RiCORE

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WP **4**	Deliverable **4.4**

Pre-consent survey guidance

Deliverable 4.4

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BOX 1. DEFINITION OF TERMS

AIS – *Automatic Identification System;*

AMBI – *AZTI Marine Biota Index;*

CTD – *Conductivity, Temperature and Depth profilers*;

EIA – *Environmental Impact Assessment;*

EU – *European Union*;

HD – *High-Definition*;

MRE – *Marine Renewable Energy*;

MS – *Member States*;

ORE – *Offshore Renewable Energy*;

ROV – *Remotely Operated Vehicle*;

SDM – *Survey, Deploy, Monitor;*

VMS – *Vessel Monitoring System;*

WP – *Work Package*;

LIDAR – *Light Detection And Ranging;*

ADCP – *Acoustic Doppler Current Profiler;*

HF – *High Frequency;*

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RICORE Project Synopsis

The aim of the RiCORE project is to establish a risk-based approach to consenting where the level of survey requirement is based on the environmental sensitivity of the site, the risk profile of the technology and the scale of the proposed project. The RiCORE project, which has received funding from the EU's Horizon 2020 research and innovation programme, will run between January 1st 2015 and June 30th 2016.

The consenting of offshore renewable energy is often cited as one of the main non-technical barriers to the development of this sector. A significant aspect of this is the uncertainty inherent in the potential environmental impacts of novel technology. To ensure consents are compliant with EU and national legislation, such as the EIA and Habitats Directive, costly and time-consuming surveys are required even for perceived lower risk technologies in sites that may not be of highest environmental sensitivity.

The RiCORE project will study the legal framework in place in the partner MS to ensure the framework developed will be applicable for roll out across these MS and further afield. The next stage of the RiCORE project is to consider the practices, methodologies and implementation of pre-consent surveys, post-consent and post-deployment monitoring. This will allow a feedback loop to inform the development of the risk-based framework for the environmental aspects of consent and provide best practice. The project will achieve these aims by engaging with the relevant stakeholders including the regulators, industry and EIA practitioners, through a series of expert workshops and developing their outcomes into guidance.

The impact of the project will be to improve, in line with the requirements of the Renewable Energy Directive specifically Article 13 (1), consenting processes to ensure cost efficient delivery of the necessary surveys, clear and transparent reasoning for work undertaken, improving knowledge sharing and reducing the non-technical barriers to the development of the ORE sector so it can deliver clean, secure energy.

1. INTRODUCTION

In order to ensure the timely and sustainable development of MRE, the way must be paved for efficient streamlined cost-reducing EIA procedures in all MS. The main aim of the RiCORE project is to ensure the successful development of the sector in EU MS by reducing the cost and time taken to consent projects of low environmental risk, through the development of a risk-based approach during projects' consenting. This type of approach has already been developed in Scotland (SDM Approach) and its application across Europe (with appropriate adaptations to each MS) may be a way of standardising the assessment of key components of environmental risk as a result of deploying MRE devices.

In order to implement a risk-based approach through utilising the SDM approach, the development of guidance for pre-consent surveys considering the spectrum of survey requirements for projects under SDM and existing project experience is needed. This is the key outcome of the work to be undertaken in WP4, which comprises four different tasks that correspond to four deliverables (available through the project website):

1) The first task focused on the review of existing requirements for pre-consent surveys in the EU MS (Simas & Henrichs 2015).

2) The second task, analysed the commonalities, transferability and applicability of those methodologies for pre-consent surveying among MRE technology types (wave, tidal, and offshore wind, which includes fixed and floating devices) (Simas *et al*. 2015).

3) The third task highlighted the potential for using emerging and innovative technologies for pre-consent surveys of key receptor groups at proposed MRE sites and identified potential reductions in cost through comparison of survey methods currently utilised (Culloch *et al*., 2015). This deliverable also reviewed and examined patterns and trends in data from long-term studies to investigate how interpretation of data changes over time and what the implication of these

findings has on defining a suitable survey duration for gathering baseline data, where required.

