

SPLiCE Phase 1 Rapid Evidence Assessment Case Study 2: The North Devon Biosphere Reserve

Output 2b for SPLiCE Phase 1



Report for Defra

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Executive summary

This is a rapid evidence assessment (REA) with the intention of testing a draft REA protocol produced in Work Stream 2 of the Sustainable Pathways to Low Carbon Energy (SPLiCE) project to allow high quality, consistent reviews of published literature (Smithers, 2015). To test the method in a reasonable timeframe the initially wide question was narrowed quickly to look at a few technologies. The method produces results in 10 output Excel workbooks to ease entry into a prospective Knowledge Gateway. These outputs were used to produce this report and the document indicates where text is derived from those outputs or where those outputs should be referred to separately. A complete list of the output workbooks can be found in Appendix 1.

The remainder of the main text of this document presents a REA as prepared following the draft REA protocol. Lessons learned that informed the development of the REA method are given in Appendix 2.

Please note that, as the purpose of this case study is to test a draft REA method, it is not, and is not intended to be taken as, a full REA covering the research question.

Primary Question

Question	<i>What are the environmental, social and economic impacts of specific energy supply and demand options individually on habitats and communities comparable to those of the North Devon Biosphere Reserve?</i>
<i>Population</i>	<i>Habitats and communities comparable to those of the North Devon Biosphere Reserve</i>
<i>Intervention/exposure*</i>	<i>Nuclear, onshore and offshore wind, tidal range, tidal current, solar PV, biomass, domestic insulation and domestic car use.</i>
<i>Comparator</i>	<i>Increasing implementation of the intervention/exposure (above)</i>
<i>Outcome</i>	<i>An assessment that considers what can be inferred about cumulative effects based on studies of the impacts of single energy options on habitats and communities that are characteristic of, or particularly important within, the North Devon Biosphere Reserve area.</i>

Evidence summary

There was a lack of evidence specific to the North Devon Biosphere Reserve, and only 33 studies considered cumulative impact as a topic. Screening at abstract level revealed that they all approached this in terms of the cumulative impacts of one energy option (e.g. offshore wind), usually also on just one species or sector (such as birds or fishing), and so did not provide relevant information on the cumulative effects of different energy supply or demand options. Therefore, only the broadest iteration of the primary question was addressed.

Distinct themes emerged in the evidence returned by searches for the impacts on benthic habitats by the foundations of tidal current and offshore wind turbines:

- Positive impacts were reported for fish, lobster, edible crab and velvet swimming crab, which had a high abundance and/or biomass near the device foundations compared to the control situation. The relationship appeared species specific with fish: cod and pouting exhibited an association with or attraction to device structures, while a weaker or negative association was seen for flatfish species, particularly dab. The association of commercial species with energy structures was reported across multiple studies, but there were no studies empirically evaluating the implications of these effects beyond the footprint of the device foundations and so effects on fisheries are unknown.

- Evidence was similarly positive for mussels, barnacles, and similar colonising epifauna, suggesting an increase in their biomass at marine renewable energy device foundations. However, certain species colonising turbine foundations (such as the ascidian, *Ciona intestinalis*) can dominate and hence limit biodiversity
- Evidence of specific impacts on sandbank, mudbank and reef habitats and associated benthic fauna from seven studies provided mixed positive and negative results.
- Consistent results across studies suggest changes in sediment particle size.
- An increase in the density and diversity of infauna was also reported with some consistency. However, a negative effect may be that the composition of the communities was different before and after turbine construction, and so the natural community may be lost. These effects on benthic communities appear to be limited to the immediate footprint of device foundations.
- Although studies used robust data collection methods and included before/after control/impact (BACI) comparisons, the limited temporal scale on which baseline data was collected may be insufficient to detect patterns of natural variability, reducing confidence in conclusions drawn about the impacts of the energy devices.
- The duration and reversibility of impacts remains unknown, due to a lack of long terms studies or experience of decommissioning.
- There is a greater body of evidence for offshore wind, and more variables have been studied in that context than for tidal current turbines. Where similar parameters were assessed (sediment, fish abundance), the impacts were broadly consistent across both technology types, and so the cumulative impacts or different marine renewables are likely to act in the same direction. Whether the magnitude of the impact would increase in a linearly additive manner, or through a more complex relationship is unknown.

In terms of the perceptions of the public and stakeholders:

- There was high agreement across the four studies which identified NIMBYism: people showed a general recognition of the benefits from renewable energy and the need to address climate change but were reluctant to accept developments near their homes.
- A positive perception of employment opportunities and potential economic benefits from cheaper electricity or community ownership was found across multiple studies and multiple technologies.
- Perceived negative impacts were reduced visual amenity, reduced house prices, and a loss of fishing and tourism opportunities.
- Evidence was repeated across multiple studies but the limited number of studies within the data extraction process limits confidence in the evidence.

Caveats arising from the REA process

The following caveat should be attached to this report:

- The work undertaken was part of a scoping exercise to assess the Rapid Evidence Assessment methodology developed as part of SPLiCE Phase 1 (Smithers, 2015), for which limited resource was available. Therefore, a comprehensive assessment of the available evidence was not undertaken, and so the outputs should be considered as examples only and should not be interpreted as providing evidence that can be used in addressing the primary and secondary questions posed.

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Appendix 2	Filenames for rapid evidence assessment outputs
Appendix 3	Comments on draft REA method arising from this case study

1 Protocol [Output 1]

Authors

Report authors: Dr Tara Hooper, Dr Matthew Ashley and Prof Melanie Austen of Plymouth Marine Laboratory have expertise in the assessment of environmental and social impacts of marine renewable energy on coastal communities and habitats. Additional local knowledge for the case study was provided by Andy Bell (North Devon Biosphere Reserve Coordinator, Devon County Council)

Aim

To evaluate a representative mix of cumulative environmental, social and economic impacts of a typical mix of energy supply and demand options on one particular region.

Rationale

Energy strategies will involve a mix of multiple supply and demand options, the impacts of which will interact. Thus, it is important to consider the cumulative impacts for different energy pathways.

Objective

The assessment will consider demand options that have been identified as local priorities (Bell et al., undated) and supply technologies that are most likely to be developed on a significant scale within the next 10 years. Appropriate technologies will be determined based on existing energy infrastructure consents, current trajectories of energy development, and the potential for new renewable energy technologies that have not yet been deployed (Bell et al., undated). The assessment will focus on specific local impacts attributable to particular energy options, and will not consider larger scale effects such as climate change mitigation.

