



Berwick Bank Wind Farm

Additional Environmental Information (AEI) Submission

**AEI02: Addendum to the Derogation Case
Section 3 Implementation, Monitoring and Adaptive
Management**

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Acronyms

| Acronym | Description |
|---------|---|
| AEI | Additional Environmental Information |
| AON | Apparently Occupied Nests |
| BBWF | Berwick Bank Wind Farm |
| BBWFL | Berwick Bank Wind Farm Limited |
| CCM | Colony Compensation measures |
| EIA | Environmental Impact Assessment |
| EU | European Union |
| FCM | Fisheries Compensatory Measures |
| FTRAG | Forth and Tay Regional Advisory Group |
| HES | Historic Environment Scotland |
| IMP | Implementation and Monitoring Plan |
| MRF | Marine Recovery Fund |
| MD-LOT | Marine Scotland Licensing and Operations Team |
| NTS | National Trust for Scotland |
| PVA | Population Viability Analysis |
| PEMP | Project Environmental Monitoring Programme |
| RIAA | Report to Inform Appropriate Assessment |
| SNH | Scottish Natural Heritage |
| SWT | Scottish Wildlife Trust |
| SSB | Spawning Stock Biomass |
| SPA | Special Protection Area |

| Acronym | Description |
|---------|-------------------------------------|
| SSER | SSE Renewables |
| SSG | Strategic Stakeholder Group |
| TAC | Total Allowable Catch |
| TSB | Total Stock Biomass |
| UK | United Kingdom |
| UKCEH | UK Centre for Ecology and Hydrology |

Executive Summary

This report provides additional environmental information on implementation, monitoring and adaptive management for fisheries and colony compensation measures as requested by MD-LOT. The Applicant has reviewed the responses from NatureScot, Natural England and RSPB and identified key themes from these responses. These key themes have been fully addressed in this report.

As an initial step the Applicant completed a review of the academic literature and guidance on the approaches to adaptive management and developed a framework to present additional information for each of the compensation measures. The literature reviewed identified that the adaptive management approach can be a useful way to manage the uncertainty of system responses to management actions. Whilst best practice is to put mechanisms in place for adaptive management, in practice it is less likely to be required where there is high confidence in the efficacy of the measure.

Proposals for adaptive management were provided in the Implementation and Monitoring Plan forming part of the Derogation Case for all measures, namely “Option 1” full closure of the sandeel fisheries in SA4, “Option 2” ecosystem management of sandeel fisheries in SA4, wardening at Dunbar Castle and eradication of rats at Handa Island. Those proposals for adaptive management, and the monitoring to support adaptive management, are supplemented in this submission. Reduction in the cull of gannet at Sula Sgeir was not included but has now been provided for in response to consultee comments.

This report presents a step-by-step approach to implementation, monitoring and adaptive management, to enable stakeholders to be clear on what actions will be taken, and when, in the delivery of the compensatory measures. In each case, stakeholder engagement is fundamental to the process, and the Applicant remains committed to engaging with stakeholders to deliver the compensatory measures, to monitor their success and to adapt them as necessary, including via the overarching Colony Measures Implementation Plan and the Sandeel Measures Compensation Plan and operational and monitoring plans for each compensatory measure.

The implementation of adaptive management to address any residual uncertainty (which is considered to be low) means that there is a very high degree of confidence that the proposed measures will be successful in offsetting the impacts of the Proposed Development. After implementation of the compensation measures the progress of the whole compensation package and new evidence gathered through the Project Environmental Monitoring Programme and other strategic research programmes will be monitored and reviewed. A range of management actions and ultimately contingency compensation measures, including further implementation, monitoring and management set out in this document, could then be carried out if at any point the monitoring framework indicates that the package of measures is not performing as predicted to offset the impacts of the project.

This report demonstrates the Applicant’s understanding of the adaptive management process and how it should be applied to reduce any residual uncertainty. Read alongside the Implementation and Monitoring Plan, it demonstrates that monitoring and adaptive management of each measure is feasible, and contingency measures are also available. Robust implementation of this approach together with an overall monitoring framework and ability to implement contingency measures provides Scottish Ministers with full confidence that compensation to offset the potential adverse effects of the project can be secured and will ensure the overall coherence of the National Site Network is protected.

1. Introduction

1.1. Purpose

The purpose of this document is to provide additional information on implementation, monitoring and adaptive management for both sandeel and colony compensation measures proposed in the Berwick Bank Derogation Case. The information has been requested by MD-LOT as shown below:

“It has been identified by NatureScot, Natural England and RSPB that there is insufficient information in relation to both sandeel fishery and colony compensation measures on implementation and monitoring and adaptive management, and each have provided further detail on specific points to be addressed. Additional information must be submitted on these points and MD-LOT advises that Berwick Bank contact NatureScot, Natural England and RSPB to inform the detail of information required.”

1.2. Overview

The Applicant has reviewed the specific points made by the stakeholders on implementation, monitoring and adaptive management. These have been addressed in the gap analysis and common themes emerging from this analysis have been identified. These common themes were used to develop an initial response that was presented to the stakeholder group (MD-LOT, Marine Directorate, NatureScot and RSPB) on the 29th June 2023. This meeting provided greater clarity on the areas where the stakeholders required additional information. This feedback has been used to further develop the additional information provided below.

The document is structured as follows.

- Firstly, the key themes from the consultation responses and the stakeholder meeting are set out and discussed. This discussion introduces the principle that adaptive management is an effective way of managing uncertainty for individual measures. However, these individual measures need to be considered with a broader monitoring framework that evaluates the progress of the compensatory measures and the actual effects of the project. This approach will provide confidence that the overall package of measures can be delivered and will be sufficient to compensate the adverse effects of the project.
- The next section deals with the general approach to adaptive management and demonstrates its applicability to the compensation measures proposed. This includes a review of the literature with specific reference to the Scottish Natural Heritage (SNH) guidance on adaptive management (SNH, 2015). A framework for the evaluation of the adaptive management approach is developed and described, which is then used to evaluate and demonstrate the applicability and feasibility of adaptive management to the proposed measures. This evaluation demonstrates how the Applicant will use the adaptive management approach to reduce uncertainty and ensure that the management objectives for each measure have the greatest chance of being met.
- Each individual compensatory measure will be subject to annual monitoring and management. The next section describes how these individual measures will sit within a broader framework to review the monitoring of the potential impacts, consider new evidence, and evaluate overall progress of the full suite of compensation measures. Contingency compensation measures can then be implemented if required.
- The final section provides a summary of the key points and concludes that Scottish Ministers can be confident that the proposed measures can be implemented and managed to compensate for the adverse effects of the project, and the overall coherence of the National Site Network will be protected.

1.3. Key Themes from Stakeholders

The Applicant has provided a response to each individual issue raised by stakeholders in the gap analysis. The Applicant has also reviewed all the responses and identified key themes to inform a broader and deeper response to the issues raised. The stakeholder meeting held on the 29th June 2023 provided a useful forum for the Applicant to present initial thoughts on the additional information required to address the issues raised by stakeholders.

The key themes identified by the Applicant from the consultation responses and the stakeholder meeting on implementation, monitoring and adaptive management are:

| | |
|--|--|
| Importance of adaptive management | <p>Several responses highlighted the importance of adaptive management as a methodology to demonstrate and secure compensatory measures. In particular, the importance of setting the compensation measures within a monitoring framework that will allow alternative measures to be implemented if the primary measures underperform or fail.</p> <p>Stakeholders suggested that a step-by-step description of the “learning by doing” process will be needed to show what actions would be taken if monitoring indicated that compensation measures were not working. This could include the identification and ranking of questions. This process should be linked to a hypothesis for monitoring, which may need further engagement with technical experts at a later stage.</p> |
| Baseline data | <p>Stakeholders requested further consideration of baseline data and monitoring requirements to ensure that progress towards targets could be assessed and appropriate action implemented. This should include an assessment of any baseline data gaps.</p> |
| Progress indicators | <p>Stakeholders commented that progress indicators should be developed at an early stage and not left until the development of the implementation and monitoring plan. These progress indicators should be considered in the light of the available baseline data and gaps identified.</p> |
| Efficacy of adaptive measures | <p>Some stakeholders questioned the efficacy of specific measures proposed in the applicant’s original submission.</p> <p>Stakeholders made the point that some adaptive management measures may themselves take time to become effective and that there is a need for early checkpoints to check progress of primary measures. A process should be in place to ensure that action is taken early enough to ensure that adaptive management measures can be effective.</p> |
| Adaptive management timelines | <p>Stakeholders identified some uncertainty around the timing of decision-making processes to address any failure of measures to achieve the targets proposed for each measure.</p> |
| Monitoring of impacts | <p>There was general agreement that the monitoring of impacts from the proposed Development should also be considered as part of any monitoring and adaptive management process.</p> <p>Stakeholders highlighted that areas of uncertainty are to be found in both the assessment of impacts and the delivery of the compensation measures. Stakeholders advised that the Applicant should be careful not to confuse the two areas and ensure that the key question is answered – if the outcomes are not met, what would be done?</p> |

The process for implementation of the compensatory measures is provided in the Implementation and Monitoring Plan (IMP). The common themes from stakeholders relate primarily to monitoring and adaptive management rather than the process of implementation and this additional information focusses on these two key areas. The fundamental issue underlying all these two themes is the management of uncertainty. The next section explores this issue and the most appropriate ways for this to be managed in the delivery of the compensatory measures.

1.4. Managing Uncertainty in Impacts and Compensatory Measures

Following implementation of the measures three aspects of uncertainty can be identified in relation to the delivery of the compensatory measures:

- Uncertainty about the actual impacts from the proposed project;
- The delivery of predicted outcomes from the individual measures; and
- The delivery of predicted outcomes from the overall package of measures.

This section describes each of these aspects and how the uncertainty will be considered and managed in the implementation of the compensatory measures.

1.4.1. Impacts from the Proposed Project

There is inherent uncertainty about what the actual impact from the proposed project on seabird populations and the National Site Network will be. To effectively manage this uncertainty a precautionary approach to the ornithology assessment has been taken by the Applicant to quantify the potential impacts. This precautionary assessment is then considered in the Report to Inform Appropriate Assessment (RIAA) to evaluate the possible impact on the National Site Network. A precautionary approach is again taken with adverse effects ruled out only when no reasonable scientific doubt remains as to the absence of such effects.

It is anticipated that monitoring of environmental effects of the project via the Project Environmental Monitoring Programme (PEMP), new evidence from industry research, and refinement of project design parameters will refine the impact assessment, and provide evidence that the number of birds to be compensated for is much lower than those predicted considering the precautionary approach taken in the RIAA supporting the application.

1.4.2. Delivery of Predicted Outcomes from Individual Compensatory Measures

The Applicant has provided robust evidence and data to demonstrate that the compensatory measures proposed will be effective, are sufficient and can be secured and implemented. However, the natural environment is inherently variable and there may be some uncertainty and a lack of knowledge about how ecosystems will respond to different management actions.

The adaptive management approach is an effective way to manage this uncertainty and reduce the risk that individual compensatory measures will not deliver the predicted outcomes.

1.4.3. Delivery of Predicted Outcomes from the Overall Package of Measures

Despite the substantial evidence and data provided to demonstrate that the measures will be effective, coupled with a likely reduction in impacts (demonstrated by monitoring) and an adaptive management approach to ensure that the compensatory measures are delivering the outcomes predicted, there remains a very low risk that the compensatory measures may not be sufficient to offset the impacts from the proposed project. This risk was articulated at the stakeholder meeting, – “*what will be done if the compensatory measures do not work*”.

This uncertainty would be managed in two ways:

Firstly, a higher-level framework will be put in place to monitor the success of the overall package of measures. Some compensatory measures may be doing better than expected and some may be

performing less well. It is important at this higher level to understand how the entire package of measures is performing against expectations.

This higher-level assessment also needs to take a holistic perspective and incorporate new information on the actual impacts from the proposed project as well as new evidence and research from other monitoring programmes. Given the precautionary approach to assessment, it is likely that the actual impacts from the proposed project will be lower than predicted. This new evidence and data need to be evaluated as part of this higher-level framework to identify when and if further management action is needed.

Secondly, in the unlikely event that the monitoring program identifies that the compensation measures are unlikely to offset the predicted impacts, contingency measures which would be held in reserve and could be put in place pending the outputs of monitoring and consultation with stakeholders. These measures can be developed at an early stage and held in reserve ready for implementation or can be researched and developed as the monitoring program evolves in consultation with key strategic stakeholders.

1.4.4. Step by Step Approach to Manage Uncertainty

Following implementation of the measures a step by step process will be followed to manage uncertainty in the delivery of the compensation measures is as follows.

- **Step 1: Adaptive Management** – Following implementation of the individual compensation measures an adaptive management approach will be used to manage uncertainty within these measures.
- **Step 2: Monitoring Framework**- This overall framework will monitor progress of the overall compensation package and new information from research and monitoring as compared to impacts of the project. Strategic Stakeholders will evaluate the balance of progress of the compensatory measures against updated estimates of actual impacts.
- **Step 3: Contingency Compensatory Measures** - Implement contingency compensation measures if required based on the results of monitoring, i.e. in the unlikely event the package of measures is not compensating for the adverse effects of the project.