4) The fourth task, focused on the development of a guidance on pre-consenting monitoring scope and intensity, which is presented herein.

1.1 Objectives

The present deliverable aims to consolidate the findings of the preceding tasks (D4.1, D4.2 and D4.3) and consequently develop advice on the scope and intensity of pre-consent monitoring. The following sections discuss the use and suitability of existing data and how this may contribute to an efficient and effective survey design. This leads in to discussions on spatial and temporal coverage and the methodologies that can be used by MS for several key receptors (e.g. benthos, seabirds, marine mammals). In the last of the discursive sections, this deliverable considers the analytical aspect of pre-consent surveys, with emphasis on whether or not the data collected will be fit for purpose. In the conclusion, the deliverable provides advice for whether or not and to what extent (i.e. volume of data collected both spatially and temporally) pre-consent surveys are required.

2. ANALYSIS OF EXISTING DATA AND SURVEY PLANNING

When screening the requirements for pre-consent site characterisation surveys, priority receptors are likely to identified from what existing data and associated analysis suggest the site is relatively more important for. This would therefore suggest that existing data may well be very useful when planning and informing pre-consent surveys. For example, existing data can be extremely useful for identifying spatial and/or temporal occurrence of receptors within and close to the proposed MRE site. However, as noted by Sparling *et al* (2016), there is a growing consensus amongst regulators, statutory nature conservation advisors and developers and their environmental consultants that a 'one size fits all' approach to site characterisation pre-consent surveys to inform consenting processes should not be considered fit for purpose. The extent of pre-consent survey requirement should be proportional to the risks associated with the technology type, scale of development, and sensitivity of the area. Although their report only considers wave and tidal stream projects and marine mammals as potential receptors, the underlying issues also apply to other technologies and other potential receptors (e.g. seabirds, fish and benthos). Consequently, developers and regulators are encouraged to consider what the potential risks are, e.g. displacement and/or collision risk, and evaluate whether or not and to what extent existing data can appropriately be used to quantify the risk. Project specific considerations regarding how current these data are (e.g. the extent to which recent surveys for only 2 years are considered representative of current use compared to a longer multi-year survey that is several decades old), whilst taking account of knowledge regarding site and receptor specific variation (where this additional information exists), should be made. The quality and reliability of the data should also be considered (e.g. was the platform used to gather the data fit for purpose, were the surveyors suitably trained and experienced, is the data recording system fit for purpose). In particular, confidence limits of estimates (e.g. abundance) should be calculated, as this will assist regulators in deciding whether or not, and to what degree (i.e. volume of data collected both spatially and temporally), pre-consent surveys are required. Consequently, for pre-consent site characterisation surveys it would be good practice to not only provide point estimates, but to also present the associated confidence intervals.

During the scoping phase of the project, whether or not and to what extent pre-consent surveys are required should be considered in relation to the likely degree of risk of significant impacts to relevant receptors as a result of the proposed project. Where it can be demonstrated, using existing data, that the likelihood of potential impacts exceeding a pre-defined acceptable level are sufficiently low, then it should not be considered either proportionate or informative to request additional pre-consent site characterisation. By making use of existing information, a fully flexible approach can be taken regarding the utility of pre-consent survey. This can be taken further to consider what types of data will be most informative for the purposes of environmental assessment, which is another criticism of the 'one size fits all' approach, insomuch as, it may not always provide useful information for underpinning environmental assessments. Sparling *et al.* (2016) offer recommendations with respect to how to tailor a pre-consent survey to provide more information on specific effect mechanisms that result in impacts. Their advice can be extended to other receptors and mechanisms of effect.

When planning pre-consent surveys, the ability of the survey sampling design to capture temporal variability across the period should be considered. Fewer pre-consent surveys over shorter periods will be unable to capture natural variability associated with longer periods. For example, one-year of site characterisation surveys cannot capture inter-annual variability; however, one-year site characterisation surveys may still be designed to capture variability in seasonal use, or within tidal cycles, or even variation in diurnal use of a site.

