

Marine Spatial Planning for Offshore Wind Energy Projects in the North Sea:
Lessons for the United States

Kara M. Blake

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Committee:

David Fluharty, Chair

Terrie Klinger

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University of Washington

Abstract

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Kara M. Blake

Chair of the Supervisory Committee:
Professor David Fluharty
School of Marine and Environmental Affairs

Addressing spatial conflicts among offshore wind energy (OWE) projects and other resource users is a new issue in the United States as proposals for renewable energy projects transition from theoretical to actual installations in U.S. waters. This study investigated how three countries in the North Sea (Germany, the Netherlands, and England) with OWE projects currently deployed and operating in its waters engaged in national-level marine spatial planning (MSP) to address spatial conflicts arising among OWE projects and competing ocean uses. Experiences from representatives from each of these three countries on the North Sea confirm that MSP is a valuable mechanism for reducing spatial conflicts. MSP efforts in the United States should focus on matters of process and promoting dialogue between all resource users, in addition to content. Standardization of mapping, data collection, and reporting methods across jurisdictional boundaries is advised to reduce miscommunications and promote symmetry in regional planning efforts.

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GLOSSARY OF ABBREVIATIONS

BSH	Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie)
CMSP	Coastal and Marine Spatial Planning
IMO	International Maritime Organization
EEZ	Exclusive Economic Zone
EU	European Union
GIS	Geographic Information System
GW	Gigawatt
MMO	Marine Management Organisation
MOU	Memorandum of Understanding
MSP	Marine Spatial Planning
MW	Megawatt, one million watts
MWh	Megawatt-hours
NGO	Non-governmental Organization
NOC	National Ocean Council
NM	Nautical mile. This equals 1.852 km
OSPAR	Oslo-Paris Convention. OSPAR Treaty: treaty on the protection of the marine environment in the north-eastern part of the Atlantic Ocean
OWE	Offshore Wind Energy
RES	Renewable Energy Strategy
SAC	Special Area of Conservation
SCI	Site of Conservation Importance
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational Scientific and Cultural Organization
UK	United Kingdom

1. INTRODUCTION

The marine and fresh waters of the United States are prized for an abundance of natural resources and economic opportunity. The coastal regions of the United States currently support many types of traditional commercial and recreational activities, including fishing, shipping, nature conservation, tourism, military activities, extraction of oil and gas, and installation of cables and pipelines. Adding to the mix are new ocean uses, such as offshore renewable energy (wind, wave, and tidal) projects are currently being proposed in many areas in state and federal waters in the United States.

Offshore wind energy (OWE) holds great potential as a significant and economically viable source of domestic, carbon-free renewable energy in the United States. Winds blowing across offshore waters in the United States in many areas are stronger and more uniform than wind on land. The U.S. Department of Energy reports that the total gross offshore wind resource potential in the United States is 4,150 GW (Beaudry-Losique et al., 2011). Research indicates that one gigawatt (GW) of offshore wind power capacity can generate 3.4 million megawatt hours (MWh) of electricity annually. This power output is equivalent to consuming 1.7 million tons of coal or 27.6 billion cubic feet of natural gas (Beaudry-Losique et al., 2011). If developed, offshore wind energy (OWE) could significantly contribute to, and diversify, the nation's domestic renewable energy portfolio.

Because this is a new technological development, there is a large degree of uncertainty as to the impact OWE installations will have on the surrounding environment and other ocean uses. Current state and federal laws give numerous state and federal agencies authority over the planning, permitting, and installation of OWE projects in U.S. waters. Multiple government agencies and stakeholders are engaged in the planning process for OWE installations throughout

the country. Figure 1 below illustrates proposed OWE projects on the west coast, east coast, and Great Lakes region (US Dept. of Energy, 2013). At the time of this report, no OWE projects have actually been deployed in the United States.

