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COWRIE workshop on the cumulative impact of offshore windfarms on birds

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Executive Summary

This report outlines recommendations for improving the delivery and effectiveness of Cumulative Impact Assessment (CIA) of the potential effects of offshore windfarms on bird populations.

A key source of information for the development of this process was a workshop held in May 2007 involving a wide range of stakeholders with an interest in assessing the potential effects of windfarms on birds.

Overview of Workshop Outcomes

There was an excellent attendance at the workshop (56 people from 36 organisations) with representation from all the sectors with an interest in the development of offshore windfarms and their potential impacts on birds. As well as people and organisations with an interest in UK waters, attendees also came from countries surrounding the North Sea basin, bringing a wider experience of developments and regulatory environments.

The workshop was run with a mix of plenary and parallel sessions and structured to give both breadth and depth in its considerations. There was emphasis on focusing on key issues and concerns and turning these into solutions. The key tests that were applied to assess the merit of the conclusions were:

- Compliance with Directives

- Scientific rigour

- Commercial viability

- Practicality

- Timescale

The conclusions centred on the need for continuing dialogue in the preparation of a CIA, the relationship between CIA and marine spatial planning, the relationship between CIA and strategic assessment, good practice examples of CIA, tools and methodology, information storage and access, monitoring and guidance on CIA.

The most significant conclusions during the workshop were:

- There was not an agreed definition of cumulative impact but it was recognised that the CIA report needs to be structured in a way that presents impacts across a specified timescale and from specified sources. Timescales could include past (historic) impacts, current impacts and impacts not yet manifested but that will occur due to factors already operating and future predicted impacts. Sources of impact could include the proposed windfarm, other windfarms, other projects that have been given consent or are reasonably foreseeable and activities such as fishing and boat traffic that are not consented on a project basis.

- The need for openness and dialogue.

- That marine spatial planning presents an opportunity to improve CIA and related Strategic Environmental Assessment (SEA) but its potential may not be realised and its extended timescale for implementation means that it cannot be relied upon alone to progress the efficacy of CIA.

That a planned release of potential development sites (another Round) in UK waters would be an opportunity to identify and address potentially significant cumulative effects strategically, but that an ad-hoc process will constrain such a strategic approach.

The review of the sample of windfarm Environmental Statements (ES) undertaken for the workshop had revealed, at best, patchy treatment of cumulative impact assessments despite such assessments being a legislative requirement.

There are examples of good practice and data contained within the “correspondence” between the regulators and the developer/consultant. It is currently not clear how interested parties would access this information. Making such correspondence a formal addendum to the ES might help.

There is a tendency for discussions about the potential effects of windfarms on bird populations to rapidly focus on concerns about data deficiencies and a lack of understanding about behavioural responses. It would be of value to UK consenting processes if future discussions on bird data deficiencies (population and distribution) and behavioural responses concentrated on what was relevant to future areas for new consents (suggested by some to be extensions to Round 1 and 2 sites and key potential future areas in seas adjacent to eastern Scotland, north-east England and south-west England).

Population Viability Analysis (PVA) has the potential to be the key tool to predict impacts at the wider regional (i.e. biogeographical population) and temporal scales needed for CIA.

It was not clear how the UK Government would be progressing the Berlin Declaration commitment on CIA methodology studies.

Monitoring is the key tool to judge the predictions made in an ES and without that testing of predictive methods we will not improve the utility of a CIA study.

Any new guidance on CIA should take the form of a working document that evolves as lessons are learnt.

The workshop sought to gain agreement amongst the attendees on solutions to problems and the way forward to improve CIA effectiveness. It was not possible to gain such agreement on several topics, let alone the overall approach. That it was not possible bring together a group with diverse interests and different levels of understanding and agree an approach in its entirety, simply highlights the complexity of CIA. Nevertheless progress has been made and this report outlines how a process of CIA could work.

Recommended Process

The implications of background research and the workshop discussions have been considered in light of the Environmental Impact Assessment (EIA) process. For most assessments this process typically involves the following stages:

- Screening / Scoping
- Data gathering
- Analysis
- Test of significance
- Reporting

The process recommended emphasises early consideration of potential cumulative effects in the assessment process so that data requirements can be identified and appropriate survey undertaken.

Ensuring that CIA is effectively implemented will, however, require further action from all the stakeholders involved. It is considered that the key actions required are:

1. The development of a guidance document based on the process outlined in this report. Within this guidance there is a clear need for:
 - a. specific advice and direction on the scoping of CIA;
 - b. clearer guidance than is currently available on additional or complementary ornithological surveys that may be required to specifically inform CIA;
 - c. direction to improve the consistency and transparency of data analyses and the assumptions that underpin these; and,
 - d. direction to improve the consistency of CIA report content and presentation.
2. Further discussion amongst relevant technical experts about how existing tools for CIA can be further developed. This task would usefully include the development of guidance for the parameterisation of tools such as collision risk models.
3. To provide a scientific basis for assessing the significance of impacts on bird populations, there is a requirement for the wider use of PVA. The outcomes of the literature review currently being undertaken by COWRIE should usefully inform further actions in this area.
4. Improvement of the capacity for learning from the monitoring of operational windfarms, including mechanisms for identifying and disseminating useful data and best-practice examples.

Delivery of this programme of action will require commitment from the relevant parties to undertake the actions and to allocate the resources to do so. There will also need to be active participation by stakeholders to participate in the action process, bringing with it additional knowledge, resources and commitment to implementation.

1. Introduction

COWRIE commissioned a workshop of interested parties to discuss and agree a process for Cumulative Impact Assessment (CIA) of the effects of offshore windfarms on birds.

The aim of the workshop was to obtain consensus amongst stakeholders on potential CIA processes, relevant to offshore windfarms and birds, capable of satisfying the “in combination” requirements of Appropriate Assessments and the “cumulative assessment” requirements of Environmental Impact Assessments (EIA). The “ideal” outcome sought would be agreement between industry, consultants, consultees and regulators (BERR (formerly DTI) and DEFRA) on the elements likely to constitute a cumulative impact assessment for key bird species. Where agreement could not be obtained it was to identify the strengths and weaknesses of approaches and the best practice to be used under specific circumstances.

During the workshop, discussions about approaches were facilitated and documented. A detailed account of the workshop and its outcomes is attached in an Annex to this report.

It was not possible during the workshop to achieve consensus about a potential CIA process. This arose for the following reasons:

1. There was a wide range of views amongst the more than 60 workshop participants.
2. There were different levels of understanding about key issues.
3. The subject area is inherently contentious and understanding about marine bird populations and the effects of windfarms upon them is still developing.

The discussions were, however, informative and a number of recommendations emerged about which there was agreement. On this basis a process of CIA is outlined in this document that is consistent with the discussions held. In proposing a process, we take also took the following positions:

1. It is in the interests of all stakeholders that EIA is completed accurately, cost-effectively and in a timely fashion. There is no benefit arising from the introduction of unnecessary delays.
2. The focus of assessment should be on the identification of potential significant effects, to the extent that is practically possible within the EIA process. There are wider uncertainties that cannot be resolved through EIA and these belong to a research agenda.

The remainder of this report is structured as follows:

The key outcomes of the workshop are summarised. A detailed account of the workshop and its conclusions are included as an Annex to this report.

The proposed CIA process is outlined. This concentrates on the key stages of assessment, namely: screening/scoping; data-gathering; analysis; test of significance; and reporting.

Strategic assessment. Discussion of CIA clearly emphasised the potentially important role of strategic assessment of windfarm effects. The implications of the discussion for any Strategic Environmental Assessment (SEA) are outlined and opportunities for CIA arising from a strategic approach to assessment briefly discussed.

Key actions arising are summarised.

Throughout this document there is reference to offshore windfarm development within the UK. It should be noted, however, that the approaches to offshore development may differ between England and Wales, where BERR (formerly DTI) is the lead consenting authority and Scotland, where the Scottish Executive has responsibility for the development of offshore windfarms. It is understood that the Scottish Executive will be undertaking SEA for any plans or programmes for offshore windfarms in Scottish waters.

2. Key Outcomes of the Workshop

Details of the workshop are detailed in an Annex attached to this report. The following paragraphs summarise the key recommendations arising from the workshop.

Definition and Presentation of Cumulative Impacts

Agreeing a definition of cumulative impact has proven contentious. It is recognised that there are two classes of factor to be addressed – timescale and source of impact – and that both these need to be explicitly reported upon. With regard to timescale there are four components – past (historic) impacts, current impacts, impacts not yet manifest but that will occur due to factors already operating and future predicted impacts. With regard to source of impact there are four components - the proposed windfarm, other windfarms, other projects that have been given consent or are reasonably foreseeable and activities such as fishing and boat traffic that are not consented on a project basis. The CIA should be structured in a way that reports on these factors and their components. If the reporting is to be in separate chapters of the CIA report, divided between those components that influence the baseline and those that influence the prediction of impacts, then an overview of the combined impacts should be provided in summary form, potentially as a matrix.

Recommendation on the Overall Approach to Ornithological CIAs

Those involved in the consenting process (developers, regulators, statutory conservation advisers, consultants and Non Governmental Organisations (NGOs)) should:

- Be more open about our lack of knowledge on conducting CIA.

- Be willing to try different approaches and to learn from those approaches.

- Have greater dialogue between relevant parties in the process of seeking consent – from screening and scoping the CIA, through baseline studies, impact prediction to eventual reporting.

Recommendation on CIA and Marine Spatial Planning

The benefits that Marine Spatial Planning (MSP) will bring to CIA must be regarded as an opportunity for long term gain but its potential may not be realised and its extended timescale for implementation means that it cannot be relied upon alone to progress improvements in the efficacy of CIA. In the interim there should not be a relaxation of efforts to improve the methods applied to, and the delivery of, CIA.

Recommendations on CIA and Strategic Assessment

A planned release of potential development sites (another Round) in UK waters would be an opportunity to identify and address potentially significant cumulative effects strategically but that an ad-hoc process will constrain such a strategic approach. In the absence of a structured 'round' greater effort and resources should be applied to the delivery of CIA.

Windfarm developers should not be expected to resource the assessment of widespread and multi-sectoral effects to which they may only contribute a very small proportion of the cumulative impact. If a structured Round of development is not pursued there is the potential for a significant gap – the assessment of widespread and multi-sectoral effects - that will need to be plugged in the period up until marine spatial plans are drafted and are themselves subject to CIA and Appropriate Assessment. It is not clear how the work to fill this gap would be funded.

Recommendation on Good Practice Example(s) of CIA

The advances made in good practice during the consenting process, post Environmental Statement (ES) submission, such as on dealing with uncertainty, phased developments and tests of significance merit wider distribution and this should be facilitated by the regulatory bodies and developers.

Recommendations on Improving the Tools to Deliver Ornithological CIAs

There should be further technical discussion of CIA in a meeting of relevant experts that focuses on how to develop tools to deliver CIA, drawing on the best of the existing tools that have been applied in CIA and building upon the conclusions of this workshop. Its purpose would be to inform the assessment of any proposed extensions to Round 1 and 2 sites and potential future areas for offshore windfarm development such as eastern Scotland, north-east England and south-west England. Specific regional meetings might be appropriate.

Population Viability Analysis (PVA) should be used as the 'common currency' for the wide scale / regional ornithological CIAs. COWRIE and interested parties should discuss and decide how best to build on the results of the COWRIE project that is looking at the potential use of PVA to assess the impacts of offshore windfarms on bird populations.

The relevant Government Department should clarify how it is to progress the commitment for a collaborative study with Germany to test CIA methodologies published in the 'Berlin Declaration from the European Policy Workshop on Wind Power Deployment, February 2007.'

Recommendation on Improving the Availability of Information for and on Ornithological CIAs

There should be a review of information availability relevant to CIA that encompasses:

- The effectiveness of databases maintained by Defra on the monitoring of Round 1 consented sites and COWRIE on the ornithological studies of Round 2 application sites.

- The revised or additional material produced during the decision making process and/or subsequently provided as part of developing or implementing conditions applied to the consent (the "in correspondence" information).

- The accessibility of information across international borders.

Recommendation on Improving the Delivery of Ornithological CIAs

The statutory conservation agencies, led by the Joint Nature Conservation Committee (JNCC), should develop a 'living draft' guidance note on CIA, in close consultation with relevant parties, that:

- Emphasises the need for developers to be more interactive with the regulators and their advisers.

- Is open about our lack of knowledge.

- Stresses the need for screening and scoping of CIA issues as much as project based issues.

- Evolves with each review of CIA statements.

- Incorporates novel methods, the results of post-construction monitoring and 'lessons learnt'.

- Incorporates the proposed Institute of Ecology and Environmental Management (IEEM) guidance.

- Is widely promoted to the industry, their consultants and NGOs.

A web based document appears most likely to deliver these requirements.

3. Recommended Process

The implications of background research and the workshop discussions have been considered in light of the EIA process. For most assessments this process typically involves the following stages:

Screening / Scoping

Data gathering

Analysis

Test of significance

Reporting

A key implication of the approach outlined here is that CIA is considered as a key component of EIA from the outset, rather than something that is dealt with at the end of the process.

Strategic Environmental Assessment (SEA) is particularly important for offshore windfarm development, not least because the approach to date has emphasised Rounds of development that can be interpreted as falling within the definition of Plans or Programmes within the “SEA Directive” (Directive 2001/42/EC on the Assessment of the Effects of Certain Plans and Programmes on the Environment, 27 June 2001). Implications for SEA are considered separately in Section 4, but it is envisaged that much of that which is proposed for EIA is equally applicable to SEA.

3.1 Screening / Scoping

3.1.1 Introduction

Council Directive No. 85/337/EEC (as amended by Council Directives Nos. 97/11/EC and, more recently, 2003/35/EC) together frequently referred to as the “EIA Directive” requires EIA to be completed in support of an application for development consent for certain types of project. Offshore windfarms are listed in Annex II of the Directive as ‘installations for the harnessing of wind power for energy production (windfarms)’ and proposals for such developments should, therefore, be subject to EIA.