How the data will be used to inform the environmental assessment and associated decision making will also be an important consideration for the sampling design. For example, where absolute densities are required for the purpose of collision risk modelling, rather than relative densities, this becomes an important consideration when planning the survey/experimental design.

3. PRE-CONSENT SURVEY PERIODS AND SPATIAL COVERAGE

Workshop 1 of the RICORE project, held in Bilbao on the 21st April 2015, was split into two parts, the first part of the workshop focused on the pre-consent requirements of MSs for each relevant receptor (marine mammals, seabirds, fish and shellfish, benthos/habitats, physical environment and other users). This discussed current pre-consent monitoring requirements for site characterisation in each MS and what effective methodologies and practices would meet a (recommended) one-year site characterisation survey for pre-consenting, according to the SDM policy.

The principal findings of Workshop 1 was that the information requirements for the pre-consenting phases of MRE projects tend to be established on a case-by-case basis for most of the MSs (Simas and Henrichs, 2015). In countries where more MRE projects have been installed (UK, Germany and Netherlands) there are more prescriptive requirements with regard to monitoring parameters, duration and methodologies to be used. However, all experts agreed that a compromise should be established between data utility/significance/power (in terms of statistical analysis) versus data collection and processing costs (they could be so high that they can stifle the development), considering the early stage development of the industry and the role of cost optimisation on projects' feasibility. Therefore, it is essential to focus monitoring activities, limiting them to what is really necessary to better understand project impacts.

3.1 Temporal coverage of data

A consensus amongst the experts appeared to exist in temporal coverage of data; specifically, there is a perceived need to have more than one year of data for the pre-consenting phase of MRE projects (Simas and Henrichs, 2015). In contrast to what has been said in Section 2, in some cases, the minimum period for data collection was regarded to be 3 years for some receptors and/or environmental factors (e.g. noise, fish and shellfish and physical environment), with a general opinion of the longer the better for receptors, such as seabirds and marine mammals, which are long-lived, far ranging with discrete life-history periods (e.g. breeding, moulting, foraging). It is also evident that the duration of the monitoring activities during pre-consenting is the only prescriptive requirement to inform sufficient data collection for baseline characterisation of some receptors, especially in the countries where several MRE parks have been deployed.

3.2 Spatial coverage

The experts raised concerns regarding the limitations of focusing on relatively small areas given the home range/geographical range of some receptors, such as marine mammals, seabirds and fishes. Consequently, the need for considering monitoring areas that are out-with the perceived impact zone were underlined. It was felt that a wider spatial coverage to include buffer and/or control areas during the pre-consent phase will allow a better analysis of the expected impacts in further post-consenting monitoring phases as well.

4. EFFICIENT METHODOLOGIES AND SAMPLING FREQUENCY

4.1 Pre-consent methodologies currently in use

As part of Work Package 4, a review was carried out on the methodologies used to assess several environmental receptors (physical environmental, marine mammals, fish and shellfish, benthos and seabed habitats, seabirds, bats and other users – socio economic factors) as well as their applicability to pre-consent surveys regarding the different MRE types (wave, tidal and offshore wind, which includes fixed and floating devices) (Simas and Henrichs, 2015; Simas *et al*. 2015). In general, methodologies to assess most of the parameters identified for each receptor seemed to be applicable to all MRE types. However, there are some exceptions related to aspects of the specific marine environment where the developments are to be located. One of these exceptions is the site depth, which in the case of floating offshore wind projects may be greater than the other technology types. This may influence the methods selected for the benthos and sediments assessment, which will likely require the use of ROVs to collect images as opposed to samples being gathered via dredging, grab sampling or core sampling, for example (Table 1). Another exception is related to acoustic assessment of the physical environment. Although all listed approaches are valid for all MRE types considered, drifting systems are recommended in high tidal flow areas to minimise the effects of flow noise. In some cases, the assessment of some parameters and receptors may not be a concern for some of the MRE types; for example, the accurate measurement of wind resource conditions using LIDAR techniques for wave and tidal energy developments would not be required. Also, the assessment of bats is not considered a concern for wave and tidal developments. A summary of the main parameters and respective methodologies per receptor that have been considered during the pre-consent phase are summarised in Table 1**Error! Reference source not found.**; for more information see Simas *et al*. (2015).