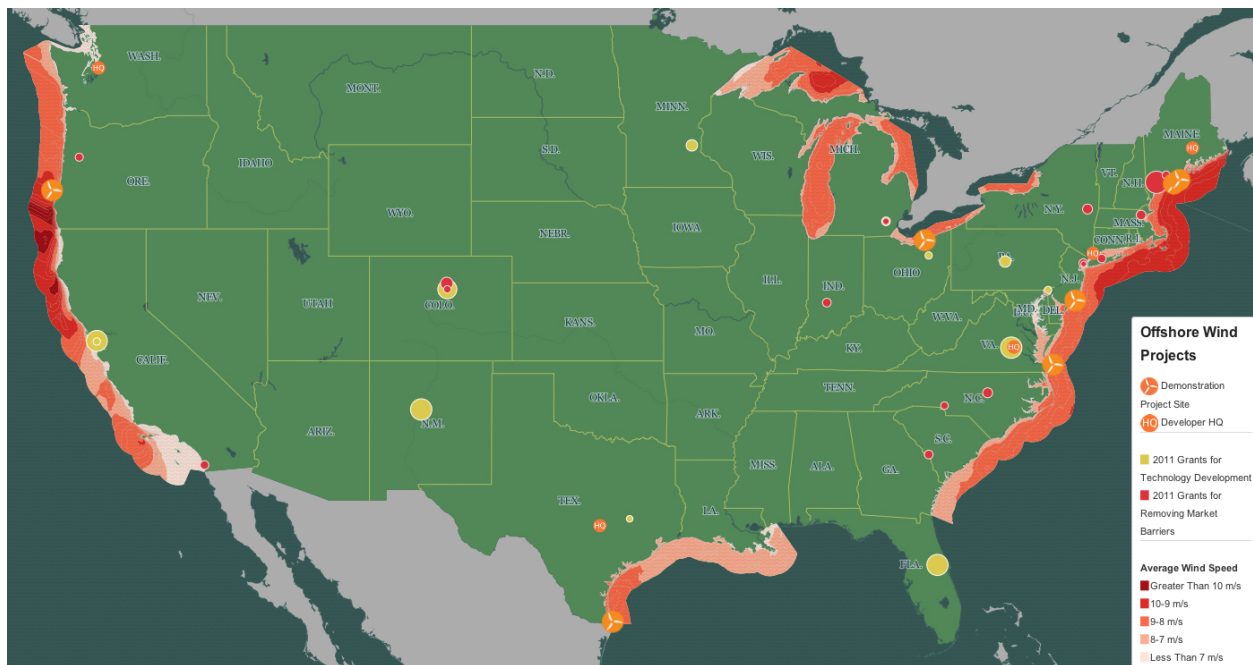


Figure 1: Offshore wind resource and proposed projects in the U.S. (U.S. Department of Energy, 2013).

OWE projects are also being explored as a source renewable energy in other parts of the world. In northern Europe, many countries on the North Sea, including Denmark, Germany, the Netherlands, and England have already planned for, permitted, and installed OWE projects in their jurisdictional waters.

Expansion of industry, offshore activities, and the development of new uses of the sea increase the likelihood that spatial incompatibilities will arise between competing user groups over physical space and resources. One method that is being explored by policy makers to achieve a coordinated strategy for ocean governance is marine spatial planning (MSP). The

United Nations Educational Scientific and Cultural Organization (UNESCO) guide to Marine Spatial Planning defines MSP as:

A practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for the development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way (Ehler & Douvère, 2009, p. 18).

A generally agreed-upon purpose of MSP is to create a management plan that takes into account the various objectives (i.e., ecological, social, economic) of the multiple activities that are taking place within a management area. One of the challenges facing marine planners and resource users is that of organization: user groups are accustomed to acting independently, but must adopt coordinated strategies in order to obtain higher joint benefits or reduce their joint harm (Ostrom, 1990). The strategy behind engaging in a MSP process is to move beyond single-sector management and to organize and prioritize use of natural resources and space in a more comprehensive and collective way.

