Annex J2 Costs of Marine Conservation Zone verification, baseline setting and monitoring surveys

Contents

1 Introduction

J2.1 Costs have been estimated for the three different types of survey which it is envisaged will be required for the recommended Marine Conservation Zones (rMCZs) (further details are provided in Section 2). These costs are based on the assumptions outlined in Sections 2 and 3. The costs have been provided for the purposes of the MCZ Impact Assessment (IA) and the actual costs for verification, baseline setting and monitoring surveys may differ from the estimates provided for the IA. The Joint Nature Conservation Committee (JNCC) will have responsibility for monitoring offshore sites (outside 12nm (nautical miles)) and Natural England will have responsibility for monitoring inshore sites (inside 12nm). Sites which cross the 12nm boundary will be monitored jointly by the two organisations. All costs detailed in this document exclude VAT. VAT will not be applicable to offshore survey costs but will be applicable to inshore costs.

J2.2 JNCC and Natural England have medium confidence in the cost estimates that they have provided for use in the IA. The costs are expected to reflect the survey costs for MCZs as they are based on a combination of estimates from past surveys and past experience, and they are therefore considered to be reasonable given the assumptions that have been made. However, any changes to the assumptions in Sections 2 and 3 would have the capacity to significantly affect the estimates. The two areas with most capacity to affect overall estimates are the number of sites/features that will ultimately be designated, and whether sufficient resources will be available to allow all designated features to be monitored once every six years. A further area where costs may be most likely to change from those estimated is the relative distribution of costs between verification surveys and baseline monitoring, for example if significant additional evidence is collected prior to designation. This is likely to happen as the Centre for Environment, Fisheries and Aquaculture Science (Cefas) on behalf of the Department for Environment, Food and Rural Affairs (Defra) undertook a significant survey programme in spring 2012 to improve the information available for many sites. The results of this programme have been taken account of when considering future costs for verifying offshore MCZs; however, it has not been possible for this to inform the IA process for inshore MCZs as the full details of the success of the programme that was completed inshore are not yet available.

2 Survey work required to inform the designation and subsequent management of Marine Conservation Zones

J2.3 At this stage, it would be premature to describe in detail how the condition of features protected by MCZs will be monitored. Defra has commissioned a multi-year research and development project which is anticipated to report in 2015, and one of its aims (as one of the many outputs) is to identify how the condition of MCZ features will be monitored. The project, led by JNCC, involves all of the Statutory Nature Conservation Bodies (SNCBs). Survey techniques are likely to include acoustic mapping and ground-truthing by video or grab sampling for subtidal habitats, together with aerial photography, core sampling and quadrat sampling for intertidal features.

J2.4 It is envisaged that three types of survey will be required during the MCZ designation process and the subsequent management of the sites:

- A site verification process which will include survey work will be completed to improve the level of confidence in the identification of features in rMCZs and in the development of the conservation objectives. It will involve relatively limited sampling, primarily to confirm the presence and rough extent of MCZ features. Verification surveys will build on the evidence base for the presence and extent of MCZ features as part of the site designation and implementation process. They are expected to take place prior to designation in most cases.

- The second will be a more detailed baseline setting survey, usually involving a combination of broad-scale and direct sampling techniques, e.g. acoustic surveys for subtidal features, or aerial photography and/or light detection and ranging (LIDAR) for those in the intertidal zone, together with video imagery, grab or core sampling or in situ surveying. These techniques will be used to map the extent of features more fully, and to provide the level of detail required to form a baseline for any subsequent monitoring of the site features. In general, the evidence required from baseline setting surveys to inform management is likely to include:
  - detailed spatial distribution and characterisation of features, including distribution and extent of component biotopes and key species;
  - site-specific ecological data relevant for identifying changes in the condition of features.

- The third type of survey will take the form of subsequent condition monitoring surveys to obtain site-specific ecological data on the condition of features through the monitoring of specific features within the sites. For the purposes of providing an estimate for the IA it is assumed that, from 2018, each site will be visited once during each six-year reporting cycle, although (as stated in Vina-Herbon and Davies (2011)) this may be unlikely to be achieved.[1] It is possible that some sites or features may need to be monitored more frequently and some less frequently. Monitoring and assessment will be used to improve the evidence base for the condition of MCZ features, and to compare the current state of a feature against baseline data and the desired conservation objective.