Table 1. Parameters and methodologies that have been considered during pre-consent surveys per environmental receptor (reproduced from Simas *et al*., 2015).

Receptors	Parameters	Methodologies used
Physical environment	Geomorphology	Grab and core sampling analysis; Acoustic and Optical methods; Numerical modelling; Sediment trap analysis
	Weather data	Desk based study; Meteorological station; LIDAR
	Hydrodynamics	Modelling; Moored wave buoys; ADCP; HF radar
	Water quality	CTD; ADCP; Water samples collection and analysis
	Sediments quality	Grab and core sampling analysis
	Underwater acoustics	Desk based study on local noise sources; Boat based surveys; Static systems; Drifting systems
Marine mammals	Broad scale Occurrence, (relative/absolute) abundance and habitat preferences	Desk-based study; Fixed-point (typically land-based) surveys; Boat-based surveys (line transects); Boat-based platform of opportunity; Aerial surveys (line transects); Aerial platform of opportunity; Towed hydrophones (add-on to boat-based surveys); Ecological/habitat modeling; Photo-identification (add-on to boat-based surveys); Autonomous acoustic monitoring; Haul out counts
	Fine scale behaviour, movement, habitat use and connectivity	Desk-based study; Telemetry; Theodolite tracking from fixed-point (typically land-based) platform; Cetacean photo-identification (add-on to boat-based surveys); Pinniped photo-identification (add-on to haul out counts); Ecological/habitat modelling
Fish and shellfish	Species composition, abundance and population structure	Desk based study; Commercial gears (pots, trawls, fixed nets, etc.); Hydro-acoustic surveys; Underwater video and photography; Side-scan sonar
	Species distribution and habitat use	Desk based study; Hydro-acoustic surveys; Underwater video and photography; Side-scan sonar
Benthos and seabed habitats	Species composition, abundance and population structure	Desk-based study; Commercial gears (pots, trawls, fixed nets, etc.); hydro-acoustic surveys; underwater video and photography; side-scan sonar
	Species distribution and habitat use	Desk-based study; Hydro-acoustic surveys; underwater video and photography; side-scan sonar
	Seabed mapping and sediments' grain size	Desk-based study; Analysis of samples collected with dredges, grabs and corers (soft bottom); imagery acquisition (hard bottom); Multibeam sonar
	Habitat (biotope) distribution	Desk-based study; Imagery acquisition with vehicles
	Species composition and abundance and benthic community conditions	Desk-based study; Analysis of samples collected with dredges, grabs and corers (soft bottom); Imagery acquisition with vehicles (hard bottom); Calculation of diversity indices

Receptors	Parameters	Methodologies used
Seabirds	Broad scale occurrence, (relative/absolute) abundance and habitat preferences	Desk-based study; Fixed-point (typically land-based) surveys (e.g. snapshot scans, line transects, flying bird watches); Boat-based line transects; Aerial surveys (line transects with/without high resolution digital photography/video); Ecological/habitat modelling
	Fine scale behaviour, movement, habitat use and connectivity	Desk-based study; Telemetry (e.g. positional information, dive depths, swim speeds, flight altitude); Focal-follows/behavioural observations (e.g. diving behaviour, flight paths, identify prey items); Ecological/habitat modelling
Bats	Occurrence, abundance and habitat use	Desk based study; Acoustic surveys; Radar; Thermal infrared imaging
Other users (socio-economy)	Archaeological heritage	Registry of archaeological remains
	List of commercial and recreational activities in the site	Listing of activities; AIS data; Radar survey; Maritime traffic routes
	Public opinion about MRE and the specific project	Questionnaire surveys; Public sessions; Meetings with relevant stakeholders
	Landscape and seascape perception	Photorealistic simulation; Visual surveys; Historical assessment (desk based studies)
	Socio-economic benefits	Number of jobs created