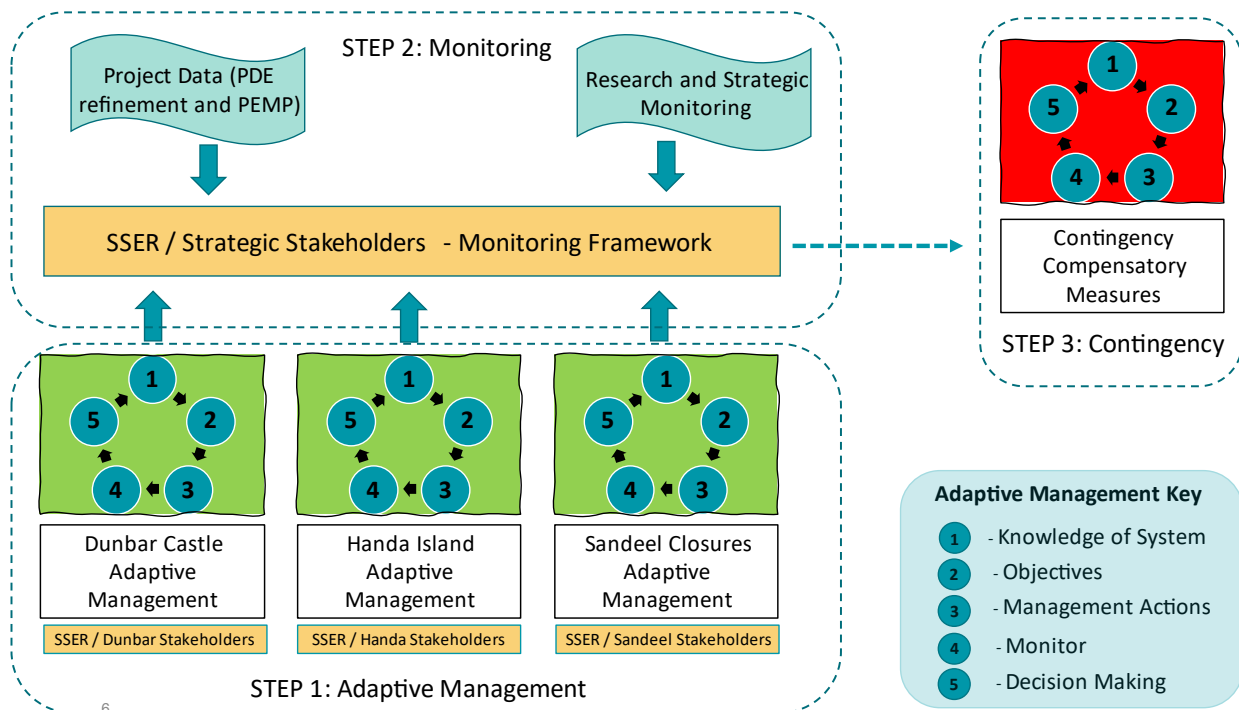


Figure 1 Overall approach to the management of uncertainty in the delivery of compensation measures to ensure coherence of National Site Network

For example, it would be possible that one or more of the proposed compensatory measures is only partially successful. However, the Strategic Stakeholders may conclude that the effects of the project are more than offset by the compensation that is successful, especially considering the very likely reduction in actual impacts that become apparent from new project data and research and monitoring. Step 1 Adaptive Management is about learning to maximise success (and reduce uncertainty) but the need for contingency measures in Step 2 Monitoring Framework is driven by the strict question of whether the effects of the project are being compensated to ensure the coherence of the network.

The next section provides a review of the literature on adaptive management and develops a framework that is then used to evaluate each of the proposed compensatory measures and provide further information on how the adaptive management approach will be implemented for each measure.

2. Step 1: Adaptive Management

2.1. Adaptive Management Literature Review

Uncertainty is pervasive in natural resource management and adaptive management has emerged as a preferred approach to manage this uncertainty via an iterative process of management experiments designed to reduce that uncertainty (Rist et al, 2013). Adaptive management is often recommended as a methodology to manage uncertainty and is regularly specified in management plans and policies (SNH, 2015). At the heart of adaptive management is the process of “learning by doing” - putting in place management actions, monitoring the system response and then adapting management actions based on the monitoring of those changes. This implies that adaptive management is an ongoing, iterative process rather than a strict guideline for management with a focus on learning to improve management decisions.

SNH (2015) provide guidance on adaptive management based on a two-step process. Firstly, evaluating whether adaptive management is appropriate and feasible and secondly, a set of steps to implement adaptive management; set out clear objectives together with stakeholders, decide on management actions and their alternatives, develop a monitoring program, and build a structured decision-making framework.

Williams *et al.* (2007) also highlight the important stage of evaluating the applicability of adaptive management, citing the important dimensions of uncertainty and degree of controllability. Adaptive management is argued to be primarily applicable when there is a high degree of uncertainty as well as a high degree of controllability of management actions. They also provide an implementation framework with 6 steps – assess problem, design, implement, monitor, evaluate and adjust.

Rist *et al.* (2013) outline the importance of evaluating the appropriateness of adaptive management and suggest that the key factors for success are clearly defining the management problem and ensuring sufficient resources for managers. Rist *et al.* (2013) also provide a template of the adaptive management process that gives stakeholder participation a central role and places greater emphasis on the identification of uncertainty. This six-step process is an evolution of the original conceptualisation on adaptive management produced by Walters (1986) and Holling *et al.* (1978).

This review of the literature suggests that for adaptive management to be successful it is important to evaluate the appropriateness and feasibility of the approach as a first step. Secondly, to acknowledge that adaptive management is a structured approach that involves setting clear management objectives and conducting management experiments to reduce uncertainty on an iterative basis. These implementation processes should be in the context of adequately resourced and broad stakeholder decision making framework to capture a wide range of perspectives and expertise.

Several frameworks for applying an adaptive management approach have been reviewed. The framework proposed by Rist *et al.* (2013) provides a good overview of how the adaptive management process can be implemented on an ongoing basis. The framework makes explicit reference to identifying areas of uncertainty as part of the process and places greater emphasis on the role of stakeholders in achievement of successful management.

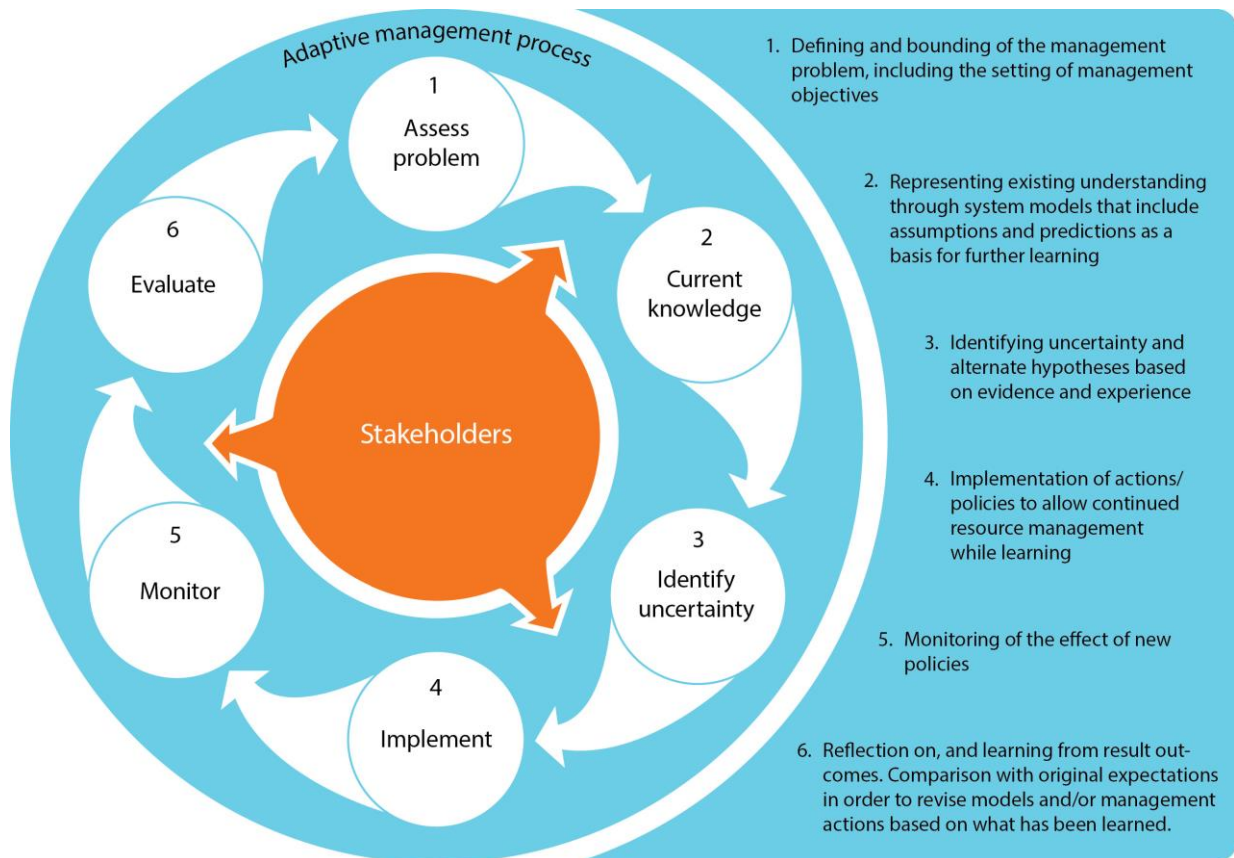


Figure 2 Adaptive management process from Rist *et al.* (2013) based on Walters (1986) and Holling (1978)

The guidance provided by SNH (2015) provides a similar framework but places emphasis on considering the applicability and feasibility of adaptive management before implementation. It also has a greater focus on the initial set up of an adaptive management approach rather the process of ongoing implementation and provides a series of useful questions to be addressed during development and implementation.

For this reason, the SNH (2015) framework has been used to develop a structure for the provision of additional environmental information for each compensatory measure. Reference to the framework provided by Rist *et al.* (2013) and others has been incorporated where appropriate and reflects the work that has been carried out to identify knowledge about the system and any uncertainties to be reduced using the adaptive management approach.

2.2. Adaptive Management Framework

The table below shows the framework that will be used to describe the adaptive management of the proposed compensatory measures. This framework is derived from the approach outlined by SNH (2015) with additional elements from Rist *et al.* (2013). The framework shows the two questions that should be answered before an adaptive management approach is implemented, and then the five actions that need to be completed to implement an adaptive management approach.

| Question | Evaluation |
|-------------------------------------|---|
| Is adaptive management appropriate? | <p>Adaptive management is appropriate when there is uncertainty in the ecological or socio-economic system and the uncertainty can be managed by monitoring and implementation of alternative management actions</p> <p>Adaptive management is not appropriate where uncertainty is not affected by an experiment or management activities.</p> |
| Is adaptive management feasible? | <p>Are resources available and does enough management flexibility exist to enable investigation to identify the different factors affecting the system in a timely manner?</p> <p>Can a monitoring program be developed and implemented that will provide the information needed to learn and adapt?</p> |

| Action | Description |
|--|---|
| Identify current knowledge of the system and uncertainties | Identify the current knowledge available on the system, both ecological and socio-economic data. Set out the assumptions and predictions as a basis for learning |
| Set clear objectives with stakeholders | Set and agree management objectives and targets to be achieved. Identify stakeholders and key management issues. |
| Decide on management actions and their alternatives | <p>Set up a conceptual model to predict system responses to management actions and identify alternative management actions.</p> <p>Identify areas of uncertainty and how these might be addressed by investigation.</p> |
| Develop a monitoring program | Decide on appropriate indicators, which may only need to be trends rather than absolute numbers. Does data from monitoring provide measurable indicators of system change? |
| Build a structured decision-making framework | Decision making framework uses data from monitoring to evaluate outcomes against objectives. This may lead to changes to objectives or plans and solutions. |

The two questions and the five actions shown in the framework have been used to demonstrate how the Applicant has developed, and will apply, the adaptive management approach to each of the proposed compensatory measures – Dunbar Castle, Handa Island, Sandeel Closures Option I and II, and Sula Sgeir (without prejudice).