MSP is being implemented in the United States by governing authorities in both federal and coastal state waters. At the U.S. federal level, the MSP process is still in an early stage of development. The planning process formalized in 2010 when President Obama signed Executive Order 13547 (75 FR 43023, 2010) adopting the recommendation of the U.S. Interagency Ocean Policy Task Force to develop and implement “Coastal and Marine Spatial Planning” (CMSP) over nine regions the United States as a national priority objective (Council on Environmental Quality, 2010). CMSP is defined in the Executive Order as:

A comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas. Coastal and marine spatial planning identifies areas most suitable for various types or classes of activities in

order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives. In practical terms, coastal and marine spatial planning provides a public policy process for society to better determine how the ocean, our coasts, and Great Lakes are sustainably used and protected – now and for future generations (75 FR 43023, 2010, p. 43024).

The Executive Order established the National Ocean Council (NOC) to implement coastal and marine spatial planning and other national priority objectives recommended by the Interagency Ocean Policy Task Force (75 FR 43023, 2010). The NOC is administratively situated in the White House Council on Environmental Quality. The agency held a series of workshops and stakeholder engagement in 2011. In 2012, the NOC released a draft National Ocean Policy Implementation Plan for the United States, which identified two preliminary national objectives and five actions that the NOC will take over the next five years (National Ocean Council, 2012).

MSP is also in varying stages of development and implementation in some state jurisdictions. Massachusetts, Rhode Island, New York, Florida, Oregon, and Washington are a few of the states engaged in a MSP process. Initial support for MSP in the U.S. came from academic and environmental advocacy groups who viewed MSP as a way to protect marine ecosystems (Gopnik et al., 2012). However, an additional driver for MSP is the rapid increase in interest in the development of offshore renewable energy projects.

Questions still remain in the United States as to whether MSP can fulfill its anticipated benefits, including the ability to reduce spatial conflicts among traditional resource uses (e.g. commercial fishing, shipping, tourism) and new ocean uses (e.g. OWE projects). How exactly does MSP help reduce conflicts between incompatible uses? What, in the experience of others, are the most effective elements of the process? Because the UK, the Netherlands and Germany each have OWE project installations deployed and operational in the water, project developers, government officials, and other resource users in these countries have first-hand experience with

a new ocean use projected for development in the United States. The aim of this study is to gather insight from the experiences of individuals in these three countries on both the MSP process and OWE project development to inform state and federal planning processes in the United States.

The criteria for case selection and background information is described in Section 2. Section 3 outlines the research design and methodology. Research findings are described in Section 4, and further discussed in Section 5. Section 6 provides recommendations for policy makers and planners to improve U.S. state and federal MSP efforts in planning for the development of OWE and other renewable energy projects in U.S. waters.

2. CASE SELECTION

This study examines actual examples of spatial conflicts that arose among offshore wind energy project developments and competing ocean uses in jurisdictions with existing national marine spatial plans. Because offshore wind energy (OWE) projects are a relatively new development worldwide, few countries have existing wind farms installed and operating offshore. I selected the United Kingdom (UK), the Netherlands, and Germany as study cases because lessons learned from industrialized countries will have the greatest relevance for the United States. In addition, these three countries share the waters of the central and southern basin of North Sea, each country has OWE projects operating in its national waters, and each has developed its own national-level approach to MSP. Further details on how each country meets the three case selection criteria are discussed below.

2.1 Location in the central and southern basin of the North Sea

The North Sea (Figure 2) is the body of water located between England in the west, Scotland and Norway in the north, and the continental European countries of Denmark, Germany, the Netherlands, Belgium, and France in the east and south (*North Sea*, n.d.). It is connected to the Atlantic Ocean by the Strait of Dover and the English Channel in the south and opens to the Norwegian Sea in the north. It has been a center for industry and commerce for hundreds of years and is heavily utilized by multiple sectors including shipping, fishing, the military, cable and pipeline providers, oil and gas, gravel, nature conservation, tourism, marine wildlife protection, and most recently, offshore renewable energy (OWE) production (Veum et al., 2011).

