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Prioritisation of monitoring and research for diadromous fish in the context of Marine/Offshore Renewables: A summary of stakeholder engagement meetings between Marine Scotland, wild fisheries interests and wind, wave and tidal developers.

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Summary

Marine Scotland Science (MSS) prepared a scoping report of the research requirements for Atlantic salmon, sea trout and European eel in the context of offshore renewables (Malcolm *et al*, 2013). This report was intended to inform the development of a **National Research and Monitoring Strategy for Diadromous Fish** (hereafter NRMSD) to investigate the potential for interactions between diadromous fish and wind, wave and tidal renewable energy developments. To ensure that the NRMSD had broad sectorial support, meetings were convened to identify and discuss priority areas.

There was general agreement on information requirements between the stakeholder groups. The following areas were considered priorities:

- Fish Distribution,
- Population Status,
- Response to noise,
- Effects of electromagnetic fields
- Risk of collision.

Future engagement events will be convened at suitable stages in the development of the National Research and Monitoring Strategy for Diadromous Fish.

1. Introduction

Marine Scotland Science (MSS) prepared a scoping report to identify the strategic research and monitoring requirements for the diadromous fishes including Atlantic salmon, sea trout and European eel in the context of marine renewable energy (Malcolm *et al*, 2013). Following publication of this report, Marine Scotland initiated a process to develop a national strategy to coordinate and align research and monitoring in this area.

Stakeholder meetings were organised with wild fish interests and representatives of the wind, wave and tidal sectors in July and August 2013 respectively. The overall aim of the stakeholder meetings was;

To strengthen communications and promote a shared understanding of the priorities for research and monitoring in relation to the species Atlantic salmon, Sea trout and European eels and marine/offshore renewable energy between Marine Scotland Science and relevant stakeholders.

The specific objectives were:

- For MSS to provide an overview of potential research and monitoring opportunities in relation to diadromous fish as identified by Malcolm *et al.* (2013).
- For MSS to provide an overview of the proposed process for stakeholder engagement in order to prioritize research and monitoring for scoping.
- For Stakeholders to provide feedback on the scoping document and identify omissions.
- To discuss local and national monitoring requirements and opportunities for integration across scales.
- For stakeholders to prioritise areas of research and monitoring to be taken forward for project scoping.

This report summarises the process undertaken to establish inclusive stakeholder groups for consultation and the outcomes of the workshops. Next stages are also identified for the development of the NRMSD.

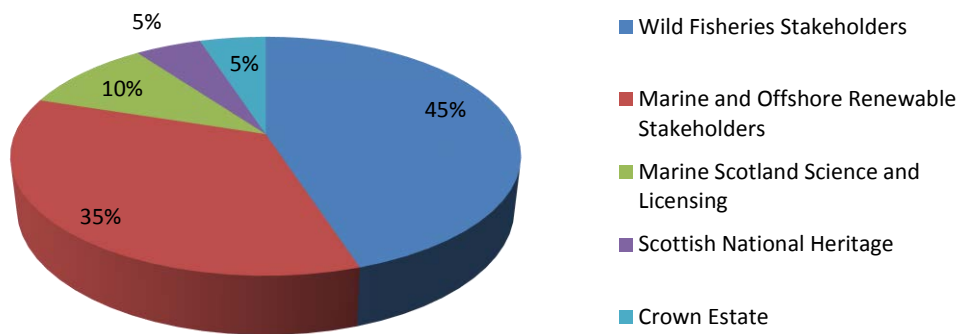
2. Stakeholder Meetings

Two groups of stakeholders were identified by Marine Scotland as part of the consultation exercise, these were (1) managers interested in either target fisheries or the conservation of wild migratory fish and (2) wind, wave and tidal developers. Separate workshops were undertaken for these two groups. Stakeholder meetings were established by sending out invitation emails which provided background information and explained the purpose of the meetings. A total of 41 individual delegates attended the stakeholder meetings. Representatives of a further 4 wild fisheries groups provided information which was subsequently incorporated into this report although they were unable to attend in person. A list of invited stakeholders and a summary of all representatives are provided in Table 1 and Figure 1.