2.3. Dunbar Castle: Monitoring and Adaptive Management

The process for implementing the measure at Dunbar Castle is shown in the IMP. The table below provides information, primarily derived from the IMP, on how an adaptive management approach has been developed and will be implemented at Dunbar.

| Question | Response | RAG Status of Question |
|--|--|---|
| Is adaptive management appropriate? | Whilst there is good evidence from the literature, other colonies, direct observation, and some quantification of impacts to provide confidence that human disturbance is adversely affecting kittiwakes at Dunbar Castle, there is uncertainty about the precise response of kittiwakes to a reduction in human disturbance. This uncertainty can be reduced through experimentation and monitoring. | Adaptive management is appropriate for proposed compensatory measure at Dunbar Castle |
| Is adaptive management feasible? | <p>A full-time warden post is proposed for the site and the measures have the full support of local stakeholders. A monitoring program can be implemented that will provide the data needed to monitor and adapt as appropriate. Alternative management strategies can be implemented based on the feedback from monitoring.</p> <p>Further details on the broader technical, legal and financial feasibility of the proposed measures are set out in the Derogation Case.</p> | Adaptive management is feasible for the proposed compensatory measures |
| Action | Description | RAG Status of Action |
| Identify current knowledge of the system and uncertainties | <p>Current knowledge about the colony is provided in the Colony Compensatory Measures (CCM) Evidence Report. This sets out the key demographic indicators of the colony, how the population has changed over time and possible causes of that change.</p> <p>The IMP provides information on the proposed baseline data collection:</p> <ol style="list-style-type: none"> 1. Extent and productivity of the colony 2. Sources of disturbance 3. Constraints to kittiwake habitat. <p>Full details are provided in Dunbar Castle Baseline Data Collection in the IMP. Additional clarification is provided below.</p> <p>The core premise is that a reduction in human disturbance will lead to an increase in kittiwake productivity and allow recolonization of areas previously occupied by kittiwakes. This increase in productivity and available habitat will lead to an increase in adult birds, increasing the colony population from 800 to 1,200 nesting birds.</p> | <p>There is good knowledge of the colony and the key uncertainties have been identified.</p> <p>These uncertainties can be reduced by adaptive management</p> |

| Action | Description | RAG Status of Action |
|--|--|--|
| | <p>The residual uncertainties to be managed via adaptive management are:</p> <ul style="list-style-type: none"> • To what extent will kittiwakes respond to a reduction in human disturbance? • Which elements of human disturbance are having the most impact? • How can human disturbance be most effectively reduced? | |
| <p>Set clear objectives with stakeholders</p> | <p>As set out in the IMP the aim of the measure is to increase the number of nesting birds from 800 to 1,200. This will be achieved by implementing an adaptive management approach to address residual uncertainties – identifying specific pressures, setting up monitoring programs and implementing strategies based on this learning in discussion with stakeholders.</p> <p>The IMP proposes to develop an initial Operational Kittiwake Management Plan in discussion with NatureScot, RSPB, East Lothian Council, Dunbar Harbour Trust and Heritage Environment Scotland as a first step in the process of implementation. This will clarify and agree the key elements of the adaptive management approach that is proposed, including objectives.</p> <p>Key management issues are likely to be interaction and engagement with harbour users, tourists and the local residents of Dunbar.</p> | <p>Clear objectives have been developed by the Applicant and these are shown in the IMP.</p> <p>A process for developing and agreeing these final objectives is set out in the IMP</p> |
| <p>Decide on management actions and their alternatives</p> | <p>The conceptual model to be tested is relatively simple. A reduction in human disturbance will lead to an increase in productivity and an increase in available nesting habitat. This increase in productivity and nesting habitat will lead, over time, to an increase in adult birds nesting in the colony.</p> <p>The IMP describes the range of proposed management actions that can be implemented to reduce human disturbance and improve kittiwake habitat. The three core areas are:</p> <ol style="list-style-type: none"> 1. Manage disturbance 2. Reduce disturbance 3. Improve nesting habitat <p>Full details are provided in the IMP and expanded on below.</p> <p>The IMP sets out how the annual management actions will be agreed with stakeholders. This plan will be updated based on the outcomes of the monitoring program and progress indicators, and in discussion</p> | <p>The management actions and alternatives have been identified in the IMP and are set out below.</p> |

| Action | Description | RAG Status of Action |
|---|---|---|
| | <p>with stakeholders. The proposed progress indicators cover two core areas:</p> <ol style="list-style-type: none"> 1. Monitoring of disturbance 2. Monitoring of colony <p>Full details are provided in IMP - Dunbar Castle Approach to monitoring and below.</p> <p>A proposed set of ecological evaluations to support the conceptual model and assumptions are set out in the IMP. These are designed to explore the response of seabirds to a reduction in disturbance, reduce uncertainty and identify the most effective management actions.</p> | |
| <p>Develop a monitoring program</p> | <p>The IMP provides information on the proposed monitoring program which includes monitoring of the colony:</p> <ul style="list-style-type: none"> • spatial extent of nests, • colony counts, • productivity, • chick provisioning • use of litter in nests. <p>Further monitoring of the precise nature of the human disturbance is also proposed. Detail is provided in the IMP but a summary is shown here</p> <ul style="list-style-type: none"> • activities and frequency of occurrence • response of seabirds to different activities • level of interest and engagement of public <p>This data will provide information on system change because of the management measures implemented.</p> <p>This monitoring – spatial extent of nests, colony counts, productivity, frequency and severity of human disturbance will be the progress indicators that will be used to monitor progress towards the objectives. They will be reported on annually and used in decision making framework below.</p> <p>Further detail on progress indicators to be agreed is shown below.</p> | <p>An outline monitoring program has been prepared and is shown in the IMP</p> |
| <p>Build a structured decision-making framework</p> | <p>As described in the IMP the annual monitoring reports will be provided and evaluated to monitor progress towards objectives. In discussion with stakeholders the annual Operational Kittiwake Management Plan will be updated.</p> <p>An overview of the adaptive management approach for Dunbar Castle is shown in the figure below.</p> | <p>The annual decision-making framework is described in the IMP. Further clarity on how decisions will be made is provided below.</p> |

2.3.1. Dunbar Harbour Stakeholder Group

As identified in the literature review and guidance, an adaptive management approach requires the active and continual engagement of stakeholders right from the start of the process. Stakeholder engagement would provide knowledge and expertise on the current status of the system to be managed and agree baseline data capture requirements, specific management actions and their alternatives, progress indicators and play a vital role in decision-making following an analysis of results from monitoring.

The Applicant has engaged extensively with a wide range of stakeholders to develop the compensation measures proposed and provided a detailed IMP that sets out how the compensation measure would be delivered. These plans would be further developed, and the core areas discussed and agreed formally before implementation. The Applicant will set up a Dunbar Harbour Stakeholder Group to oversee and deliver adaptive management. The following organisations are proposed:

- East Lothian Council
- Dunbar Harbour Trust
- NatureScot
- RSPB
- SSER

Following the refinement and agreement of the Operational Kittiwake Management Plan these stakeholders will play an active role in delivering adaptive management to ensure that the management objectives are met. They will also provide feedback into the overarching monitoring framework to allow the Strategic Stakeholders to evaluate the progress of the overall package of measures, together with new evidence from monitoring and research (Step 2).

Building on the information already provided, further specific detail is provided below on Baseline Data, Progress Indicators and Alternative Management actions.

Baseline data collection will be reviewed and agreed by the Dunbar Harbour Stakeholder Group and used to clarify objectives and specific management actions before implementation. Proposed data to be collected are provided here as an indication of the potential approach and to outline who will collect it and why it is being collected. The data collected will allow for a quantitative assessment of the impact of differing levels of human disturbance to support the conceptual model from existing evidence. However, this may be a complex relationship to untangle depending upon which subsites are monitored, as kittiwakes may have moved to less suitable nesting sites due to human disturbance and hence actually have a lower productivity than more disturbed locations.

2.3.2. Baseline Data Collection

| Description | By Whom | Purpose |
|---|-----------------------|--|
| Number of kittiwake nests (Apparently Occupied Nests 'AON') | Dunbar Harbour Warden | To build on current knowledge and establish baseline to monitor progress |
| Location of kittiwake nests | Dunbar Harbour Warden | To build on current knowledge, cross reference to sources of disturbance, and establish baseline to monitor progress |

| Description | By Whom | Purpose |
|---|-----------------------|--|
| Kittiwake productivity | Dunbar Harbour Warden | To build on current knowledge, cross reference to sources of disturbance, and establish baseline to monitor progress |
| Identify key sources of human disturbance | Dunbar Harbour Warden | To enable prioritisation of management actions |
| Identify areas that are accessible to public | Dunbar Harbour Warden | To enable prioritisation of management actions |
| Range and extent of recreational use of the harbour | Dunbar Harbour Warden | To enable prioritisation of management actions |
| Potential nesting areas and suitability for enhancement | Dunbar Harbour Warden | To identify potential alternative management actions |

2.3.3. Monitoring and Progress Indicators

The table below provides further detail on the proposed progress indicators that will be used by the Dunbar Harbour Stakeholder Group to evaluate the success of management actions and agree next steps to achieve management objectives. The number of kittiwake AON (and hence the number of breeding adults), productivity data, and the extent of nesting locations will provide early indicators to the stakeholder group of likely progress to the management objective of increasing adult kittiwakes at the colony. The Dunbar Castle Stakeholder Group will provide this information to the Strategic Stakeholders, who will use this information to evaluate the progress of the overall package of measures.

| Description | Expected Trend | Review period |
|---|--|---------------|
| Kittiwake AON (number of breeding adults) | Increasing from historic and baseline levels | Annual |
| Kittiwake productivity | Increasing from historic and baseline levels | Annual |
| Extent of nesting location | Expanding | Annual |
| Disturbance events | Decreasing | Annual |
| Engagement of key groups with colony | Increasing | Annual |

2.3.4. Management Actions and Alternatives

The priority and order in which the management actions identified in the IMP and below are implemented will depend on the outcome of the baseline data collection and preparation of the Operational Kittiwake Management Plan. They are provided here as an indication of potential approaches and new actions may be identified and implemented as more is learnt about the interaction of kittiwakes and human disturbance at Dunbar Castle.

| Description | Trigger | Implementation |
|--|---|---------------------------------|
| Reduce human disturbance | | |
| Restricting access to the front face and entrance steps on the south side of the harbour. | Probable initial measure | Warden and Dunbar Harbour Trust |
| Fencing off the green in front of the steps to add a buffer between the kittiwakes and the public. | Success of other management measures not as expected | Warden and Dunbar Harbour Trust |
| Keeping watch and stopping children throwing stones at kittiwake nesting sites. | Success of other management measures not as expected | Warden and Dunbar Harbour Trust |
| Manage human disturbance | | |
| Liaison with fishermen and a representative of the fishing community to reduce disturbance. | Probable initial measure | Warden |
| Visits to local schools | Success of other management measures not as expected monitoring | Warden |
| Provision of tours to the colony; | Success of other management measures not as expected | Warden |
| Improving public awareness of the colony through social media | Success of other management measures not as expected | Warden |
| Warden to be on site at the Castle Battery in the tourist season at specific times with a | Success of other management | Warden |

| Description | Trigger | Implementation |
|---|--|---|
| telescope to provide opportunities for both visitors and members of the local community to see the birds and learn more about them. | measures not as expected | |
| Develop codes of conduct with local groups. | Success of other management measures not as expected | Warden |
| Improve kittiwake nesting habitat | | |
| Remove plastic from nests overwinter. | Success of other management measures not as expected | Warden and ELC countryside ranger |
| Adding artificial ledges and overhangs in certain areas (in winter), ensuring these are the correct size to prevent access from herring gulls; and carried out through liaison with stakeholders. | Success of other management measures not as expected | Warden, ELC countryside ranger, Dunbar Harbour Trust and specialist contractors |

2.3.5. Decision-making Framework

The flow diagram below shows how the above information will be used by the Dunbar Harbour Stakeholder Group to make decisions and implement alternative management actions as part of adaptive management approach for Dunbar Castle.

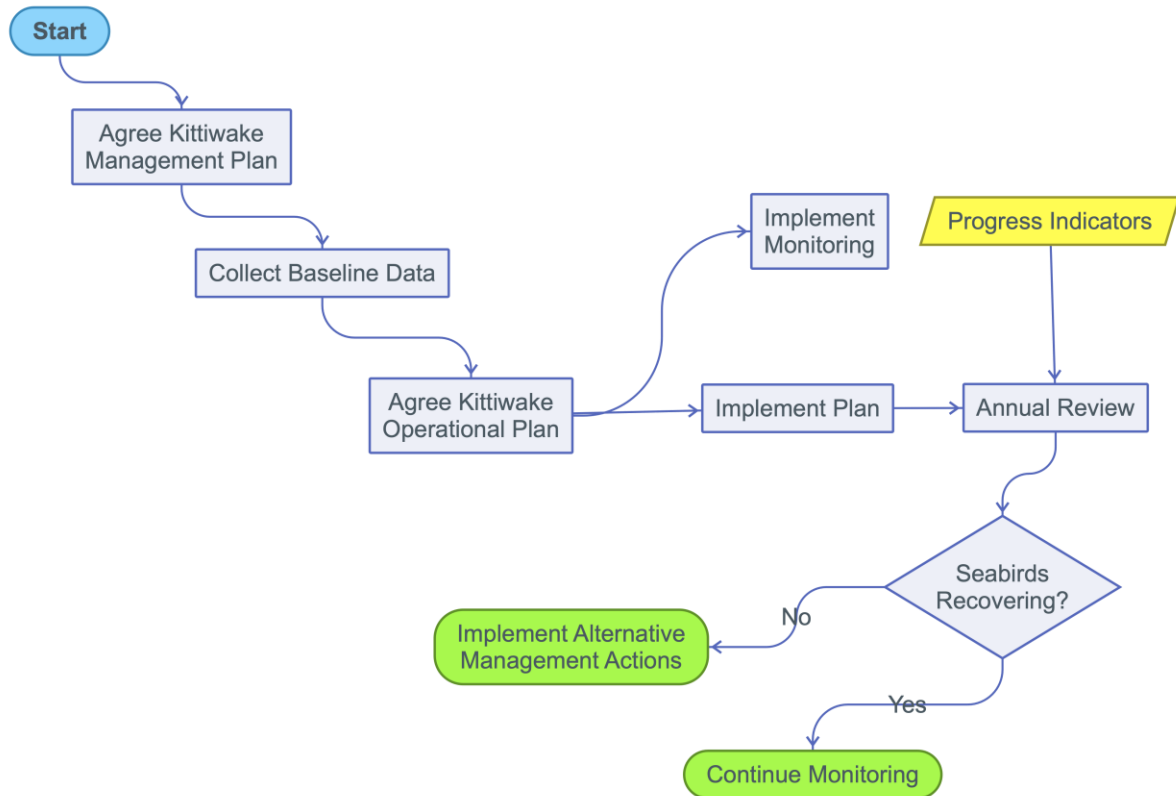


Figure 3 Flow diagram for implementation and first year of decision making for adaptive management approach to compensatory measures at Dunbar Castle