The provisions of the EIA Directive have been transposed into relevant legislation governing consenting for offshore projects in the UK as follows:

The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000 (as amended) – require EIA for projects that are to be consented issued under Sections 36 and 37 of the Electricity Act 1989. In Scotland these requirements are implemented through the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000.

The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (as amended) – require EIA for certain public and private projects (defined in Schedules 1 and 2 of the Regulations) that are to be consented in accordance with the Town and Country Planning Act 1990. EIA requirements are implemented within the Scottish planning system through the Environmental Impact Assessment (Scotland) Regulations 1999 and in Northern Ireland through the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999.

The Marine Works (Environmental Impact Assessment) Regulations 2007 – require EIA for certain activities that need to be licensed under Part II of the Food and Environmental Protection Act (FEPA) 1985 throughout the UK. In addition, within Great Britain, these regulations now apply to schemes proposed to be sited in or partly within a port or harbour, that were previously covered by Part 2 (now repealed) of the Harbour Works (Environmental Impact Assessment) Regulations 1999 as amended by the Harbour Works (Environmental Impact Assessment) (Amendment) Regulations 2000. There are separate regulations applying to harbour works in Northern Ireland – the Harbour Works (Environmental Impact Assessment) Regulations (Northern Ireland) 2003.

Screening is a statutory step in the determination of whether or not an EIA is required. The proponent of a development may seek a formal screening opinion from the competent authority concerning the need for an EIA or may voluntarily decide to carry out an EIA itself.

In practice it is unlikely that a proposal for an offshore windfarm would ever be consented without the need for an EIA. Nevertheless, it would be useful at this early stage to identify whether a reason for undertaking EIA is the potential for a cumulative impact arising from the proposal.

Scoping is the process of determining the content and extent of matters that should be covered in an EIA. Although there is no legal requirement for scoping, proponents are entitled, under the EIA Regulations, to seek a formal 'scoping opinion' from the competent authority. The scoping opinion summarises the specific advice of the competent authority concerning the required coverage and content of the ES for a particular application. In preparing a scoping opinion, the competent authority is required to consult with the proponent and with relevant statutory consultees. Statutory consultees can play an important role in providing contextual information and advice on any legal/statutory requirements and good practice. The preparation of a scoping opinion does not preclude the competent authority from asking for further information at a later stage in the EIA process.

3.1.2 How is it currently done?

Typically EIA scoping tends to focus on project specific matters and whilst cumulative assessment is usually recognised as a requirement it is often dealt with in general terms.

In summary there is little specific attention to potential cumulative effects a consequence of which is that these may emerge later in the assessment process.

3.1.3 What should we be trying to achieve?

The process of scoping provides an opportunity to identify, at an early stage, the nature of potential cumulative impacts, leading to a clearer identification of information requirements.

Consequently there should also be agreement about the scope and extent of surveys required to inform analysis and assessment of those impacts and the basis for establishing significance of impacts.

There is now a considerable body of information about the distributions of marine birds around the British coast and the potential effects of windfarms on these species. It should be possible to establish in many locations an early idea of likely cumulative effects, particularly within the existing Round 2 areas where there has been focused data-gathering about the distribution and relative abundance of seabirds, assessment issues are now well rehearsed and there is information

about the predicted effects of existing, consented but yet to be constructed or planned projects. Outside of the Round 2 areas it may be possible to predict potential assessment issues, but it is unlikely that there will be a similar level of baseline data to inform assessment. If there are further rounds of offshore windfarm development, it may be possible to identify strategic areas within which surveys can be co-ordinated. If not, survey requirements will need to be carefully considered to ensure that they adequately inform the assessment of the project alone and together with other proposals.

Key outcomes of the scoping process for CIA should be:

- 1) Agreement about the other projects and plans that should be considered in the CIA
- 2) Agreement about potentially significant cumulative effects that are likely to arise (eg collision risk, habitat loss, displacement/disturbance, barrier effects)
- 3) Agreement about the scope and extent of surveys required to inform analysis and assessment of potential cumulative impacts
- 4) Basis for establishing significance of impacts

3.1.4 How this could be done?

Discussions at the workshop emphasised the advantages of standardising approaches where possible (for example through the use of pro-forma or check-list approaches).

We have a good working knowledge of the key issues in the existing strategic areas that are likely to be relevant when considering CIA in those areas. Some of the key issues that have required consideration within the Round 2 strategic areas are summarised in Table 1.

Table 1. Key ornithological issues that have emerged within each of the Round 2 strategic areas.

Area	Key ornithological interest	CIA issues
North-west	Common Scoter (winter population in Liverpool Bay) Red-throated Diver (winter population in Liverpool Bay) Manx Shearwater Pink-footed Goose (migration) Whooper Swan (migration) Lesser Black-backed Gull (onshore breeding colonies) Herring Gull (onshore breeding colonies)	Displacement Barrier effects Displacement Barrier effects Displacement Collision Barrier effects Collision Barrier effects Collision
Greater Wash	Pink-footed Goose (migration, wintering) Tern colonies Waterfowl assemblage	Collision Barrier effects Collision Barrier effects (Displacement) Displacement Barrier effects
Thames	Red-throated Diver (winter population)	Displacement Barrier effects

Table 1 could be extended for areas where future offshore windfarms are likely to be installed (eg north-east England or south-west approaches).

There is variation in the extent to which specific projects are included in CIA and there is little specific guidance on this topic. Circular 02/99 “Environmental Impact Assessment” indicates that local planning authorities should always have regard to the possible cumulative effects with any existing or approved development. With respect to the Habitats Directive, although already completed plans and projects are excluded from the assessment requirements of Article 6(3), the EU guidance document Managing Natura 2000 sites indicates that “...it is important that some account is still taken of such plans and projects in the assessment, if they have continuing effects on the site and point to a pattern of progressive loss of site integrity”. That document indicates, however, that “...it

would seem appropriate to restrict the combination provision to other plans or projects which have been actually proposed”.

Delegates at the workshop highlighted the fact that effects from previous developments may not manifest themselves immediately. Furthermore there may be unpredicted effects that were not considered in the assessment of those projects.

Clarity in scoping could be gained by recognising that there are two classes of factor to be addressed in the assessment – timescale and source of impact.

With regard to timescale there are four components:

1. Past (historic) changes in the population of specific bird species.
2. Impacts currently affecting the population of specific bird species.
3. Impacts that will inevitably occur to the population of specific bird species because the factor is now operating or a particular project has recently been constructed but the effects of that factor are not yet manifested in the measurements made to define the baseline conditions.
4. Predicted impacts that would derive from the proposed windfarm, other projects that have been consented or are reasonably foreseeable and other changes in unconsented activities that can be predicted to occur.

With regard to source of impact there are four components:

1. The proposed windfarm.
2. Other windfarms.
3. Other projects that have a specific consenting process and have been given consent or are reasonably foreseeable.
4. Activities in the marine environment such as fishing and boat traffic that are not consented on a project basis.

Delegates at the workshop also emphasised the need for early and constructive dialogue about the scope of CIA. Early consideration of these issues would identify what surveys, if any, in addition to those that will be required to inform the assessment of the project alone will be required to inform CIA. This could also include modification to the extent or duration of surveys likely to be required in light of current survey guidance.

3.2 Data Gathering

3.2.1 Introduction

The promotion of large scale offshore windfarm development in Britain has brought a need for data-gathering within an environment that, compared to many terrestrial environments, is relatively poorly understood. Furthermore the relatively large size of offshore windfarm developments (often extending over several hundred square kilometres) and the sheer scale at which potential effects need to be considered (Common Scoter and Red-throated Diver populations, for example, potentially affected by windfarms extend over thousands of square kilometres) means that data-gathering has been required on a scale that has rarely been seen previously in Britain.

In this context, providing appropriate data to inform CIA is clearly a challenge. Experience from the assessment of projects during Round 1 and Round 2 of the current programme of offshore windfarm developments have highlighted both the strengths and limitations of existing approaches.

3.2.2 How is it currently done?

There has been considerable attention given to the development of appropriate survey methods and clear guidance exists for this topic (see, for example, Camphuysen *et al.* 2004). On the whole developers and key consultees have a good understanding of the guidance and, as a result, in most case developers have access to transect data obtained from boat surveys (which they usually commission themselves) and aerial surveys (the majority of which, during Round 2, were co-ordinated by the DTI).

These data have proven to be useful at informing an understanding about:

- The species assemblage present.

- The relative abundance and density of those species.

- Any seasonal variations in the above.

- Behavioural characteristics, including flight heights.

There are limitations to the transect survey approach and boat and aerial sampling methods, however, including:

- Aerial surveys provide good regional coverage, but are less able to provide information about the distribution or behaviour of species (there are many species groups, such as terns, auks and gulls, where species level identifications are difficult using this method). Conversely boat surveyors are more likely to record observations to species level and to obtain useful information about behaviour (including flight heights) but the extent of surveys is more restricted. This means that whilst aerial surveys have provided useful information for CIA about the regional scale distribution of species such as Common Scoter or Red-throated Diver (where there is little scope for confusion between species), they are less useful for understanding effects on, say, foraging terns where species identity is more important.

- The frequency of sampling means that infrequent or sporadic events may be missed. One example would be migratory waterfowl, the passage of which may be concentrated into a short, but unpredictable timeframe. The main concern is usually that surveys might miss passage events, however, problems also arise if, by chance, the survey should coincide with such an event. The result is that predictions of movements based on sampling will tend to either under-estimate the frequency of passage (because they are all missed and activity is assumed to be low) or over-estimate them because a chance encounter is assumed to be representative of activity occurring between survey events (this may be measured in weeks or months when the passage event might occur over hours or days). In summary, it is difficult to put chance or infrequent observations into context.

In some cases developers have augmented these core methods with surveys using alternative methods to specifically inform CIA, one example is radar surveys at Walney and West of Duddon Sands offshore windfarms. These were co-ordinated to provide information about both windfarms and were targeted to coincide with the autumn passage of Pink-footed Geese and Whooper Swan.

3.2.3 What should we be trying to achieve?

The availability and wide adoption of guidance on surveys has promoted good survey practice across the large majority of sites. CIA requirements may emphasise, however, the need for additional data that is not necessarily provided

by these methods. As a consequence it is important that, at the scoping stage, any requirements for additional or complementary methods are clearly identified.

Aerial surveys have proven to be an essential source of regional scale data (subject to certain limitations) and it is important that this type of data continues to be available. It is unclear what role BERR is likely to take with respect to the co-ordination of further surveys. In the absence of such co-ordination, however, it will fall to developers to take the initiative on the commissioning of these surveys at sufficiently large geographical scales. Again it will be important to determine at an early stage how large an area any surveys would need to cover. Conversely if it is clear that aerial surveys are unlikely to yield useful data it may be more appropriate to divert resources to other, better targeted methods.

3.2.4 How this could be done?

To appropriately focus surveys on potential CIA issues it may be necessary to extend surveys beyond the minimum requirements outlined in existing guidance. Some areas where specific additional surveys may be required, include, for example:

Birds that occur infrequently or are present for short periods of time in significant numbers – including migratory species (e.g. swans and geese) or birds that forage on prey of sporadic availability (e.g. shearwaters). Obtaining information about these populations may require long-term point counts undertaken from moored vessel, a platform or by radar equipment. To inform CIA these may need to be undertaken at a large spatial scale in order to understand how bird movements relate to the distribution of windfarms.

Bird populations that extend over areas that are considerably larger than the windfarm area – understanding impacts on populations that forage over large areas (e.g. Common Scoter and divers) has been facilitated by the availability of regional-scale aerial survey data. Round 2 catalysed the co-ordination of large scale aerial surveys, if there is no similar strategic initiative in future, then the onus for organising and co-ordinating surveys at an appropriate scale will fall to developers.

Where there may be effects on a specific feature of interest (e.g. tern colony) – where there is a concern that there may be an effect on a specific feature of interest it is often important to determine the identity of individuals observed within windfarm areas. For example, where proposed windfarms lie offshore of tern colonies it would be necessary to determine whether those windfarms are likely to result in cumulative collision mortality of the breeding populations. To do this it may be necessary to identify whether birds observed in the windfarms originate from the colonies and if so, which one. Techniques that could be employed for this type of survey might include, for example, radio-tracking, visual tracking or radar.

The timely implementation of these methods emphasises the importance of early and effective scoping. This process would be aided through the development of a map or matrix of likely issues within distinct offshore areas (as indicated in the section on screening / scoping above).

3.3 Analysis

3.3.1 Introduction

Analysis of survey data is undertaken to inform the evaluation of the magnitude of potential impacts. This could include, for example, the derivation of the frequencies of flights through a windfarm area and the corresponding modelling of collision risk. In this case the analysis would yield a prediction in terms of the likely rate of collisions within a specific timeframe (e.g. mortality rate per annum or over the total lifetime of a windfarm, say, 20-25 years). This stage is distinct from the assessment of the likely significance of a predicted collision rate (see below).

3.3.2 How is it currently done?

The potential effects of windfarms on birds are reasonably well understood (Langston & Pullen 2003, for example, review potential effects) and tools exist for the analysis of the magnitude of impacts, including, for example:

Habitat loss – this arises from the direct effect of the construction of turbine foundations (along with any scour protection). The extent (in areal terms) of these can be readily determined from engineering plans. This information, combined with the results of marine habitat surveys, can be used to determine the extent of loss of specific biotopes that may be of importance for foraging birds.

Collision mortality – the risk of collision can be inferred from information about flight heights. Birds that habitually fly close to the sea surface are at low risk of collision, for example. For those species that do fly at rotor height it may be necessary to quantify the risk using a collision risk model (e.g. Scottish Natural Heritage 2000, 2005). For collision risk modelling to yield meaningful outputs, however, it is important to have good quality input data. Reviews of the use of collision risk models emphasise the importance of appropriate estimate of flight activity (RPS 2006) and the sensitivity of modelling to assumptions about avoidance rates (Chamberlain 2005).