Table 1. Invited External Stakeholder Representative Details

Wild Fisheries Stakeholders	Wind, wave and tidal renewable energy Stakeholders
Association of Salmon Fishery Boards	Aquamarine Power
Beaully District Salmon Fishery Board	Brown and May Marine Ltd
Caithness District Salmon Fishery Board	Crown Estate
Cromarty Firth District Salmon Fishery Board	Main Stream Renewable Power
Dee District Salmon Fishery Board	Meygen
Deveron District Salmon Fishery Board	Natural Power
Esk District Salmon Fishery Board	Nautricity Limited
Findhorn, Nairn and Lossie District Salmon Fishery Board	Open Hydro
Helmsdale District Salmon Fishery Board	Pelamis Wave Power Ltd
Kyle of Sutherland District Salmon Fishery Board	Repsol
Moray Firth Sea Trout Project	RPS Energy
Northern and West District Salmon Fishery Board	Scottish Power
National Anguilla Club	SSE Renewables
Naver District Salmon Fishery Board	Vattenfall
Ness District Salmon Fishery Board	Xi Engineering
Scottish National Heritage	
Spey District Salmon Fishery Board	
Tay District Salmon Fisheries Board	
River Tweed Commission	
Wester Ross District Salmon Fishery Board	

Figure 1: The contribution of all attendees by sector



Prior to the meetings all attendees were sent an agenda and relevant background papers:

- The scope of research requirements for Atlantic salmon, sea trout and European eel in the context of offshore renewables (Malcolm *et al*, 2013)
- Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables. (Malcolm *et al*, 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 (Gill and Bartlett, 2010).

Both meetings started by presenting the background and context for the NRMSD as identified by Malcolm *et al.* (2013), and the current MSS work program for which resource had already been committed. The morning session included presentations from Marine Scotland Science followed by facilitated discussions. The afternoon session was devoted to facilitated discussions, including the prioritisation exercise. The workshop was intended to give delegates an opportunity to identify and consider research and monitoring needs, but also consider options for delivery. A summary of the facilitated discussions and research prioritisation is presented below. At the close of each meeting, the chair summarised the priority areas to ensure that priorities had been appropriately captured during the consultation process.

2.1 Stakeholder Meetings Summary

Five questions were identified prior to the workshops to facilitate discussion and ensure that the main issues were considered. The following summarises the outcomes of both stakeholder meetings in relation to these questions.

A. Are the stakeholders satisfied with the priorities identified in the scoping document?

Significant discussion arose around the scoping document (Malcolm *et al*, 2013). The wind, wave and tidal developers were generally satisfied that the scoping document identified the main priorities and did not identify any further issues. However, there was some scepticism about the likely significance of construction noise. The Wild Fisheries stakeholders felt that whilst the main priorities had been identified there were two additional topics that should also be considered. First, Scottish National Heritage identified the need for research into species of conservation interest beyond those identified in the scoping document, in particular Lamprey. It was highlighted that the River Lamprey and Sea Lamprey are present in Scotland and the potential impact from marine/offshore renewables on these species had not been explored. River Lamprey are listed in Annex II of the European Union Habitats Directive and in the Appendix III of the Bern Convention. Whilst Sea Lamprey are listed in Annex II of the European Union Habitats Directive and Appendix III of the Bern Convention. Both River and Sea Lamprey are also UK Biodiversity Action Plan Priority List species. Secondly, it was suggested that there was a need to ensure resilience in salmonid populations through a focus on improvements in freshwater habitat. It was suggested that such actions, could in part mitigate against additional mortality of fish at sea.

B. Are the areas of work identified for scoping by MSS in the current work plan also the priorities for the stakeholders?