2.4. Handa Island: Monitoring and Adaptive Management

The process for implementing the rat eradication at Handa is shown in the IMP and the Handa Feasibility Report. The table below provides information, primarily derived from the IMP, on how an adaptive management approach has been developed and will be implemented at Handa Island to explore and implement different ways to achieve management objectives.

| Question | Response | RAG Status of Question |
|--|---|---|
| Is adaptive management appropriate? | <p>There is good evidence in the literature that rat eradication from islands can have a beneficial effect on seabird demographics to provide confidence that the measure will increase populations of key seabird species. There is uncertainty about to what extent seabirds at Handa will increase once rats have been eradicated. Once rats have been eradicated management options may include reduction in human disturbance and improvements to nesting habitat.</p> <p>Rat eradication from islands is well understood and there is minimal uncertainty around the most effective way to eradicate rats. However, there are a range of alternative management actions that can be implemented through a process of monitoring.</p> | Adaptive management is appropriate to the management of the rat eradication program and to the wider objective of increasing seabird numbers. |
| Is adaptive management feasible? | <p>Resources are available and there are a range of management options to enable eradication of rats from the island.</p> <p>A detailed assessment of the overall feasibility and management options of the rat eradication program is provided in the Assessment of the Feasibility of Eradication of Brown Rats from Handa Island.</p> | Adaptive management is feasible for the rat eradication. |
| Action | Description | RAG Status of Action |
| Identify current knowledge of the system and uncertainties | <p>The CCM Evidence Report outlines the current knowledge of Handa Island colony, the historical impact of rats on seabirds and recent eradication attempts. This suggests that historically rats have led to a significant reduction in seabird numbers and that when rats were eradicated more recently this led to a recovery in the range and number of seabirds.</p> <p>The core premise is that the eradication of rats from Handa Island will lead to an increase in all the key species identified as well as other important seabird species.</p> <p>The second assumption is that rats can be eradicated and that the island can be maintained as rat free for the lifetime of the project.</p> <p>The key uncertainties are:</p> | <p>There is extensive knowledge of seabirds on the Island and previous eradication attempts.</p> <p>Additional baseline data is required on the number and extent of rats on the island which will be captured before implementation.</p> |

| Action | Description | RAG Status of Action |
|--|---|---|
| | <ul style="list-style-type: none"> • The number and extent of the rats on the Island • The extent of seabird recovery following rat eradication • Whether rats can be eradicated from the island • Whether the island can be maintained as rat free | |
| <p>Set clear objectives with stakeholders</p> | <p>As set out in the CCM the management objective is to eradicate rats from Handa Island and maintain the island rat free for the lifetime of the project. This is predicted to lead to an increase in the number of adult birds from the key species over the lifetime of the project.</p> <ul style="list-style-type: none"> • Kittiwake 7,498 ->11,838 • Puffin 208 -> 1,748 • Razorbill 5,047 -> 10,647 • Guillemot 68,524 -> 84,354 <p>The key management issues are likely to be the successful implementation of the rat eradication program and ongoing biosecurity to ensure that the island is kept rat free</p> | <p>The management objective is clear and will be finalised and agreed in the Implementation Plan</p> |
| <p>Decide on management actions and their alternatives</p> | <p>The conceptual model to be tested is will seabirds increase in number and extent following eradication of rats.</p> <p>The IMP sets out the management actions that will be taken to implement the rat eradication, including feasibility study (now complete), pre-eradication study, implementation, intensive monitoring, biosecurity plan, re-incursion plan.</p> <p>The Handa Feasibility Study sets out a detailed assessment of potential uncertainties and how these uncertainties can be reduced by the collection of data from the site and monitoring. Key alternative management actions that can be taken include:</p> <ul style="list-style-type: none"> • Alternative rodenticides there are several options to use different rodenticides • Extension of the mainland “control and monitor” buffer zone – Details of extent and function are provided in the Handa Feasibility Study • Expansion of the eradication to include other predatory mammals if identified. <p>The IMP identifies that improvements to nesting habitat could be implemented to enhance recovery of seabird species subject to the results of the monitoring program. These actions are:</p> | <p>The Handa Feasibility Study and the IMP set out clearly the management actions that will be taken to eradicate rats from the Island.</p> <p>Alternative management actions have been identified for the both the rat eradication and the increase in seabird numbers. These are set out in the IMP</p> |

| Action | Description | RAG Status of Action |
|---|---|---|
| | <ul style="list-style-type: none"> • Artificial ground cover • Social attraction methods, • Vegetation management, • White paint could be used to simulate guano <p>Reductions in human disturbance could also be considered.</p> | |
| <p>Develop a monitoring program</p> | <p>Following best practice guidance, the IMP sets out the proposals for monitoring of the rat eradication program, medium term monitoring to ensure that the island is rat free and long-term monitoring to rapidly identify any re-incursions. In addition, proposals are set out for the monitoring of seabirds to build on the existing seabird monitoring program and monitoring already being delivered by Scottish Wildlife Trust.</p> <p>The suggested content of the annual monitoring report is shown in the IMP. This identifies the key progress indicators and covers both the rat eradication program and the response of the key seabird species. Action based on the performance against these indicators will be taken annually.</p> <p>Mammal Predators</p> <ul style="list-style-type: none"> • Evidence of presence / absence on Island • Evidence of presence / absence on mainland buffer control zone • Evidence of other mammal predators <p>Seabirds</p> <ul style="list-style-type: none"> • Colony counts • Mapping nest locations • Productivity monitoring <p>A monitoring and evaluation plan will be prepared based on these initial proposals and agreed with Handa Island Stakeholder Groups before the work is implemented.</p> | <p>The initial monitoring program and progress indicators have been developed and are shown in the IMP.</p> |
| <p>Build a structured decision-making framework</p> | <p>As set out in the IMP the annual report will provide the focus for annual decision making with stakeholders. The monitoring results will be used to update the biosecurity plan and implement actions to improve nesting habitat if needed. If a re-incursion does occur, then the re-incursion plan would be implemented. Lessons learned would be identified and actions required would be put in place and biosecurity plan updated. An overview of the annual monitoring report is shown below:</p> <ul style="list-style-type: none"> • Overview of evidence of rat re-incursion (if any) • Overview of implementation of biosecurity measures | <p>Annual decision-making framework is show in the IMP. Further detail is provided below</p> |

| Action | Description | RAG Status of Action |
|--------|---|----------------------|
| | <ul style="list-style-type: none"> • Overview of the results from seabird monitoring (section only included once island is declared rat free) <ul style="list-style-type: none"> ○ Colony counts ○ Mapping nest locations ○ Productivity monitoring • Actions delivered <ul style="list-style-type: none"> ○ Actions to manage biosecurity ○ Actions to improve seabird habitat • Identification of emerging issues • Approach to biosecurity measures for the following year • Approach to monitoring for the following year | |

2.4.1. Handa Island Stakeholder Group

A comprehensive stakeholder group is proposed that will be important to ensure the initial success of the rat eradication and ongoing biosecurity of the island and recovery of the seabird populations is successful. The Handa Island Stakeholder Group will oversee and deliver two aspects of this proposed compensatory measure. In the first instance, the eradication of rats from the island and secondly the monitoring and management of the colony to encourage to an increase in the rate of growth of the colony. They will fulfil this role by providing knowledge and expertise on the current status of the colony, identifying and agreeing practical implementation constraints and opportunities, baseline data capture requirements, areas of uncertainty, potential management actions and their alternatives, progress indicators and will play a vital role in decision-making following analysis of monitoring results.

The Applicant has engaged extensively with the Scottish Wildlife Trust to understand the baseline and key issues, and to develop the compensation measures proposed. These plans will be further developed, and the core areas discussed and agreed formally before implementation. The Applicant will set up the Handa Island Stakeholder Group to oversee and deliver adaptive management. The following organisations are proposed:

Handa Island Stakeholder Group

- Scottish Wildlife Trust (SWT)
- Specialist Pest Control Consultant
- NatureScot
- RSPB
- Ferry Operator
- Local Tourism Operators
- Scourie Estate
- Loch Duart Ltd (Aquaculture)

Following the refinement and agreement of the Handa Island Implementation and Monitoring Plan these stakeholders will play an active role in delivering adaptive management to ensure that the management objectives are met. They will also provide feedback into the overall monitoring framework to allow the Strategic Stakeholders to evaluate the progress of the overall package of measures.

Building on the information already provided further specific detail is provided below on Baseline Data, Progress Indicators and Alternative Management actions for both the rat eradication program the recovery of the seabird colony. These data will be reviewed and agreed by the Handa Island Stakeholder Group and used to clarify objectives and management actions before implementation.

2.4.2. Baseline Data Collection

The proposals here are developed from the IMP and the Handa Feasibility Study and shown here as an indication of potential approaches and outline the data to be captured, who will collect it and why it is being collected.

| Description | By Whom | Purpose |
|--|------------------------------------|--|
| Predator Eradication | | |
| Quantify the number and extent of rats on Handa Island | Specialist Pest Control Contractor | To build on current knowledge and establish baseline to develop eradication plans. Establish the species of rat on the Island. |
| DNA of rats captured from monitoring on the island and from location onshore | Specialist Pest Control Contractor | To determine if there are any differences in the populations and provide information on whether the previous eradication was successful, or a re-incursion occurred. |
| Tissue samples for captured rats | Specialist Pest Control Contractor | To build on current knowledge on the extent to which rats predate on seabirds and seabird eggs |
| Rodenticide resistance | Specialist Pest Control Contractor | Determine any resistance to proposed rodenticides and reduce any potential for adverse impacts on non-target species |
| Presence / absence of other mammal predators | Specialist Pest Control Contractor | Evidence to prepare appropriate eradication plan |
| Seabirds | | |
| Number of nesting adult birds from key species | SWT / Ornithology Contractor | To build on current knowledge and establish baseline to monitor progress |
| Location of nests of key species | SWT / Ornithology Contractor | To build on current knowledge and establish baseline to monitor progress |
| Productivity of key species across the site | SWT / Ornithology Contractor | To build on current knowledge and establish baseline to monitor progress |

2.4.3. Monitoring and Progress Indicators

The table below provides further detail on the key progress indicators that will be used by the Handa Island Stakeholder Groups to evaluate the success of management actions and agree next steps to achieve management objectives.

Data from key species productivity, number of key species AON and extent of nesting locations will provide early indicators to the stakeholder group of likely progress to the management objective of increasing the number of adult key species at the colony. The Handa Island Technical Stakeholder Group will provide this information to the Strategic Stakeholders who will use this information to evaluate the progress of the overall package of measures.

| Description | Expected Trend | Review period |
|--|--|---|
| Predator Eradication | | |
| Presence / Absence of rats on the Island | Decrease from baseline to zero | Short, long, and medium-term monitoring as set out in IMP and Feasibility Study |
| Presence / Absence of rats in the mainland buffer / control zone | Very low and stable, not increasing | Short, long, and medium-term monitoring as set out in IMP and Feasibility Study |
| Seabirds | | |
| Key species AON (breeding adults) | Increasing from historic and baseline levels | Annual |
| Productivity of the key species | Increasing from historic and baseline levels | Annual |
| Extent of nesting location for key species | Expanding | Annual |

2.4.4. Management Actions and Alternatives

The primary management action for the measures is the eradication of rats from Handa Island.