Displacement / disturbance – the magnitude of displacement effects can be inferred from the sensitivity of species to disturbance. More sensitive species can be expected to avoid working areas (during the construction phase) or turbine structures and maintenance vessels (during operation) to a greater extent than disturbance tolerant species. As a consequence the area of sea rendered totally or partially unavailable to birds will be greatest for the most sensitive species. If the area affected comprises important foraging habitat then this displacement effect represents a form of habitat loss (functional habitat loss). The magnitude of this effect can be expressed in areal terms (i.e. the extent of habitat that is rendered unavailable) or in relation to the population (e.g. % of the population affected). So, for example, the area of habitat affected (or the proportion of the population displaced) may be evaluated by assuming, say, complete displacement within the windfarm areas and a diminishing response with a distance away from the windfarm boundary. For ease of calculation this could be assumed to be, for example, 50% displacement within a 1km buffer around the windfarm.

Barrier effects – barrier effects arise when birds avoid entering the windfarm. In extreme cases this may render areas inaccessible, although it is more likely that the presence of a windfarm would require birds to modify, and probably extend, their flight paths. The magnitude of this

effect can, therefore, be evaluated by calculating the extent to which flight paths must increase to avoid the windfarm, the energetic cost of the increased distances that are flown and the likely implications for survival or productivity.

The key issue, therefore, is less about the availability of tools, but more about the assumptions that are made, the way that information is presented and, for CIA, consistency across assessments.

For example information about collision rates can be presented in at least two different ways. The most common approach is to predict a collision rate (e.g. birds killed per year). But it is also possible to express the risk of significant collision mortality as a threshold avoidance rate. For example, it can be stated that a significant effect is not predicted when the avoidance rate exceeds, say, 99.3%. Although both measures are useful, they are not comparable and the use of these different approaches between sites that are being considered cumulatively hinders CIA. In addition even where the same methods are used it is difficult to compare predictions if it is unclear whether the same assumptions have been made.

3.3.3 What should we be trying to achieve?

Delegates at the workshop noted that the analytical tools used in assessment emerged through a process of evolution and natural selection. Those that are useful for assessment survive and find wider acceptance and usage. It was considered that there is little to be gained from trying to force the development of tools.

It was agreed, however, that guidance on appropriate assumptions for analyses, such as, for example, collision risk modelling, would foster greater consistency. At the very least the outputs of analyses will better inform CIA if they are expressed in similar terms with a clear indication of the assumptions that have been made (this is an issue for reporting too).

The accuracy of predictions made in assessments would be improved if they were better informed by the results of monitoring. This implies both the monitoring of operational sites and the dissemination and sharing of monitoring results.

Assessment of displacement effects requires an understanding of the degree of variability in the distributions and abundance of populations potentially affected. This will typically require data to be collected over a number of years.

A key point made by delegates at the workshop is the need for greater accumulation of knowledge through the reporting, dissemination and sharing of the results of monitoring and data interpretation.

3.3.4 How this could be done?

There is scope for the development of guidance on appropriate assumptions, particularly where there is empirical evidence that can be referred to. A key area is the assumptions that need to be made in collision risk assessment. Whilst there are good data contained within existing literature on the physical parameters of birds, there is little guidance on the two aspects that have most influence on the outcomes of modelling:

Estimation of flight activity. SNH have issued useful guidance for collision risk modelling for onshore sites, but the methods used onshore (based on vantage point observations) are dissimilar to those employed offshore (usually transect counts). It would be useful to provide specific guidance on how flight activity offshore can be calculated for the purposes of collision risk modelling.

Avoidance rates. As relatively small changes in avoidance rate can have a large influence on model predictions, it would be desirable to provide guidance on appropriate rates. This may take the form of a range (ideally based on empirical data, if this is available) or a precautionary rate based on the physiology of the species.

Consistency would be facilitated through a more standardised way of presenting information, particularly in relation to collision risk.

3.4 Test of significance

3.4.1 Introduction

The purpose of ornithological impact assessment is to identify likely significant effects on bird populations arising, in this case, from the construction, operation and decommissioning of offshore windfarms.

3.4.2 How is it currently done?

Percival *et al.* (1999) is a widely used framework for assessing impacts of windfarms on birds. This framework categorises the magnitude of an impact on the basis of change in population size or habitat extent. Using a significance matrix, the magnitude of the impact is combined with the sensitivity (importance) of the population to derive an assessment of the significance of an impact. The Institute of Ecology and Environmental Management (IEEM) is also developing guidance for the assessment of ecological impacts in the marine environment. The approach taken by IEEM is moving away, however, from a matrix based approach, in favour of a more detailed analysis of the magnitude, duration, extent (etc) of an impact leading to a judgement about whether an impact is considered to be significant or not.

Inevitably, though, these approaches rely on a judgement of the extent to which any change arising from the effects of windfarms will affect the integrity of the population. In the absence of a detailed understanding of population dynamics this judgement will rest on arbitrary criteria. A frequently used criterion of significance, for example, particularly in relation to the assessment of collision risk, is whether deaths per year arising from collision are equivalent to 1% or more of the existing annual background mortality rate.

3.4.3 What should we be trying to achieve?

Delegates at the workshop agreed that it was desirable to move away from arbitrary criteria. The aim should be to increase the scientific basis for the test of a significant effect, without sacrificing consistency between assessments or making the process so complex that it becomes impractical.

3.4.4 How this could be done?

It was agreed at the workshop that PVA should form the basis for assessing whether the magnitude of any change in population was likely to be significant.

3.5 Reporting

3.5.1 Introduction

This is typically the final stage of CIA. The outcomes of the various consultations, surveys, data analysis and assessments are summarised in documents, usually prepared to support applications.

3.5.2 How is it currently done?

The Environmental Statement (ES) is the principle method of reporting on the outcomes of an impact assessment. Other documents may be produced in response to questions raised by the ES or in support of further investigations undertaken to inform Appropriate Assessment.

Delegates at the workshop noted that key cumulative impacts are often not clearly presented within an ES and identified the following specific issues:

The presentation of CIA needs to be simplified, more instructive and provide a better summary of data collection and analysis methods.

A non-standardised approach to CIA causes problems with reading and writing ES.

CIAs are often fragmented through ES documents, making them hard to read and review.

There are no clear guidelines of what to include.

Identifying significant impacts with clarity and simplicity is often a challenge.

It is problematic to identify the future developments that are anticipated within the defined CIA area.

3.5.3 What should we be trying to achieve?

The objective should be for a clear and consistent presentation of CIA issues. The CIA report needs to be structured in a way that presents impacts across a specified timescale and from specified sources. Timescales could include past (historic) impacts, current impacts, impacts not yet manifested but that will occur due to factors already operating and future predicted impacts. Sources of impact could include the proposed windfarm, other windfarms, other projects that have been given consent or are reasonably foreseeable and activities such as fishing and boat traffic that are not consented on a project basis.

Delegates at the workshop identified the following potential solutions:

The presentation of CIA within an ES needs to be standardised.

Need to allow for easy access to methods, analysis, datasets and conclusions.

Need to be explicit about what "scoped in and out".

A technical appendix may be helpful to provide the finer details.

For the more general reader, it would also be useful to provide concise summary.

In addition it was noted, with respect to data analysis that there was a need to clearly identify any assumptions underpinning key aspects of the analyses informing the assessment, particularly collision risk assessment.

3.5.4 How this could be done?

Development of standards for the description of the scope of the CIA and the assumptions that have been made.

Delegates also stressed the importance of identifying and disseminating best-practice examples of CIA as models for future assessments.

4. Strategic Assessment

The approach of the UK Government to further offshore windfarm development has implications for CIA. If development is encouraged within the context of a structured plan, similar, for example, to Round 2, then, under EU law there will be a need for a Strategic Environmental Assessment (SEA). To the extent that any plan was likely to have a significant effect on a site of European importance then an Appropriate Assessment of the plan would also be required.

Similarly it is likely that any plan potentially adopted under a marine planning system (as currently proposed in the Marine Bill White Paper consultation) will also require a strategic level assessment (although it is considered that the timeframe for the introduction and implementation of a system of marine planning implies that this is a medium to long-term consideration).

It is envisaged that the recommendations outlined in this report would benefit CIA undertaken either in the context of SEA of a plan or EIA of a project.

It was clear from workshop discussions, however, that there are clear benefits to a strategic approach to assessment, including:

1. A greater emphasis on the identification and assessment of cumulative and in-combination effects at an earlier stage in the planning process.
2. Likelihood that plans will be modified at an early stage to avoid potentially significant cumulative impacts. Government could not, for example, adopt a plan where there was a reasonable likelihood of an adverse effect on the integrity of a European site unless there were no alternative solutions and an over-riding public interest.
3. Opportunity to identify and co-ordinate any surveys that may be required to inform CIA at an early stage. Identification of additional survey requirements at a more advanced stage of planning creates the risk of significant additional cost and delay to individual applications.

To the extent possible, therefore, it is considered that opportunities for a strategic approach to assessment should be encouraged with respect to future offshore windfarm development. On the other hand SEA should not be relied upon as the only mechanism for undertaking cumulative assessment. As indicated above any plans produced in the context of marine planning are unlikely come forward in the short-term. It is also unclear if, or how, plans will be brought forward for further rounds of offshore wind development. On this basis it remains important that the process of CIA be improved for EIA undertaken for individual projects as they come forward as outlined in this report.

5. Conclusions

This report outlines a process for CIA based on the outcomes of a workshop comprising delegates of mostly stakeholders with an interest in the assessment of potential ornithological impacts of offshore windfarms.

This process emphasises early consideration of potential cumulative effects in the assessment process so that data requirements can be identified and appropriate survey undertaken.

Ensuring that CIA is effectively implemented will, however, require further action from all the stakeholders involved. The key actions required are:

1. The development of a guidance document based on the process outlined in this report. Within this guidance there is a clear need for:
 - a. specific advice and direction on the scoping of CIA;
 - b. clearer guidance than is currently available on additional or complementary ornithological surveys that may be required to specifically inform CIA;
 - c. direction to improve the consistency and transparency of data analyses and the assumptions that underpin these; and,
 - d. direction to improve the consistency of CIA report content and presentation.
2. Further discussion amongst relevant technical experts about how existing tools for CIA can be further developed. This task would usefully include the development of guidance for the parameterisation of tools such as collision risk models.
3. To provide a scientific basis for assessing the significance of impacts on bird populations, there is a requirement for the wider use of PVA. The outcomes of the literature review currently being undertaken by COWRIE should usefully inform further actions in this area.
4. Improvement of the capacity for learning from the monitoring of operational windfarms, including mechanisms for identifying and disseminating useful data and best-practice examples.

Previous consideration of CIA at workshops (Oakwood Environmental Ltd 2003, Gilliland *et al.* 2004) has not resulted in a co-ordinated programme of actions that has then driven forward material improvements in good practice and the resultant improvement in the quality of impact assessments. We have proposed a programme of actions that we recommend to COWRIE and stakeholders that we consider will take us forward.

To deliver this programme of action will require commitment from the relevant parties to undertake the actions and to allocate the resources to do so. There will also need to be active participation by stakeholders to participate in the action process, bringing with it additional knowledge, resources and commitment to implementation.

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Annex: Summary of Workshop Discussions

Aim of the Workshop

The aim of the workshop was to obtain consensus amongst stakeholders on potential Cumulative Impact Assessment (CIA) processes, relevant to offshore windfarms and birds, capable of satisfying the “in combination” requirements of Appropriate Assessments and the “cumulative assessment” requirements of Environmental Impact Assessments. The “ideal” outcome sought would be agreement between industry, consultants, consultees and regulators (DTI and DEFRA) on the elements likely to constitute a cumulative impact assessment for key bird species. Where agreement could not be obtained it was to identify the strengths and weaknesses of approaches and the best practice to be used under specific circumstances.

Background

Several problems are associated with the evaluation of the potential cumulative impact of windfarm development on seabird populations. The COWRIE Environment Working Group decided that a workshop focusing on birds and involving developers, regulators and stakeholders could explore these issues and discuss the approaches being applied elsewhere. COWRIE commissioned RPS to arrange, deliver, chair and report on such a workshop. This report is the product of that contract.

The main outcome sought from the workshop was an agreed approach to cumulative impact assessment, ideally one that could be applied throughout the UK e.g. in all three strategic windfarm areas and in Scotland. It is acknowledged that a “perfect” solution was unlikely to be obtained but consensus was sought on potential assessment processes and their strengths and weaknesses. The process and solutions that were sought should also be capable of satisfying the “in combination” requirements of Appropriate Assessments under the Habitats Directive and the cumulative assessment requirements under Environmental Impact Assessment and Strategic Environmental Assessment Directives, as applied in the UK through relevant regulations.

Invitations, Attendance and Representation

Invitations to attend the workshop were sent out based on a list prepared by COWRIE. The invitation list covered the full range of parties with an interest in the development of offshore windfarms and their potential impacts on birds - windfarm developers, regulators, statutory agencies, researchers, consultants advising developers and NGOs. Appendix 1 is this invitation list, running to 98 people and 61 organisations, giving the name and their affiliation. Invitees were asked to nominate an alternative person from their organisation if they were not able to attend.

Those people who expressed a wish to attend were supplied a briefing pack in advance of the workshop. The contents of this briefing pack are described below under their individual elements. These elements were:

Agenda

- The aims of each section of the workshop

- Definitions and scope for the workshop

- Background papers for the parallel sessions

- Marine spatial planning and strategic assessment

- Review paper

Annex 1 species and UK waters

An excellent response from the invitation was achieved and 56 people from 36 organisations attended. Appendix 2 is a list of the people who attended the workshop and their affiliation. Good representation was achieved from the sectors with an interest in the development of offshore windfarms and their potential impacts on birds. As well as people and organisations with an interest in UK waters, attendees also came from countries surrounding the North Sea basin, bringing a wider experience of developments and regulatory environments.

