



Scottish Aquaculture Research Forum
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OVERVIEW OF THE SCOTTISH AQUACULTURE RESEARCH FORUM (SARF)

SARF Secretariat, 28th February 2018

INTRODUCTION

The original version of the Strategic Framework for Scottish Aquaculture was published by the then Scottish Executive in March 2003. The Ministerial Working Group outlined a vision of an aquaculture industry guided by the principles of sustainable development, balancing economic progress with social justice and environmental responsibility. The formation of the **Scottish Aquaculture Research Forum (SARF)** was one of 33 priorities for action contained within the framework, and SARF was created in April 2004 to promote, encourage and support research and development in aquaculture.

MEMBERS

SARF has had a range of Members since 2004, including representatives from the aquaculture industry, government organisations, wild fish groups and environmental NGO's. The research undertaken has been across a broad range of areas and is designed to meet the collective needs of its Members. At the time of writing, SARF's trustees and their respective Member organisations are:

- A W Adrian – The Crown Estate Scotland
- C A Burton – Sea Fish Industry Authority
- P R Hart - WWF
- N C Lake – Association of Scottish Shellfish Growers
- I Sutherland – Highlands and Islands Enterprise
- J L Webster – Scottish Salmon Producers Organisation
- D A Sandison - Scottish Salmon Education and Research Foundation
- R G Lees – Scottish Natural Heritage
- A J Mitchell – Marine Scotland
- D S Sinclair – Scottish Environment Protection Agency
- R S Raynard – Marine Scotland Science
- D A McLeod – British Trout Association

FUNDING & ADMINISTRATION

SARF's core funding has come from subscriptions from its Members, with some additional co-funding on a project-by-project basis. Figure 1 shows the historic sources of SARF's core funding, which has amounted to some **£4.2 million** since 2004. In addition to this core funding, there has been a total of **£2.2 million** of co-funding, from a variety of sources, including the aquaculture industry.

SARF’s administration has been accomplished by a two-person Secretariat, working on a part-time basis. Overall operating costs have therefore been kept very low, averaging some **14%** of total expenditure.