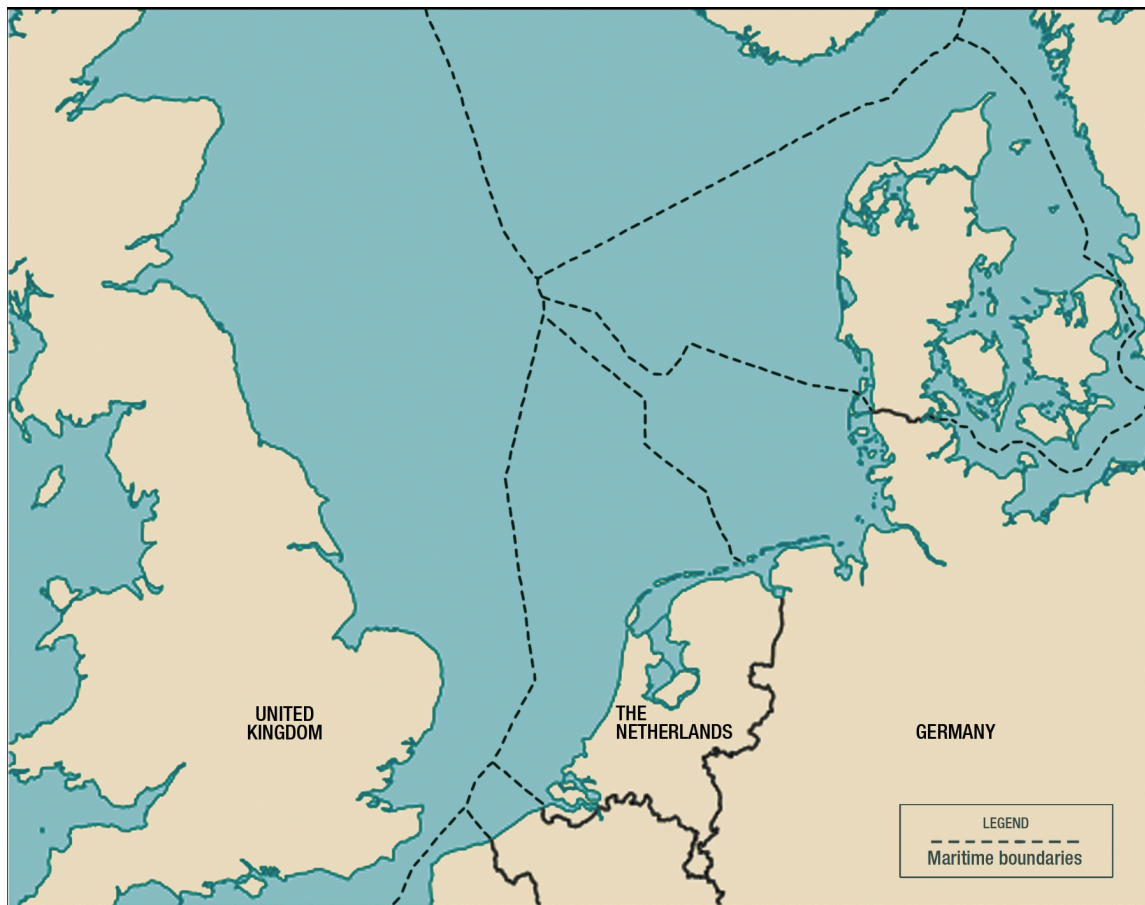


Figure 2: Maritime boundaries in the North Sea (NordNordWest, 2010).