Agenda and Structure of the Workshop

The workshop was structured as follows:

1. Introduction – Plenary session
2. Cumulative impact – “Heaven and Hell” – Plenary session
3. Discussion on Spatial Planning, Core Requirements and Quick Win Ideas - Parallel workshop sessions
4. Discussion to develop conclusions on Spatial Planning, Core Requirements and Quick Win Ideas - Parallel workshop sessions
5. Report back – Plenary session
6. Heaven or hell – have solutions been identified? – Plenary session
7. Next steps– Plenary session

Additional details are given in Appendix 3 which is the agenda supplied to delegates.

The Aims of Each Section of the Workshop

Set out below is a brief description of the aim of each discussion session in the workshop and an outline of the process that was followed on the day. Attendees were provided with a briefing pack that contained documents that related to particular sessions. These briefing papers are reproduced as Appendix 5, 6, 7 and 8.

Cumulative Impact – “Heaven and Hell”

This was an opening ‘ice breaker’ discussion and it sought to draw out the attendees worst fears about a cumulative impact statement for a windfarm proposal (hell) and their best hopes about what a cumulative impact statement can achieve (heaven). The issues raised were recorded and used as a reference point for the closing sessions in order to judge what progress had been made during the day toward finding solutions to issues and concerns. These issues are listed in Appendix 4, having been sorted and ordered from the original suggestions.

Parallel Workshop Sessions

Attendees were allocated to one of three groups on registration with the allocation made to ensure a good mix of interests and organisations within each group. There were three topics to address and each group addressed these in turn as follows:

	Group: Atlantic Puffins	Group: Black Scoters	Group: Common Terns
Session 1	Spatial Planning	Quick Win Ideas	Core Requirements
Session 2	Core Requirements	Spatial Planning	Quick Win Ideas
Session 3	Quick Win Ideas	Core Requirements	Spatial Planning

The topic facilitators were:

Spatial Planning:	Tim Norman
Core Requirements:	Roger Buisson
Quick Win Ideas:	Nick Askew

A briefing paper was provided to each of the attendees that provided a suggested outline structure and a set of issues for the discussion. These are reproduced here as Appendix 5. Further briefing was given in specific papers on Marine Spatial Planning (included in this report as Appendix 6) and a review that was conducted for the workshop on the treatment on cumulative impacts in recent environmental statements produced for a selection of offshore windfarms in UK waters (included in this report as Appendix 7).

Each group spent time addressing each of the topics but to prevent time spent repeating what a previous group had done, an 'accelerated discussion' process was used. The first session was allocated more time for the wider ranging gathering of ideas. The wide sets of ideas were synthesised and built upon by the second group and third group. These groups were given less time since much of the 'leg-work' had already been done. The benefits of this process were that everyone made an input, there was more in-depth analysis and it avoided each group repeating what had been done before.

Developing Conclusions

This was a further parallel session held in the same groups and with the same topic facilitators that developed the earlier discussions into a series of conclusions that were presented in the following plenary session. Each group focused on the topic that they began with in the parallel sessions, benefiting from the input of the two following groups' discussion and analysis.

The groups were asked to consider the merit of their conclusions against the criteria of:

- Compliance with Directives
- Scientific rigour
- Commercial viability
- Practicality
- Timescale

Closing Plenary Sessions

This plenary session opened with the topic facilitators presenting a summary of the groups' conclusions. It then moved on to consider to what extent the issues

that had been raised in the opening 'Heaven and Hell' session had been addressed. A shorter time available than planned meant that this session merged into the discussion of conclusions, recommendations and next steps.

The conclusions and recommendations developed in this session are presented in separate sections later in this report.

Definition of Cumulative Impact

The three key pieces of European legislation, the SEA Directive (2001/42/EC), the EIA Directive (85/337/EEC as amended) and the Habitats Directive (92/43/EEC), do not provide us with a definition of "cumulative" impact.

The body of guidance that has been produced on impact assessments have definitions of cumulative impact that focus around two elements:

1. Inclusion of the effects of other projects and activities.

This has been phrased as:

'changes caused by an action in combination'

'in combination with other projects and activities'

'significance should be considered cumulatively with other projects'

'plans and projects in all sectors'

'not only other potential windfarms but also other types of projects'

'identifying the total effect of both direct and indirect effects'

1. Inclusion of effects considered over a temporal scale:

This has been phrased as:

'with other past, present and future human actions'

'incremental effects of human activity'

'incremental changes caused by other past, present or reasonably foreseeable actions together with the project'

'actions that have been or will be carried out in the foreseeable future'

The definitions of temporal scale frequently encompass effects that have occurred in the past and/or occur in the present. It was proposed and then discussed in the 'Core Requirements' topic session that if the effect had already manifested itself in the present then it should not be included within the cumulative impact assessment. This is because the resultant effect of past and present projects and activities should be documented in the baseline studies of the species and habitats. It has been suggested that the temporal scale for cumulative impact assessments should encompass projects and activities that might arise in the future or change from their current scale or nature. It was proposed that the workshop consider "cumulative impact" as being:

Changes to particular environmental receptors (in this instance populations of birds) that result from the project that is being assessed and that result from other reasonably foreseeable projects and activities that occur during the lifetime of the proposed project, should the project go ahead.

It is recognised that this is a departure from much of what has been presented in existing guidance and related publications. Accordingly discussion of this potential change in definition was encouraged. This discussion identified that there was the risk of creating a gap in the assessment. This was when the effect of a factor or constructed project had not yet manifested itself and as a result was not measured in the baseline.

Bird Species under Consideration

The workshop focused on those birds relevant to the United Kingdom and its offshore waters out to the limit of its continental shelf interests. A list of relevant bird families and species, prepared in conjunction with COWRIE, was provided in the briefing pack for attendees. This is reproduced as Appendix 8.

Reports from the Parallel Sessions

These are provided as lists of key points as recorded during the parallel sessions. For clarity they are presented as free standing sections of this Annex.

Spatial Planning

Key points raised during the parallel workshop session facilitated by Dr Tim Norman

Marine Spatial Plans

Should identify and move toward actions to reduce conflicts.
Consider that they will have a limited ability to predict impacts.

Information requirements:

- Key species.

- Marine conservation zones.

- Who pays for widespread and generic studies – Government with the assistance of industry?

Flexibility:

- Changes of species conservation status.

- Population/distribution

Temporal dimensions to plans – seasonality:

8-10 years to deliver MSP:

- Fits with industry perspective.

- Industry needs to engage.

A Future Leasing 'Round' and MSPs

Think about characteristics of Round 3.

- Round 2 = 5GW.

- Round 3 = 15GW (!)

- 2020 target.

- Potential areas - East of England, Scotland, South West England

Consider essential infrastructure.

- Onshore effects.

Need to plan for CIA requirements in Round 3, if it will occur, in advance.

- Making more information available

- Is there time to collect data?

MSP will not deliver in time to meet Round 3.

- Number of stakeholders much greater in MSP than SEA.

- Types of stakeholders offshore.

Strategic Environmental Assessment (SEA)

Delivering the SEA

- Government need not lead on SEA.
- It could be a sector led SEA.
- e.g. oil development in Atlantic frontier.
- e.g. REAs by aggregates.
- Mix of Government and industry.
- Time required to address data gaps.
- Resourcing the SEA.

What does SEA include?

- Gap analysis – knowledge.
- Plan for dealing with it.
- Need steering group – feeds information in at early stages.

Will the preparation of a SEA speed up the delivery of a project based EIA within the strategic area?

SEA cannot be a replacement for project based assessment.

Tools for SEA – cumulative assessment

- Displacement.
- Collision risk.
- Barrier effects.

Offshore Designated Areas

Boundaries of Special Protection Areas (SPAs):

- Significant limitation to impact assessment is the current lack of clarity on SPAs in offshore areas.
- With formal designation should come clear conservation objectives for the features of European interest. This will give greater clarity to assessment processes.

Core Requirements

Key points raised during the parallel workshop session facilitated by Dr Roger Buisson

Definition of Cumulative Impact

It was proposed in the paper that was sent out prior to the workshop that the definition could be:

Changes to particular environmental receptors (in this instance populations of birds) that result from the project that is being assessed and that result from other reasonably foreseeable projects and activities that occur during the lifetime of the proposed project, should the project go ahead.

It was noted that this definition differed from that used by some authorities in that it was:

Forward looking

Based on the assumption that past and existing impacts will have been described and accounted for in the baseline studies

Discussion centred on whether or not this definition 'captured' the likely range of cumulative effects that might occur. There were concerns that included:

Reporting needed to be explicit in recognising the 'death by a thousand cuts' cumulative effect (ie the current proposal adds sufficiently to past losses that a threshold would be passed). If this had occurred or was close to occurring, it would need to be reported within a section that examined the current baseline and compared it to some past situation before the cumulative effects had occurred. This might require a 'past cumulative impacts' section in the baseline description.

There may be a time lag between changes due to an existing activity occurring or a recently consented project being constructed and its impacts being manifest and hence detected. This time lag needs to be allowed for in the cumulative impact prediction.

There was the potential to create a 'gap' in the impact assessment that under the proposed definition may not be captured.

There was not agreement on this definition, nor on a revised version that was proposed. The revision made it explicit there could be a time lag before an impact is manifested, achieving this by the inclusion of the qualifying text "*taking into account impacts due to existing projects but not yet manifest*".

In the absence of agreement on a definition, the view expressed was that in any particular CIA there needs to be an explicit statement of the particular definition of cumulative impact that is being applied. This would give transparency to the inclusion or exclusion of particular time periods and sectors (projects/activities) that might have led to impacts observed or predicted. The greatest clarity could be gained by recognising that there are two classes of factor to be addressed – timescale and source of impact – and that the conclusions made could be summarised in a matrix in the CIA.

With regard to timescale there are four components:

- i. Past (historic) changes in the population of specific bird species. This requires the setting of a starting point or reference year from which change is described. Defining this starting point is in itself contentious. This component is needed to identify the impact of the many past activities and projects and is the means to recognise the potential for the 'death by a thousand cuts'. This component could be included in that chapter of the CIA report that describes the baseline conditions.
- ii. Impacts currently affecting the population of specific bird species. This component is the baseline for the CIA. This component could be included in that chapter of the CIA report that describes the baseline conditions.
- iii. Impacts that will inevitably occur to the population of specific bird species because the factor is now operating or a particular project has recently been constructed but the effects of that factor are not yet manifest in the measurements made to define the baseline conditions. This component could be included in that chapter of the CIA report that describes the how the baseline conditions might change in the absence of the proposed project.
- iv. Predicted impacts that would derive from the proposed windfarm, other projects that have been consented or are reasonably foreseeable and other changes in unconsented activities that can be predicted to occur. This component is equivalent to the 'in-combination' impact assessment required by the Habitats Directive. This component would form part of the core content of the chapter of the CIA report that describes the predicted impacts.

With regard to source of impact there are four components:

- i. The proposed windfarm.
- ii. Other windfarms.
- iii. Other projects that have a specific consenting process and have been given consent or are reasonably foreseeable.
- iv. Activities in the marine environment such as fishing and boat traffic that are not consented on a project basis.

For clarity the CIA should be structured in a way that reports on these factors and their components. If the reporting is to be in separate chapters of the CIA report, divided between those components that influence the baseline and those that influence the prediction of impacts, then an overview of the combined impacts should be provided in summary form, potentially as a matrix.

Relationship between CIA and SEA

SEA is of benefit in helping scope project EIA.

Recognise the value that SEA could deliver for cumulative component of project based EIA.

Who delivers the SEA?

Government or developers through co-operation or a combination.

SEA requires

Common data standards
Co-operation.
Developer information.

SEA Scepticism

Will it be resourced – both money and time?
There is never the time in project plans
The effort will not be put into data gathering
Can we make predictions at the spatial scale required?
Are we able to interpret the data that we gather at this scale?

SEA has potential to speed up consenting, but that potential may not be delivered – in speed or quality.

Is there a scale at which we apply SEA that makes best use of the information that we can gather and the predictive tools that we have available?

Note that there was a considerable difference between the attendees of the workshop in the degree of optimism / scepticism about the benefits of SEA.

CIA Method

Technical concerns:

We assume that there is a threshold but can we predict it?
Even if we know what birds are there, do we have methodology to predict impact?
Could we even measure such impacts should they manifest themselves post construction? It is questionable if the pre-construction 'baseline' monitoring undertaken and the post construction monitoring following a BACI protocol have the statistical power to detect changes in seabird numbers unless they are very large eg in the order of 50-100%.

Issues of scale in cumulative impact studies:

Receptor and impact defines the scale at which CIA undertaken.
Site based assessments
Where an SPA is involved, displacement from the site is a legal issue even if there is no population impact (ie birds moving outside SPA boundary is a significant negative impact on integrity).
Regionally based assessment
Impact on population (size, productivity, survival) is a key issue.

CIA can be undertaken as an accumulation of worst case scenarios:

Inevitably leads to a high probability of identifying a significant adverse effect
How to determine what is the reasonable set of scenarios

Reasonable scientific doubt:

Will not be determined by the court (they only examine procedural issues in judicial review cases)
Could it be done by "peer review"? But who would make up such a panel of peers?

What would happen if they judged the evidence base unsound?

The workshop groups concluded that there was no appetite for a new third party to judge “reasonable scientific doubt” since that would duplicate the advice from the statutory nature conservation agencies.

It was noted that an “independent review panel” for oil and gas structure decommissioning had been set up in the 1990s after the adverse publicity for the Brent Spar (this was the *NERC Scientific Group on Decommissioning Offshore Structures*).

Data integrity improved for CIA if standard impact units:

- Would be easier in long term

- Pluses – enables adding impacts across studies, enables sharing across studies

- Downside – all studies might end up using the wrong method.

Method development:

- Are we moving toward a common method by “natural selection”?

- How to speed up the process of natural selection

- Effective means to learn

- Cannot stop method development – could consider a revisit of the COWRIE review of bird survey methods

Limitations in the Legal Framework

The legal framework does not necessarily allow us to take action on the most significant factor that is leading to an overall cumulative impact in an area

CIA may identify a mitigation action that is not achievable under the present consenting regime (eg regulation to reduce the impact from an existing activity of another industry sector). A cost benefit analysis of such a mitigation action might reveal that it has a better outcome for the UK economy than rejecting the development application or placing onerous conditions on the applicant. Such alternative, more cost efficient, mitigation actions may also not be acceptable under the Habitats Directive.