J2.5 Vina-Herbon and Davies (2011) set out the underlying principles in relation to the anticipated type and level of evidence required for the selection, recommendation, designation and management of MCZs. Their paper also contains the following key points which are relevant to MCZ data collection and monitoring:

- For most sites, a monitoring scheme (including a baseline setting survey) will need to be put in place to evaluate the condition of features, to subsequently determine whether conservation objectives are being achieved, to evaluate the status of the network and to further inform management needs. Prioritisation for data gathering will take into account the risks of damage to the features from activities and type of sites.

[1] The reason for this is not stated in the document but it is assumed that it would be due to financial and resource limitations.

- The prioritisation of data collection within and between MCZs will be based on need by the management authority and the vulnerability of the feature. Risk assessments may be used to guide public authorities and SNCBs on the priorities for data collection.

- Prioritisation for monitoring will be given to those cases where the limitations of the data used in the identification process for MCZs have created a low scientific confidence in feature condition at designation. The aim will be to improve the quality of the information about the feature, for example the extent and distribution of typical species within a protected habitat, and also to inform the effectiveness of management or to verify the efficacy of the management measures if there is a risk of serious and irreversible damage.

- It is unlikely that monitoring data will be collected from all sites within the six-yearly cycle. Interpretation and analysis of data, development of assessment tools and methods to improve the evidence and our understanding of biological communities and ecosystems will also be used to inform the assessment and reporting on the condition of the sites and the Marine Protected Area (MPA) network as a whole.

- Management measures, where required, will need to be put in place at an appropriate point after designation with the aim of delivering the objective of sites being 'well managed' by 2016 and meeting 'good environmental status' by 2020.

J2.6 Both JNCC and Natural England have undertaken evidence assessments of the data available for rMCZs, JNCC offshore and Natural England inshore. In both cases the results of these assessments determine the proportion of sites where verification surveys are considered to be necessary. For both offshore and inshore sites the assessments considered the scientific confidence in the presence and extent of features in rMCZs according to Technical Protocol E for the SNCB advice project for rMCZs.

J2.7 The assessment process assigns the scientific confidence of data for individual features in rMCZs to one of three categories: high, moderate or low. For offshore sites, the confidence at a feature level was aggregated to give a score for each site. For the purposes of the IA it is assumed that features which have been identified as being within sites with high scientific confidence will not require site verification data prior to designation as there should be sufficient evidence on the presence and extent of the features within the sites.

J2.8 For inshore sites, estimates are based on individual habitat features. Only those habitat features which have been identified through the evidence assessment as having 'high scientific confidence' for both their presence and extent have been excluded from the costing process for verification surveys on the basis that it is assumed that these features will not require further verification prior to designation.

J2.9 Estimates of costs for undertaking the site verification, baseline setting and condition monitoring surveys are outlined below. The surveys have been grouped into two categories: offshore (beyond 12nm) and inshore (within 12nm), with inshore being further divided into two sub-categories – sites located between 6nm and 12nm, and sites within 6nm. Cross-boundary sites were assigned to the 6–12nm category if more than 50% of the site was inside 12nm, and were

assigned to the offshore category if more than 50% of the site was outside 12nm. Costs have been provided up to the year 2033. It has been necessary to make a number of further significant assumptions in order to undertake this cost estimation – these are set out in detail in Section 3.

2.1 Offshore sites

J2.10 For offshore sites, it is assumed that the site verification work will be complete by 2014 and baseline setting by 2018, with monitoring of all sites taking place over a six-yearly cycle from 2019. The total cost of these surveys each year has been calculated based on the assumption that each site will be monitored only once during the six-yearly reporting cycle. The total cost of monitoring for a six-year period was averaged to obtain a cost per year as it is assumed that some monitoring surveys will take place every year but it is not possible to know the year in which each individual site will be monitored.

J2.11 It has not been possible to separate the costs for rMCZs that are not Reference Areas and those that are as many of the offshore Reference Areas are located within rMCZs that are not Reference Areas and others are very small in size. Reference Areas would not be surveyed separately but along with the surrounding and/or nearby rMCZs that are not Reference Areas.