Spatially, Germany, the Netherlands, and the UK share the waters in the southern and central basin of the North Sea. The jurisdictional waters of all three countries come together in a large shallow area called the Dogger Bank. The Dogger Bank has been an area of long-standing importance to fishermen and conservationists (The North Sea Regional Advisory Council, 2012). It is a major trans-boundary fishing ground for German, Dutch, and UK fleets. It has been designated as a Site of Conservation Importance (SCI) in the Netherlands and Germany, and as a Special Area of Conservation (SAC) candidate site in the UK under the EU Natura 2000 conservation network (The North Sea Regional Advisory Council, 2012). In the UK, the relatively shallow waters on the Dogger Bank are currently being explored as a potential site for OWE projects (Forewind, 2011). Accordingly, OWE is a new competing use with commercial

fishing, international shipping, and international conservation interests in a highly valued, trans-boundary region of the North Sea.

2.2 Offshore wind energy production projects in the UK, the Netherlands, and Germany

Development of OWE projects in the North Sea is driven in part by European Union renewable energy targets (Table 1). In 2009, the European Union implemented the Renewable Energy Strategy (RES) Directive that set an aim for the EU to obtain 20% of its energy from renewable energy sources by 2020 (EU Directive 2009/29/EC, 2009). The EU renewable energy targets were adopted into the national law by EU member states. For Germany, the Netherlands, and the UK, national renewable energy portfolios include deriving energy from offshore wind in the North Sea.

The Netherlands set a national target for the development of 6,000 MW of wind power generation in the Dutch part of the North Sea by 2020 (Seanergy 2020, 2011c). The German offshore wind energy installation target is for 10,000 MW by 2020 and 25,000 MW by 2030 in jurisdictional waters of the North Sea and Baltic Sea (Seanergy 2020, 2011b). The UK has the highest offshore wind installed capacity target of 25,000 MW by 2020 in UK waters in the North Sea and Irish Sea (Seanergy 2020, 2011a).

Table 1: Installed and projected offshore wind energy capacity for the UK, the Netherlands, and Germany

Country	Installed capacity in the North Sea (End of 2011) [MW]	Total installed capacity: all national waters* (End of 2010) [MW]	Consented (End of 2010) [MW]	2020 National targets* [MW]
UK	826	1,341	2,591	13,000
The Netherlands	228	228	2,719	6,000
Germany	60	92	8,435	10,000

Source: Wiersma et al. (2011)

* 2020 National targets are for offshore wind capacity in all national waters, not just the North Sea. For the UK, it includes the North Sea and Irish Sea. For Germany, it includes both, North and Baltic Seas.

These targets collectively translate into a rapid expansion of offshore wind energy production development in the Central and Southern North Sea basin (Veum et al., 2011). The UK, the Netherlands and Germany all have deployed offshore wind energy production projects in their national waters (Table 2). Currently, the UK has installed the largest OWE capacity of any country in the North Sea, with a total installed capacity of 826 megawatts (MW) distributed across six wind parks (Thanet, Lynns & Inner Dowsing, Gunfleet Sands, Kentish Flats, Scroby Sands, and Beatrice). Projects currently under construction in the UK include Sheringham Shoal and Greater Gabbard. The Netherlands operates two wind parks (Princess Amalia and OWEZ) with a combined installed capacity of 228 MW. Germany has developed a demonstration project, Alpha Ventus, with a 60 MW operational capacity. The first commercial OWE project in the German portion of the North Sea, “BARD Offshore 1,” is currently under construction and due to be in commission by the turn of the year 2013/2014 (BARD, 2012). With a 400 MW capacity, BARD Offshore 1 will be the largest single development to date in the North Sea.

Table 2: Offshore wind development in UK, Dutch, and German portions of the North Sea

Country	Wind farm name	Capacity (MW)	Distance to Shore (km)	Year of Completion
UK	Thanet	300	11	2010
	Lynns & Inner Dowsing	194	5	2009
	Gunfleet Sands	172	7	2010
	Kentish Flats	90	10	2005
	Scroby Sands	60	2.5	2004
	Beatrice	10	23	2007
The Netherlands	Princess Amalia	120	26	2008
	OWEZ	108	13	2008
Germany	Alpha Ventus	60	56	2010
	BARD Offshore 1	400	101	2013/2014