Quick Win Ideas

Key points raised during the parallel workshop session facilitated by Dr Nick Askew

Discussion focused around three issues:

Content, structure and clarity of results

Environmental statements often run into hundreds of pages in length presenting a complex, difficult and time-consuming task for a decision maker looking to be informed of the significance of the effects of a proposal. Any means of making such documents easier to produce, read and review would greatly aid the project planning and decision making process – but how can we achieve this?

Speeding up the process

Are there areas of the process of considering cumulative impacts that could easily be speeded up or simplified?

Study design, data collection and interpretation

Good study design is key to suitable data collection and interpretation. With designs and data collection methods often varying between projects, clear ideas of what is and is not required may aid future developments.

Points were raised and discussed in relation to:

Data

Suitable data for assessing cumulative impacts are often not available.

Available data are not in the forms that are comparable or provide estimates of error.

Data is not in a form that allows a “meta-type” analysis to be undertaken.

A lack of methodological guidance leads to little standardisation of data collection.

It is relatively easy to analyse data incorrectly; the risk of human error should be minimised.

Solutions may come through:

A web-based site to act as a central point for the collation and sharing of datasets - including international datasets – that would allow for easy access and sharing of data and be managed in a way that overcomes existing commercial sensitivities.

We need more consideration of data limitations and to identify what and where additional information can be obtained.

Clarity of ES

Key cumulative impacts are often not clearly presented within an ES.

The presentation of CIA needs to be simplified, more instructive and provide a better summary of data collection and analysis methods.

A non-standardised approach to CIA causes problems with reading and writing ES.

CIA's are often fragmented through ES documents, making them hard to read and review.

There are no clear guidelines of what to include.

Identifying significant impacts with clarity and simplicity is often a challenge.

It is problematic to identify the future developments that are anticipated within the defined CIA area.

Solutions may come through:

The presentation of CIA within an ES needs to be standardised.

Need to allow for easy access to methods, analysis, datasets and conclusions.

Need to be explicit about what "scoped in and out".

A technical appendix may be helpful to provide the finer details.

For the more general reader, it would also be useful to provide concise summary.

Monitoring

There is a lack of knowledge of cumulative impacts after development consent has occurred.

There is little long-term monitoring post-construction.

Existing CIA guidelines are not focused enough to address avian impacts and the different versions are open to interpretation.

Solutions may come through:

Predictions made in ESs need to be tested against actual impacts to refine future methods and CIA's.

We need more long term (years) post-construction monitoring against clearly defined objectives. It would be good to use a BACI design. With regards to FEPA licences - we need standardisation of long-term monitoring plans to ensure more scrutiny. Data quality and limitations need to be clear. We need more targeted research, not "open ended" monitoring.

Targeted study design monitoring of key species at key sites is a lot better than all species across a wider area. However, we should still collect data for all species encountered. Control sites also need to be carefully considered.

Speed

Late involvement of key stakeholders can significantly slow the process of CIA.

Solutions may come through:

Earlier consultation with stakeholders will help scope in and out receptors. This will also give the opportunity to agree methods, data analysis and interpretation. However, agreements should be followed through and ratified.

It is very important to include other industries where practical from an early stage. Open and wide-ranging dialogue will help to scope in and out issues. Consultation workshops are useful.

It would be useful to develop a set of cumulative assessment guidelines. There was a feel that the existing ones are not focused and the various versions are open to interpretation. We need to identify which methods are most appropriate to birds - but allow novel methods to be developed and reviewed. There was a feeling that post-construction monitoring may help inform which methods worked best. The information could be disseminated via the web.

Training / Reference materials

There is a lack of examples and studies for reference.

There is little knowledge of the training opportunities already available.

Solutions may come through:

List of courses that are already available

Training courses for cumulative impacts focused on target subject areas could be made available. This could be through online e training.

Data programme that automatically calculates collision risk to reduce human error.

Conclusions from the Plenary Session

Overview

There was general consensus that the potential for cumulative impacts had not always been considered with sufficient rigour to date given that it is a legal requirement, is an issue that can lead to delays in decision making and could ultimately be grounds for refusal. It was concluded during the workshop that in future industry, regulators, consultants and NGOs should:

Be more open about our lack of knowledge on conducting CIA.

Be willing to try different approaches and to learn from those approaches.

Have greater dialogue between relevant parties in the process of seeking consent – from scoping the CIA, through baseline studies, impact prediction to eventual reporting.

CIA and Marine Spatial Planning

A significant consideration is the potential effect of marine planning and how this may facilitate CIA. The Marine Bill White Paper foreshadows the introduction of a marine planning system that is not dissimilar to that which operates within the terrestrial environment. The introduction of marine planning provides an opportunity to identify constraints on windfarm development, including the analysis of their potential cumulative effects. In addition any plans brought forward under this system will require strategic environmental assessment, including identification of potential in-combination effects on features of European importance.

The timeframes involved in establishing the legal basis for marine planning and the subsequent time required for the development and adoption of plans implies, though, that this is a long-term rather than a short to medium term consideration.

CIA and Strategic Assessment

The approach taken to assess cumulative impacts will, to some extent depend on the mechanism by which further offshore windfarm developments are brought forward. Two scenarios can be postulated:

1. A planned release of potential development sites
2. An ad-hoc consideration of sites as proposals are made by individual developers

A planned release of potential development sites could be comparable to that for the Round 2 leases. This would lead to a requirement and an opportunity to identify and address potentially significant cumulative effects strategically. Any strategic assessment of such plans would also need to identify potential in-combination effects on features of European importance. This would give the benefits of:

3. Early identification of potential cumulative risks which in turn would focus early attention on:
 - a. Population affected
 - b. Geographical scope of the assessment

4. In light of (1) there would be a longer a lead in time (prior to the submission of applications for individual projects) permitting greater flexibility to obtain appropriate data.
5. Avoidance of “piecemeal” approaches to assessment. There is an opportunity to identify more efficient approaches to cumulative assessment other than individual project developers taking the burden of data collection and analysis upon themselves (and potentially even more inefficiently, multiple developers addressing the same issues in isolation).

At this stage it is unclear whether future windfarm development in UK offshore waters will occur within such a structured framework.

Good Practice Example(s) of CIA

There is not a CIA statement (either standalone or within an ES) that has birds as its focus from the NE Atlantic region that can be held up as a good practice example. It was suggested that the Thames windfarms collective study of marine mammals provides a good practice approach.

Good examples may not exist in the published ESs but there have been advances in good practice during the consenting process post ES submission that merit wider distribution. Such examples will be contained within the “correspondence” between the regulators and the developer/consultant. As such it may not be readily available to others to learn from.

Tools and Methodology

There is a tendency for discussions about the potential effects of windfarms on bird populations to rapidly focus on concerns about data deficiencies and a lack of understanding about behavioural responses. Although additional data will always be welcomed by all involved in impact assessment, such pessimism fails to take account of recent developments in terms of data collection. The aerial survey programme co-ordinated by DTI, for example, provides an extremely useful database on the distribution and abundance of sea birds within the three Round 2 strategic areas that could clearly inform cumulative assessment of further windfarm development in these areas.

The basic mechanisms by which windfarms are likely to impact upon birds are also well established. There is little debate that the key mechanisms include collision mortality, displacement (functional habitat loss through a range of direct and indirect processes) and barriers to movement.

More specifically, environmental impact assessment undertaken to date in UK waters highlights the following issues:

- Potential collision and barrier effects on migratory species – eg Pink-footed Goose, particularly in the north-west and The Wash
- Displacement of winter flocks of sea ducks and divers – eg Common Scoter in the north-west and Red-throated Diver in the Thames
- Collision, displacement and barrier effects on pelagic species – eg Manx Shearwater in the north-west
- Collision, displacement and barrier effects on colonially nesting birds – eg terns in The Wash

Further technical discussion of CIA could, therefore, usefully focus on how these specific issues have been addressed, how existing tools (eg collision risk

modelling) have been used to assess likely significant effects and what difference any novel approaches would have made. Further key questions should include:

How have the models been used to evaluate the risk (eg avoidance rates, magnitude of displacement effects)?

What thresholds for a significant effect were adopted?

What assumptions were made about the features of conservation importance potentially affected (eg population size, distribution)?

It is recognised that the workshop has given only limited time to detailed discussion of technical issues and that there would be benefit to be gained from a more focused discussion about the specific technical issues associated with CIA. Discussions about these issues would be particularly useful in informing assessment of any proposed extensions to Round 1 and 2 sites. Industry delegates at the workshop also identified key potential future areas for offshore windfarm development in sea areas adjacent to eastern Scotland, north-east England and south-west England. It would be constructive to examine to what extent the lessons learned from Round 1 and 2 can be applied to these areas prior to plans or projects being brought forward.

It was considered that Population Viability Analysis (PVA) has the potential to be the key tool to predict impacts at the wider regional (i.e. biogeographical population) and temporal scales needed for CIA. It can account for both direct mortality effects such as collision and indirect effects such as displacement from good feeding areas (leading to increased mortality) and barrier effects on migrating birds (leading to reduced fitness on arrival at breeding grounds and hence reduced productivity) or barrier effects disrupting links between breeding, foraging and roosting areas (leading to reduced fitness and productivity or survival). A major limitation to its application at present is the lack of information about some of the key parameters used as the model inputs.

A contract is to be let by COWRIE, entitled "Population Viability Analysis – Literature Review (COWRIE PVA-03-07)", with a closing date of Friday 11th May 2007. This will consider the data requirements, existing data availability to operate models for seabirds, seaduck and geese and identify any data gaps - see the project specification for further details <http://www.offshorewind.co.uk/Downloads/COWRIEPVAProjectSpecification.doc>

An initial gap analysis was conducted prior to the drawing up of the specification that identified particular deficiencies for Sandwich Tern, Little Tern, Red-throated Diver and Manx Shearwater.

The input parameters to the PVA that can be the common currency to apply in a CIA are:

birth rate (fecundity)

death rate (survival rate)

and how these vary with:

different life stages/ages of individuals

population density

environmental factors

Advances in methodology may not always be seen in the published ES because they occurred later in the consenting process (post ES submission). Such examples will be contained within the "correspondence" between the regulators

and the developer/consultant and may not be readily available to others. A means needs to be identified that will allow such 'lessons learnt' to be disseminated. An option would be for them to be treated as formal addenda to the ES, listed alongside the ES in any public database of environmental information and be available on request.

Collision risk modelling has been shown to be subject to human error in the processing of field data and prediction of mortality. A template spreadsheet, in addition to the strike probability spreadsheet currently available from SNH, could be produced and made available online that would eliminate some of those mathematical errors. This would need to be accompanied by a user-guide on input parameters, scenario testing and advice on the interpretation of the outputs.

It was not clear how the UK Government would progress the Berlin Declaration commitment on CIA methodology studies - Paragraph 31 repeated below:

UK and Germany will explore during 2007 the possibilities of a collaborative project to test cumulative impact assessment methodologies using a waterbird of conservation concern (e.g. red throated diver or common scoter) often present in areas of offshore windfarm development.

Information Storage and Access

Information from recent windfarm proposals and developments is being archived and made accessible through a number of routes:

Round 1 sites

Defra is seeking to collect the monitoring datasets from the Round 1 sites.

Round 2 sites

Information on the collation and management of data supplied as part of the Round 2 leases can be found in the COWRIE draft Data and Information Management Plan –

http://www.offshorewind.co.uk/Downloads/DIMP_consultation_draft.pdf

and the catalogue of data held, accessed from <http://data.offshorewind.co.uk/>

In addition to these two sets of accessible information that relate to UK waters, information for a CIA may need to encompass the jurisdiction of other countries. There would appear to be merit in having a web-based site that is able to act as a portal to datasets that are appropriate to the geographical scale of CIA, which is an international scale.

We might expect the above datasets to be insufficient to enable adequate CIA and future studies will need to be explicit about where data gaps have been identified.

It is currently not clear how interested parties would access (other than by a specific Environmental Information Regulations or Freedom of Information Act request) the post ES "correspondence" that might contain information on the development of the methodology for the CIA or additional survey data collected in response to statutory consultees' comments on the ES. Making such correspondence a formal addendum to the ES might ease this accessibility issue.

Concerns about commercial confidentiality may limit the extent to which data will be made accessible and shared at certain stages in the application process.

Monitoring

Monitoring is the key tool to judge the predictions made in an ES and without that testing of predictive methods we will not improve the utility of a CIA study.

Since CIA for key bird species is likely to be across a broad geographical scale, monitoring would equally need to be applied at a broad scale. This raises issues of who would undertake and fund those studies that encompass impacts arising from multiple sectors and across areas containing more than one windfarm. There was not agreement on this issue.

It was suggested that FEPA licences needed to have more transparent conditions, especially with regards to post-construction monitoring activities. Standardisation of the expression of conditions would also help delivery and scrutiny. Clear objectives need to be stated to ensure that the monitoring is not open-ended.

The use of control areas (preferably a BACI design) was agreed to be an important study design principle, but one with limitations when considered across a cumulative geographic area. The issue of what would be a suitable control site for cumulative assessment could not be agreed upon.

Guidance on CIA

An offer was made on behalf of the statutory conservation agencies to provide clearer guidance on what they expect in a CIA statement. The guidance would emphasise the need to be more interactive with the regulators and their advisers. It would include a requirement for evidence led studies. It would have to be a working document that evolves with each review that is conducted of CIA statements, incorporates novel methods, the results of post-construction monitoring and 'lessons learnt'. A web based resource would readily cater for such an evolving guidance document.

The Offshore Renewables Energy Environmental Forum (OREEF) has received a discussion paper produced by Hartley Anderson Ltd that summarises what guidance is currently available (April 2007) and concludes "*The issue of cumulative impact assessment is complex and challenging for developers, regulators and academics alike. The calls for definitions of cumulative effects and for more guidance on assessment are understandable, but more important are the underlying concept and objective of cumulative effects assessment*".