4.2 Innovative survey technologies, sampling duration and frequency

New techniques are rapidly becoming available to improve aspects of data collection, including spatial and temporal coverage, and automated methodologies that minimise risks to health and safety (e.g. drones/unmanned aerial surveys vs. manned aerial surveys) (Culloch *et al*. 2015). Many of these new technologies have the potential to improve environmental assessment methodologies and may be able to measure parameters that could not be measured previously (e.g. benthic communities and seafloor integrity assessment at great depths). The potential for using emerging and innovative technologies for pre-consent surveys of key receptor groups is part of the RiCORE D4.3 report (Culloch *et al*., 2015). In this report the identification of potential reductions in cost through comparison of survey methods currently utilised is also presented. In general, the cost of pre-consent surveys will be dictated by the questions that need to be addressed and how much data are required to do that. Furthermore, as survey methods and approaches are often specific to the data that are required, it is recommended that the starting point is to identify the data required, rather than designing pre-consent monitoring with a budget in mind.

Table 2 shows some examples of these innovative technologies that may be considered for site characterisation with regard to the range of environmental receptors to be considered during the pre-consenting phase.

Table 2. Description of innovative methodologies and their respective conditions of sampling duration and frequency (reproduced from Culloch et al., 2015).

Methodologies	Description	Sampling duration and frequency
High-Definition photography and video	Considerable advances in HD photography and video technology in recent years has led to their relatively successful application to seabird surveys. The application of such techniques to marine mammal surveys have not been as successful, due to the influence of environmental conditions on sightings and species identification. However increased strip width of the cameras, giving greater coverage of the development area as compared to visual aerial or boat-based surveys, does suggest that these techniques will supersede visual aerial and boat-based surveys for these two groups of species in the near future.	Dedicated monthly or seasonal campaigns may be set depending on the species.
Unmanned Aerial Systems (UAS)	UAS are probably one of the more likely technologies to be applied to offshore surveys in the near future. They provide an improved method for monitoring, particularly, seabirds (and their nests) and marine mammal populations through: reduced cost, reduced human risk, increased accuracy of detection, location and identification of species.	They can operate in a permanent mode recording all period of the survey.
Remotely Operated Vehicles (ROVs)	ROVs have been widely adopted in seabed surveys carried out using more traditional methods such as divers or towed or drop-down platforms. They are often used to obtain imagery for seabed mapping, habitat distribution and species composition and abundance. ROVs are a more compact, portable and practical alternative, without the element of human risk. They are often deployed to survey difficult areas and/or to survey larger areas in shorter periods of time.	Boat-based, monthly or seasonal ROV campaigns (depending on the species and seabed areas to be surveyed) can be carried out to collect images from the seabed.
High-frequency SONAR	Hydroacoustics is a non-invasive technique to monitor fish based upon the use of split-beam scientific fishing echo sounders. This method provides relative abundance and horizontal and vertical spatial distribution of biomass split into broad groupings. The new generation of split beam echo-sounders will move from narrow band to wide band to introduce/improve species identification in the near future. Dual-frequency identification sonar is also being progressively advanced for better understanding of fish ecology.	The equipment allows month-to-month, or even hour-to-hour, comparisons of results.
FLOWBEC-4D	The FLOw, Water column and Benthic ECology 4-D is a device recently trialled at the European Marine Energy Centre (EMEC), Orkney, UK. This device is a sonar platform that combines several instruments, including below-the-water instruments like sonars, hydrophones and underwater camera and above-the-water sensors like radar to record a range of information on e.g.	Data are collected continuously for a period of 2 weeks or more, capturing an entire spring-neap tidal cycle.