In light of both European Union and national renewable energy targets in the UK, OWE construction is being proposed on the Dogger Bank. In June 2008, The Crown Estate, the owner of seabed in UK territorial waters, identified and opened an area of seabed on Dogger Bank as one of nine development zones available to OWE development proposals in the third round (Round 3) of offshore wind farm leasing. Following a competitive tender process in the Round 3 leasing, The Crown Estate awarded the company *Forewind* development rights to the Dogger Bank Zone in January 2010 (Forewind, 2011). The company is now pursuing an OWE project with a target of installed capacity of nine gigawatts (GW) on the Dogger Bank by 2020 and believes that the Dogger Bank Zone has the potential for up to 13 GW (Forewind, 2011). If developed, the Forewind OWE project on the Dogger Bank will be one of the largest OWE projects in the world (Forewind, 2011). As discussed above in Section 2.1, the Dogger Bank has been an area of importance to fishing fleets and conservation interests. The proposed location for the Forewind OWE project on the northern part of a designated Natura 2000 conservation site

raises questions as to whether OWE projects and conservation areas can both be designated in the same area.

2.3 Marine Spatial Planning in Germany, the Netherlands, and the UK

Governance of the waters in Germany, the Netherlands and the UK is controlled in part by overarching global and regional frameworks. International law, such as the United Nations Convention on the Law of the Sea (UNCLOS), is consulted for guidance (UNCLOS, 1982). As member states to the European Union they are all bound to EU directives and initiatives. All three have signed regional conventions, including the Oslo-Paris Convention (OSPAR)(OSPAR Commission, 2013), for international cooperation for the protection of the marine environment in the North-East Atlantic. In addition to these international and regional frameworks, Germany, the Netherlands, and the UK each have established a basis for Marine Spatial Planning in their respective national legal frameworks.

Germany

Germany has a jurisdictional approach to MSP that is similar to the United States whereby the coastal States (the Länder) have jurisdiction for planning within the territorial sea (from shore out to 12 nm) and the Federal government has jurisdiction beyond the territorial sea, over the waters of the German Exclusive Economic Zone (EEZ). Consequently, there are multiple marine spatial planning efforts in German waters on both the North Sea and the Baltic Sea. Several of the Länder, including Mecklenburg-Vorpommern (Baltic Sea) and Lower Saxony (North Sea) have developed plans for state waters by extending their existing terrestrial spatial plans into the territorial sea (Drankier, 2012). The Federal government released the Spatial Plan for the German EEZ in the North Sea in 2009 (BSH, 2009). Because most OWE

projects are planned to be installed in the German EEZ (BSH, 2012), the focus of this study is on the MSP process and corresponding plan created by the Federal government covering the German EEZ.

The Netherlands

In July 2008, the scope of the Spatial Planning Act in the Netherlands was extended to include the Dutch territorial sea and Exclusive Economic Zone (EEZ) in the North Sea (Drankier, 2012). The Spatial Planning Act allowed the national government to develop a strategic policy document, or “structural vision,” for MSP in the North Sea (Drankier, 2012).

The legal basis for MSP in the North Sea is further provided via an amendment to the Water Act in December 2009, which established a national vision for water management in all of the Netherlands, including the Dutch part of the North Sea (Drankier, 2012). Procedurally, the overall policy framework for MSP is found in the North Sea chapter of the Dutch National Spatial Strategy and the current National Water Plan (Ministries of Transport, Public Works and Water Management, 2009a). The Marine Spatial Planning process took about two years to compete.

The United Kingdom

The UK has developed their legal framework for MSP (named ‘marine planning’ in the UK) with the adoption of the comprehensive Marine Coastal Access Act in 2009. The Marine and Coastal Access Act is an overall legal framework for marine management (*Marine Coastal Access Act*, 2009). The statutory authorities for marine spatial planning in the UK are the Marine Management Organisation (MMO), Marine Scotland, the Welsh Government, and the

Department of the Environment Northern Ireland (*Marine Coastal Access Act*, 2009). The focus of this study is the east coast of England and the planning efforts of the MMO.