The IEEM guidelines that are currently being developed on ecological impact assessment in the marine environment will include an element on cumulative impacts. The timescale for producing a draft for external consideration is around 6 months.

Greater clarity in the reporting of CIA would be achieved if the guidance proposed a move toward standardising:

- Reporting on methods, analysis, datasets and conclusions
- Being explicit about what was "scoped in and out" and having an audit trail for this process
- Use of a technical appendix to present the finer details and datasets
- A summary of the CIA for inclusion in the overall non-technical summary

The guidance would need to be explicit about what to include within each section and how the information should be presented to make it more accessible.

Appendix 1: Invitees to the Workshop

Name	Affiliation
Cathryn Hooper	Airtricity
Mardik Leopold	Alterra
Julie Drew	AMEC
Marisa Di Marcantonio	Belgian Federal Government
Henning von Nordheim	BfN Vilm
Dr Georg Nehls	Bioconsult
Gordon Picken	BMT Cordah
Mark Rehfish	BTO
Sjoerd Dirksen	Bureau Wardenburg
Sian Whitehead	CCW
Sarah Wood	CCW
Richard Caldow	Now with Purbeck DC, was CEH
Danielle Lane	Centrica
Lourdes Cooper	Collingwood Environmental Planning
Jo Treweek	Consultant
Colin Barton	Cork Ecology
Claire Pollock	Cork Ecology
Chloe Delgery	COWRIE secretariat
Sarah Fowler	COWRIE secretariat
Carolyn Heeps	Crown Estate
Ben Barton	Crown Estate
Rachael Mills	Defra
Jo Myers	Defra
Chuin Kee	Defra
Paul Leonard	Defra
Rosemary Bradley	DoE NI EHS
Ian Enlander	DoE NI EHS
Kurt Jensen	DONG Energy
Jesper Holst	DONG Energy
Philip Bloor	DTI
Angela Wratten	DTI
Luuk Folkerts	ECOFYS
Steve Percival	Ecology Consulting
Dr. Martin Perrow	ECON Ecology
Gareth Lewis	EDF
Steve Bellew	Elsam
Jennifer Norris	EMEC
Tim Proudler	EON UK
Andy Coates	ERM
Paul Gill	ESS Ltd
Iain Bell	Faber Maunsell
Bob Furness	Glasgow University
Elizabeth Masden	Glasgow University
Harry Sealy	Halcrow
John Hartley	Hartley Anderson Ltd
Nick Cutts	IECS Hull University
Lucas Mander	IECS Hull University
Dr Jan Kube	IfAO
Dr Ommo Hüppop	IFV Vogelwarte Helgoland
Joris Everaert,	INBO
Andrew Prior	JNCC

Name	Affiliation
Zoe Crutchfield	JNCC
Andy Webb	JNCC
Ben Dean	JNCC
Linda Wilson	JNCC
Rachel McCall	METOC
Mike Young	Natural England
Sarah Anthony	Natural England
Ian Reach	Natural England
Allan Drewitt	Natural England
Louise Burton	Natural England
Michael Rooney	Natural England
Keith Henson	Natural England
Ib Krag Petersen	NERI
Tony Fox	NERI
Mark Desholm	NERI
Kees Camphuysen	NIOZ
Georgia Boston	NPower Renewables
Carol Cooper	NPower Renewables
Ian Hatton	Ormonde Energy Ltd
Jan Petterson	Ottenby
Ed Frost	RES Group
Gero Vella	RES Ltd
Suzann van Lieshout	RIKZ
Rob Staniland	Royal Haskoning
Sally Hough	RSK
Kevin Webb	RSK
Rowena Langston	RSPB
Daniel Pullan	RSPB
Tim Melling	RSPB
Kirsty Coutts	RSPB
Tim Youngs	RSPB
Lisa Palframan	RSPB
Bernard van Hemert	Scira Offshore Energy Ltd
Ian Bainbridge	Scottish Executive
David MacArthur	Scottish Power
Ralph Thornton	Scottish Power
David Flood	SLP Energy
Andy Douse	SNH
Bill Band	SNH
Rhys Bullman	SNH
Erica Knott	SNH
Luke Reade	University of Edinburgh
Dr Stefan Garthe	University of Kiel
Richard Evans	Warwick Energy Limited
Adrian Maddocks	Wind Prospect
Peter Cranswick	WWT
Baz Hughes	WWT

Appendix 2: Attendees at the Workshop

Name	Affiliation
Cathryn Hooper	Airtricity
Kathy Wood	AMEC
Thomas Merck	BfN Vilm
Jan Blew	Bioconsult
Mark Rehfish	BTO
Martin Poot	Bureau Wardenburg
Sian Whitehead	CCW
Colin Barton	Cork Ecology
Sarah Fowler	COWRIE Secretariat
Ben Barton	Crown Estate
Rachael Mills	Defra
Jesper Holst	DONG Energy
Philip Bloor	DTI
Luuk Folkerts	ECOFYS
Aulay MacKenzie	ECON Ecology
Eleanor Skeate	ECON Ecology
Katherine Degenaar	ERM
Paul Gill	ESS Ltd
Bob Furness	Glasgow University
Elizabeth Masden	Glasgow University
John Hartley	Hartley Anderson Ltd
Lucas Mander	IECS
Jan Kube	IfAO
Andrew Prior	JNCC
Andy Webb	JNCC
Ben Dean	JNCC
Linda Wilson	JNCC
Zoe Crutchfield	JNCC
Rachel McCall	METOC
Allan Drewitt	Natural England
Ian Reach	Natural England
Keith Henson	Natural England
Louise Burton	Natural England
Mike Young	Natural England
Sarah Anthony	Natural England
Ib Krag Petersen	NERI
Tony Fox	NERI
Ed Frost	RES Group
Gero Vella	RES Ltd
Rob Staniland	Royal Haskoning
Anna Butcher	RPS
Darren Frost	RPS
Nick Askew	RPS
Roger Buisson	RPS
Tim Norman	RPS
Kevin Webb	RSK

Daniel Pullan	RSPB
Lisa Palframan	RSPB
Rowena Langston	RSPB
Alastair MacKay	RWE Npower
Gillian Hendry	Scottish Power
Rebecca Smith	Scottish Power
Andy Douse	SNH
Jeremy Barker	TEC
Luke Reade	University of Edinburgh
Paul Vertigen	Warwick Energy Ltd

Appendix 3: Workshop Agenda

10.00 – 10.30	Arrive and registration Tea/coffee/biscuits available
10.30 – 10.40	Introduction Plenary
10.40 – 11.00	Cumulative impact – heaven and hell Plenary
11.00 – 12.45	Parallel workshop sessions

	Group A	Group B	Group C
Session 1: 11.00 – 11.45	Spatial Planning	Quick Win Ideas	Core Requirements
Session 2: 11.45 – 12.15	Core Requirements	Spatial Planning	Quick Win Ideas
Session 3: 12.15 – 12.45	Quick Win Ideas	Core Requirements	Spatial Planning

12.45 – 13.45	Buffet Lunch
13.45 – 14.30	Developing conclusions Parallel, groups as above
14.30 – 15.00	Report back Plenary
15.00 – 15.15	Tea/coffee/biscuits
15.15 – 16.00	Heaven or hell – have solutions been identified? Plenary
16.00 – 16.30	Next steps Plenary
16.30	Close of workshop

Appendix 4: Heaven and Hell

Legal Issues

Adverse effects on SPA must be avoided
One decision setting a precedent
Failure to regulate/recognise trans-boundary effects
Plans and programmes not so far subject to appropriate assessment – future plans will require this

Biological Issues

Diminished bird populations / changed distributions
Incremental growth in impact
Impact above threshold
Timelag – threshold passed before it is recognised.
Failure to baseline study to recognise/identify past impact (timelag)
Assessment against changing baseline

Assessment Issues

Unable to compare different types of impact across different sectors
No common currency
Need to work from top down (to set level playing field)
Could we ever pass the SEA and AA test?
Defining scenarios for SEA
SEA study for inadequately resourced
One decision setting a precedent

Development Issues

Alternative energy sources developed with greater overall impact.
Delays through legal challenges
Moratorium falsely imposed due to mistaken impact identification.
Applying incorrect level of precaution
Loss of confidence in decisions
Demands for ever wider studies at late stage

Appendix 5: Background Papers for the Parallel Sessions

For each of the three parallel sessions a briefing paper has been prepared that provides a suggested outline structure and a set of issues for the discussion. These three briefing papers follow this section in the order:

Core Requirements

Spatial Planning

Quick Win Ideas

It is proposed that the briefing papers are used by workshop participants to initiate the discussion in the relevant session. The papers are not intended to be exhaustive in content or to limit the scope of discussion. What is requested of participants is that if the 'burning issue' that you wish to raise is better addressed by one of the other two topic sessions then please be patient and raise it at the relevant time. If your issue does not fit into the topics that have been selected then it is most appropriate that it is raised in the first session since more time has been allowed in that first session for a more wide ranging discussion.

Core Requirements Facilitator: Roger Buisson

Theme: There are components of cumulative impact assessment that have to be done because they are legal obligations

This session is focused on exploring those components of cumulative impact assessment that have to be delivered because they are legal obligations or are otherwise considered essential and to omit them would result in a proposed windfarm application being refused for reasons of serious shortcomings in the information supplied.

The core requirements sought in the cumulative impact assessment

The cumulative impact assessment should:

Provide the legal requirements – content and due process

Inform the decision maker - clarity

Be capable of having identified if there would be significant effects that result from the proposed project that might only manifest themselves over time, at a wide scale or in-combination with other proposals – technical integrity

Issues that arise for discussion on legal requirements include:

Would it be acceptable to move to a definition of 'cumulative impacts' that results in the combination of past and present impacts being assessed within the baseline and that a 'cumulative impact assessment' addresses the combination of the proposed project and other reasonably foreseeable projects and activities?

How could limits be negotiated on what is 'reasonably foreseeable'?

How can 'reasonable scientific doubt' be judged? The courts appear unwilling to do it, should there be an independent peer review process?

Can the in-combination impact assessment required within an appropriate assessment be considered a specialist type of cumulative impact assessment?

Issues that arise for discussion on technical integrity include:

Is scoping done with sufficient depth and analysis?

How do we identify what is that is important to assess?
How large an area around the proposal do we have to assess?
How do we determine what other the other projects and activities to consider?
Over what duration of time must effects be assessed? Past, present and future?
Are carrying capacity and thresholds useful concepts in cumulative impact assessment?
How do we determine the significance of impacts?
How should we deal with uncertainty?

These issues arise as much for project-only assessment as they do for cumulative assessment. It is considered that in cumulative assessment there will a greater need for more explicit scoping and early agreement with stakeholders on what other projects and activities to consider, the spatial scale of the assessment and the treatment of uncertainty.

Note that issues related to 'clarity' will be addressed in the "Quick Win Ideas" topic.

Spatial Planning

Facilitator: Tim Norman

Theme: Avoiding cumulative impacts – the potential role of spatial planning and strategic assessment

This session is focused on exploring opportunities for avoiding cumulative impacts through appropriate planning and the consequent SEA and AA of those plans. Although only two approaches are detailed here, attendees are invited to identify additional ideas that operate at this high level of decision making.

Marine Spatial Planning

It is the intention of the UK Government to implement planning within the marine environment that is strategic and spatially explicit. Planning bodies (to be formed) and existing regulators will have a statutory duty to consider the objectives and plans arising from this system when considering development applications. It can be envisaged that in areas where there is good ecological information, effective plans can be formulated that provide developers with a relatively high level of certainty about the acceptability, or otherwise, of their proposals. It is more unclear how plans will be formulated in less well understood areas, although it is likely that the approach will be precautionary placing greater emphasis on developers to support applications with appropriate environmental information. Some key questions for this workshop are suggested:

Does the approach to spatial planning foreshadowed by the Marine Bill White Paper consultation provide an effective basis for identifying and avoiding potential cumulative impacts?

Are there any specific information needs that can be identified? Would a 'quick win', for example, be a spatial plan informed by defined feeding ranges from seabird breeding colonies and any concentrations of seabirds shown by existing JNCC aerial and boat based surveys (e.g. as proposed in JNCC report 325)?

What other modifications / improvement could be made to increase effectiveness of plans in informing cumulative impact assessments?

Strategic Environmental Assessment

SEA is an effective process for identifying the key environmental issues potentially arising from a plan, including the evaluation of a range of development

scenarios. It is (as is EIA) constrained by gaps in baseline data or uncertainty about the sensitivity or behaviour of ecological features. It is also a reactive tool that is only activated in response to a proposed plan. An SEA of the second round of offshore windfarm development was undertaken in 2003. Some key questions for this workshop are suggested:

What have we learnt from Round 2 on information requirements for effective SEA?

Are there any specific circumstances in which SEA is clearly an effective tool for predicting potential cumulative impacts on birds (e.g. is it only relevant for “Rounds” of development where there are clearly defined development areas / scenarios)?

Are there any other obvious opportunities for improving SEA to better identify potential cumulative impacts?

Further consideration of these issues is given in the paper “Marine spatial planning and strategic assessment” provided later in this document.

Quick Win Ideas

Facilitator: Nick Askew

Theme: What simple things can be done to improve the process of evaluating cumulative impacts?

This session affords delegates the opportunity to raise and discuss ideas that may be used to improve the process of evaluating the cumulative impacts of offshore windfarms on birds. The aim is to produce a list of “quick-win ideas” to provide benefit to developers, statutory bodies and conservationists alike. Consequently, delegates are encouraged to provide and discuss simple ideas that may improve and speed up the process of evaluating the cumulative impacts of offshore windfarms on birds. To aid the formation of ideas, some potential topics for discussion are provided below. However, delegates are free to discuss any ideas that do not follow the suggestions below but do fall within the overall theme.

Content, Structure and Clarity of Results

Environmental statements often run into hundreds of pages in length presenting a complex, difficult and time-consuming task for a decision maker looking to be informed of the significance of the effects of a proposal. Any means of making such documents easier to produce, read and review would greatly aid the project planning and decision making process – but how can we achieve this? Would any of the following suggestions be useful?