The first stage of the assessment will be to determine whether sufficient evidence exists to draw conclusions about cumulative effects on the area from studies that have directly considered impacts from the interaction of more than one energy option specifically on the case study site: The North Devon Biosphere Reserve (NDBR). In the absence of such evidence from the case study site, the next step will be to consider whether assessments of cumulative impacts have been undertaken in other parts of the UK for the communities and habitats that characterise the NDBR.

In the case of insufficient evidence from studies where cumulative impacts have been assessed directly, the next step will be to determine impacts of the energy supply and demand options individually, and to consider how this evidence could be used in evaluating potential cumulative effects. Again, this will first consider evidence from the NDBR before, if necessary, widening the assessment to include similar communities and habitats elsewhere in the UK.

Primary question

The primary question is defined in terms of the Population, Intervention/Exposure, Comparator and Outcome (PICO) elements in Tables 1 to 4, illustrating the iterative approach to its refinement.

Table 1: The PICO elements of the preferred primary question

Question	<i>What are the cumulative environmental, social and economic impacts of energy supply and demand options on the North Devon Biosphere Reserve?</i>
<i>Population</i>	<i>North Devon Biosphere Reserve</i>
<i>Intervention/exposure*</i>	<i>Nuclear, onshore and offshore wind, tidal range, tidal current, solar PV, biomass, domestic insulation and domestic car use.</i>
<i>Comparator</i>	<i>Increasing implementation of the intervention/exposure (above)</i>
<i>Outcome</i>	<i>A highly site-specific assessment that considers only studies that i) specifically looked at cumulative effects of energy supply or demand options and ii) were undertaken for the case study site.</i>

* this list may be refined as the assessment progresses

Table 2 The PICO elements of a refined primary question (considering a broader population)

Question	<i>What are the cumulative environmental, social and economic impacts of energy supply and demand options on habitats and communities comparable to those of the North Devon Biosphere Reserve?</i>
<i>Population</i>	<i>Habitats and communities comparable to those of the North Devon Biosphere Reserve</i>
<i>Intervention/exposure</i>	<i>Nuclear, onshore and offshore wind, tidal range, tidal current, solar PV, biomass, domestic insulation and domestic car use.</i>
<i>Comparator</i>	<i>Increasing implementation of the intervention/exposure (above)</i>
<i>Outcome</i>	<i>An assessment that considers only studies that have specifically looked at cumulative effects of the energy supply or demand options on habitats and communities that are characteristic of, or particularly important within, the North Devon Biosphere Reserve area.</i>

* this list may be refined as the assessment progresses

Table 3 The PICO elements of a refined primary question (considering individual, as opposed to cumulative, effects)

Question	<i>What are the environmental, social and economic impacts of specific energy supply and demand options individually on the North Devon Biosphere Reserve?</i>
<i>Population</i>	<i>North Devon Biosphere Reserve</i>
<i>Intervention/exposure</i>	<i>Nuclear, onshore and offshore wind, tidal range, tidal current, solar PV, biomass, domestic insulation and domestic car use.</i>
<i>Comparator</i>	<i>Increasing implementation of the intervention/exposure (above)</i>
<i>Outcome</i>	<i>An assessment that considers what can be inferred about cumulative effects based on studies of single energy options, including only evidence derived specifically within the case study.</i>

* this list may be refined as the assessment progresses

Table 4 The PICO elements of a refined primary question (considering individual effects on a broader population)

Question	<i>What are the environmental, social and economic impacts of specific energy supply and demand options individually on habitats and communities comparable to those of the North Devon Biosphere Reserve?</i>
<i>Population</i>	<i>Habitats and communities comparable to those of the North Devon Biosphere Reserve</i>
<i>Intervention/exposure*</i>	<i>Nuclear, onshore and offshore wind, tidal range, tidal current, solar PV, biomass, domestic insulation and domestic car use.</i>
<i>Comparator</i>	<i>Increasing implementation of the intervention/exposure (above)</i>
<i>Outcome</i>	<i>An assessment that considers what can be inferred about cumulative effects based on studies of the impacts of single energy options on habitats and communities that are characteristic of, or particularly important within, the North Devon Biosphere Reserve area.</i>

* this list may be refined as the assessment progresses

Supplementary questions

The information obtained from addressing the primary questions can be examined in order to answer specific questions related to knowledge gaps and research outputs. These supplementary questions that will be considered are:

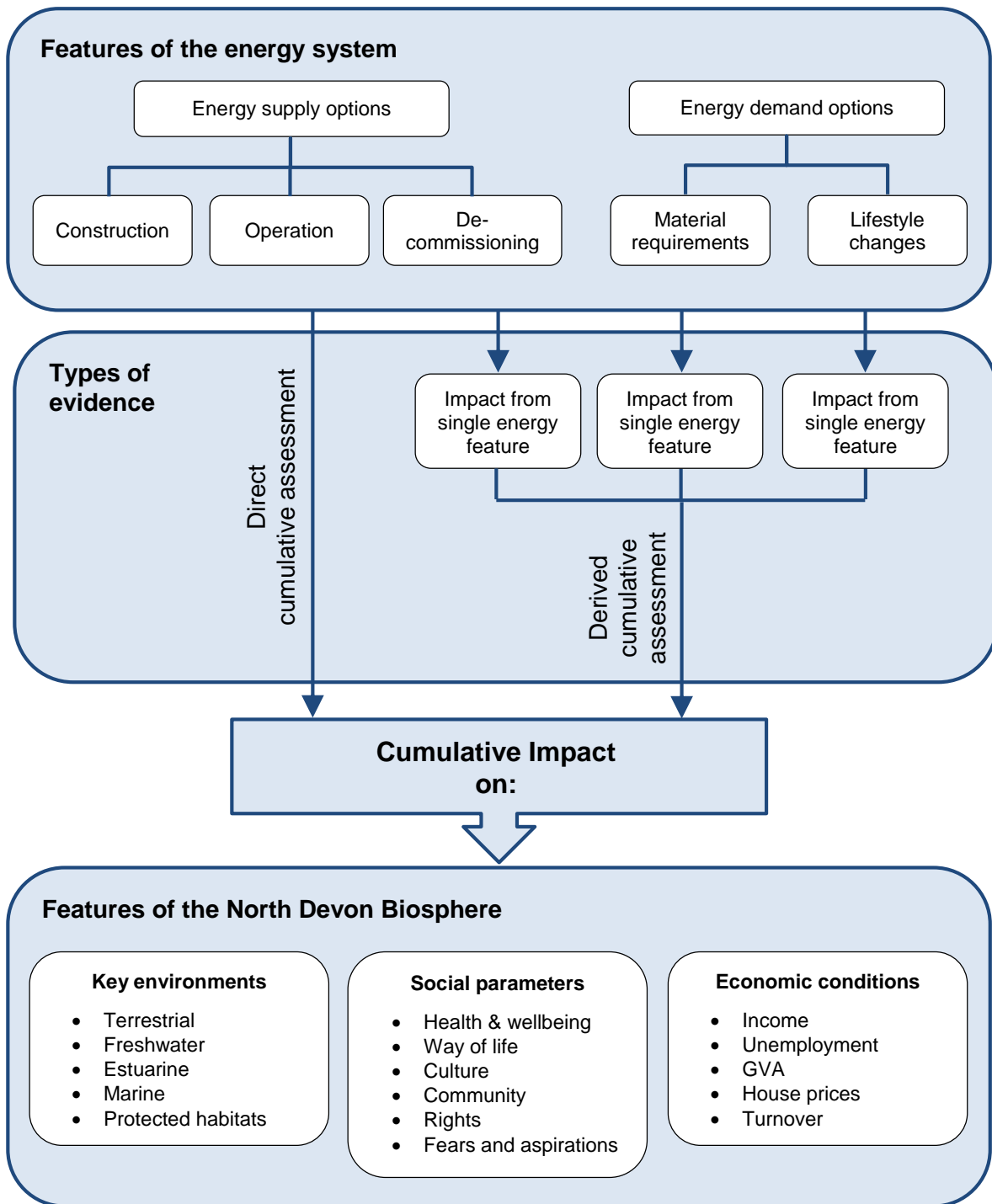
- What is the distribution of existing evidence between environmental, social and economic impacts?
- What do the results suggest about research needs for individual energy options or environmental, social or economic criteria?
- Is there evidence of direct assessment of ecosystem services?
- Have monetary values been used to quantify impacts?
- How transferable are the results from one location to other areas with similar characteristics?