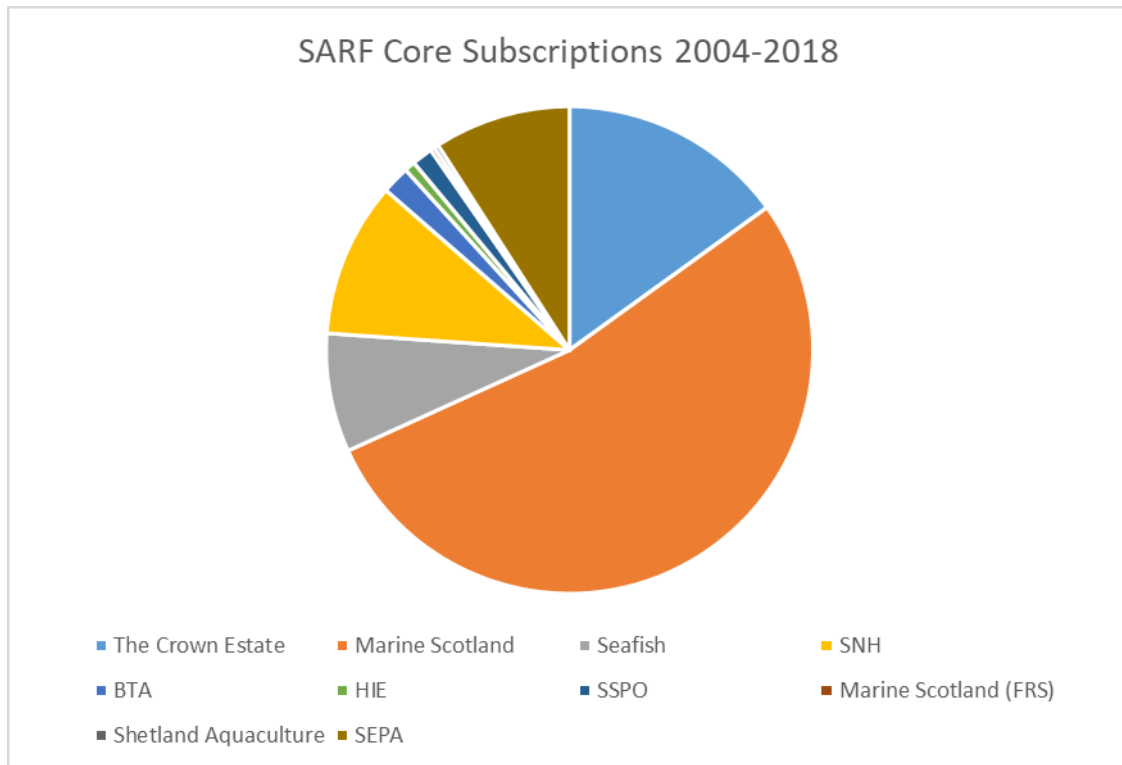


Figure 1. Member’s core subscriptions.

HOW SARF RESEARCH IS CONTRACTED AND MANAGED

SARF has commissioned a total of 91 discrete research projects to date, with a total value of over **£5.6 million**. Individual Members are asked to consult within their organisation and bring their research priorities to the Board in a transparent and formalised system every year. The Board debates these and selects those it considers to be the highest priority at the time, within the constraints of the available budget for the year. These research opportunities are widely advertised as an annual Call for Proposals. SARF invariably receives several competing applications for individual research projects, and these are assessed by 3 or 4 independent experts on an anonymous basis. The Board then meets to consider the applications and the advice of the assessors, and agrees the preferred contractor for each of the projects. SARF research contracts are fixed price.

All SARF projects are actively managed by way of an appointed Project Steering Group, which normally includes some Trustees/Directors of the SARF Board, and some external experts in the particular research field. External experts are required to sign the same confidentiality agreement that is standard for Members.

All SARF completed research is independently and anonymously peer reviewed, and then formally approved by the SARF Board before publication. Reports are published on the SARF website, and also lodged with the British Library.

SARF RESEARCH TOPICS

SARF research is categorised into a number of discrete ‘topics’, as illustrated in Figures 2 and 3 below.