A checklist of items considered or “scoped-out” at each stage?

A box stating the impacts of the proposal that other projects should consider when examining the potential cumulative impacts of their specific development?

A separate section for cumulative impacts for birds that includes: background, methods, determination of effects etc?

Should we be more explicit about the positive environmental aspects of the proposals?

Speeding up the Process

Are there areas of the process of considering cumulative impacts that could easily be speeded up or simplified?

Removal of red tape?

The collection and sharing of data could be more efficient - how?

Would a “common currency” of impacts help?

Study Design, Data Collection and Interpretation

Good study design is key to suitable data collection and interpretation. With designs often varying between projects, clear ideas of what is and is not required may aid future developments:

Monitoring effort varied widely between projects - should we agree a common standard?

Monitoring should include control areas – is this a useful and practical idea?

Many studies collect data on bird species ecology (e.g. flight heights) – are there research opportunities that may aid future developments?

Further exploration of these issues is provided in the paper “Review of the treatment of cumulative impacts of offshore windfarms on birds” prepared for this workshop following a consideration of a sample of Environmental Statements.

Appendix 6: Marine Spatial Planning and Strategic Assessment

Introduction

This paper explores options for avoiding cumulative impacts through appropriate planning, including the necessary assessment of any plan produced. It seeks to raise the issue that spatial planning and assessment of such plans have the potential to provide significant benefits to project developers through setting the framework within which individual projects are assessed. The spatial scale of such plans has the potential to be that at which it is most appropriate to consider cumulative impacts with the result that the background information and scoping of issues that a project developer seeks will already have been substantially or in part carried out.

Marine Spatial Planning

The key tools for identifying and assessing the potential effects of development activities are SEA and EIA. Both of these tools are reactive as they are implemented in response to plans (SEA) or project applications (EIA). There is currently no proactive planning framework for most of the marine environment analogous to the spatial planning system established for onshore areas under the Town and Country Planning Act 1990, as amended by the Planning and Compulsory Purchase Act 2004.

It is the intention of the UK Government to implement spatial planning within the marine environment. The Marine Bill White Paper consultation (open for comment until June 2007) indicates, for example, that a key aim of government is:

“To create a strategic marine planning system that will clarify our marine objectives and priorities for the future, and direct decision-makers and users towards more efficient, sustainable use and protection of our marine resources.”

To this end, the consultation document outlines an approach to marine planning that is:

Statutory

Strategic

Plan-led (spatially explicit)

Robust yet flexible

A two-stage approach is proposed comprising the creation of a UK marine policy statement which articulates the UK Government's vision and objectives for the marine environment and its uses, followed by a series of marine plans which will implement the policy in specific areas, using information about spatial uses and needs in those areas.

Although the consultation recognises the need for clear objectives for ecosystem health and biodiversity, it also recognises that there are gaps in understanding that will limit the ability to set clear limits within which sustainable development can operate. The policy statement will be sufficiently flexible that it can adapt as understanding improves.

Plans will be developed for marine areas led by the UK government and the devolved administrations. The planning bodies charged with drafting plans will do so with regard to the policy statement and in liaison with relevant Government

departments and other stakeholders. To the extent possible plans will consider relevant activities and their impact on one another. It is anticipated that plans will also consider both the natural and cultural resources within an area, and the changing ecosystems, seasonal patterns and migration routes by adopting a temporal approach in some areas.

It is recognised that information gaps and uncertainty may constrain both objective setting and plan formulation. It is also recognised that information demands may be greater in some busier areas (such as near ports and within estuaries) where more detailed plans may be required.

It can be envisaged that in areas where there is good ecological information, effective plans can be formulated that provide developers with a relatively high level of certainty about the acceptability, or otherwise, of their proposals. It is less clear how plans will be formulated in less well understood areas, although it is likely that the approach will be precautionary placing greater emphasis on developers to support applications with appropriate environmental information.

The proposal for a marine spatial planning system raises some key questions for the workshop:

Does the approach to spatial planning foreshadowed by the Marine Bill White Paper consultation provide an effective basis for identifying and avoiding potential cumulative impacts?

Are there any specific information needs that can be identified? Would a 'quick win', for example, be a spatial plan informed by defined feeding ranges from seabird breeding colonies and any concentrations of seabirds shown by existing JNCC aerial and boat based surveys (e.g. as proposed in JNCC report 325)?

What other modifications / improvement could be made to increase effectiveness of plans in informing cumulative impact assessments?

Strategic Environmental Assessment

Article 3(2) of European Directive 2001/42/EC "*on the assessment of the effects of certain plans and programmes on the environment*", known as the Strategic Environmental Assessment (SEA) Directive makes SEA mandatory for plans and programmes:

- a) which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use and which set the framework for future development consent for projects listed in Annexes I and II to the Environmental Impact Assessment (EIA) Directive (85/337/EEC); or
- b) which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of the Habitats Directive (92/43/EEC).

This would include any plans brought forward as part of the proposed marine planning system (see above).

SEA extends the aims and principles of Environmental Impact Assessment (EIA), which is carried out at the level of the individual project, to decision-making at 'strategic' levels, where alternative approaches and their implications for the environment can more easily and appropriately be considered.

For sectoral development strategies such as that for offshore windfarms, SEA can make valuable contributions to:

- identification of environmentally preferred option(s);
- early identification of areas with presumptions for/against development;
- production of development guidelines for project design, siting construction and operational management practices in relation to a preferred option and/or specific areas, thus assisting the development process for both industry and government;
- providing information which can be used in subsequent project-level EIAs, which are also helped by the earlier identification of environmentally preferred options;
- assessment of cumulative impacts of possible individual projects or actions;
- identification of any significant individual or cumulative impacts which may affect other countries ('trans-boundary' impacts).

The Department of Trade and Industry (DTI) undertakes SEA of plans for offshore oil and gas exploration and production. In May 2003 DTI also published an SEA for the Government's plan for a second round of offshore windfarm development in three strategic areas (Thames Estuary, Liverpool Bay and Greater Wash).

That SEA identified the key environmental potentially arising from a range of development scenarios within these strategic areas. With respect to birds the SEA noted that there were significant baseline data gaps, including *"distribution and main flight paths of seabirds including migratory, feeding/roosting patterns (being addressed partly by RSPB/JNCC study funded by DTI) and their behavioural response to windfarms"* that created uncertainty about predicted effects.

Whilst SEA is an effective process for identifying the key environmental issues potentially arising from a plan, including the evaluation of a range of development scenarios, it is (as is EIA) constrained by gaps in baseline data or uncertainty about the sensitivity or behaviour of ecological features.

Some key questions for this workshop are:

- What have we learnt from Round 2 with respect to information requirements for effective SEA?
- Are there any specific circumstances in which SEA is clearly an effective tool for predicting potential cumulative impacts on birds (e.g. is it only relevant for "Rounds" of development where there are clearly defined development areas / scenarios)?
- Are there any other obvious opportunities for improving SEA to better identify potential cumulative impacts?

Appendix 7: Review Paper on CIA in Environmental Statements

Review of the treatment of cumulative impacts of offshore windfarms on birds

Introduction

The aim of this review was to study how cumulative impacts, and the parallel but more specific “in combination” effects, have been assessed for bird species found near offshore windfarms in the United Kingdom. This was achieved by reviewing the results of offshore windfarm studies as published in Environmental Statements (ES) and Appropriate Assessments (AA). By reviewing the process of how cumulative impacts have been approached in the planning process, it is hoped that issues will be highlighted which may help focus discussion at the COWRIE workshop on the cumulative impact of offshore windfarms on birds to be held on the 3rd May 2007.

Methodology

The process of examining, reviewing and assessing documents was undertaken using an objective approach wherever possible. This was achieved by producing a list of unambiguous items that may be considered in an ES or AA as identified in relevant legislation, policy and best practice. However, where it was not possible to clearly identify whether a topic or issue had been addressed, professional judgement was used having carefully considered the text.

ES's and AA's were chosen to represent a good geographic spread in the UK of offshore windfarms as follows:

Environmental Statements (n = 13)

Thames – southwest England (n = 3)

Liverpool Bay – northwest England & north Wales (n = 7)

Wash / Humber – eastern England (n = 3)

Appropriate Assessments (n = 4)

Thames - southwest England (n = 2)

Liverpool Bay – northwest England & north Wales (n = 2)

For clarity, the process of reviewing documents was split into four stages: (I) Scoping & Planning; (II) Surveying; (III) Determination of Effects; and (IV) Assessment of Significance.

Stage One: Scoping & Planning

Scoping and Planning encompassed activities that occur prior to data collection at the proposed site. These activities included presenting a description of the proposed site, identification of protected sites and species nearby, and also the consideration of other projects within the Zone of Cumulative Impact. Many of these items were presented following desk-based studies of the proposed areas by the developer.

A key issue was the consideration of other projects when assessing their cumulative impacts on bird species. Firstly, we sought to identify the types of projects that were considered for cumulative impacts. It is important to note that only those projects that were explicitly stated in the text could be included in this review; often projects may have been “scoped out” of the assessment and were

not mentioned. Secondly, the status of the projects being considered varied between proposals and was therefore important to record. Particular attention was focussed on whether existing projects were considered, or only projects that were also being proposed to be built.

Stage Two: Surveying

This stage included those activities where new data were collected and presented for the proposed sites. This included information as to how the data were collected, which species were included, the size of the study area and the time-scales involved. Of particular interest was whether the developers shared the burden of data collection over the wider area required for Cumulative Impact Assessment, and if the study design incorporated buffers and control areas outside the windfarm footprint. The collection of bird data was often targeted at the immediate area around the windfarm and not for the purpose of Cumulative Impact Assessment. This was particularly the case with boat-based surveys that were slower and covered relatively smaller areas than aerial and radar studies. Consequently, it was considered important to separate those boat surveys that were for Ecological Impact Assessment (EcIA) work only, and studies which also collected data for the wider seascape around the windfarm and was therefore informative from a cumulative impact perspective.

Stage Three: Determination of Effects

This stage assessed which potential impacts were considered for cumulative effects. As before only impacts that were explicitly considered in the text with respect to cumulative effects could be recorded by this review. It is assumed some issues were addressed but not considered important and, consequently, not mentioned in the text.

Stage Four: Assessment of Significance

This final stage addressed how the significance of the effects was considered. Often the determination of effects was clearly stated in the main body of the document with regards to impacts relating only to the windfarm (EcIA only). However, how the significance of cumulative impacts was addressed was often not clearly, or explicitly, presented. In these circumstances it was assumed the same methodology presented for the windfarm only (EcIA) impacts was used for cumulative impacts.

Results

A total of thirteen Environmental Statements and four Appropriate Assessments were included in this review. The table below displays the results of the review. The numbers represent how many proposals considered each item – those in parentheses display the percentage for each grouping. For clarity, only where the AA differed from their respective ES has been displayed. This was done to highlight where the process of undertaking an AA differs from an ES. A discussion of key results follows the table.

Table 1

STAGE ONE: SCOPING & PLANNING	Environmental Statement			Total
	Thames	Liverpool Bay Wash / Humber		
Number	3	7	3	13
Identification of location				
Alternatives considered?	3	7	3	13 (100)
Presumption to avoid important bird areas?	3	6	3	12 (92)
Cumulative Impacts considered?	1	2	1	4 (31)
Development boundaries defined?	3	7	3	13 (100)
Desk study undertaken?	3	7	3	13 (100)
SPA study	3	7	3	13 (100)
a. Identified?	3	7	3	13 (100)
b. Potential identified?	1	7	1	9 (69)
c. Data to suggest area could be an SPA (1% UK population)?	2	4	0	6 (46)
Are the population levels stated contemporary?	3	6	3	12 (92)
Evidence of consulting statutory agencies?	3	7	3	13 (100)
Nearby windfarms identified?	3	7	3	13 (100)
Existing projects?	3	7	3	13 (100)
Approved but uncompleted projects?	3	7	2	12 (92)
Plans or projects for which applications has been made and are under consideration by the consenting authorities	3	7	2	12 (92)
Plans and projects that are “reasonably foreseeable”	1	4	1	6 (46)

Evidence of dialogue with neighbouring windfarms?	2	6	3	11 (85)
Evidence of sharing data / monitoring effort?	2	2	3	7 (54)
Nearby Non-windfarm projects identified?	3	5	2	10 (77)
Need to consider if each of the projects is existing (E) or proposed (P) ?				
Oil and Gas	2E / 2P	4E / 4E	1E / 2P	7E / 8P
Waste Disposal sites	0E / 0P	2E / 2P	0E / 0P	2E / 2P
Coastal inshore windfarms,	0E / 0P	1E / 0P	0E / 0P	1E / 0P
Aggregate extraction	3E / 2P	3E / 3P	1E / 2P	7E / 7P
Dredging and disposal of dredged material	2E / 2P	2E / 2P	0E / 0P	4E / 4P
Shipping	2E / 2P	1E / 1P	0E / 0P	3E / 3P
Fishing	0E / 0P	1E / 0P	0E / 0P	1E / 0P
Submarine cables	1E / 3P	3E / 4P	0E / 0P	4E / 7P
Non-planning process projects (shipping / fishing)	0E / 0P	0E / 0P	0E / 0P	0E / 0P
Evidence of dialogue?	1	3	1	5 (38)
Species of concern identified?	3	7	3	13 (100)
Focus on specific bird species – nationally or internationally important?	3	7	3	13 (100)
Non-bird species considered?	2	7	3	12 (92)
STAGE TWO: SURVEYING				
Baseline studies undertaken?	3	7 3		13 (100)
All species surveyed?	3	7 3		13 (100)

a. Conservation importance?	3	7 3	13 (100)	
b. Most likely to be affected - high densities?	1	1 2	4 (31)	
c. Vulnerable to windfarm - high collision or disturbance risk?	2	0 2	4 (31)	
Spatial-scale of surveying?				
a. Case-by-case basis?	0	0 0	0 (0)	
i. Breeding unit	0	0 0	0 (0)	
ii. Breeding / wintering Population	0	0 0	0 (0)	
iii. Flyway level?	0	0 0	0 (0)	
iv. Any rules applied to choose zone of influence?	0	0 0	0 (0)	
b. Single spatial area for all species?	3	7 3	13 (100)	
c. Were issues considered on an international scale?	0	0 0	0 (0)	
d. Control area used?	1	0 3	4 (31)	4 (100)
i. Baseline gathered for control?	1	0 3	4 (31)	
Temporal-scale of monitoring (EcIA only)?				
What was the time-scale for baseline monitoring studies?	3	7 3	13 (100)	
Plans for monitoring during construction ?	2	3 1	6 (46)	
Plans for monitoring during operation ?	0	2 0	2 (15)	
Plans for monitoring during decommissioning ?	0	0 0	0 (0)	
Plans for monitoring long-lived species ?	0	0 0	0 (0)	
Methods used?				
Standard methodology used?	3	7 3	13 (100)	
a. Boats (EcIA Only)	3	7 3	13 (100)	
a. Boats (EcIA & CIA - i.e. over a wide area)	0	3 1	4 (31)	

b. Aerial	3	7 1	11 (85)
c. Radar	0	3 1	4 (31)
d. Coastal bird surveys	0	1 0	1 (8)