Scope

- *Geographic range:* Initially, the geographic range will be limited to the North Devon Biosphere Reserve area, although this will be expanded if necessary. If a broader approach is taken, social and economic impacts will be generally restricted to the UK to ensure relevance, but evidence from outside the UK will be included for environmental impacts where this relates to comparable habitats and species.
- *Topic:* Energy supply and demand options and social, environmental and economic characteristics of the area will be defined by specific keywords (see Methods below).
- *Language:* English
- *Time period:* Assessment of social and economic impacts will be restricted to documents published between 2009 and 2014, again to ensure relevance. There is a lower temporal sensitivity for environmental impacts, but the need to constrict the scope in light of time available dictated a restriction to the period from 2000.

Conceptual model

Figure 1. The conceptual model used to frame the approach



2 Methods

Keywords

An initial selection was made of keywords that encompass generic environmental, social and economic impact assessment. These included very broad habitat types (e.g. marine, terrestrial) and social and economic indicators that are common usage (e.g. income, GVA) (HM Treasury, 2015; Pugh, 2008; IAIA, 2003). Local literature (Bell et al., undated), was used to define social and economic keywords of specific relevance to the NDBR context. Important habitats were identified based on spatial extent, determined from Landscape Character Assessments (Devon County Council, undated), locally identified conservation priorities (Bell et al., 2013) and mapping of marine and coastal habitats (VALMER, unpublished data). Habitats present within the NDBR which are protected or otherwise designated as important were also included, based in information contained within the MAGIC database (DEFRA, undated) and supporting documentation. The principle keywords used to frame the study are shown in Table 5.

Table 5. Principle keywords considered for the targeted literature search

	<i>Energy options</i>	<i>Environmental Impacts</i>	<i>Social/economic impacts</i>	<i>Case study scope</i>
<i>Level 1 terms</i>	<i>energy supply, energy development, energy use</i>	<i>habitat, environment</i>	<i>social, economic</i>	<i>cumulative, Taw Torridge, North Devon, Biosphere Reserve</i>
<i>Level 2 terms</i>	<i>tidal range, tidal stream, tidal barrage, nuclear energy, onshore wind, offshore wind, biomass, domestic energy, household energy, solar PV, turbine, lagoon, insulation, car use, boiler efficiency solar thermal, heat pump, hydro,</i>	<i>estuary habitat, marine habitat, terrestrial habitat</i>	<i>culture, way of life, health, wellbeing, spiritual, income, politic, personal property, unemployment, employ, job, house price, GVA, infrastructure, transport, manufacturing, health, retail, agriculture, fishing, construction, tourism, fears, aspirations, flood risk, heritage, water quality, land use, population density, services,</i>	
<i>Level 3 terms</i>		<i>pelagic, benthic, demersal, fluvial, catchment, river, wetland, grassland, culm, moorland, heathland, woodland, farmland, pasture, parkland, saltmarsh, sand dune, wooded, valley, farm, national park, flood, water</i>	<i>turnover, fuel poverty, affordable housing, job prospects, public transport, highway maintenance, skilled, education, blue collar, white collar, growth, development, deprivation, communication,</i>	

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		<i>quality, land cover, protected area, BAP, SAC, MCZ, AONB, UNESCO, MNR</i>	<i>public sector, private sector, housing conditions, skill, benefit</i>	
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Search strategy

A search strategy was developed to consider two main types of evidence (peer-reviewed journal articles, and grey literature), to reduce publication bias and to address current issues where limited academic research has been undertaken. Unpublished information was not considered, as the process to discover and obtain this is very time consuming.

- **Peer-reviewed journal articles:** Web of Science and Scopus were used, as these two academic search engines were able to search all relevant peer-reviewed articles (from the UK, Europe and internationally) and produce repeatable results.
- **Grey literature:** the ‘Open Grey’ search engine and the search tool within the national ‘Gov.uk’ website were used as the primary source of national and international government reports, studies published by industry and non-Governmental Organisations, theses and dissertations. This was supplemented with searches of individual organisations’ websites, including Renewable UK and Devon County Council.

Refinement of search strings

An iterative process was undertaken to develop keywords and keyword strings (linked by the terms AND, OR) that would balance the specificity of the search with the number of results returned. Primary keywords were selected to relate to the individual energy supply/demand options addressed. Secondary keywords were selected to relate to the typology of the impacts from the identified energy supply/demand options (Table 5). Initial combinations of search terms identifying only cumulative impacts or containing keywords relating to the exact geographic location (such as Taw Torridge, North Devon Biosphere Reserve, North Devon) provided very few results. Therefore, these very specific keywords were removed and the search strategy was broadened as indicated in the scope.