The five preliminary priority areas proposed by MSS for discussion were;

- 1) Development of a national fish counter network
- 2) Development of Acoustic arrays (Near river and Coastal)
- 3) Production of a map of post-smolt migration in the North Sea
- 4) Assessment of the affects of AC EMFs.
- 5) Noise Monitoring

There was extended discussion on the preliminary priority areas. The overall outcomes from both stakeholder groups was that establishment of the spatial and temporal distribution and population status of the wild fish was important. Both these aspects were highlighted and explored in the scoping document (Malcolm *et al*, 2013). The wind, wave and tidal renewable energy stakeholder group emphasised that these priority areas are also important for other coastal developers such as aquaculture and it was felt that the burden of developing such projects should not fall solely on the shoulders of marine/offshore renewable developers. The wind, wave and tidal renewable energy stakeholders expressed caution over what could realistically be achieved in terms of research and monitoring that could support

developments. Furthermore they highlighted that it was important to clearly identify the context of the work and how the resulting outcomes would be used for management and decision making, for example, in marine spatial planning and regional locational guidance.

Three other areas were also identified as important to both stakeholder groups:

- Impacts of underwater noise,
- Electromagnetic fields and
- Strike.

These three aspects were also highlighted and explored in the scoping document (Malcolm *et al.* 2013).

The wind, wave and tidal renewable energy stakeholders discussed the potential types of local projects that could be undertaken to explore noise, electromagnetic fields and the risk of collision/strike. This aspect was felt to be important but it was not clear how or where this type of research would fit within the NRMSD. The wild fisheries stakeholders indicated that site-specific issues, such as those related specifically to the technology employed, for example the type of blade used or cabling arrangements on the renewable devices, should be dealt with by the developer directly and that the NRMSD should focus on national projects not individual issues such as these. So, for example, an overall understanding of the likely impact from noise in the construction and operational stages of the development should be explored in the NRMSD. Similarly the likely impact from electromagnetic fields to migration and the potential likelihood of strike/collision should be explored within the NRMSD.

The wild fisheries stakeholders suggested that it was clear that fish will be able to detect the noise produced from marine/offshore renewable developments at some distance, however the behavioural consequences of this are poorly understood. The wind, wave and tidal renewable energy stakeholders were aware of and appreciated the concerns of the wild fisheries stakeholders over the ability of fish to detect noise and subsequent behavioural effects that this had therefore this has been explored in their Environmental Impact Assessments. They felt a NRMSD to explore the noise aspects from all stages of construction, operation and decommissioning was important to ensure consensus in terms of actual impact in this area.

Both stakeholder meetings included detailed discussion of the potential effects of Electro Magnetic Fields. It was noted that experimental work was being undertaken by MSS to investigate the interactions between Atlantic Salmon and AC electromagnetic fields. The wind, wave and tidal renewable energy stakeholders indicated the importance of publishing results as soon as possible. Wild fisheries stakeholders also identified the need for rapid publication of results but also

highlighted the importance of disseminating the research to as wide an audience as possible.

Finally the wind, wave and tidal renewable energy stakeholders suggested that research had already been undertaken (for example Thorley, 2013) and these published reports and their outcomes should be made widely available.

C. Is the stakeholder group satisfied with a work program focussed on a regional northern/east coast scale providing that findings are more generally transferable to the national level?

Both stakeholder groups confirmed that a NRMSD initially focussed on delivering transferable knowledge from work undertaken at a regional north/east coast scale would be appropriate. Scottish National Heritage noted the importance of ensuring that coastal waters in the west of Scotland were not excluded. It should also be noted that although all District Salmon Fishery Boards were invited to the stakeholder meeting, no west coast boards attended and only one west coast board provided comment (via telephone). The Wild fisheries stakeholders indicated that any regionally focussed work should demonstrate wider value and applicability for it to be included in the NRMSD. It is expected that as the NRMSD develops, projects will be undertaken in coastal waters across all regions depending on information requirements and opportunities

D. What are the local research priorities and is there potential to develop local issues into the national strategy

At both stakeholder meetings there was some discussion of local issues. Both stakeholder groups agreed that at this stage there were not any additional local research priorities that needed to be specifically included in the NRMSD beyond those common issues identified in the scoping document.