Costs for verification surveys

J2.12 These costs are based on a limited sampling campaign using a 'vessel of opportunity' with the vessel costs covered by a third party, as the aim will be to participate in collaborative surveys. A vessel of opportunity is a survey vessel which has been commissioned by a third party. If the vessel is going to or near an area of interest (e.g. an rMCZ), the SNCB could collaborate with the third party to complete extra survey work, for example either by taking the opportunity of downtime on a fishing survey to take samples in the rMCZ at night or by paying for additional days to be added on to the original survey to collect data in an rMCZ. The third party could be, for example, another government body or a research institute. The majority of the survey costs (e.g. the vessel costs) would be borne by the third party. The survey results would simply verify the presence and extent of features and would not provide more detailed information for management or monitoring purposes. The cost of £80/km^2 is based on the cost of JNCC participation in the International Bottom Trawl Surveys (IBTS) and the cost of the survey in October 2011 on the *Pole Star* (owned by the Northern Lighthouse Board), where the vessel costs were covered by Marine Scotland. For the former, JNCC used the vessels of opportunity provided by the IBTS surveys to gather samples during the night when trawling was not taking place.

J2.13 The costs per km^2 for MCZ verification surveys are approximately equivalent to the cost of £87/km^2 for site verification surveys to ten rMCZs in February and March 2012 on the RV *Cefas Endeavour*. During the dedicated site verification survey, it is possible to visit more sites in less time than when using a vessel of opportunity.

Costs for baseline setting surveys and monitoring surveys

J2.14 Costs were derived from an estimate of approximately £0.250m per site and an average size of 918km^2 for an offshore rMCZ.[2] The survey would involve some mapping and detailed sampling to establish the condition of the site and works out at a cost of £272/km^2. The estimate of £0.250m per site is derived from the average cost of offshore survey data acquisition and analysis undertaken by JNCC.

J2.15 The total cost of monitoring every site in a six-year reporting cycle has been estimated starting from 2019 to 2024. The total cost of monitoring for a six-year period was averaged to obtain a cost per year as it is assumed that some monitoring surveys will take place every year but it is not possible to know the year in which each individual site will be monitored. The average cost per site is £0.250m.

Table 1: Estimated survey costs for offshore rMCZs

Year	Verification cost £m	Surveys for baseline setting £m	Cost of monitoring sites once every reporting cycle £m
2013	0.611		
2014		1.698	
2015		1.698	
2016		1.698	
2017		1.698	
2018		1.698	
2019			1.417
2020			1.417
2021			1.417
2022			1.417
2023			1.417
2024			1.417
2025			1.417
2026			1.417
2027			1.417
2028			1.417
2029			1.417
2030			1.417
2031			1.417
2032			1.417
	0.611	**8.488**	**19.833**

2.2 Inshore sites

J2.16 For inshore sites it is also assumed that the site verification work will be undertaken in 2013/4 and 2014/5.

[2] This is the average value for the 34 offshore rMCZs that are not Reference Areas. Reference Areas located within rMCZs that are not Reference Areas were removed from the analysis to ensure that they were not double counted. The final average does not include two Reference Areas that are not located within rMCZs and that are not Reference Areas as their combined area was less than 5km^2. Areas were calculated using the ETRS 89 LAEA projection.

J2.17 The costs of baseline setting surveys have been allocated evenly over the six years from 2013/4 to 2018/9, although in practice it is anticipated that features with 'recover' objectives, or where significant change in management is expected, including rMCZ Reference Areas, would be prioritised between 2013/4 and 2015/6.

J2.18 The total cost of monitoring all features in a six-year reporting cycle has also been estimated starting from 2019–24. The cost per year is one sixth of the cost for the reporting cycle as it is anticipated that the surveys will take place in roughly equal numbers each year.

J2.19 As stated above, the costs for monitoring inshore sites have been further divided into sites inside 6nm and sites between 6nm and 12nm. The reason for this is twofold. First, sites inside 6nm have on average approximately seven habitat features (broad-scale habitat features or habitat Features of Conservation Importance (FOCI)), significantly more than sites between 6nm and 12nm, which on average have four features per site, similar to the offshore sites. Second, the costs of monitoring sites further offshore tend to be greater as larger vessels are required compared with sites inside 6nm. Species FOCI have not been specifically considered within this process as it is assumed that these will be assessed as part of the surveys of their supporting habitats and that this will not significantly affect the total cost of these surveys.

Sites within 6nm

J2.20 Calculations are based on 72 rMCZs (excluding rMCZ Reference Areas) with an average of 7.07 habitat features per site, giving 509 habitat features. Note that overlapping or adjacent rMCZ Reference Area features are not included within the overall calculation, as it is assumed that features identified within these overlapping or adjacent rMCZ Reference Areas will usually be similar to the features within the wider rMCZ. However, costs have been included for a further 17 'external' rMCZ Reference Areas with an average of 3.8 habitat features per site, providing an extra 65 features and making 574 habitat features in total.