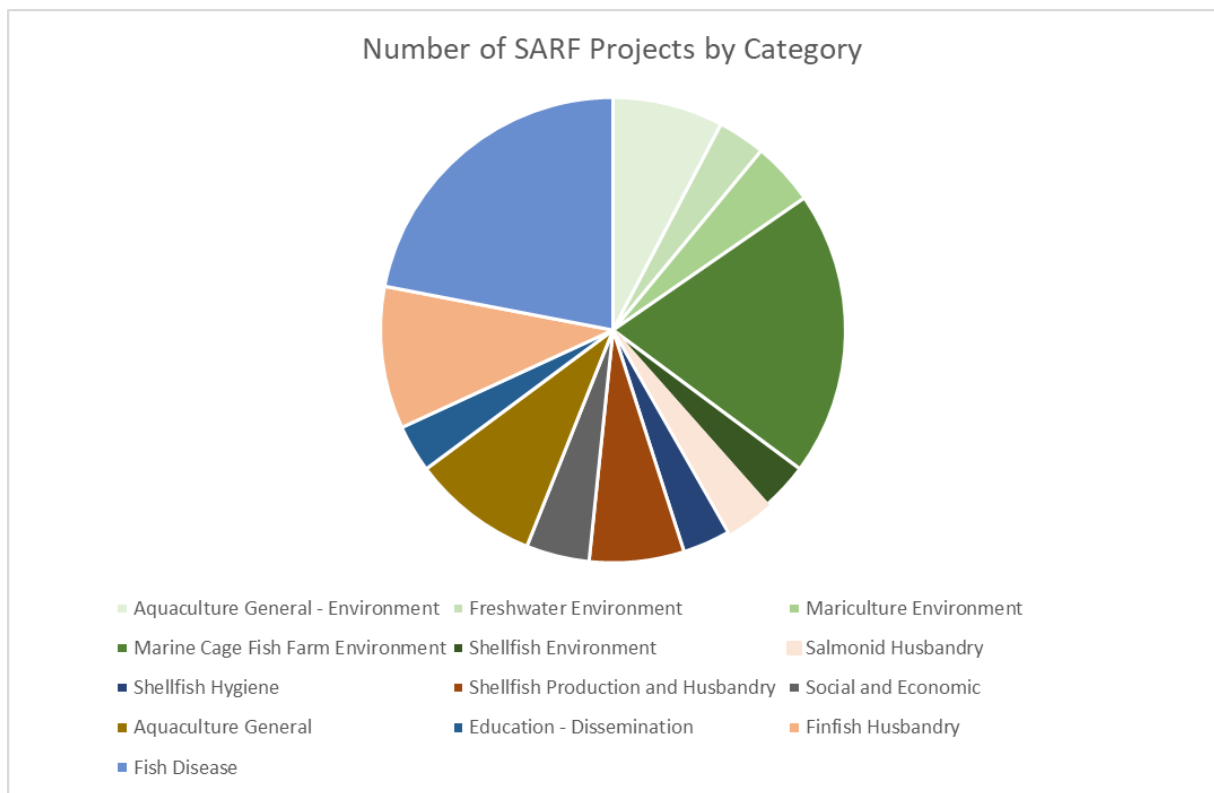


Figure 2. SARF project numbers by research topic.

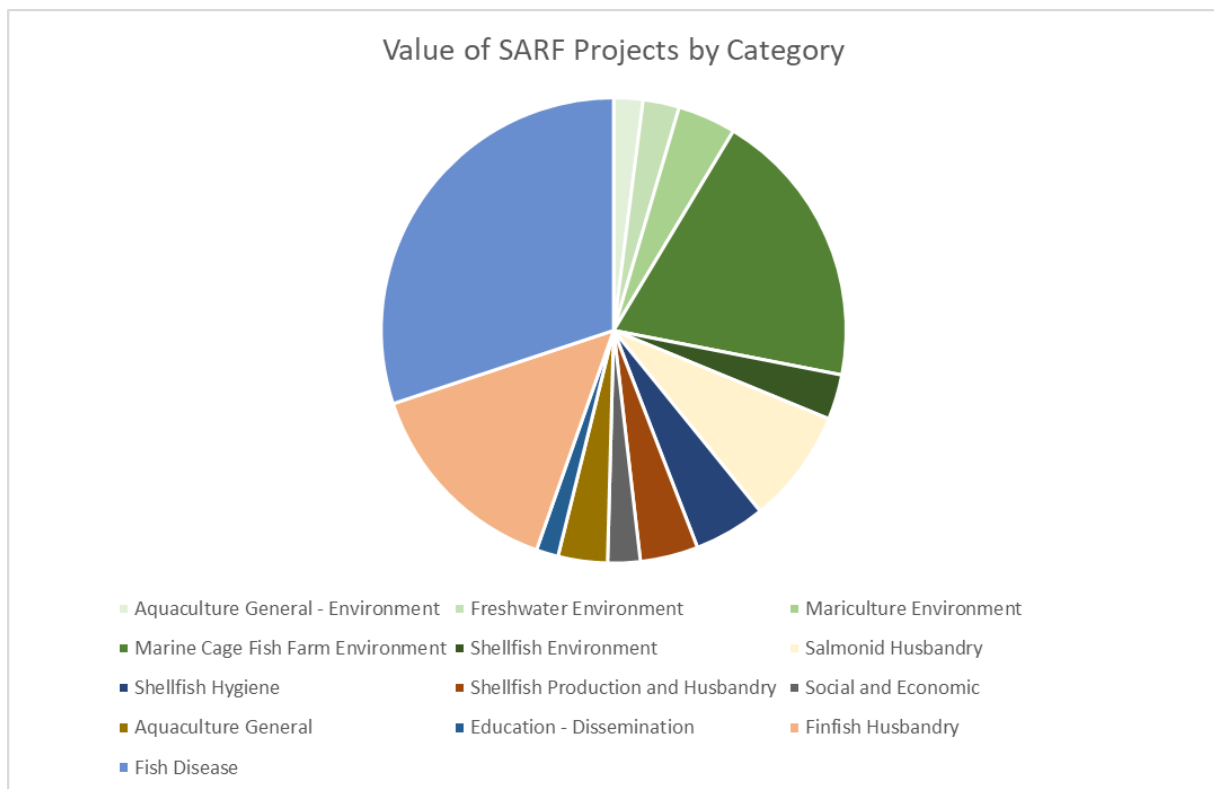


Figure 3. SARF project values by research topic.