The table below outlines the **alternative management actions** that will be taken and the triggers that will determine their implementation. These steps are set out in the IMP and the Handa Island Feasibility Study, in effect eradication work continues until the island is declared rat free. If monitoring does indicate that rats have re-established the re-incursion plan will be implemented

In the unlikely event that rat eradication does not lead to a recovery in the key seabird species the following alternative management actions outlined below could be implemented. They are provided here as an indication of potential approaches and new actions may be identified and implemented as more is learnt during the eradication phase and subsequent recovery of the seabird population.

| Description | Trigger | Implementation |
|--|--|------------------------------------|
| Predator Eradication | | |
| Rat re-incursion plan – developed and agreed with stakeholders before implementation | Monitoring indicates that rats have returned to the Island | Specialist Pest Control Contractor |
| Extension of control and monitor buffer zone | Monitoring indicates increase in rats in buffer zone. | Specialist Pest Control Contractor |
| Increase trapping in buffer in control and buffer zone | Monitoring indicates increase in rats in buffer zone. | Specialist Pest Control Contractor |
| Expand eradication to include other mammal species | Monitoring identifies other mammal predators | Specialist Pest Control Contractor |
| Seabirds | | |
| Artificial ground cover to further increase breeding performance at potential cliff-top breeding sites as well as artificial nesting boxes | Early indicators from monitoring of productivity, number and location of nests suggests targets may not be met | SWT / Contractor |
| Social attraction methods , such as playbacks and decoys, could be used to increase the likelihood of recruitment. | Early indicators from monitoring of productivity, number and location of nests suggests targets may not be met | SWT / Contractor |
| Vegetation management , comprising reduction in height and density of grasses and shrubs and loosening of soils on tops of steep slopes may be adopted prior to the start of the nesting season to optimise conditions and create space and access for target seabird species, notably burrow nesting puffin. | Early indicators from monitoring of productivity, number and location of nests suggests targets may not be met | SWT / Contractor |
| White paint could be used to simulate guano at potential breeding sites This could be used for the cliff-nesting auks, potentially alongside the use of vegetation management, decoys and playbacks, with the aim of increasing colonisation rates following rat eradication | Early indicators from monitoring of productivity, number and location of nests suggests targets may not be met | SWT / Contractor |

2.4.5. Decision-making Framework

The flow diagrams below show how the information shown above will be used by the Handa Island Stakeholder Group to manage the rat eradication program and the response of seabirds to the eradication of rats, including the implementation of alternative management actions.

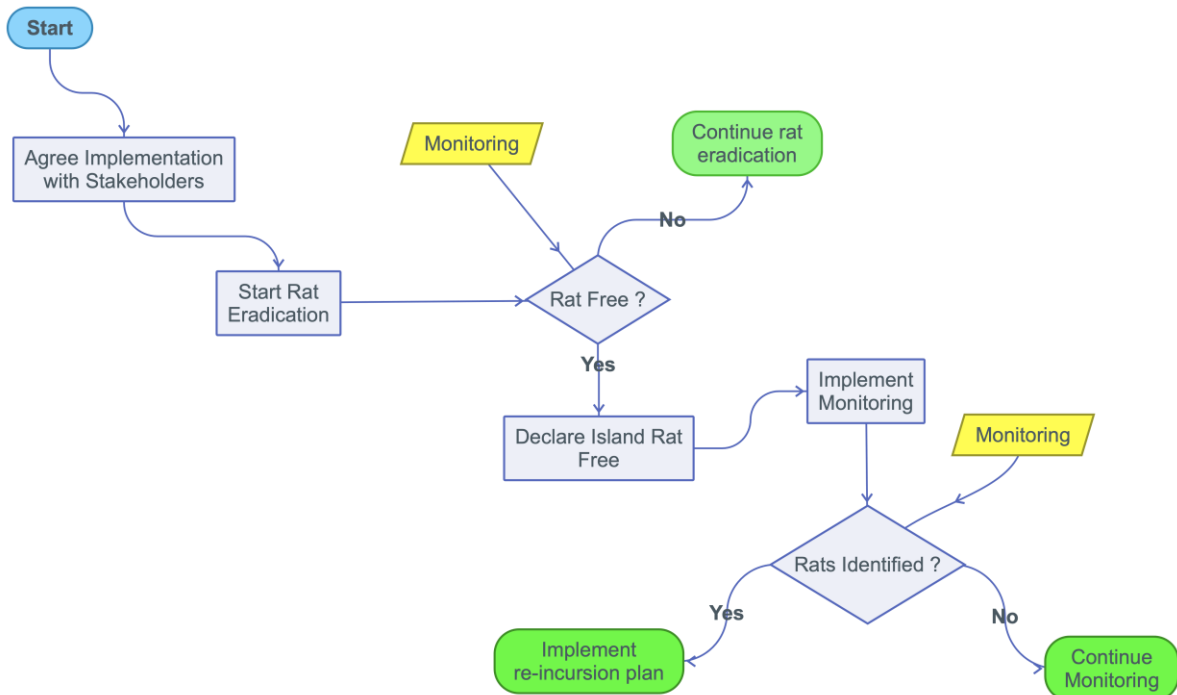


Figure 4 Flow diagram for adaptive management of rat eradication at Handa Island

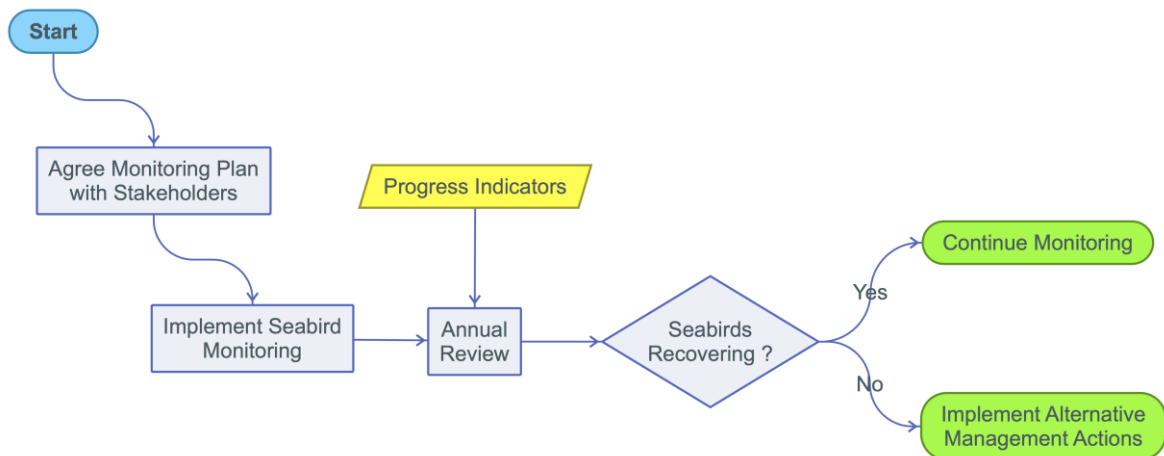


Figure 5 Annual Flow diagram for adaptive management of seabird recovery at Handa Island

2.5. Sandeel Fishery Closure Option 1 and Option 2: Monitoring and Adaptive Management

The Applicant has provided two options for the management of Sandeel Fisheries in SA4. Option 1 is full permanent closure of SA4, Option 2 is an ecosystem-based approach to managing the fishery in SA4. These two options are considered together in the adaptive management evaluation provided below. The process for implementation is shown in the IMP.

| Question | Response | RAG Status of Question |
|--|---|--|
| <p>Is adaptive management appropriate?</p> | <p>The Fisheries Compensatory Measures Evidence Report (FCM) sets out the analysis and evidence to demonstrate that closure of sandeel fisheries would lead to an increase in Sandeel Total Stock Biomass (TSB) and an increase in the numbers of the key species.</p> <p>There is some uncertainty about the speed at which sandeel stocks will recover and the rate of increase in the seabird population that will result. This uncertainty can be reduced by implementing the measure and monitoring the results. However, there are other factors influencing both the sandeel population and the seabird population and there is limited capacity to reduce uncertainty around these factors by management action.</p> <p>However, there is little uncertainty of the sufficiency of this measure, as demonstrated via scenario analysis. This shows that for the worst-case benefit of the proposed compensation measures combined with the worst-case impact, compensation ratios of greater than 8 can be achieved. Further information has been provided as additional environmental information on the timing of benefit from sandeel closures to show that only a 10% increase in Sandeel TSB will offset the impact of the project. This increase is within historic norms and can be delivered by the removal of Total Allowable Catch (TAC) for sandeels only.</p> | <p>Option 1 is a one-off closure of the fishery and there is no opportunity to adapt management actions based on learning.</p> <p>Option 2 provides greater scope for an adaptive management approach in that Total Allowable Catch TAC rates can be amended based on the response of the sandeel and seabird populations.</p> |
| <p>Is adaptive management feasible?</p> | <p>Resources can be made available for both options.</p> <p>The monitoring put in place will provide information on the sandeel and seabird populations.</p> <p>With Option 1, monitoring will reduce the uncertainty around the response of sandeels and seabirds to the removal of fishing pressure. This increased knowledge about the system will be extremely useful in determining the extent to which the measure is providing ecological benefits which could be relied</p> | <p>Adaptive management is feasible for both options, and the implementation of a robust monitoring program will generate valuable new understanding of sandeel and seabird interactions that will be useful to inform the capacity of the measure to be relied upon</p> |

| Question | Response | RAG Status of Question |
|----------|--|---|
| | <p>upon e.g. by other developers for strategic compensation.</p> <p>With Option 2 it is also possible to learn and adapt the levels of fishing pressure in response to increasing knowledge about the response of sandeels and seabirds to these management actions.</p> | <p>e.g. by other developers for strategic compensation.</p> |

| Action | Description | RAG Status of Action |
|---|--|--|
| <p>Identify current knowledge of the system and uncertainties</p> | <p>The FCM Evidence Report and the additional information provided on the timing of sandeel benefit provides extensive information on the current knowledge of the SA4 sandeel fishery and the response of seabirds to sandeel TSB.</p> <p>The core premise of this compensatory measure is that the removal of fishing pressure will provide an immediate increase in sandeels available to seabirds. Over time the sandeel population will also recover to much higher levels than currently observed.</p> <p>This increase in sandeel TSB will lead to increase in adult overwinter survival for all key species and will also increase chick productivity for kittiwake, puffin and guillemot.</p> <p>The key uncertainties are:</p> <ul style="list-style-type: none"> • The rate at which the sandeel population will increase • The extent to which seabird populations will increase | <p>There is good knowledge on the status of the sandeel fishery and robust evidence to support the core premise.</p> <p>Uncertainty is best reduced by implementing the measure and monitoring the response.</p> |
| <p>Set clear objectives with stakeholders</p> | <p>The management objective is to increase the sandeel population and the populations of the key seabird species. This compensatory measure alone has the capacity to offset all the potential impacts from the proposed project.</p> <p>From the evidence and analysis presented in the FCM Evidence Report it is considered reasonable to assume that the sandeel TSB will increase from 300,000 tonnes up to at least 400,000 tonnes if fishing pressure is removed.</p> <p>However, the most recent Population Viability Analysis (PVA) analysis, shown in the timing of sandeel benefit report in the Additional Environmental Information, submitted by the applicant, shows the net effect of just a 10% increase in sandeel TSB would be sufficient to</p> | <p>The management objectives for both options are clear</p> |

| Action | Description | RAG Status of Action |
|--|--|--|
| | <p>generate a Net Benefit of adult birds after 10 years of more than:</p> <ul style="list-style-type: none"> • Kittiwake – 33,000 • Guillemot – 29,000 • Razorbill – 5,000 • Puffin – 35,000 | |
| <p>Decide on management actions and their alternatives</p> | <p>For Option 1, closure of the fishery is a one-off management action. The implementation of possible adaptive management actions such as cessation of scallop dredging in sandeel habitat could be explored further if objectives were not being met. This is discussed later in the section on contingency compensatory measures.</p> <p>For Option 2 alternative management actions fall into three categories</p> <ol style="list-style-type: none"> 1. Input Controls – vessel size, vessel power, time at sea, days at sea regulations 2. Technical Measures – Design and deployment of gear, seasonal closures, area closures, reductions in access to vessels of certain power and size 3. Output Controls – set TAC based on information from monitoring <p>Output controls - setting TAC based on information from monitoring is considered viable in the context of sandeel fisheries.</p> | <p>Alternative management actions can be developed / be implemented based on feedback from monitoring</p> |
| <p>Develop a monitoring program</p> | <p>The IMP sets out an overview of the proposed monitoring program for both sandeels and seabirds that will provide reliable indicators of systems responses.</p> <p>A sandeel and seabird monitoring program will be prepared and agreed with stakeholders before implementation</p> | <p>The outline monitoring program has been developed and is shown in the IMP</p> <p>Further details are provided below</p> |
| <p>Build a structured decision-making framework</p> | <p>The IMP sets out the stakeholders and the annual decision-making frameworks that would need to be put in place to implement and manage both Option 1 and Option 2.</p> | <p>The outline decision making framework has been developed and is shown in the IMP.</p> <p>Further details are provided below</p> |

2.5.1. Sandeel Stakeholder Groups

Stakeholder groups will be established to provide expertise and experience to further develop the baseline data collection, monitoring and progress indicators and the alternative management actions. Two groups will be required, one focusing on the monitoring of the sandeel stock and one focusing on the monitoring of the response of seabirds to increased prey availability. The Applicant will facilitate their collaboration to understand and respond to the interaction of these two workstreams. These are complex areas that will require substantial input from stakeholders and cannot be confirmed until the scope and extent of the compensation measures is agreed. There will also be extensive engagement with existing strategic monitoring frameworks and the monitoring that will be implemented for the proposed project as part of any project specific consent conditions to ensure the agreed activities provide data in an effective way to inform management of this measure and to inform other industry initiatives.

As such the tables below provide further clarity on the proposed baseline data collection, monitoring and progress indicators and alternative management actions. The following stakeholder groups are proposed.