Sites between 6nm and 12nm

J2.21 Calculations are based on 19 sites with an average of 4.05 habitat features per site, giving 77 habitat features. Note as above that overlapping or adjacent rMCZ Reference Area features are not included within this total. There are no 'external' rMCZ Reference Areas between 6nm and 12nm.

2.3 Cost for verification surveys

J2.22 It is assumed that verification surveys will only be required for those sites assessed as having low or moderate scientific confidence associated with their underpinning evidence base for either the presence or the extent of MCZ features. This has been derived from the evidence assessment, as described above.

Sites within 6nm

J2.23 Of the 574 habitat features within 6nm, 101 have been assessed as having high confidence in both presence and extent, i.e. 17.6% of the total. Thus for the purposes of the IA it is envisaged that the remaining 473 habitat features will require further survey prior to designation.

J2.24 For sites within 6nm, estimates are based on the number of broad-scale habitat features and habitat FOCI within a site, and assume roughly two days of small boat work and limited associated sample/data analysis per habitat feature. The estimates are based on a cost of £5,000 excluding VAT per habitat feature in each site. This in turn is based on estimated costs for planning (£400), two-day boat hire (£2,000), two scientists for two days (£1,600), and analysis and reporting (£1,000). No consideration of costs associated with verifying species features has been considered in the estimates provided.

Sites between 6nm and 12nm

J2.25 Of the 77 habitat features between 6nm and 12nm, six have been assessed as having high confidence in both presence and extent, i.e. 7.79% of the total. Thus for the purposes of the IA it is envisaged that the remaining 71 habitat features will require further survey prior to designation.

J2.26 For sites outside 6nm, estimates are based on the number of broad-scale habitat features and habitat FOCI within a site, and assume approximately 12 hours of survey time using a large survey vessel such as Cefas vessel *Endeavour* at an estimated cost of £17,000 per feature in each site (excluding VAT, which in any event may not be payable, e.g. for work undertaken by Cefas for Defra).

2.4 Cost for baseline setting surveys

Sites within 6nm

J2.27 For each habitat feature (either broad-scale habitats or FOCI habitats) it has been assumed that the average cost of obtaining a baseline will equate to around £50,000 per feature per site. This would provide roughly 7 days of acoustic survey (at £14,000 in total) plus 10 days of drop video and analysis (at £29,000 in total, giving an overall total of £43,000 per feature per site), **or** 7 days of acoustic survey (at £14,000 in total) plus 4 days of grab sampling and analysis (at £36,000 in total, giving an overall total of £50,000 per feature per site), all using an inshore vessel. Please see Table 2 for a more detailed breakdown. For simplicity the higher overall survey cost of £50,000 has been used in later calculations.

Table 2: Breakdown of inshore monitoring costs

	7 day acoustic survey £	**10 day video survey £**	**4 day grab sampling survey £**
Boat	7,000	10,000	4,000
Surveyor	3,000	8,000	3,000
Analysis and reporting	3,000	10,000	28,000
Mobilisation/demobilisation	1,000	1,000	1,000
Total	**14,000**	**29,000**	**36,000**

Table 3: Estimated survey costs for inshore rMCZs including rMCZ Reference Areas

Year	Verification cost for sites inside 6nm	Verification cost for sites between 6nm and 12nm	Surveys for baseline setting for sites inside 6nm	Surveys for baseline setting for sites between 6nm and 12nm	Cost of monitoring sites inside 6nm once every reporting cycle	Cost of monitoring sites between 6 and 12nm once every reporting cycle	Total annual cost
	£m	£m	£m	£m	£m	£m	£m
Formula used for the calculations'	574x.824x5/2	77x.922x17/2	574x50/6	77x90/6	574x40/6	77x70/6	
2013	1.182	0.603	4.783	1.155			7.723
2014	1.182	0.603	4.783	1.155			7.723
2015			4.783	1.155			5.938
2016			4.783	1.155			5.938
2017			4.783	1.155			5.938
2018			4.783	1.155			5.938
2019					3.827	0.898	4.725
2020					3.827	0.898	4.725
2021					3.827	0.898	4.725
2022					3.827	0.898	4.725
2023					3.827	0.898	4.725
2024					3.827	0.898	4.725
2025					3.827	0.898	4.725
2026					3.827	0.898	4.725
2027					3.827	0.898	4.725
2028					3.827	0.898	4.725
2029					3.827	0.898	4.725
2030					3.827	0.898	4.725
2031					3.827	0.898	4.725
2032					3.827	0.898	4.725
Total	**2.364**	**1.206**	**28.698**	**6.93**	**53.578**	**12.572**	**105.348**