A broader search strategy did indeed expand the number of results returned, to an extent that the output was unmanageable in the time available for the case study. Nuclear energy and car use were therefore excluded from the study at this point, to reduce the quantity of results to be taken through to the next stage of the process. The final search strings are given in Table 6, and further details of the iterative process used in its development are given in Appendix 1.

Table 6. The search strings used to discover appropriate evidence for the case study

	Keyword strings
Primary keywords	
Energy options	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass energy" OR "solar thermal" OR "tidal power" OR "tidal barrage" OR "tidal stream" OR "offshore wind")
	AND
Secondary keywords	
Generic impact terms	(environment OR habitat OR social OR economic OR cumulative OR impact)
Environmental impacts	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benth* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sanddunes OR farm OR "national park" OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")
Social and/or economic impacts	(culture OR "way of life" OR health OR wellbeing OR spiritual OR income OR politic* OR employment OR job OR house price OR GVA OR infrastructure OR transport OR manufacturing OR retail OR "fuel poverty" OR "job prospects" OR "public transport" OR education OR growth OR development OR deprivation OR communication OR "public sector" OR "private sector" OR "housing conditions" OR agriculture OR fishing OR construction OR tourism OR

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	perceptions OR "flood risk" OR heritage OR "water quality" OR "population density" OR services OR "sense of place")
Cumulative impacts	(cumulative OR "cumulative assessment" OR "cumulative impact")

Outline inclusion and exclusion criteria

The principle inclusion criteria are as defined within the scope: i) studies are required to be in English and published from 2000 onwards; ii), social and economic impacts are restricted to the UK, while results from any similar temperate habitats can be included for environmental impacts. Additional inclusion criteria were also applied for documents accessed through the UK Government website (gov.uk): the filters 'impact assessments' and 'research and analyses' were utilised in order to reduce irrelevant hits (related to, for example, speech transcripts). Reviews were excluded unless no other empirical studies were available, and studies reporting original data collection were prioritised over modelling studies. Studies related to engineering aspects of energy technology and medical topics were also excluded. The appearance of search keywords within the titles (from all sources) also guided inclusion beyond the first level of screening, although the analysts knowledge of appropriate synonyms and indirect reference was also important. Details of the documents included and excluded at different steps in the screening process are provided in [\[Output 2\]](#).

3 Results

Evidence extracted

For the purpose of this scoping exercise, evidence was extracted from only a subset of the studies generated by the search. Two specific topics were pursued to illustrate the full REA process, with two energy options considered in each case in order to investigate potential cumulative impacts. The topics were: i) the environmental impacts of offshore wind and tidal current turbines on marine benthic habitats (based on the 10 most recent studies) and ii) public perceptions of onshore wind and tidal current turbines (4 studies). One study assessing cumulative affects directly was also reviewed. The details of the studies, and the evidence provided by each, are summarised in [\[Output 3\]](#).

Critical appraisal of the evidence

One study attempted to review cumulative impacts on benthic habitats, but the research did not follow an appropriate systematic review or meta-analysis technique and so received a poor pedigree score. The empirical studies that evaluated specific impacts on benthic habitats of individual marine energy options provided stronger evidence: generally these undertook controlled experiments, used reliable methods and compared independent measurements, although the temporal scales used were often relatively short. Studies assessing stakeholder perceptions of the impacts of energy supply options also received good to very good pedigree scores.

Consistent agreement in results was seen across studies of benthic ecology impacts of individual marine energy options. Along with the high pedigree scores of these studies 'high agreement and robust evidence' was present. Consistent agreement was also present for studies of stakeholder perceptions of impacts providing similar 'high agreement and robust evidence' although numbers of evidence pieces were low and approaches were slightly different across studies which limit confidence for some identified impacts, e.g. perceived positive or negative impacts to tourism were only addressed in one study (Bailey et al., 2011).

Details of the confidence rankings are provided in [\[Output 4\]](#), summarised in Table 7.

Table 7. Degree of confidence in the evidence

	Key words used in extracting evidence	Number of studies	Pedigree scores	Score no of studies	Strength of evidence	Evidence rank	Degree of agreement	Overall confidence
	cumulative	1	P	L	M	L		L
Environmental	pelagic	2	2VG	L	M/R	M	High	Med/High
	benth*	6	2VG, 4G	M	M/R	M	High	Med/High
	demersal	2	2VG	L	M/R	M	High	Med/High
	farm	6	2VG, 4G	M	M/R	M	High	Med/High
Social, economic	fishing	2	2VG	L	M	M	Med	Med
	construction	1	1VG	L	M	M		Med
	perceptions	2	2VG	L	M/R	M	High	Med

Synthesis of the evidence

[\[Output 5\]](#) contains statistics describing the quantity and types of evidence and their location, scale and pedigree. These are summarised in the Tables 8–10.

Table 8. The number of studies identified and retained at each stage of the screening process

	Environmental	Socio-economic	Total
Initially identified			18877
After filtering / removal of duplicates			11626
After first phase of screening			514
After second phase of screening	258	121	379

Table 9. The number of studies related to each primary keyword retained after the second phase of screening, and the type of literature

	Environmental	Socio-economic	Total
Relevant to each primary keyword:			
<i>Cumulative</i>	26	5	31
<i>boiler efficiency</i>	0	2	2
<i>loft insulation</i>	4	6	10
<i>wall insulation</i>	4	6	19
<i>onshore wind</i>	11	13	23
<i>solar PV</i>	7	9	16
<i>solar thermal</i>	9	10	19
<i>tidal barrage</i>	21	8	29
<i>tidal power</i>	67	15	82
<i>tidal stream</i>	23	7	30
<i>offshore wind</i>	133	44	177
Type of literature:			
<i>Peer-reviewed</i>	243	106	349
<i>Grey literature</i>	15	15	30

Table 10. The location, scale and pedigree ranking for the 15 studies taken to the data extraction stage

	Environmental	Socio-economic	Total
Location:			
<i>UK</i>	4	3	7
<i>EU</i>	7	1	8
International	0	0	0
Scale of study:			
<i>Site level</i>	1	2	3
<i>Local</i>	9	1	10
<i>Country</i>	0		
<i>Region</i>	1		1
<i>International</i>	0	1	1
Pedigree ranking for individual studies:			
<i>poor</i>	0	0	0
<i>moderate</i>	0	0	0
<i>good</i>	7	1	8
<i>very good</i>	4	3	7

Pedigree ranking for reviews:			
<i>poor</i>	1	0	1
<i>moderate</i>	0	0	0
<i>good</i>	0	0	0
<i>very good</i>	0	0	0

Evidence summary

A summary of the evidence obtained is discussed below [forming Output 6].