Methodologies	Description	Sampling duration and frequency
	phytoplankton, zooplankton, fish seabirds and mammals.	
Telemetry and other remote transmitters	Telemetry devices are well established in the study of marine mammals (particularly pinnipeds but can also be applied to cetaceans although constrains to affix the tags may limit its use) and seabirds. There are a broad range of devices available. Acoustic transmitters, which can give location, temperature and depth readings with no need to recapture the animal can be surgically implanted into fish.	The longevity of devices varies between a few months to several years; for pinnipeds, these devices are limited to a maximum of one year (seals will shed the tag during the annual moult). The volume of data, the interval and the lag in data retrieval also varies between devices. The size and weight of seabird tags limit the amount of data collected.
PAM devices	Drifting Passive Acoustic Monitoring devices (PAM) may be used for the mapping of odontocete vocal detections within tidal areas and can be used to investigate temporal variation across low speeds and tidal phases.	The metric of survey effort is based on time spent within cells of a spatial grid. Campaigns using this technique may be set for e.g. seasonal specific periods
VMS to monitor vessel traffic and fishing activity	Both smaller (<12 m) and bigger vessels (≥12 m) are used for commercial fisheries. The latter are covered by the satellite-based Vessel Monitoring System (VMS), and those over ≥300 Gross Tonnes are additionally covered by the Automatic Identification System (AIS) a maritime navigation safety communication system. AIS data is routinely used in the pre-consent desk-based review of vessel traffic in the MRE sites.	Data from VMS and AIS are recorded continuously; samples of records maybe available for specific periods and sites
Radar	Radar systems for tracking seabirds: the system consists of two radars and a dedicated software designed to record bird activity. One of the radars rotates horizontally and records the spatial patterns, flight routes, migration routes and avoidance of the wind farm and turbines; the other rotates vertically and records information on flight heights and intensities of seabirds. The radars are able to scan an area of about 5km around it and up to 1.4 km above it.	The system is operational 24 hours a day, during poor weather, and can be accessed and controlled remotely from offices on the mainland; radars maybe set to collect data during specific periods of time which cover e.g. seasonal migrations or periods of higher activity regarding sensitive species.

5. DATA ANALYSIS

During the planning stage of pre-consent monitoring, consideration should be given to both ensuring that the data that are collected are fit for purpose and that the analytical approaches to be applied to the data are appropriate. Giving proper due care and consideration to these factors will give the developer, regulator and stakeholders greater confidence in the findings and conclusions of pre-consent surveys. Developers and regulators are encouraged to seek expert advice on survey/experimental design and statistical analysis. Section 4 of Deliverable 4.3 addressed both these points and provided a detailed discussion on the conventional approaches to data analysis and the requirement for gathering data pre-consent (Culloch *et al*., 2015); the principal findings shall be briefly outlined here, prior to providing guidance on data analysis for pre-consent surveys.

When using the conventional analytical approach, if the *P* value given in the output of the statistical test is >0.05, it is concluded that there is no statistically significant difference (i.e. the null hypothesis is accepted). In other words, there is no significant change in the metric measured (e.g. abundance) for the receptor of interest over time. When comparing pre-consent data to post-consent data, it would be concluded that there is no significant impact on the receptor as a result of construction activity. However, there is growing concern that in some cases these analyses may be failing to detect an effect that is present; which is referred to as a Type II error. In statistical terms, a Type II error occurs when there is failure to reject a false null hypothesis (false-negative). The converse is also possible, where an incorrect rejection of a true null hypothesis (false-positive) occurs, i.e. the analysis detects an effect that is not present; this is referred to as a Type I error. The likelihood of a Type I or Type II error occurring can, in part, be addressed by using a statistical power analysis; this is discussed in detail in Culloch *et al.* (2015) and as such, neither the theory or the analytical approach shall be discussed herein.