Sandeel Stakeholder Group

- Marine Directorate
- SSER

Seabird Stakeholder Group

- RSPB
- NatureScot
- SSER
- National Trust for Scotland (NTS)
- UK Centre for Ecology and Hydrology (UKCEH)
- Scottish Seabird Centre

The stakeholder groups will monitor the progress of the measure and provide feedback to the strategic stakeholder group will evaluate to the progress of the overall package of measures.

2.5.2. Baseline Data Collection

Much of the baseline data shown below is already available from existing monitoring activities and can be readily collated to provide a baseline before implementation. There may be gaps in the baseline from existing data for productivity and return rates and the most effective way to capture these data will need to be agreed with stakeholders before implementation. There is also a risk that if sandeel fisheries are closed in 2024 that monitoring by the Marine Directorate may cease and it will be essential that monitoring protocols are agreed and implemented quickly to ensure that a consistent time series of data is maintained to monitor and evaluate the impact of the closures on the seabird population.

| Description | By Whom | Purpose |
|--|--|---|
| Sandeels | | |
| Sandeel Total Stock Biomass (TSB) – dredge surveys and returns from monitoring TAC | Marine Directorate (current) and/or contractor (after closure) | To build on current knowledge and establish baseline to monitor response following closure / ecosystem management |

| Description | By Whom | Purpose |
|---|--|---|
| Sandeel Spawning Stock Biomass (SSB) – dredge surveys and returns from monitoring TAC | Marine Directorate (current) and/or contractor (after closure) | To build on current knowledge and establish baseline to monitor response following closure / ecosystem management |

Seabirds – Core baseline data

| | | |
|--|--------------------------------|--|
| Adult populations of key species at impacted Special Protection Areas (SPAs) | Existing monitoring Consultant | To build on current knowledge and establish baseline to monitor progress |
| Productivity of key species at impacted SPAs | Existing monitoring Consultant | To build on current knowledge and establish baseline to monitor progress |
| Return rates of key species at impacted SPAs | Existing monitoring Consultant | To build on current knowledge and establish baseline to monitor progress |

Seabirds – Additional potential baseline data

| | | |
|--|--------------------------------|--|
| Foraging behaviour of key species from impacted SPAs | Existing monitoring Consultant | To build on current knowledge and establish baseline to monitor progress |
| Seabird diet / chick provisioning | Existing monitoring Consultant | To build on current knowledge and establish baseline to monitor progress |

2.5.3. Monitoring and Progress Indicators

The progress indicators below will be used primarily to reduce uncertainty around the quantum and timing of benefits to the seabird populations. This reduction in uncertainty is expected to demonstrate a significant increase in the ecological benefits from this measure beyond the significant benefits already modelled, which could be made available for future offshore wind projects that may require compensation.

Information on the sandeel TSB and SSB, together with annual echo sound surveys of sandeel locations will provide the data and evidence needed to implement the alternative management actions proposed below.

| Description | Expected Trend | Review period |
|--|--|---------------|
| Sandeels | | |
| Sandeel Total Stock Biomass (TSB) – dredge surveys and returns from monitoring TAC | Increasing from historic and baseline levels | Annual |

| Description | Expected Trend | Review period |
|---|--|---------------|
| Sandeel Spawning Stock Biomass (SSB) – dredge surveys and returns from monitoring TAC | Increasing from historic and baseline levels | Annual |
| Echo sound surveys of important sandeel locations | Variable depending on recruitment and environmental factors. Required to refine and implement alternative management actions | Annual |
| Seabirds - Core progress indicators | | |
| Adult populations of key species at impacted SPAs | Increasing from historic and baseline levels | Annual |
| Productivity of key species at impacted SPAs | Increasing from historic and baseline levels | Annual |
| Return rates of key species at impacted SPAs | Increasing from historic and baseline levels | Annual |
| Seabirds - Additional potential indicators | | |
| Foraging ranges of key species from impacted SPAs | Breeding season foraging ranges align with sandeel distribution | Annual |
| Seabird diet / chick provisioning | Increased proportion of sandeel in diet | Annual |

2.5.4. Management Actions and Alternatives

No specific alternative management actions are proposed of Option 1 – Sandeel Closures, but a range of potential alternative management actions are available for Option 2 – Ecosystem management of Sandeel Fisheries. The management action of adjusting the annual TAC is the most likely measure to be applied.

| Description | Trigger | Implementation |
|--|---------|----------------|
| Sandeels Option 1 | | |
| No specific alternative management measures due to full closure. Potential contingency compensatory measures are set out in Section 3. | N/A | N/A |
| Sandeels Option 2 | | |

| Description | Trigger | Implementation |
|---|--|--------------------|
| Output Controls – adjust TAC, this may be increased or decreased down to zero | Monitoring of Sandeel TSB and SSB and Seabird Numbers, Productivity and Return Rates | Marine Directorate |
| Seabirds | | |
| No alternative management measures. Potential wider contingency compensatory measures are set out in Section 3. | N/A | N/A |

2.5.5. Decision making Framework

A flow diagram showing how the information provided above will be used to implement an adaptive management approach for Option 2.

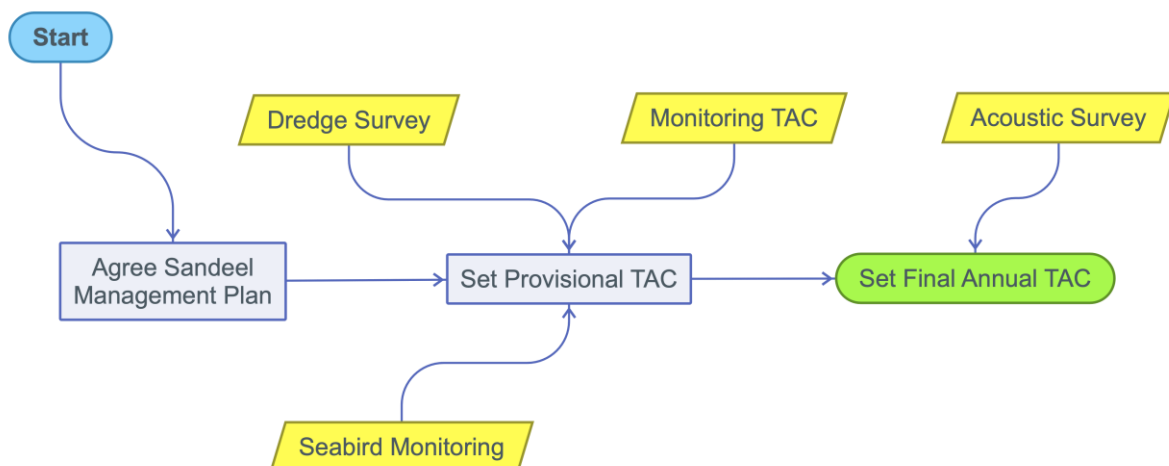


Figure 6 Annual flow diagram of Option 2 ecosystem management of sandeel fisheries

2.6. Sula Sgeir: Monitoring and Adaptive Management

The process for implementing the measures at Sula Sgeir is shown in the Additional Environmental Information (AEI) Submission Addendum to the Derogation Case – Gannet Compensation (without prejudice) The Applicant maintains the position that the potential for an adverse effect on site integrity for gannet can be ruled out beyond reasonable scientific doubt. The table below provides an evaluation of an adaptive management approach for this measure. A compensatory measure for gannet is provided on a without prejudice basis.

| Question | Response | RAG Status of Question |
|--|---|---|
| Is adaptive management appropriate? | <p>A reduction in the cull of gannet chicks from 2000 to 1000 is proposed on the Island of Sula Sgeir. There is little uncertainty that this will lead to an increase in the Gannet population on the island. However, there is some uncertainty as to extent to which this measure will lead to an increase in adult gannet and over what timescale.</p> <p>This uncertainty can be addressed by monitoring the response of the population and adjusting the number of gannet chicks culled in response.</p> | <p>There is some uncertainty in the ecological system and this can be addressed by monitoring and changes to management.</p> <p>Adaptive management can be applied to this measure.</p> |
| Is adaptive management feasible? | <p>Yes, it is feasible to increase or decrease the level of the cull.</p> <p>A monitoring program can be developed and implemented to provide the data needed to decide whether to amend the level of permitted cull.</p> | Adaptive management is feasible |
| Action | Description | RAG Status of Action |
| Identify current knowledge of the system and uncertainties | <p>There is good knowledge about the colony and robust and accepted relationships for the survival of chicks to adulthood. There are no significant data gaps that need to be addressed.</p> <p>The core assumption is that reducing the cull from 2000 to 1000 will result in an additional 258 adult birds per annum.</p> | Good knowledge of system and clear hypothesis for management |
| Set clear objectives with stakeholders | The management objective is to reduce the annual cull of gannet chicks at Sula Sgeir from 2,000 to 1,000. | There is a clear management objective |

| Action | Description | RAG Status of Action |
|---|---|--|
| Decide on management actions and their alternatives | <p>The conceptual model is that a reduction in the cull will lead to an increase in gannet chicks. Over time these 1000 extra chicks will increase the adult population by 258 per annum.</p> <p>The areas of uncertainty are the exact number of adults that will be added to the population. This uncertainty can be addressed by monitoring the response and adjusting the level of the cull accordingly</p> | Conceptual model identified, management actions and alternative management actions in place. |
| Develop a monitoring program | <p>Monitoring program can be implemented and will provide indicators of changes to the system. Key indicators are:</p> <ul style="list-style-type: none"> • Numbers of Adult Birds • Numbers of Juvenile Birds • Numbers of Immature Birds <p>Further details are provided below</p> | A monitoring program can be implemented, and key indicators put in place |
| Build a structured decision-making framework | <p>A stakeholder group will be established who will use the data from monitoring to evaluate progress against the management objectives and then take appropriate action.</p> <p>Further details are provided below</p> | A robust decision-making framework can be established |

2.6.1. Sula Sgeir Stakeholder Group

Sula Sgeir is isolated and inaccessible and the timing and best approach to the assessment of the baseline and ongoing monitoring will need to be discussed and agreed with the stakeholders before implementation. It is anticipated that the Stakeholder Group will consists of

- NatureScot
- RSPB
- Men of Ness
- SSER

The group will review the results of ongoing monitoring and put in place the relevant management actions to deliver the overall objectives. They will also report to the Strategic Stakeholder Group on the progress of the compensation measure.

2.6.2. Baseline Data Collection

Baseline data collection will focus on the two measures that will be monitored to clarify objectives and specific management actions before implementation. Proposed data to be collected are provided here as an indication of the potential approach and to outline who will collect it and why it is being collected.

| Description | By Whom | Purpose |
|--|------------|--|
| Count of immatures in non-breeding areas | Consultant | To build on current knowledge and establish baseline to monitor progress and estimate the total number of Immature birds at the colony |
| Number of gannet AON | Consultant | To build on current knowledge and establish baseline to monitor progress and estimate the total number of Adult Gannet at the colony |

2.6.3. Monitoring and Progress Indicators

The table below provides further detail on the proposed progress indicators that will be used by the Sula Sgeir Stakeholder Group to evaluate the success of management actions and agree next steps to achieve management objectives. The Sula Sgeir Stakeholder Group will provide this information to the Strategic Stakeholders, who will use this information to evaluate the progress of the overall package of measures.

| Description | Expected Trend | Review period |
|--|--|---|
| Number of juvenile birds at the colony | Increasing from historic and baseline levels in line with survival rates in Horswill and Robinson (2015) | Annual Yr 1 to 5 and then every three years |
| Number of immature birds at the colony | Increasing from historic and baseline levels in line with survival rates in Horswill and Robinson (2015) | Annual Yr 1 to 5 and then every three years |
| Number of gannet AON | Increasing from historic and baseline levels in line with conservation targets | Annual Yr 1 to 5 and then every three years |

2.6.4. Management Actions and Alternatives

The priority and order in which the management actions identified below are implemented will depend on the outcome of the baseline data collection.

| Description | Trigger | Implementation |
|---|---|------------------------|
| Amend the level of cull for gannet chicks | Monitoring indicates that numbers of juvenile, immature and adult birds are lower than expected | Applicant / NatureScot |

2.6.5. Decision Making Framework

The flow diagram below shows how the above information will be used by the Sula Sgeir Stakeholder Group to make decisions and implement alternative management actions as part of adaptive management approach for Sula Sgeir.