Appendix 1. SARF RESEARCH PROJECTS

All approved and published SARF research reports can be downloaded from the website (www.sarf.org.uk), and to assist in finding particular projects of interest, a full list of published projects is shown in Table 1. SARF112 is not quite complete, and SP010 has been extended for a further year of fieldwork. SARF currently has 3 additional running projects, all of which are due to be complete by the end of 2018.

Table 1. All published SARF projects.

| Project Code | Project Title | Start Date | End Date |
|---------------|---|------------|------------|
| SARF001 | Prevention and management of <i>Ichthyophthirius multifiliis</i> | 01/01/2005 | 31/07/2005 |
| SARF003 | Development of a GIS-based tool to assist planning of aquaculture developments | 01/03/2005 | 28/02/2006 |
| SARF004 | Vaccine performance - efficacy in gadoids measured by cell mediated immune responses | 01/05/2005 | 30/04/2008 |
| SARF004a | BAC Library | 01/09/2006 | 28/02/2007 |
| SARF005 | Site optimisation for aquaculture operations | 20/01/2005 | 19/10/2005 |
| SARF009 | Coastal assimilative capacity for amalgamated fish farm chemicals/organic pollutants | 01/04/2005 | 31/03/2008 |
| SARF011 | Review of Environmental Quality Standards (EQS) for use in assimilative capacity model development | 01/06/2005 | 31/05/2006 |
| SARF012 | The development of modelling techniques to improve predictions of assimilative capacity of water bodies utilised for marine caged fish farming | 01/07/2005 | 30/09/2007 |
| SARF012a | Development of assimilative capacity and carrying capacity models for water bodies utilised for marine bivalve and caged fish farming | 01/04/2008 | 30/09/2010 |
| SARF013 & 13a | Identification of sources of faecal pollution in Scottish coastal waters to help clarify causes of recent deterioration in the quality of Shellfish Harvesting waters (to be associated with the EU REDRISK Project) | 14/11/2005 | 13/11/2007 |
| SARF014 | Cod broodstock nutrition, and specifically the role of essential fatty acids such as arachidonic acid. | 01/10/2005 | 30/09/2007 |
| SARF015 | The aetiology and epidemiology of Pancreas Disease (PD) and similar pathologies - Heart and Skeletal Muscle Inflammation (HSMI) and Cardiomyopathy Syndrome (CMS) - in Scotland | 01/11/2005 | 30/11/2007 |
| SARF016 | Rainbow Trout Gastro Enteritis | 01/05/2006 | 31/03/2009 |
| SARF017 | A rationale for the identification of sea lochs with isolated deep water, to help assess the risk of widespread basin de-oxygenation. | 01/12/2005 | 30/11/2006 |
| SARF021 | The development of practical but meaningful welfare indices for cod ongrowing. | 01/03/2006 | 11/06/2009 |
| SARF022 | Novel species risk to biodiversity assessments study: as discussed within the Scottish Biodiversity Strategy Implementation plans | 05/01/2006 | 05/07/2006 |
| SARF023 | Review of sea lice bath treatment model | 12/06/2006 | 17/08/2007 |
| SARF024 | A Review of Fish Farm Environmental Impact Assessments | 01/09/2006 | 31/03/2007 |
| SARF025 | Consumer attitudes to aquaculture feed sustainability | 01/02/2007 | 30/09/2007 |
| SARF026 | Evaluation of copper concentrations around marine cage fish farms. | 01/02/2007 | 01/11/2009 |