There was a lack of evidence specific to the North Devon Biosphere Reserve, and only 33 studies considered cumulative impact as a topic. Screening at abstract level revealed that they all approached this in terms of the cumulative impacts of one energy option (e.g. offshore wind), usually also on just one species or sector (such as birds or fishing), and so did not provide relevant information on the cumulative effects of different energy supply or demand options. Therefore, only the broadest iteration of the primary question was addressed: *What are the environmental, social and economic impacts of specific energy supply and demand options individually on habitats and communities comparable to those of the North Devon Biosphere Reserve?*

Distinct themes emerged in the evidence returned by searches for the impacts on benthic habitats by the foundations of tidal current and offshore wind turbines:

- Positive impacts were reported for fish, lobster, edible crab and velvet swimming crab, which had a high abundance and/or biomass near the device foundations compared to the control situation. The relationship appeared species specific with fish: cod and pouting exhibited an association with or attraction to device structures, while a weaker or negative association was seen for flatfish species, particularly dab. The association of commercial species with energy structures was reported across multiple studies, but there were no studies empirically evaluating the implications of these effects beyond the footprint of the device foundations and so effects on fisheries are unknown.
- Evidence was similarly positive for mussels, barnacles, and similar colonising epifauna, suggesting an increase in their biomass at marine renewable energy device foundations. However, certain species colonising turbine foundations (such as the ascidian, *Ciona intestinalis*) can dominate and hence limit biodiversity
- Evidence of specific impacts on sandbank, mudbank and reef habitats and associated benthic fauna from seven studies provided mixed positive and negative results.
- Consistent results across studies suggest changes in sediment particle size.
- An increase in the density and diversity of infauna was also reported with some consistency. However, a negative effect may be that the composition of the communities was different before and after turbine construction, and so the natural community may be lost. These effects on benthic communities appear to be limited to the immediate footprint of device foundations.
- Although studies used robust data collection methods and included before/after control/impact (BACI) comparisons, the limited temporal scale on which baseline data was collected may be insufficient to detect patterns of natural variability, reducing confidence in conclusions drawn about the impacts of the energy devices.
- The duration and reversibility of impacts remains unknown, due to a lack of long terms studies or experience of decommissioning.
- There is a greater body of evidence for offshore wind, and more variables have been studied in that context than for tidal current turbines. Where similar parameters were assessed (sediment, fish abundance), the impacts were broadly consistent across both technology types, and so the cumulative impacts or different marine renewables are likely to act in the same direction. Whether the magnitude of the impact would increase in a linearly additive manner, or through a more complex relationship is unknown.

In terms of the perceptions of the public and stakeholders:

- There was high agreement across the four studies which identified NIMBYism: people showed a general recognition of the benefits from renewable energy and the need to address climate change but were reluctant to accept developments near their homes.
- A positive perception of employment opportunities and potential economic benefits from cheaper electricity or community ownership was found across multiple studies and multiple technologies.

- Perceived negative impacts were reduced visual amenity, reduced house prices, and a loss of fishing and tourism opportunities.
- Evidence was repeated across multiple studies but the limited number of studies within the data extraction process limits confidence in the evidence.

A synthesis of the evidence is provided in Tables 11–13 **[Output 7]**.

Table 11. Synthesis of the evidence of impacts on benthic habitats by offshore wind turbines

Energy supply/demand option driver of impact: <i>Offshore wind energy</i>	Impact				
Pressure: <i>Turbine foundation deployment</i>	<i>Sediment dynamics</i>	<i>Benthic biomass</i>	<i>Benthic community</i>	<i>Fish</i>	Cumulative impacts
Positive or negative (+/-)	-	+	-	+/-	+/-
Extent (site level, local, national, regional, or international)	Site level	Site level	Site level	Site level	Site level
Duration (permanent, semi-permanent, or temporary)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)
Reversibility (irreversible, difficult to reverse, or reversible)	Unknown	Unknown	Unknown	Unknown	Unknown
Frequency (always, during construction and/or operation)	Always (construction and operation)	Always (construction and operation)	Always (operation)	Always (operation)	Always (construction and operation)
Magnitude of impact (high, medium, low)	Medium	High	High	High	Medium - High
Confidence (high, medium, low)	Medium	Medium	High	Medium	Medium - High
Significance: magnitude x confidence (see key)					
Significance with climate change					

Key to significance in Figures 11-13

		Magnitude		
		L	M	H
Confidence	H			
	M			
	L			

Table 12. Synthesis of the evidence of impacts on benthic habitats by tidal current turbines

Energy supply/demand option driver of impact: <i>Tidal energy</i>	Impact				
Pressure: <i>Turbine foundation deployment</i>	<i>Sediment dynamics</i>	<i>Benthic biomass</i>	<i>Benthic community</i>	<i>Fish</i>	Cumulative impacts
Positive or negative (+/-)	-	Unknown	Unknown	+	+/-
Extent (site level, local, national, regional, or international)	Site level			Site level	Site level
Duration (permanent, semi-permanent, or temporary)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)
Reversibility (irreversible, difficult to reverse, or reversible)	Reversible	Unknown	Unknown	Unknown	Unknown
Frequency (always, during construction and/or operation)	Always (construction and operation)			Always (operation)	Always (construction and operation)
Magnitude of impact (high, medium, low)	Medium			High	Medium - High
Confidence (high, medium, low)	Low			Low	Low
Significance: magnitude x confidence					
Significance with climate change					

Table 13. Synthesis of the evidence on public perceptions of renewable energy technologies

Energy supply/demand option driver of impact: <i>Renewable energy technologies</i>	Impact						
<i>Pressure: Deployment of tidal energy, offshore and onshore wind developments</i>	<i>Employment opportunities</i>	<i>Cost of living</i>	<i>Landscape</i>	<i>House prices</i>	<i>Impact on tourism</i>	<i>Impact on existing industry (fishing)</i>	<i>Cumulative impacts</i>
Positive or negative (+/-)	+	+	-	-	-	-	+/-
Extent (site level, local, national, regional, or international)	Local	Local	Local	Local	Local	Site level	Local
Duration (permanent, semi-permanent, or temporary)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)	Unknown (dependent on extent of impacts during operation and recovery following decommissioning)
Reversibility (irreversible, difficult to reverse, or reversible)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Frequency (always, during construction and/or operation)	Always (construction and operation)	Always (construction and operation)	Always (construction and operation)	Always (construction and operation)	Always (construction and operation)	Always (construction and operation)	Always (construction and operation)
Magnitude of impact (high, medium, low)	High	Medium	High	Medium	Medium	Medium	Medium - High
Confidence (high, medium, low)	Low	Low	High	Low	Low	Low	Low - High
Significance: magnitude x confidence							
Significance with climate change							

Implications for policy and / or practice

The possibilities for mitigating impacts or enhancing the additional benefits of energy options were rarely discussed in the papers reviewed. Where examples were found, these are identified in Table 14 [forming Output 8].