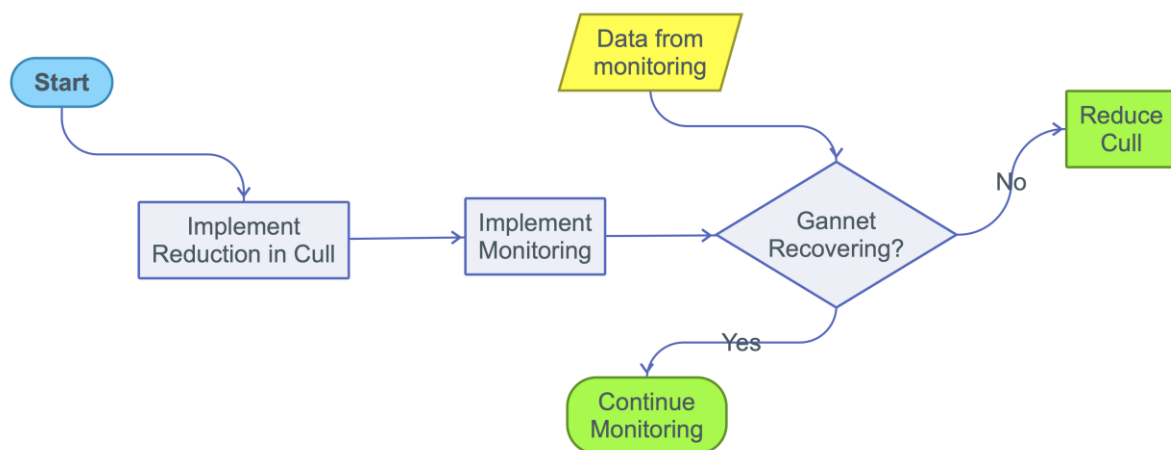


Figure 7 Annual flow diagram for reduction of gannet cull at Sula Sgeir

2.7. Section Summary

This section has provided the outputs from a literature review of adaptive management approaches and developed a framework to evaluate and deliver the proposed adaptive management measures. Detailed information, derived primarily from the IMP, has been provided to demonstrate how an adaptive management approach will be implemented for each measure. This includes information on baseline data capture, monitoring and progress indicators, management actions and alternatives (showing that each is feasible) and flow diagrams to show the timing of decisions to achieve management objectives.

The academic literature, conceptual models and guidelines explored in the literature review all highlight the important role that stakeholders play in implementing an adaptive management approach. Expertise and input from stakeholders will be required at all stages of the process to ensure the effectiveness of this approach. The additional environmental information provided in this document demonstrates that the Applicant fully understands the concept, challenges and opportunities presented by implementing an adaptive management approach. As proposed in the IMP, further engagement with stakeholders will be undertaken throughout the implementation, monitoring and adaptive management of each of the measures to ensure their successful delivery.

2.8. Alternative Approaches to Reducing Uncertainty

The section above has considered each measure individually whereby uncertainty is reduced by implementing an adaptive management approach.

The Applicant has also managed uncertainty for Option 1 full closure of the SA4 sandeel fishery by implementing two complementary approaches:

Scenario Analysis

- This involves analysing a range of potential scenarios that could occur from the implementation of this measures and selecting the most precautionary one to reduce the uncertainty the measure will be sufficient. The FCM Evidence Report demonstrates how this has been achieved by exploring a range of scenarios of possible benefit from an increase in the sandeel TSB against the worst-case impacts from the proposed project. The scenario that delivered the worst-case benefit was combined with the scenario that gave the worst-case impact. This double worst-case scenario provides enough benefit to more than offset the impacts of the proposed project.

Compensation Ratios

- This worst-case scenario - lowest benefit, and highest impact provides compensation more than 8 times greater than is required to offset potential worst-case impacts from the proposed project. This very high ratio of benefit to impact further reduces the uncertainty as to whether the compensatory measure will be sufficient to offset the impacts.

Balance of overall annual impacts and benefits to the SPA network for both Fisheries Management and Colony Based Measures combined

| Species | SPA population | Adult Mortality (Scoping Approach) | Fisheries Measures Benefit | Colony Measures Benefit | Compensation Surplus | Species Compensation Ratio |
|-----------|----------------|------------------------------------|----------------------------|-------------------------|----------------------|----------------------------|
| Kittiwake | 253,164 | 699 | 5,429 | 222 | 4,952 | 8.1 |
| Guillemot | 344,608 | 1,229.9 | 9,208 | 577 | 8,555 | 8.0 |
| Puffin | 178,139 | 30.2 | 4,925 | 56 | 4,951 | 164.9 |
| Razorbill | 113,842 | 71.2 | 452 | 160 | 541 | 8.6 |

2.8.1. Timing of Benefit

Stakeholders have also expressed concerns around the timing of this benefit and the Applicant has provided additional environmental information on the timing of sandeel benefit to demonstrate that only a 10% increase in sandeel TSB, via the mechanism of an immediate increase in adult survival is needed to offset impacts. This increase in sandeel TSB requires only the cessation of fishing in SA4 and does not rely on the recovery of the sandeel population. The 10% required is provided by the TAC not taken. Timing is therefore not an issue.

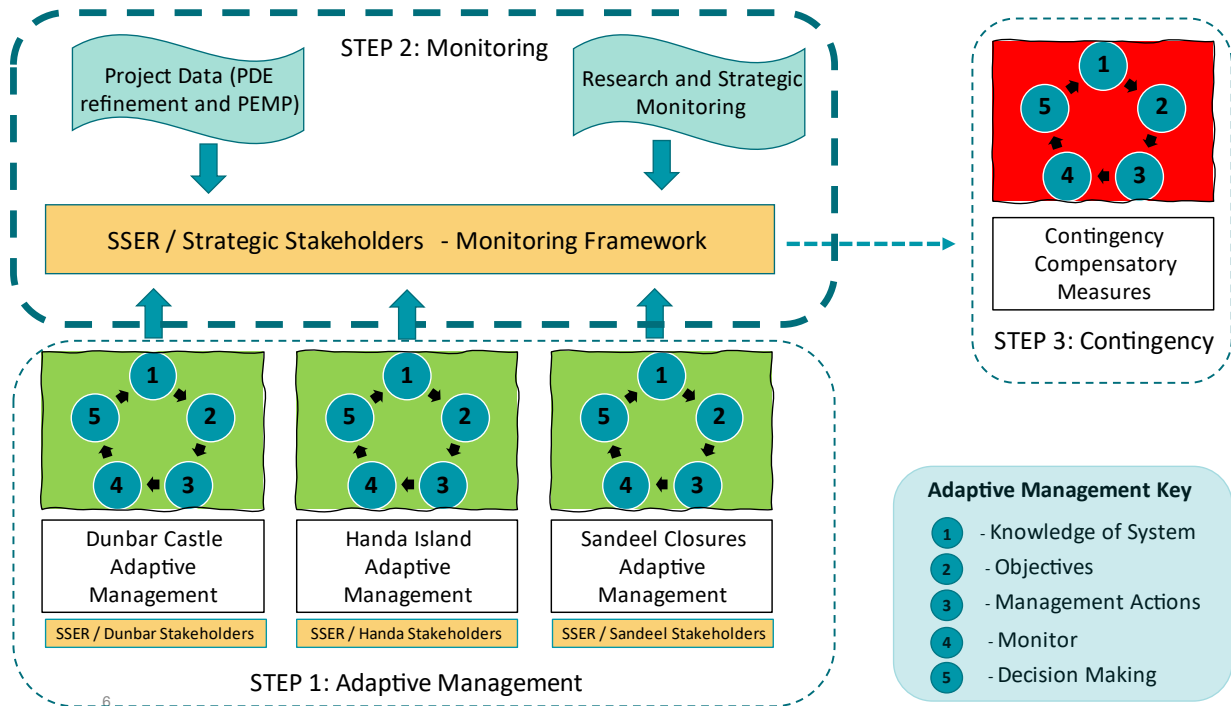
In combination these analyses provide a robust approach to managing and reducing uncertainty where adaptive management may be less applicable.

The Applicant has demonstrated an understanding of the adaptive management approach to the individual measures. This understanding has been applied to the proposed compensatory measures to reduce the

uncertainty about the benefits that will be delivered from these measures. Where adaptive management is less applicable alternative approaches have been applied to reduce uncertainty. Scenario analysis and high compensation ratios together significantly reduce uncertainty around the sufficiency of the compensatory measures. The additional environmental information on the timing of sandeel benefit provides further compelling reasons and evidence that the implementation of the measures will offset the potential impacts.

There is therefore a very low risk associated with the success of the compensation measures and the Scottish Ministers can be confident that the overall coherence of the National Site Network will be protected.

3. Step 2: Monitoring Framework



The section sets out the Applicant’s proposals for a wider monitoring framework that builds on the reduction of uncertainty that is delivered by the adoption of an adaptive management approach for the individual measures and the alternative approaches applied to reduce uncertainty applicable to Option 1 – full closure of the SA4 sandeel fishery.

At the heart of this step is the Strategic Stakeholder Group (SSG). This is distinct from the stakeholder groups that will be set up to develop and implement the individual compensation measures. These focused groups will provide technical expertise and are concerned with ensuring that the individual compensatory measures are implemented effectively in line with the adaptive management approach.

The SSG has a broader remit and will consider and act in the context of evidence from a range of other sources. These data sources are shown below.

3.1. Data from Compensation Measures

This information will come from the annual reporting cycle that is evaluating the effectiveness of management actions to deliver objectives. For example, some early progress indicators that the SSG would expect to see are shown below. In the medium to longer term a wider range of progress indicators would be considered.

Early indicators from compensation measures to allow evaluation of progress and requirement for contingency compensatory measures.

| Description | Expected Trend | Review period |
|-----------------------------------|---|---------------|
| Sandeel Total Stock Biomass (TSB) | Increase due to cessation of fishing pressure in the short term | Annual |

| Description | Expected Trend | Review period |
|---|---|---------------|
| Sandeel Spawning Stock Biomass (SSB) | Increase due to cessation of fishing pressure in the short term | Annual |
| Status of rats on Handa Island | Rat free after two years | Annual |
| Kittiwake productivity at Dunbar Castle | Increasing | Annual |
| Adult return rates for impacts SPAs | Increasing in the short term due to increase in sandeel TSB | Annual |

3.2. Project Data

As the project is developed new data will become available that will reduce the precautionary safety margins that have been built into assessments of the ornithological impact. For example, as the project moves from concept design through to final design many of the maximum design parameters may no longer be required and the precaution included in the assessment process can be reduced.

New data will also become available as the PEMP is implemented providing additional data that will allow the precaution built into the assessment of bird density to be reduced. Both these aspects are likely to mean that the actual impacts are anticipated to be significantly lower than the precautionary outputs of the assessment process used to quantify the compensation required.

3.3. Data from Research and Strategic Monitoring

The Applicant is a funding partner of the Forth and Tay Regional Advisory Group (FTRAG) which oversees the implementation of the existing Forth and Tay development PEMPs in relation to a number of receptor groups including seabirds. The ongoing monitoring program for seabirds is designed to address evidence gaps around the impacts of collision and displacement on key species that are relevant to the project. Recent similar studies have indicated that collision risk is much lower than the assumptions made in the assessment for the project and it is to be expected that mortality from collision risk will be much lower than predicted.

Monitoring work is ongoing at several operational wind farm sites in Scottish and English waters that is providing valuable information on the accuracy of modelling tools used in the assessment process in relation to the actual impact of operational wind farms, particularly on displacement and the habituation of seabirds.

Finally, there are a number of strategic research programmes underway across the industry with the core objective of reducing uncertainty around ornithological impacts in the assessment and consenting process (e.g., ScotMER, ORJIP, OWSMRF, PrePARED, ECOWind). The outputs of this research feed into new guidance from SNCBs and should be considered in this overall assessment of actual impacts from the project.

An annual review and evaluation of these additional sources of new data will provide the SSG with the opportunity to take broader perspective on the progress of compensation measures using agreed progress indicators, the likely actual impact and decide if any action needs to be taken

3.4. Evaluation

The information from the progress of the compensation measures, data from the site and new evidence from research and strategic monitoring will be evaluated, with further analysis being completed as required. The level of compensation required to offset impacts can then be updated based on this new information and the ability of the current compensation measures, given current progress, to offset the impacts can be determined.

If all the early progress indicators are positive i.e. kittiwake productivity at Dunbar has increased, sandeel TSB and SSB are increasing, and return rates for key species at impacted SPAs are improving, then no further action may be deemed necessary. A reduction in the uncertainty around assessment of impacts would also provide confidence that the measures implemented were likely to be effective and sufficient.

Despite the comprehensive process outlined above there remains a remote possibility that the SSG may conclude that the compensation measures may not offset the impacts. In this case they may need to consider alternative management actions, including the implementation of contingency compensation measures. The figure below shows a high-level flow diagram of the decision-making process of the SSG.