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| SARF027 | Stock management strategies to optimise growth potential in on-growing of marine fish. | 01/02/2007 | 31/01/2010 |
| SARF027a | CON008 - continuation/extension of SARF027 | 15/02/2010 | 31/05/2011 |
| SARF028 | Development of a system for sentinel fish farm monitoring. | 01/03/2007 | 01/02/2009 |
| SARF030 | Assessment of the rate of sedimentary ecosystem recovery following the removal of marine fish farm cages or the cessation of farming. | 01/07/2007 | 30/09/2010 |
| SARF031 | Assessment of appropriate thresholds for the potential triggers for Environmental Impact Assessments (EIA) for shellfish farms. | 15/01/2007 | 30/09/2007 |
| SARF035 | Determination of the fate of chemical/faecal material which is transported beyond the Allowable Zone of Effects (AZE). | 26/02/2007 | 31/08/2007 |
| SARF036 | Establishing the effects of fish farm discharges on Biodiversity Action Plan (BAP) habitats and assessing their recoverability. | 01/08/2007 | 31/12/2009 |
| SARF037 | Strategic waste management and minimisation in aquaculture – a detailed review of current status and future options. | 19/02/2007 | 30/09/2007 |
| SARF038 | International Symposium | 01/04/2007 | 01/04/2010 |
| SARF039 | SARF Education and Dissemination Programme | 01/04/2007 | Ongoing |
| SARF040 | Review of Marine Fish Farm EIA Thresholds | 10/03/2008 | 14/02/2009 |
| SARF040a | Completion of SARF040 | 25/09/2009 | 27/11/2009 |
| SARF040b | PDR | 12/04/2010 | 30/06/2010 |
| SARF041 | Developing practical strategies for reducing the spread of harmful organisms during the transportation of live fish | 01/04/2008 | 31/03/2009 |
| SARF042 | Assessment of the potential to reduce the infaunal species list required to give an indication of stress in sediments. | 07/02/2008 | 06/06/2008 |
| SARF043 | Improving understanding of species specific requirements for marine finfish cultivation | 01/03/2008 | 30/06/2012 |
| SARF044 | Assessment of the impacts and utility of acoustic deterrent devices | 01/03/2008 | 31/12/2009 |
| SARF045 | Assessment of evidence that fish farming impacts on tourism. | 08/02/2008 | 28/02/2009 |
| SARF046 | Socio-economic assessment of potential impacts of new and amended legislation on the cultivation of fish and shellfish species of current commercial importance. | 08/02/2008 | 30/04/2009 |
| SARF053 | A systematic assessment of the environmental impact of Scottish shellfish farms, including benthos, water column and relevant special interactions | 01/02/2009 | 30/06/2011 |
| SARF054 | Assessment of protocols and development of best practice contingency guidance to improve stock containment at cage and land based sites. | 01/04/2009 | 01/10/2009 |
| SARF055 | Validation of OECD-model for predicted impact of freshwater cage production on in loch total phosphorus concentration | 01/02/2009 | 31/03/2010 |
| SARF056 | Development and delivery of a proposal for re-establishment, on a pilot scale, of a native oyster population in Scotland | 05/01/2009 | 30/09/2009 |
| SARF057 | Development of improved management strategies for Red Mark Syndrome (RMS) | 01/02/2010 | 01/08/2011 |