Table 14. Practices for the mitigation of negative impacts and enhancement of benefits

Energy supply/demand option	Impact	
	<i>Benthic habitats</i>	<i>Fish abundance</i>
Mitigation: practice	Site device foundations to avoid sensitive or regionally important habitat [1]	
Mitigation: policy		
Enhancement: practice		Exclude all fishing within offshore wind farms, at least in the initial years, to allow benefits of increased fisheries production to become established [2]
Enhancement: policy		

References

¹ Miller, R. G., Hutchison, Z. L., Macleod, A. K., Burrows, M. T., Cook, E. J., Last, K. S., & Wilson, B. (2013). Marine renewable energy development: assessing the Benthic Footprint at multiple scales. *Frontiers in Ecology and the Environment*, 11(8), 433-440.

² Reubens, J. T., Degraer, S., & Vincx, M. (2014). The ecology of benthopelagic fishes at offshore wind farms: a synthesis of 4 years of research. *Hydrobiologia*, 727(1), 121-136.

Secondary questions

Certain secondary questions were also posed for consideration within the review:

- What is the distribution of existing evidence between environmental, social and economic impacts?*

More than twice as many studies on environmental, as opposed to social or economic, topics remained after the second phase of screening.
- What do the results suggest about research needs for individual energy options or environmental, social or economic criteria?*

The issue of data gaps will be addressed by [Output 9], below.
- Is there evidence of direct assessment of ecosystem services?*
- Have monetary values been used to quantify impacts?*

The evidence reviewed did not address ecosystem services directly. Two studies made reference to ecosystem services (biological productivity and food provision) in discussing their results. None of the studies evaluated environmental or social parameters in monetary terms. However, the full process of evidence extraction was undergone for a small subset of potentially relevant studies returned by the search, and so direct assessment of ecosystem services or monetary valuation may exist within the wider evidence.
- How transferable are the results from one location to other areas with similar characteristics?*

This study suggests that the likelihood of obtaining a large volume of evidence for a particular location may be low. In practice, therefore, the transfer of information from comparable locations will be essential. Arguably, monetary valuation is most sensitive to context, and formal procedures exist for the transfer of economic values for environmental impact (e.g. Eftec., 2009). Where information has been transferred, confidence in the accuracy of outcomes will be reduced (to varying degrees, depending on the context and information transferred), which should be discussed within the caveats.

Knowledge gaps and research needs

The restricted nature of this scoping exercise meant that all available evidence generated by the search was not reviewed, so it would not be meaningful to attempt a detailed assessment of knowledge gaps from the small subset of studies that were considered.

However, the nature of the review did allow certain key knowledge gaps to be highlighted [forming Output 9]:

- there is a lack of empirical evidence on the cumulative impacts of multiple energy options. There is a growing literature that considers the cumulative impacts of the expansion of offshore wind on bird populations and the fisheries sector, but otherwise data is lacking. Accurate assessment of cumulative impacts requires large temporal and spatial scale, quantitative, observational before and after control impact studies of impacts.
- There is also a lack of information on the potential interactions between energy options (additive, synergistic, antagonistic), limiting the conclusions about cumulative impacts that can be drawn from evidence of impacts from individual energy options.
- The lack of results returned during the search process for certain environmental, social and economic keywords also indicates where further research could be required. In particular:
 - there were few studies that appeared to address impacts at the level of a defined habitat or landscape type (e.g. saltmarsh, grassland, moorland).
 - the implications of energy options on key cultural services (way of life, wellbeing, and sense of place) also appear poorly studied.

Caveats arising from the REA process

The following caveat should be attached to this report [forming Output 10]:

- The work undertaken was part of a scoping exercise to assess the Rapid Evidence Assessment methodology developed as part of SPLiCE Phase 1 (Smithers, 2015), for which limited resource was available. Therefore, a comprehensive assessment of the available evidence was not undertaken, and so the outputs should be considered as examples only and should not be interpreted as providing evidence that can be used in addressing the primary and secondary questions posed.

4 Resources

A summary of the time required for this scoping exercise is provided in Table 15.

Table 15. Time required for the different steps in the REA process

Task	Days	Notes
Identifying the research question	1	
Developing a protocol	2	Completing individual tasks within the protocol is covered by the tasks below.
Iterative development of keywords	3	Search strings/keywords were trialled across multiple databases.
Search for evidence	9	Extracting a large number of references from search engines/databases creates a time consuming task.
Screening the search results	5	Time needed depends on the number of references returned.
Extracting evidence	6	Although a limited number was selected for the current review this stage requires attention to detail and increased time expenditure.
Evaluating strength of the evidence	1	Time needed again dependent upon the number of references/evidence pieces.
Ranking confidence across multiple papers	1	As above
Evidence synthesis and reporting	7	As above
TOTAL	35	

5 References and sources of information

- Bailey, I., J. West, et al. (2011). "Out of Sight but Not out of Mind? Public Perceptions of Wave Energy." *Journal of Environmental Policy & Planning* 13(2): 139-157.
- Bell A., Le Helloco E. and Stainthorp R. 2013. *The State of North Devon UNESCO World Biosphere Reserve*. North Devon Biosphere Reserve. 64pp
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- Devon County Council. Undated. Devon's landscape character assessment. Landscape Character Assessments in your area. <http://www.devon.gov.uk/lca-devonareas> Accessed 20 January 2015
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- Eftec. 2009. Valuing Environmental Impacts: Practical Guidelines for the Use of Value Transfer in Policy and Project Appraisal. Report prepared for the Department for Environment, Food and Rural Affairs. 95pp
- HM Treasury 2015. Pocket databank: economic indicators. <https://www.gov.uk/government/statistics/weekly-economic-indicators> Accessed January 2015
- IAIA (2003). Why have Principles for Social Impact Assessment? International Association for Impact Assessment, Special Publication Series No. 2. www.iaia.org/publicdocuments/special-publications/sp2.pdf. (Accessed January 2015).
- Pugh, D. (2008). *Socio-economic indicators of marine-related activities in the UK economy*. Report for the Crown Estate.
- Renewables Map. <http://www.renewables-map.co.uk/> Accessed 27 January 2015
- Smithers, R. 2015. SPLiCE Phase 1: A methodology for Rapid Evidence Assessments. Report prepared for DEFRA. Draft version dated 13 January 2015.
- VALMER. Unpublished data. www.valmer.eu