E. Is the stakeholder engagement strategy appropriate or are there alternative engagement processes that would be preferred?

Both sets of stakeholders agreed that the current approach of stakeholder meetings was useful and indicated that six months was a suitable time interval before the next meeting. The wild fisheries stakeholders highlighted that the high level of attendance at a busy time of year showed the importance of marine/offshore renewables to wild fisheries stakeholders. The wind, wave and tidal renewable energy stakeholders suggested that representatives of other industries with similar research and monitoring requirements, such as aquaculture, should be invited to future meetings.

The wild fisheries stakeholders indicated to Marine Scotland that the NRMSD needs to be advanced immediately, as applications and actual developments will be established in the very near future. Finally the wind, wave and tidal renewable energy stakeholders expressed that they would like to see an overall stakeholder meeting to bring together the wild fisheries and the wind, wave and tidal renewable energy stakeholders.

3. Progress since the Stakeholder Meetings

Further to the two stakeholder workshops reported here, a management Steering Group was established (hereafter referred to as the Steering Group). This Steering Group includes representatives of Marine Scotland Science, Policy and Licensing, the wild fisheries sector and wave, wind and tidal renewable energy sectors. The overall aims of the Steering Group are to oversee the NRMSD, strengthen communications and promote shared understanding of research and monitoring requirements among stakeholders.

The specific remit of the Steering Group is to:

- Ensure that all of the relevant issues and perspectives from the stakeholders have been identified.
- Provide a summary of the priority areas of research and monitoring requirements, recommendations and proposals on behalf of the stakeholders.
- Provide advice in relation to wider stakeholder engagement and consultation activities for taking the NRMSD forward.
- To investigate and facilitate the provision of adequate resources to deliver the agreed NRMSD work packages and resulting outcomes.
- To explore the integration of the proposed research with other relevant sectors.

The areas of research prioritised by the stakeholder meetings have been incorporated alongside existing MSS research into work packages that constitute the start of the NRMSD. The new work packages are now being assessed and scoped to identify project feasibility and costs, with existing funding highlighted where relevant. As both sets of stakeholders reported that the meeting platform for engagement was appropriate, a follow up meeting to report progress and receive feedback will be convened at completion of the NRMSD prior to final sign off by the Steering Group.

4. Conclusions

The stakeholder meetings and associated Steering Group have prioritised research and monitoring in line with the views of relevant stakeholders. Emergent priorities are now being included in a NRMSD which also highlights where funding has been committed. Each of these work packages will be scoped to identify logistical challenges, potential approaches and indicative costs. Engagement will be maintained with the Steering Group and individual stakeholders to ensure a focused and cohesive approach in this rapidly advancing area.

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6. Glossary of Terms

Diadromous fish are species that migrate on a regular, timed, consistent and often obligatory basis between fresh waters and the sea (Myers, 1949).

NRMSD: National Research and Monitoring Strategy for Diadromous fish which aims to investigate the potential for interactions between diadromous fish and wind, wave and tidal renewable energy developments

Tidal Sector: Tidal renewable energy developers are a sector aiming to developed infrastructure within the marine environment to harness tidal stream energy and convert this into electricity or other useful forms of power.

Wave Sector: Wave renewable energy developers are a sector aiming to developed infrastructure within the marine environment to harness wave energy and convert this into electricity or other useful forms of power.

Wild Fisheries Sector: The wild fisheries sector included parties interested in Atlantic Salmon, Sea trout and Eels as fisheries targets and conservation.

Wind Sector: Wind renewable energy developers are a sector aiming to developed infrastructure to convert offshore wind energy into electricity or other useful forms of power.

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