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| SARF063-01 | Overcoming bottlenecks in the intensive commercial production of native oyster spat | 01/01/2010 | 30/06/2012 |
| SARF063-02 | Establishment and development of a national broodstock of the European hake, <i>Merluccius merluccius</i> | 04/01/2010 | 30/12/2012 |
| SARF064 | <i>Mytilus trossulus</i> : Managing impact on sustainable mussel production in Scotland | 04/01/2010 | 31/08/2011 |
| SARF065 | Trials to enhance oyster depuration with respect to norovirus | 01/03/2010 | 31/10/2010 |
| SARF066 | Practical trials and cost-benefit analysis for industry of reduced depuration times for the mussel <i>Mytilus edulis</i> | 01/08/2010 | 30/01/2011 |
| SARF068 | Optimising sea lice treatment regimes to minimise the development of resistance - altered to - Management of sea lice numbers with wrasse and maintaining wrasse welfare - April/May 2011 | 01/03/2010 | 01/09/2012 |
| SARF069 | Evaluation of sensitivity to chemotherapeutants in successive generations of <i>Lepeophtheirus salmonis</i> from a resistant population | 01/01/2010 | 28/02/2011 |
| SARF070 | Development of a risk evaluation system for the establishment of <i>Gyrodactylus salaris</i> in Scottish river systems | 01/03/2010 | 30/09/2010 |
| SARF071 | Preliminary tests of the behavioural responses of seals to electric fields in sea water | 01/10/2010 | 30/06/2012 |
| SARF072 | Independent Review of SARF | 20/08/2010 | 15/12/2010 |
| SARF073 | Engineering Standards | 01/12/2010 | 31/07/2011 |
| SARF075 | SARF/Telford Workshop | 28/02/2010 | 28/02/2010 |
| SARF076 | Provision of Advice | 01/10/2009 | Ongoing |
| SARF077 | Macro/Micro Algae | 22/11/2010 | 22/05/2011 |
| SARF078 | Carbon Lifecycle | 01/12/2010 | 30/06/2011 |
| SARF079 | Tourism Project - ISLAD | 01/04/2011 | 30/09/2011 |
| SARF080 | Applications for external funding | Ongoing | Ongoing |
| SARF081 | Multi Trophic Aquaculture - IMTA | 13/12/2010 | 25/03/2011 |
| SARF082 | Scottish Aquaculture's Utilisation of Environmental Resources | 01/05/2012 | 31/05/2013 |
| SARF084 | SARF Session on Fish Migration Assessment at WFC | 11/05/2012 | 11/05/2012 |
| SARF085 | Sediment Sulphide Response to Organic Loading | 01/03/2012 | 31/11/2013 |
| SARF087 | Monitoring and Eradication of Invasive and Non-native Species in Aquaculture Units | 01/02/2012 | 31/07/2012 |
| SARF088 | Student Dissertations | | On website |
| SARF088b | Student Dissertations | | On website |
| SARF090 | Impacts of salmonid pen aquaculture on hard substrates | 01/03/2013 | 15/01/2014 |
| SARF091 | Use of algal and other non-fish oils in refined edible products | 03/01/2013 | 03/07/2013 |
| SARF093 | Renewable power generation on aquaculture sites | 15/01/2013 | 31/10/2013 |
| SARF094 | RMS | 07/01/2013 | 31/12/2014 |
| SARF094b | RMS | 01/01/2015 | 30/06/2017 |
| SARF096 | New approaches to mussel seedstock acquisition | 08/04/2013 | 31/10/2013 |
| SARF097 | Plugging the Gaps: Improving Our knowledge of How Predators Impact Salmon Farms | 15/10/2013 | 30/06/2016 |
| SARF098 | PAMP Refreshment Study | 20/01/2014 | 24/07/2015 |
| SARF098C | PAMP Refreshment (C) | 01/05/2016 | June 2017 |
| SARF099 | Survey of Pacific oyster in Scotland | 01/03/2014 | 30/11/2014 |
| SARF100 | Novel Treatments for Freshwater Aquaculture | 06/01/2014 | 06/10/2014 |
| SARF103 | Aquaculture R&D Database 2013 | | 25/10/2013 |
| SARF104 | Sea Lice Research Feasibility Study | 23/09/2013 | 20/12/2013 |

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| SARF104a | Expert Assistance for SARF104 | 23/09/2013 | 20/12/2013 |
| SARF105 | STS Write-up | 01/02/2014 | 31/12/2014 |
| SARFSP001 | Assessment of the viability of the different life stages of <i>Lepeophtheirus salmonis</i> following exposure to hydrogen peroxide | 01/02/2014 | 15/05/2015 |
| SARFSP005 | Assessment of the viability of <i>Neoparamoeba perurans</i> following exposure to hydrogen peroxide | 01/02/2014 | 31/01/2015 |
| SARFSP006 | Availability and use of freshwater resources in Scotland | 13/01/2014 | 13/07/2014 |
| SARFSP007 | Production of high quality, healthy farmed salmon from a changing raw material base, with special reference to a sustainable Scottish industry | 01/06/2014 | 31/03/2015 |
| SARFSP008 | Modelling of the potential for shortening the pen-based phase of the salmon on-growing cycle | 01/02/2014 | 31/05/2015 |
| SARF106 | Mariculture | 15/09/2014 | 31/05/2015 |
| SARF108 | Sea Lice Predation | 01/11/2014 | 31/01/2015 |
| SARF109 | Load Cells | 01/04/2015 | 07/05/2017 |
| SARF110 | Locational Regulation of Shellfish Aquaculture | 01/01/2015 | 01/03/2016 |
| SARFSP010 | Piloting a network for determining spatial and temporal variation in marine survival of Atlantic salmon and effects of anti-sea lice agents | 01/05/2015 | 31/10/2018 |
| SARF112 | Influence of low frequency ADDs on cetaceans in Scottish coastal waters | 15/06/2016 | 30/08/2017 |