of species (including Atlantic salmon and sea trout), and a priority marine feature in their own right, we find it very hard to have any confidence in this assessment.

Paragraph 99 suggests that habitat loss will result in a negligible and probable effect on Atlantic salmon. However, we would highlight that our concerns relating to habitat loss would primarily be on prey species, such as sandeel, and we would again highlight our lack of confidence in the assessment of sandeel.

11.8.5.3. Cumulative Impact of Loss of Habitat

Again, we lack confidence in the assessment here, due to the considerable uncertainty in relation to the distribution of sand eels in the area.

[3] Wendelaar Bonga, S. E. (1997). The stress response in fish. *Physiol.l Rev.* 77, 591-625.

11.4.2.2. Introduction of New Habitat

Paragraph 100 states that localised, long term positive changes on the overall diversity and productivity of the seabed communities are expected to occur as a result of the introduction of hard substrate. It is likely that such structures will act as fish aggregation devices (FADs), rather than actually increasing biomass. However, if the structures do act as FADs we would also be concerned that such areas may in fact represent new 'pinch points' for predation of migrating smolts and returning adults, in an area which we must consider as a key migration route for salmon and a key feeding area for sea trout. This possibility is alluded to in paragraph 112, but does not appear to be considered further.

11.4.2.3. Electromagnetic Fields

This section makes reference to research by Normandeau *et al.* (2011) and indeed quotes averaged predicted magnetic fields above and horizontally along the sea bed for AC cables (Table 11.17). However, the figures quoted in Table 11.17 assume a burial depth of 1m, whereas the document makes frequent reference to burial of cables to a minimum depth of 0.6m. There appears to have been no effort to assess the predicted magnetic field values at this burial depth.

Paragraph 116 highlights the depths of the wind farm site and states that strength of magnetic field decreases with distance from source, concluding that the position of the particular species in the water column and water depth will influence the potential effects of EMFs. We agree – however this again highlights the vital importance of a monitoring strategy to determine swimming depth of migratory salmonids in the development area. In the absence of such monitoring, it is difficult to assess the risks of the development to migratory fish. We would note that the differing life strategies of Atlantic salmon and sea trout mean that these species must be treated differently in this respect (see below).

Paragraph 131 states that salmon and sea trout transiting the area of the wind farm will for the most not be exposed to the strongest EMFs are they normally swim in the upper meters of the water column during migration. We also note that the SALSEA project has shown that Atlantic salmon are capable of diving to considerable depths. The ES suggests that migration and feeding are mutually exclusive activities for salmon, a suggestion that is contradicted on page 10 of the 16B Annex of the ES which states: *Malcolm et al (2010) concluded based on research undertaken to date (Jakupsstovu, 1986; Holm et al, 2005; Starlaugsson, 1995) that in general terms salmon spend most of the time close to the surface although dives to greater depths of up to 280m have often been observed. Dives do not appear restricted to offshore areas, persisting late into the migration on the return to home waters. Early studies (Jakupsstovu, 1986) suggest an association between diving and feeding.*

The ES does not take into account the foraging behaviour of sea trout, which we (and the developers) assume use the area in question. No information is presented as to the depths at which such fish forage. Sea trout are also apparently more likely to be benthic feeders than salmon as on page 15 of Annex 16B it is stated that: *In addition, Pemberton (1976b) suggested a diel feeding pattern, with bottom feeding being greatest during the day and mid-water and surface feeding increasing between sunset and sunrise*.

We are aware that Marine Scotland Science are currently undertaking a research programme which aims to investigate electro-magnetic force impacts on salmonids. Until this work is completed, we are unable to assess the relative magnitude of this impact, or relate the figures quoted in Table 11.17 to those magnetic fields likely to initiate a behavioural response in salmonids.

11.8.5.4. Cumulative impact of EMFs

Again, until the research currently being undertaken by Marine Scotland Science is complete, we are unable to assess the relative magnitude of the cumulative impacts, or relate the figures quoted in Table 11.17 to those magnetic fields likely to initiate a behavioural response in salmonids. Until this work is completed, there is at least a theoretical risk that EMFs arising from both inter-array cables and offshore transmission cables could present a barrier to fish migration.

11.4.2.4 Operational Noise
No comment.

11.5 Mitigation measures and residual effects
We are very disappointed to see that no mitigation measures are included other than inter-array cable burial/protection, *where feasible*, are proposed to reduce the effects associated with the construction/decommissioning and operation phase of the development. We believe that ***all*** inter-array cabling should be buried to a suitable depth (and in the absence of any other information, we believe that the minimum depth should be 1m) or have a suitable shielding material placed over them. We do not believe that there should be any exceptions to this, irrespective of the technical difficulties involved. In addition, we would highlight our comments regarding mitigation in our response to section 11.4.12 (above).

11.9 Habitats Regulations Appraisal
We do not consider the information presented to be sufficiently robust to draw the conclusion that there are not likely to be significant effects, particularly with regard to Atlantic salmon and sea trout. We therefore consider that an appropriate assessment, based on pre-construction monitoring will be required. Clearly, the appropriate assessment must take into account the cumulative and in combination likely significant effects arising from the MORL and other developments.

11.10 Statement of Significance
The ES concludes that the construction/decommissioning and operation phase of the development will *in general terms* not result in significant effects in relation to EIA regulations. However, as highlighted above, we do not consider the information presented to be sufficiently robust to draw this conclusion, particularly with regard to Atlantic salmon and sea trout.

23.4.1. Construction/Decommissioning Phases of the Offshore Transmission Works

23.4.1.1. Increased Suspended Sediment Concentrations and Sediment Re-deposition
We note the recognition of the proximity of the proposed cable landfall to the River Spey and the possibility for fish to be disturbed prior to river entry and/or immediately after leaving the river if transiting the southern sections of the OfTW corridor. Paragraph 66 notes that works in close proximity to the shore should only be undertaken over a limited period of time, and that the seasonality or river entry and the diversity of runs should be noted. We would expect that, should the development be consented, close liaison with the Spey Fishery Board on the timing of such work should be a requirement of consent.

23.4.1.2. Noise and Vibration
No comment

23.4.2. Effects Arising from the Operational Phase of the Offshore Transmission Works

This section recognises that, given the central location of the OfTW corridor in the context of the Moray Firth area, the uncertainties in relation to migratory patterns not only for fish originating in the Moray Firth rivers but also in other areas of Scotland, and the proximity of the proposed cable landfalls to salmon and sea trout rivers (particularly the Spey), it is likely that salmon and sea trout will transit the OfTW area. This assumption is backed up by Annex 16B, which refers to the recent review by Marine Scotland Science, which suggests that these species migrate in both an easterly and westerly direction along the Moray coast. As stated earlier, we are aware that Marine Scotland Science are currently undertaking a research programme which aims to investigate electro-magnetic force impacts on salmonids. Until this work is completed, we are unable to assess the relative magnitude of the impact of EMFs arising from either an AC or DC cable.

Conclusion
As stated above, ASFB recognises the importance of offshore renewable energy. However, the environmental statement has failed to demonstrate that the development will not adversely affect the integrity of the SAC rivers around the Moray Firth. Where a Natura site is involved, the onus is on the developer to demonstrate no impact and in the absence of that the precautionary principle will apply. Under these circumstances, we do not consider that the proposed development is compatible with the requirements of the Habitats Directive or Scotland's

Marine Nature Conservation Strategy. On that basis, we have no alternative but to formally object to the proposed development, until adequate monitoring and mitigation strategies have been put in place.

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