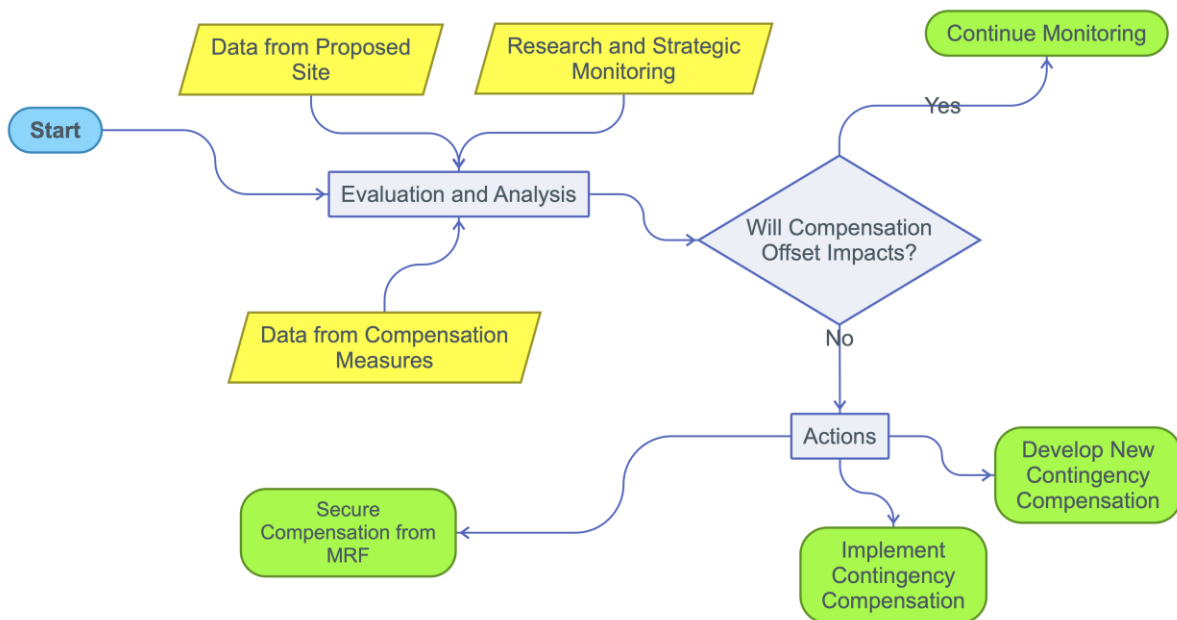
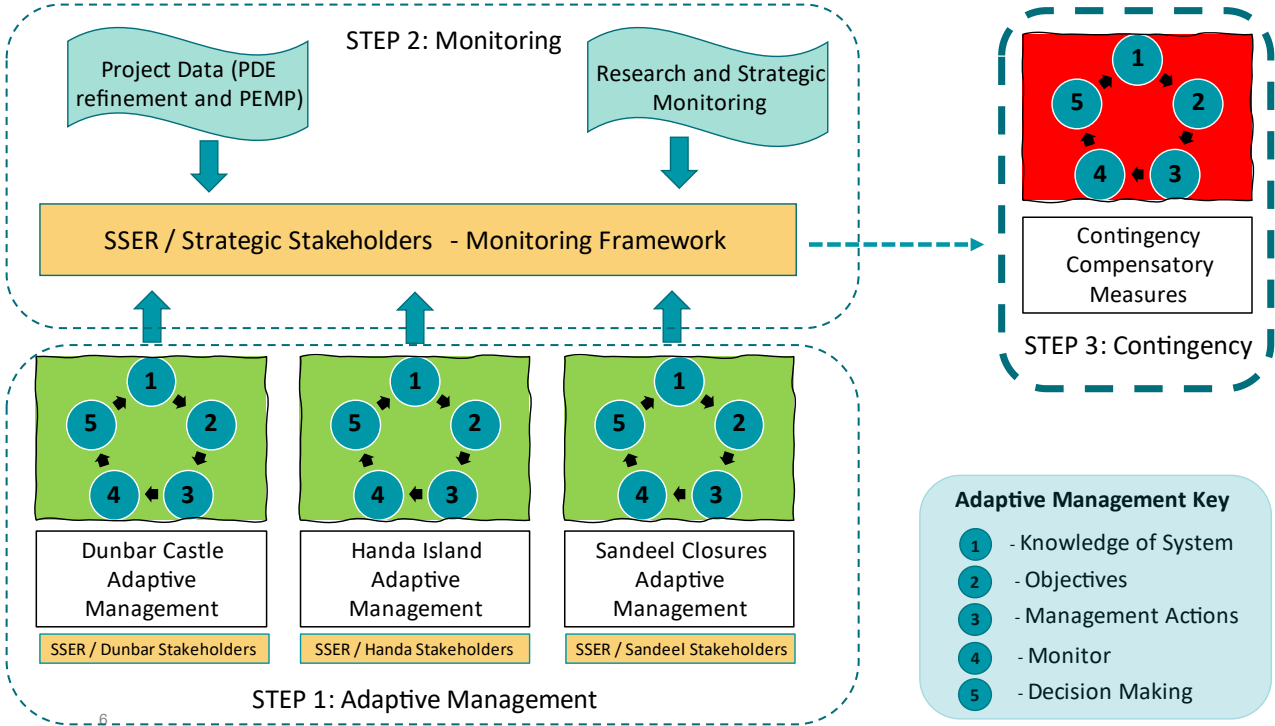


Figure 8 Annual flow diagram showing decision making process for evaluation of compensation progress

4. Step 3: Contingency Compensation Measures

Based on this evaluation the SSG will need to decide through monitoring whether the current compensation measures are delivering the compensation needed to offset the refined quantum of effects from the project. An evaluation of the early indicators shown above right from the start of the project will enable the SSG to make timely decisions about the implementation of contingency measures. If required contingency measures could be put in place well in advance to allow for the benefits from these measures to become operational.



4.1. Contingency Compensation Measures

The Applicant has researched and developed a compensatory measure for Rat eradication at Inchcolm. Subject to final agreement with Historic Environment Scotland (HES), this measure is ready for implementation and could be put in place quickly if early indicators suggest that the overall package of measures may not offset impacts. This implementation would be triggered based on the annual evaluation of progress completed by the SSG. The ability to implement this measure quickly means that there will be time for the measure to become effective before impacts occur.

Full details of this measure are shown in the CCM Evidence Report and the IMP. A full feasibility study of this measure has been provided with this submission. The Applicant is actively engaged with HES to continue the internal consultation on agreement to implement this measure. If implemented this compensatory measure would be included the overall Monitoring Framework set out above and subject to the adaptive management approach described.

4.2. Develop New Contingency Measures

The CCM Evidence Report outlined a 'long list' of potential compensatory measures, divided into three Tiers:

Tier I: Measures that are agreed to be beneficial, were generally viewed positively, and which can be implemented within the short-term:

Tier II: Measures that are agreed to be beneficial, but which are difficult to quantify, or which would require a further data-gathering stage prior to implementation.

Tier III: Measures which were discussed as a part of the consultation process, but which were not progressed due to lack of support from SNCBs and/or regulators, but which may still have the potential to deliver some compensation benefit.

The following Tier and Tier II measures could be further developed as contingency compensatory measures depending on the evaluation of the progress of the compensation measures and wider indicators.

- Forth Islands Incursion Hub
- Diversionary feeding of specialist falcon
- Diversionary feeding of other avian specialist predators
- Supplementary feeding of puffin and kittiwake
- Removal of plastic from the Firth of Forth
- Fox control at Badbea and/or Longhaven cliffs

In addition, the Applicant has explored the potential to implement a research program to investigate the options to reduce scallop fishing pressure in areas of sandeel habitat which could be implemented at an early stage.

The trigger for commencing further development of these measures will be the annual evaluation undertaken by the SSG. It is anticipated that early research and development of the measures most likely to provide benefit would start at an early stage following implementation of the proposed measures. The exact timing and which measures would be discussed and agreed with the SSG on an ongoing basis. It will be important to ensure that sufficient time is allowed to carry out research and to allow the subsequent benefit to be realised.

4.3. Marine Recovery Fund

It is understood that a Marine Recovery Fund (MRF), will be set up by Defra's Offshore Wind Environmental Improvement Package, which will be fully functional and available to offshore wind developers in 2024. The MRF is operated by Defra pursuant to the Offshore Wind Environmental Improvement Package of the British Energy Security Strategy (April 2022) for the implementation of strategic compensation for the offshore wind industry.

The Applicant will review on an ongoing basis the potential for this approach to provide compensation. Early assessment of the success of the proposed measures will allow decisions to be made in time to allow the benefit to become functional.

5. Summary

This report began with a review of the feedback from consultees on the Applicant’s original submission. The review identified several common themes that have been used to guide the development of this report and the additional environmental information provided. The Table below provides specific detail on how these common themes have been addressed.

| Common Theme | Response in the report |
|---|--|
| <p>Importance of Adaptive Management - Several responses highlighted the importance of adaptive management as a methodology to demonstrate and secure compensatory measures. In particular, the importance of setting the compensation measures within a monitoring framework that will allow alternative measures to be implemented if they underperform or fail.</p> <p>Stakeholders suggested that a step by step description of the “learning by doing” process will be needed to show what actions would be taken if monitoring indicated that compensation measures were not working. This could include the identification and ranking of questions. This process should be linked to a hypothesis for monitoring, which may need further engagement with technical experts at a later stage.</p> | <p>This report shows how the adaptive management approach for each compensatory measure will be applied to reduce uncertainty on the delivery of each measure objective. The monitoring and decision-making frameworks for each measure are described as well as a wider monitoring framework. This sets out the performance indicators and the alternative management measures that will be implemented if they fail or underperform.</p> <p>A framework has been developed to demonstrate the elements that need to be considered when implementing an adaptive management approach. This includes the annual monitoring of progress indicators and implementation of management actions with the overall aim of reducing uncertainty about the response to those management actions.</p> <p>The monitoring framework sets out the process for evaluating progress that will be reviewed annually.</p> |
| <p>Baseline Data - Stakeholders requested further consideration of baseline data and monitoring requirements to ensure that progress towards targets could be assessed and appropriate action implemented. This should include an assessment of any baseline data gaps.</p> | <p>Further details on baseline, monitoring and progress indicators, and management actions for each measure are provided. This builds on information shown the FCM Evidence Report, CCM Evidence Report and the IMP.</p> |
| <p>Progress Indicators - Stakeholders commented that progress indicators should be developed at an early stage and not left until the development of the implementation and monitoring plan. These progress indicators should be considered in the light of the available baseline data and gaps identified.</p> | <p>Further detail on progress indicators for each individual measure has been developed and is shown for each of the measures. These progress indicators are reviewed annually as part the adaptive management approach proposed.</p> <p>In addition, early-stage progress indicators are contained within a wider monitoring and management framework. These progress indicators are described.</p> |
| <p>Efficacy of Adaptive Measures - Some stakeholders questioned the efficacy of specific</p> | <p>The potential management actions and their alternatives for each individual measure and within the monitoring and management</p> |

| Common Theme | Response in the report |
|--|---|
| <p>measures proposed in the applicant’s original submission.</p> <p>Stakeholders made the point that some adaptive management measures may themselves take time to become effective and that there is a need for early checkpoints to check progress of primary measures. A process should be in place to ensure that action is taken early enough to ensure that adaptive management measures can be effective.</p> | <p>framework have been set out and their feasibility demonstrated.</p> <p>The adaptive management approach minimises the uncertainty around the response of the ecosystem to management actions. This approach therefore ensures that management objectives have the best chance of being delivered.</p> |
| <p>Adaptive Management Timelines - Stakeholders identified some uncertainty around the timing of decision-making processes to address any failure of measures to achieve the targets proposed for each measure.</p> | <p>For each individual compensatory measure, the progress indicators are reviewed annually, and appropriate action is then implemented. For the monitoring framework the progress indicators are reviewed annually, and appropriate management action implemented. The frequency of this review will allow the required action to be put in place to ensure that adaptive management actions are effective in time.</p> <p>The monitoring framework also reduces the uncertainty about what will be done if the measures are not successful via the data it will produce and the increased certainty that will follow from that. The framework will also consider the reduction in uncertainty around the impacts as new information becomes available.</p> |
| <p>Monitoring of impacts There was general agreement that the monitoring of impacts from the development should also be considered as part of any monitoring and adaptive management process.</p> <p>Stakeholders highlighted that areas of uncertainty are to be found in both the assessment of impacts and the delivery of the compensation measures. SSER should be careful not to confuse the two areas and ensure that the key question is answered – if the outcomes are not met what would be done?</p> | <p>The monitoring of impacts and new evidence has been built into the monitoring framework.</p> <p>Progress indicators for each individual measure are reviewed on an annual basis. Progress for the package as whole will be reviewed on an annual basis. This process means that action can be taken early enough to ensure that management actions will be effective.</p> |

6. Conclusion

A review of the literature on adaptive management demonstrated that this approach can be useful to reduce uncertainty in natural resource management. A framework was developed based on this literature review to provide a structure within which the Applicant's approach to adaptive management for each measure was presented. This framework was largely developed from SNH (2015) guidance and included an initial step that considered the applicability and feasibility of the adaptive management approach for each measure.

The information provided for each measure demonstrated how the adaptive management approach will be implemented to ensure that management objectives are met. Scenario based and compensation ratio approaches to the management of uncertainty for the closure of sandeel fisheries were presented. Together with the additional analysis on the timing of sandeel benefit and the implementation of an adaptive management approach there is a very low risk that the proposed compensation measures will not offset the impacts of the project.

This very low residual risk is further reduced by the implementation of a monitoring framework. Data from the compensatory measures and new evidence from wider monitoring activities will be analysed, and management actions implemented in a timely manner, including contingency compensatory measures to ensure that the compensation delivered is always sufficient to offset impacts from the proposed Development.

This report has provided a comprehensive response to the request for additional environmental information from MD-LOT. It demonstrates the Applicant's understanding of the adaptive management process and how it should be applied to reduce uncertainty. Robust implementation of this approach together with an overall monitoring framework provides Scottish Ministers with full confidence that compensation for the potential adverse effects of the project can be secured and will ensure the overall coherence of the National Site Network is protected.

7. References

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