Appendices

- Appendix 1 Summary of the iterative process for choosing search strings
- Appendix 2 Filenames for rapid evidence assessment outputs
- Appendix 3 Comments on draft REA method arising from this case study

Appendix 1 - Summary of the iterative process for choosing search strings

Date of search	Supply/demand terms Search string		Impact search strings	Search engine	Hits	Change from previous	Notes
25th Feb 2015	(tidal range OR "tidal stream" OR "tidal barrage" OR "nuclear energy" OR "onshore wind" OR "offshore wind" OR "biomass energy" OR "domestic energy" OR "household energy" OR "solar PV" OR insulation OR "boiler efficiency" OR "solar thermal" OR "heat pump" OR hydro energy)	AND	(pelagic, OR benthic, demersal, fluvial, catchment, river, "land use", saltmarsh, sand dunes, farm, national park, flood, "water quality", "land cover", "protected area", BAP, SAC, MCZ, AONB, UNESCO, MNR)	WoS	5659	search string created linking terms with OR, "land use" added to replace many different forms of "land use"	Large number of references returned although many irrelevant titles present in first 100 references scanned.
25th Feb 2015	(tidal range OR "tidal stream" OR "tidal barrage" OR "nuclear energy" OR "onshore wind" OR "offshore wind" OR "biomass energy" OR "domestic energy" OR "household energy" OR "solar PV" OR insulation OR "boiler efficiency" OR "solar thermal" OR "heat pump" OR hydro energy)	AND	(culture OR "way of life" OR health OR wellbeing OR spiritual OR income OR politic OR personal OR property OR unemployment OR employ OR job OR house price OR GVA OR infrastructure OR transport OR manufacturing OR health OR retail OR agriculture OR fishing OR construction OR tourism OR fears OR aspirations OR "flood risk" OR heritage OR "water quality" OR "land use" OR "population density" OR services)	WoS	24665	search string created linking terms with OR	Excessive number of references returned to screen within resources of scoping review. Although many irrelevant topics present in the first 100 references.
25th Feb 2015	(tidal range OR "tidal stream" OR "tidal barrage" OR "nuclear energy" OR "onshore wind" OR "offshore wind" OR "biomass energy" OR "domestic energy" OR "household energy" OR "solar PV" OR insulation OR "boiler efficiency" OR "solar thermal" OR "heat pump" OR hydro energy)	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	16 163	search string created using OR	As above
25th Feb 2015	("energy supply" OR "energy development" OR "energy use")	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	8654	search string created using OR for level 1 supply demand terms	Large number of references returned, although many irrelevant references in first 100 result scanned
25th Feb 2015	("energy supply" OR "energy development" OR "energy use")	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	8654	As above	As above
25th Feb 2015	("energy supply" OR "energy development" OR "energy use")	AND	(pelagic, OR benthic, demersal, fluvial, catchment, river, "land use", saltmarsh, sand dunes, farm, national park, flood, "water quality", "land cover", "protected area", BAP, SAC, MCZ, AONB, UNESCO, MNR)	WoS	1556	As above	As above

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Date of search	Supply/demand terms Search string		Impact search strings	Search engine	Hits	Change from previous	Notes
25th Feb 2015	("energy supply OR "energy development" OR "energy use")	AND	(culture OR "way of life" OR health OR wellbeing OR spiritual OR income OR politic OR personal OR property OR unemployment OR employ OR job OR house price OR GVA OR infrastructure OR transport OR manufacturing OR health OR retail OR agriculture OR fishing OR construction OR tourism OR fears OR aspirations OR "flood risk" OR heritage OR "water quality" OR "land use" OR "population density" OR services)	WoS	12912	As above	As above
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benth* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area")	WoS	528	Supply demand search terms edited to include only those of highest relevance to the case study site. "Nuclear energy" and "offshore wind" removed. "tidal power" used to replace tidal energy variants.	Manageable number of references returned although some evidence may be missed by not having tidal variants and the offshore wind leased area still present offshore, even if current developments have been cancelled.
25th Feb 2015	("boiler efficiency" OR "nuclear power" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benth* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area")	WoS	10103	"nuclear power" reintroduced to examine difference in references returned.	much greater number of hits. No nuclear developments are proposed in the case study area but there are developments within the wider region (Severn estuary)
25th Feb 2015	("boiler efficiency" OR "nuclear power" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	(culture OR "way of life" OR health OR wellbeing OR spiritual OR income OR politic OR personal OR property OR unemployment OR employ OR job OR house price OR GVA OR infrastructure OR transport OR manufacturing OR health OR retail OR agriculture OR fishing OR construction OR tourism OR fears OR aspirations OR "flood risk" OR heritage OR "water quality" OR "land use" OR "population density" OR services)	WoS	10702	"nuclear power" reintroduced in combination with socio economic search string to examine difference in references returned.	As above
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	2589	limited supply demand options excluding "nuclear energy/power" and generic impact terms	more manageable number of references returned compared to full supply/demand list

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Date of search	Supply/demand terms Search string		Impact search strings	Search engine	Hits	Change from previous	Notes
25th Feb 2015	("boiler efficiency" OR nuclear energy " OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	4894	"nuclear energy" added to limited list	greater number of references returned (x2)
25th Feb 2015	("boiler efficiency" OR nuclear power " OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass power" OR "solar thermal" OR "tidal power")	AND	(environment OR habitat OR impact OR economic OR social OR cumulative)	WoS	10103	"nuclear power" added to limited list	even greater number of references returned (x5)
25th Feb 2015	(tidal range OR "tidal stream" OR "tidal barrage" OR "onshore wind" OR "offshore wind" OR "biomass energy" OR "solar PV" OR insulation OR "boiler efficiency" OR "solar thermal" OR "heat pump" OR hydro energy)	AND	(pelagic, OR benthic, demersal, fluvial, catchment, river, "land use", saltmarsh, sand dunes, farm, national park, flood, "water quality", "land cover", "protected area", BAP, SAC, MCZ, AONB, UNESCO, MNR)	WoS	858	supply demand list edited to include tidal power variants and offshore wind but exclude nuclear energy. Combined with edited environmental terms list	manageable number of references returned
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass energy" OR "solar thermal" OR "tidal power" OR "tidal barrage" OR "tidal stream" OR "offshore wind" OR "hydro power" OR "heat pump system")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benthic* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")	WoS	2338	"hydro power and "heat pump system" added to supply demand list and "estuary habitat" OR "marine habitat" OR "terrestrial habitat" and "conservation zone" added to impact list to increase evidence potentially returned	large but not unmanageable number of references returned with a large number of irrelevant references present in first 100 references scanned.
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass energy" OR "solar thermal" OR "tidal power" OR "tidal barrage" OR "tidal stream" OR "offshore wind" OR "hydro power")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benthic* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")	WoS	2298	"heat pump system" excluded as only 1% of forecast energy mix in Bell et al 2014	40 references missed by exclusion
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass energy" OR "solar thermal" OR "tidal power" OR "tidal barrage" OR "tidal stream" OR "offshore wind")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benthic* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")	WoS	2017	"hydro power" excluded as predicted not to change between 2014 and 2020	281 references missed by exclusion