Sites between 6nm and 12nm

J2.28 For each habitat feature (either broad-scale habitats or habitat FOCI), it has been assumed that the average cost of obtaining a baseline will equate to around £90,000 per feature per site. This equates to roughly 60 hours of multi-disciplinary survey from a large survey vessel (assumed to be the 24-hour cost of a survey vessel and staff costs of £34,000), including both multi-beam acoustic survey and grab sampling or remote video. The estimate of time required and costs is based on our experience of similar surveys for marine Special Areas of Conservation (SACs).

2.5 Costs for repeat monitoring surveys

Sites within 6nm

J2.29 It is assumed that the cost of repeat monitoring surveys will be somewhat less than for baseline setting since, for example, upstanding reef sites are unlikely to require repeat acoustic surveys to identify reef extent. Thus the estimate per feature per site has been reduced to £40,000, by eliminating most of the acoustic survey costs which for many sites would only be required as part of the baseline survey.

Sites between 6nm and 12nm

Similarly it is assumed that the cost of repeat surveys will be somewhat less than for baseline setting for sites between 6nm and 12nm, and thus the estimate per feature per site has been reduced to £70,000, equivalent to roughly 48 hours of survey work.

3 Assumptions and limitations for Marine Conservation Zone verification, baseline setting and monitoring survey cost estimates

3.1 Assumptions for all sites

- All sites to be designated at the start of 2013 (assumption made for the purposes of the IA).
- Management will be introduced at the beginning of 2013 (assumption made for the purposes of the IA).
- Verification surveys will be complete by the end of 2014.
- All features will require detailed management/baseline setting surveys in the first reporting cycle (2012–18).
- All features will require monitoring surveys in each reporting cycle, the first of which will commence in 2019.
- rMCZ Reference Areas overlapping with rMCZs that are not Reference Areas will not add significantly to the overall costs of monitoring.
- The priority/order of sites to be surveyed will be decided according to an assessment of risk to the features within the site. JNCC and Natural England's draft advice to the Government on the regional MCZ project recommendations will include this risk assessment. The final advice is due in July 2012.

3.2 Assumptions for offshore sites only

- It has been assumed that baseline setting surveys will be completed by 2018.
- Costs of rMCZ Reference Areas have not been factored in separately as it has been assumed that where these are adjacent to or overlapping with MCZ sites they will not be surveyed separately. Unnecessary additional costs would be incurred by revisiting the same areas in separate surveys.
- From the initial/interim offshore MCZ scientific evidence assessment carried out in May 2011, it is assumed that sites with high scientific confidence will **not** require surveys in order to build on the evidence base for the presence and extent of MCZ features prior to designation.
- The cost calculations have assumed that a survey visits only one rMCZ; it is anticipated that substantial savings will be made by incorporating more than one site in a survey.

3.3 *Assumptions for inshore sites only*

- It has been assumed that baseline setting surveys for rMCZ Reference Areas and features with 'recover' objectives will be prioritised between 2013/4 and 2015/6 with baseline setting of other features being completed by 2018 and baseline setting surveys of high scientific confidence sites being completed by 2018.
- From the initial/interim offshore MCZ scientific evidence assessment carried out in May 2011, it is assumed that all features within high scientific confidence sites will **not** require surveys in order to build on the evidence base for the presence and extent of MCZ features prior to designation but that all other features for other sites will. Furthermore, it has been assumed that the proportion of high scientific confidence features for 'external' rMCZ Reference Areas will be the same as for other rMCZs that are not Reference Areas.

3.4 Limitations of MCZ monitoring cost estimates

- Initial surveys planned for building the evidence for rMCZs are still subject to ongoing assessments, and so the number of sites requiring verification surveys may vary.
- Monitoring will be prioritised through a risk-based approach at the start of every reporting cycle and it is unlikely that every site will be monitored once every reporting cycle as stated in Vina-Herbon and Davies (2011).
- It is likely that some sites or features will not require significant additional baseline information, e.g. where there is already good quality survey information because of an overlap with Regional Environmental Characterisation surveys or existing SAC monitoring data.

References

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