Using three detailed case-studies (covering macro-benthos, seabirds and marine mammals) coupled with other more general examples from the broader literature, Culloch *et al*. (2015) provided evidence to suggest that monitoring programmes rarely have sufficient statistical power to detect a change (e.g. abundance) in the receptor of interest. In other words, monitoring programmes are prone to a Type II error, failing to detect a trend, if one is present. Several factors can influence this, for example, where population size is low, the power of the available data to detect a decline in abundance can become effectively meaningless. This scenario may be normal for a large number of protected populations/species, particularly if the regulator wishes to manage small magnitudes of change. When coupled with variable sightings rates and infrequent surveys the outcome will often be the provision of data that are likely to be not fit for purpose. Consequently, these data provide no benefit to the species' monitored and can only serve to either add cost and potentially delay the consenting process if regulators request more data. Alternatively, what may be more likely, is that regulators provide consent, erroneously assuming that there is no impact (i.e. low statistical power meaning there is a failure to detect a trend that is occurring), and the true consequences of their decision making to the receptor will be poorly understood.

Given how informative power analysis can be, it is undoubtedly a statistical tool that should be employed when considering which survey method to use and how to design the spatial and temporal nature of surveys (see Culloch et al., 2015). However, when applied at the planning stage of pre-consent surveys, it is expected that power analysis will show that the volume of data required to identify changes in the receptor over time will be too great to be financially viable and/or cannot be undertaken within a realistic timeframe. For example, a review of multiple datasets showed that fifteen years of data was not sufficient for detecting a 50% decrease in abundance in several species of marine mammals (Taylor *et al*., 2007). Therefore, the commonplace approach of regulators requesting a prerequisite number of years of data for comparison against post-consent data to quantify whether or not and to what extent the receptor has been effected by the MRE development and/or operational phase(s), is likely to be not fit for purpose. The result is often a data rich, information poor (DRIPy) monitoring programme, that under conventional analytical approaches, will be highly unlikely to identify a trend, if one is occurring. Therefore, we encourage moving away from gathering baseline data for the purpose of identifying change in a relevant metric (e.g. abundance) for the receptor of interest and recommend that the principle utility of pre-consent surveys should be to assist in informing consenting decisions, and thus be considered exclusively as pre-consent site characterisation surveys.

6. CONCLUSIONS AND GUIDANCE

The aim of this report is to provide advice for whether or not and to what extent (i.e. volume of data collected both spatially and temporally) pre-consent surveys are required.

First of all, a key point is to consider the question(s) that needs to be addressed through discussion between developers, regulators and stakeholders establishing adequate communication routes. Depending on the question(s) to be answered (within a pre-defined threshold of confidence), an analysis of the existing data need to be done in order to ascertain if these data allow the question(s) to be answered:

a) if so, pre-consent surveys are not required; or

b) if not, then surveys must be designed with a thorough knowledge of the question and the requirements so as to maximise the value of the data (considering temporal and spatial variation, for example).

For the surveys, it is recommended that developers/regulators/stakeholders be aware of evolving and new technologies applicable to all MRE types (wave, tidal, fixed offshore wind and floating offshore wind) that can improve/maximise the quality of the information that can be derived from the surveys, and remove risk (health and safety) of data collection. It is important to highlight that a monitoring programme/pre-consent needs to find a compromise between data requirements, the scales of the project and the cost.

Where applicable, the use of power analysis to assess the suitability of the data and the survey design for pre-consent surveys is recommended. However, it is expected that power analysis will show that the volume of data required to identify changes in the receptor over time will be too great to be financially viable and/or cannot be undertaken within a realistic timeframe.

As such, pre-consent surveys should be employed to assist in informing consenting decisions and thus be considered exclusively as pre-consent site characterisation surveys. The extent of data required for a site characterisation should be outlined by the regulator in a guidance note. Hopefully, this will allow more pre-existing survey work to be used rather than further data collection being required for site characterisation. This will hopefully allow a developer to undertake further, more useful, monitoring work post-consent. In other words, we advocate a move away from the commonplace approach of gathering pre-consent baseline data for comparison post-consent, as these data are likely to be not fit for purpose. The major concern being that management decisions are then made based on potentially erroneous conclusions (due to a lack of statistical power) and, as a result, the true consequences of the decision making process on the receptor will be poorly understood.

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