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Date of search	Supply/demand terms Search string		Impact search strings	Search engine	Hits	Change from previous	Notes
25th Feb 2015	("boiler efficiency" OR "loft insulation" OR "wall insulation" OR "onshore wind" OR "solar PV" OR "biomass energy" OR "solar thermal" OR "tidal power" OR "tidal barrage" OR "tidal stream")	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benth* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")	WoS	734	"offshore wind" excluded as current development plans in the cas study region have been cancelled	1283 references missed by exclusion. The leased area is still present and offshore wind is a key renewable technology in many comparative regions so this search term is potentially of high relevance.
25th Feb 2015	"offshore wind"	AND	("estuary habitat" OR "marine habitat" OR "terrestrial habitat" OR pelagic OR benth* OR demersal OR fluvial OR catchment OR river OR "land use" OR saltmarsh OR sand dunes OR farm OR national park OR flood OR "water quality" OR "land cover" OR "protected area" OR "conservation zone")	WoS	1353		

Appendix 2 - Filenames for rapid evidence assessment outputs

This rapid evidence assessment has been conducted following a draft method and guidance prepared as part of SPLICE Phase 1 (Smithers, R. 2015). The draft guidance specifies ten outputs. Each has been prepared as a separate file. Some are included in this report in full and others are summarised or referred to. The table below lists the outputs specified in the guidance, the filename for each output and the degree to which it is included in this report.

Table A2.1. Outputs from the SPLICE Phase 1 Rapid Evidence Assessment case study on the North Devon Biosphere Reserve

Output	Output title – from guidance	Filename (All are xls files)	Extent of inclusion in this report
1	The REA protocol	NDBR OUTPUT 1 Protocol 6May15	In full – see section 1 – protocol. Primary question included in the Executive Summary
2	Results of screening all individual papers	NDBR OUTPUT 2 Evidence 6May15	Referred to
3	Data extraction form	NDBR OUTPUT 3 Data extraction 6May15	Referred to
4	Confidence in evidence across multiple papers	NDBR OUTPUT 4 Ranking 6May15	Referred to Summary provided in Table 7
5	Volume and characteristics of the overall evidence base	NDBR OUTPUT 5 Evidence base 6May15	Referred to Summary provided in Tables 8-10
6	A concise summary of the evidence	NDBR OUTPUT 6 Impacts summary text 6May15	In full – See section 3 Results – evidence summary Also in full in the Executive Summary
7	Significance of impacts of energy supply/demand option	NDBR OUTPUT 7 Summary of impacts table 6May15	In full – see tables 11-13 – apart from key to colours – given below
8	Implications for policy and/or practice	NDBR OUTPUT 8 Implications 6May15	In full – see section 3 – Results - Implications for policy and / or practice
9	A list of knowledge gaps and research needs	NDBR OUTPUT 9 Knowledge gaps and research needs 6May15	In full - see section 3 – Results - Knowledge gaps and research needs
10	Caveats arising from the REA process	NDBR OUTPUT 10 Caveats 6May15	In full - see section 3 – Results - Caveats arising from the REA process Also in full in the Executive Summary

Appendix 3 – Comments on draft REA method arising from this case study

As in the Executive Summary, the aim of this case study was to test a draft method for a Rapid Evidence Assessment (draft 3 issued on 13th January 2015). A number of comments were made by the authors of the case study on the REA method and these are summarised below.

Table A3.1. Summary of comments on draft REA method from experience with biomass case study

REA section	Comment	How addressed in updated REA draft
General	Mainly the methodology was a useful and good step by step guide that is clear and easy to apply to multiple review topics	Noted
Searching for evidence	The application of non Endnote reference managers and the challenge this creates when many search engines are designed to export in endnote and also the need to provide final spreadsheets can be met by copying to excel (although it's recognised this was a Defra specific request)	The text has been changed from "e.g. not Endnote, which can only be accessed by those with a valid subscription" to "e.g. Endnote"
General	The rapid evidence assessment followed the approach of a full systematic review minus some meta analysis. The scope of the REA is challenging for broad studies within tight timeframes	Noted
Output tables	There is some repetition between output tables, for instance recording number of hits for each keyword and number of hits at each screening stage but this is understandable if a need to identify the keywords responsible for high returns / low returns of evidence is required	Noted
Output 7	The impact tables become quite subjective as the traffic light system hides the complexities and reasons for shortfalls, particularly given lack of precise forecasted impacts with climate change or lack of studies approaching that particular subject for specific topics in a review). A short description or summary of impact explaining the caveats (in the caveats section of the report) may however be able to identify weaknesses and explain further where confidence issues may arise.	Noted. No change
Output 3	As raised in the WS4 milestone report, additional information would need to be systematically collected in order to use	These have been added to the guidance for Output 3

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	<p>the REA outputs in MCA:</p> <ul style="list-style-type: none"> • Subject detail (e.g. habitat type, economic sector) • Outcome variable (e.g. species abundance, unemployment rate) • Metric (e.g. GBP, individuals per m2) • Outcome detail (the quantified impact, or qualitative description, as reported in the study) 	
Table 4	<p>More generally, we had some issues with the completion of Table 4, particularly in terms of the duration and reversibility of impacts, as this was not discussed in the papers, meaning it had to be reported as unknown or else a subjective judgement made by the analyst</p>	Noted. No change
General	<p>Overall, there seemed a bit of a mismatch in effort across the process, with relatively more time being spent on developing and implementing the search and assessing the quality of the papers, with rather less on actually reporting the impacts in a meaningful way. Perhaps this is a reflection of the particular circumstances within SPLiCE, and with more time available the process might balance better</p>	Noted. No change

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