STAGE THREE: DETERMINATION OF EFFECTS

Definition of "Cumulative Impacts" addressed?	2	3 1	6 (46)	
Collision risk considered?	2	5 3	10 (77)	
Habitat loss considered?	2	4 0	6 (46)	
Displacement (aka disturbance) considered?	3	5 1	9 (69)	
Barrier Effects considered?	1	5 1	7 (54)	1 (25)
Habituation considered?	1	0 0	1 (8)	

STAGE FOUR: ASSESSMENT OF SIGNIFICANCE

Definition of unacceptable risk given?	2	4 3	9 (69)	
How was the risk assessed?				
"Favourable conservation status" maintained?	0	0 0	0 (0)	4 (100)
Precautionary "worst-case" principle?	3	7 3	13 (100)	
Reasonable scientific doubt / Waddenzee judgement	1	0 0	1 (8)	4 (100)
Evidence-based decision-making?	1	1 0	2 (15)	4 (100)
Significance Matrices?	2	6 3	11 (85)	
Thresholds used?	1	3 0	4 (31)	1 (25)
PVA used?	0	0 0	0 (0)	

Positive impacts presented?	3	73	13 (100)
Mitigation presented?	3	73	13 (100)

Results

Stage One: Scoping & Planning

All proposals considered alternative sites when selecting the offshore windfarm location, and 92% considered important bird areas during the site selection process. However, only 31% of proposals considered cumulative impacts at the planning stage.

Generally the desk studies were very thorough. All studies clearly defined their site boundaries, and identified protected sites within the wider landscape. Interestingly, all site proposals highlighted SPAs near their proposed sites, 69% identified potential SPAs (pSPA) and 46% presented data to suggest their area may be suitable to be designated as a marine SPA. All proposals provided evidence of consultation with statutory bodies and the large majority (92%) of the data were contemporary (within 10 years of the proposal).

When considering other offshore windfarms, all proposals identified existing windfarms nearby and 92% considered plans or projects that are under consideration for planning consent or approved but uncompleted. However, less than half (46%) of the proposals identified plans for windfarms that were “reasonably foreseeable”.

Just over half of the projects (54%) provided evidence of sharing monitoring effort with a neighbouring windfarm. However, there was some geographic variation in this pattern. All three sites in the Wash / Humber area showing evidence of sharing monitoring effort, compared to 66% of proposals in the Thames and just 29% in Liverpool Bay.

The majority (77%) of proposals considered cumulative impacts on birds resulting from non-windfarm projects. Oil and Gas, and submarine cables were the most frequently considered projects, with inshore windfarms and fishing activities being the least considered. There was an equal emphasis between proposed (30) and existing (29) projects when considering cumulative impacts. One AA considered fishing activities in their “in-combination effects” but did not in their ES.

All proposals identified species of conservation of concern recorded within the wider development area, and 92% also considered non-bird species such as marine mammals, fish and shellfish.

Stage Two: Surveying

All documents presented the results of early monitoring work, and focussed particular importance upon species of conservation concern highlighted at the early scoping and planning stages. A small proportion (31%) focussed specific attention to those bird species which are known to be vulnerable to, or most likely to be affected by, offshore windfarms.

When considering the spatial-scale of monitoring activities, all studies defined a single survey area within which all cumulative impacts were considered. Only three out of thirteen ES's (31%) gathered data in control areas outside their development boundaries – all of which were in the Wash / Humber geographic region. Conversely, all AA's used control data when considering “in-combination” effects.

All studies explicitly stated the period over which baseline data was collected, 46% stated that data would be collected during construction period, and 15% considered monitoring activities during the operation phase. All documents used standardised methodologies for their baseline studies. Boat surveys were used in all EcIA studies of the windfarm footprint and buffer areas, and 31% also used boats to cover the wider area. However, the large majority of studies (85%) presented the results of aerial surveys of the wider survey areas, and 31% used

radar technology. In addition, a single development proposal used a coastal bird survey to inform the cumulative impact assessment.

The period over which monitoring activities were undertaken varied significantly between projects (Table 2). On average, localised boat surveys were completed over 24.9 days per project (range: 1 to 46 days), whereas boat work that monitored a wider area lasted an average of 19.5 days (range: 6 – 33 days). Aerial surveys averaged 11.4 days per project (range: 2.0 - 21.0 days), and radar monitoring 18.3 days (5.0 - 29.0 days). The total amount of monitoring activities completed per project ranged from 3 to 96 days (mean: 42.8 days).

Table 2: Monitoring effort (days) for survey activities undertaken at proposed offshore windfarm sites:

Methods used	Mean	Max	Min
Boats (EcIA)	24.9	46.0	1.0
Boats (EcIA & CIA)	19.5	33.0	6.0
Aerial	11.4	21.0	2.0
Radar	18.3	29.0	5.0
Total effort	42.8	96.0	3.0

Stage Three: Determination of Effects

Fewer than half (46%) of the proposals presented a clear definition of cumulative impacts. Of the impacts considered collision risk was the most frequent (77%), then displacement (69%), barrier effects (54%), habitat loss (46%) and finally habituation (8%). It is assumed that many projects “scoped out” some impacts and therefore did not present them. A single AA considered barrier effects whereas its respective ES did not.

Stage Four: Assessment of Significance

Methods for assessing risk varied between projects and type of proposal, and 69% of the reports reviewed clearly presented a definition of unacceptable risk. Considering ES's, all used a precautionary – or worst-case – approach, and the large majority used a standardised sensitivity / magnitude matrix approach. Those that did not utilise a matrix approach often used a more judgement (evidence-based) approach using thresholds that define unacceptable-risk or reasonable scientific doubt. No ES's used Population Viability Analyses (PVAs) or stated that the overriding goal of the Cumulative Impact Assessment was to maintain the “favourable conservation status” of particular species in the area.

The Appropriate Assessments utilised a different approach to the ES's. Because they were triggered by their potential impacts on a Natura 2000 site, all AA's stated that their goal was to maintain the conservation status of the species or habitats that were the reason for the classification of the sites. Following the Waddenzee judgement, all (100%) AA's employed the use of reasonable scientific doubt when making more evidence-based decisions. A single AA stated a threshold background mortality level for bird species that would not be acceptable.

All proposals presented positive impacts of their developments; of which reduced CO₂ emissions was the most frequent. However, few projects stated the numerous other positive aspects of their developments for the ecological

environment. All projects presented mitigation options for the adverse effects identified.

Appendix 8: Bird Species under Consideration

This workshop focuses on those birds relevant to the United Kingdom and its offshore waters out to the limit of its continental shelf interests. By the nature of the birds making use of these waters for feeding and passing across them on migration, it means that it includes a suite of species of interest to most countries bordering the north-east Atlantic. The species or families under consideration are:

- Divers
- Grebes
- Tubenoses (fulmar, shearwaters, petrels)
- Gannet
- Shag and cormorant
- Seaducks
- Migratory wildfowl
- Migratory shorebirds
- Phalaropes
- Gulls
- Terns
- Skuas
- Auks
- Migratory passerines

Within this long list, particular species or groups can be identified based on their status or characteristics as set out below. This grouping is also a logical framework for a cumulative impact assessment.

Species of special conservation importance – Annex 1 EU Birds Directive (see below for a list of those relevant to the UK and potential Marine SPAs)

Species whose population in a study area exceeds the 1% criterion (considered in relation to the total/international population, bio-geographic population, flyway population, UK/GB population)

Species breeding outside the proposal area but regular moving into or through it to feed e.g. terns, auks

Species occurring in the proposal area in the wintering/non-breeding periods e.g. common scoter, red-throated diver

Species passing across the proposal area during long distance migratory flights from breeding to non-breeding areas and vice versa e.g. whooper swan

Species known/thought likely to have a high collision risk potential e.g. divers, grebes, seaducks (notably scoters), terns, auks, gannets, shag and cormorant

Priority by necessity is given to those species or groups for which, taking a worst case prediction of risks, there is the highest potential for a population impact resulting from displacement from a marine habitat, a barrier to migration or collision with turbine rotors. The very large population sizes and high reproductive capacity of migrant passerines passing across the area mean that this group has the lowest risk and it is not proposed to consider them at length during the workshop.

The birds that use the seas around the UK and for which marine SPAs are being considered are listed below. These are divided into those that are listed in Annex 1 and those that are considered regularly occurring migratory species. Source JNCC web site p1414.

Species	Status
Red-throated diver <i>Gavia stellata</i>	Annex I
Black-throated diver <i>Gavia arctica</i>	Annex I
Great northern diver <i>Gavia immer</i>	Annex I
Great crested grebe <i>Podiceps cristatus</i>	Migratory
Red-necked grebe <i>Podiceps grisena</i>	Migratory
Slavonian grebe <i>Podiceps auritus</i>	Annex I
Black-necked grebe <i>Podiceps nigricollis</i>	Migratory
Northern fulmar <i>Fulmarus glacialis</i>	Migratory
Cory's shearwater <i>Calonectris diomedea</i>	Annex I
Great shearwater <i>Puffinus gravis</i>	Migratory
Sooty shearwater <i>Puffinus griseus</i>	Migratory
Manx shearwater <i>Puffinus puffinus</i>	Migratory
Balearic shearwater ¹ <i>Puffinus mauretanicus</i>	Annex I
European storm-petrel <i>Hydrobates pelagicus</i>	Annex I
Leach's storm-petrel <i>Oceanodroma leucorhoa</i>	Annex I
Northern gannet <i>Morus bassanus</i>	Migratory
Great cormorant <i>Phalacrocorax carbo</i>	Migratory
European shag <i>Phalacrocorax aristotelis</i>	Migratory
Greater scaup <i>Aythya marila</i>	Migratory
Common eider <i>Somateria mollissima</i>	Migratory
Long-tailed duck <i>Clangula hyemalis</i>	Migratory
Black scoter <i>Melanitta nigra</i>	Migratory
Surf scoter <i>Melanitta perspicillata</i>	Migratory
Velvet scoter <i>Melanitta fusca</i>	Migratory
Common goldeneye <i>Bucephala clangula</i>	Migratory
Red-breasted merganser <i>Mergus serrator</i>	Migratory
Goosander <i>Mergus merganser</i>	Migratory
Red-necked phalarope <i>Phalaropus lobatus</i>	Annex I
Pomarine skua <i>Stercorarius pomarinus</i>	Migratory
Arctic skua <i>Stercorarius parasiticus</i>	Migratory
Long-tailed skua <i>Stercorarius longicaudus</i>	Migratory
Great skua <i>Catharacta skua</i>	Migratory
Mediterranean gull <i>Larus melanocephalus</i>	Annex I
Little gull <i>Larus minutes</i>	Migratory
Sabine's gull <i>Larus sabini</i>	Migratory
Black-headed gull <i>Larus ridibundus</i>	Migratory
Common gull <i>Larus canus</i>	Migratory
Lesser black-backed gull <i>Larus fuscus</i>	Migratory
Herring gull <i>Larus argentatus</i>	Migratory
Iceland gull <i>Larus glaucoides</i>	Migratory
Glaucous gull <i>Larus hyperboreus</i>	Migratory
Great black-backed gull <i>Larus marinus</i>	Migratory
Black-legged kittiwake <i>Rissa tridactyla</i>	Migratory
Sandwich tern <i>Sterna sandvicensis</i>	Annex I
Roseate tern <i>Sterna dougallii</i>	Annex I
Common tern <i>Sterna hirundo</i>	Annex I
Arctic tern <i>Sterna paradisaea</i>	Annex I
Little tern <i>Sterna albifrons</i>	Annex I
Common guillemot <i>Uria aalge</i>	Migratory
Razorbill <i>Alca torda</i>	Migratory
Little auk <i>Alle alle</i>	Migratory
Atlantic puffin <i>Fratercula arctica</i>	Migratory

Appendix 9: List of acronyms and abbreviations

AA	Appropriate Assessment
BACI	Before-After-Control-Impact (in relation to experimental design)
BERR	Department for Business, Enterprise and Regulatory Reform (formerly DTI: Department of Trade and Industry)
CIA	Cumulative Impact Assessment
DEFRA	Department for Environment, Food and Rural Affairs
DTI	Department of Trade and Industry
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEPA	Food and Environmental Protection Act
GW	Gigawatt
IEEM	Institute of Ecology and Environmental Management
JNCC	Joint Nature Conservation Committee
NERC	Natural Environment Research Council
NGO	Non Governmental Organisation
MSP	Marine Spatial Planning
OREEF	Offshore Renewables Energy Environmental Forum
pSPA	potential Special Protection Area
PVA	Population Viability Analysis
RSPB	Royal Society for the Protection of Birds
SEA	Strategic Environmental Assessment
SNH	Scottish Natural Heritage
SPA	Special Protection Area