The MMO is still in the process of developing its marine spatial plans. The English marine area has been divided into 10 plan areas “so meaningful plans can be developed on a manageable scale” (MMO, 2012c, p. 9). Planning for the East Inshore and East Offshore plan areas began in April 2011. In November 2011, the MMO published The Evidence and Emerging Issues Report for the East of England, which summarizes the current status of activities (MMO, 2012b). Informal consultations on the draft vision and objectives for the East marine plans were conducted in March and April 2012. The next step is to “develop options to address the key issues for the East Inshore and East Offshore marine plans.” The MMO intends to have a complete set of plans and an integrated management system covering the whole English area by 2021 (MMO, 2012c).

2.4 Applicability to the United States

The commercial and recreational sectors in the central and southern basin of the North Sea are similar to the commercial and recreational sectors in U.S federal and state waters. Like the UK, the Netherlands, and Germany, economic interests in the United States include shipping, fishing, military interests, oil and gas installations, pipelines, tourism, as well as interests in nature conservation and wildlife protection. Each of these sectors may be impacted by the addition of OWE and/or other marine renewable energy projects in U.S waters. By examining how three industrialized countries with similar economic and social interests to the United States planned for the installations of this new ocean use and addressed spatial disputes with other industry sectors, the United States will be better positioned to consider strategies for adopting the best policy for its jurisdictional waters.

3. RESEARCH APPROACH

A semi-structured interview methodology (Weiss, 1994) was chosen for this study to gather in-depth qualitative information about the marine spatial planning process in Germany, the Netherlands, and the UK, and gather insight for federal and state planning processes in the U.S. about spatial conflicts that arose between different user groups and OWE projects.

A semi-structured questionnaire with a list of subject areas to be covered and a list of questions to suggest lines of inquiry was developed in advance (Weiss, 1994). The subject areas for this study included a discussion of the different resource users in the jurisdictional waters, the marine spatial planning process in each country, the spatial conflicts that arose among OWE projects and other resource users, and how the marine spatial planning process was effective at addressing those issues.

To further explore the means in which MSP was effective at addressing spatial conflicts, categories were modified from conflict resolution training materials from the NOAA Coastal Services Center (2009) describing five primary areas of potential disagreement that frequently serve as sources of conflict:

1. *Facts and Data*: Differing data sources, assessment methods, or interpretations can be a beginning point of conflict and lead to a battle of the experts;
2. *Goals and Interests*: Different parties have different interests and objectives;
3. *Relationships and Structures*: Relationships between different user groups may be marred with conflict when the parties see themselves in competition for limited resources;
4. *Methods and Procedures*: Even when parties agree on goals, they may disagree on strategies for achieving those goals. (e.g. legislative efforts, public education).
5. *Values*: Parties have more intense conflict when contested issues affect core values.

A sixth category of “other” was also added to capture un-theorized variables that do not fit into the above-mentioned categories. The list of the interview questions is attached in Appendix A.

3.1 Interview methodology

In the spring of 2012, in-person, semi-structured interviews were conducted with representatives from three different groups in each country: 1) offshore wind developers, 2) key government officials and 3) environmental non-government organizations. Interview subjects were selected from three groups, in three countries, to capture representative but different perspectives on the issue and lower the likelihood of sample bias. Interview subjects were selected based on their involvement in, or knowledge about, the planning and permitting processes for offshore wind energy projects in their national waters and the North Sea region in general. Sources were identified through published literature and with the help of key informants in the region. A snowball sampling technique was also used in the study to identify people within each group (Weiss, 1994).

In total, fifteen in-person interviews were collected over a two-month period. Each interview lasted between one to two hours and was conducted either at a professional conference in northern Europe or at the interviewee’s office or convenient location in the country of residence. Consistent with semi-structured interview methodology, the interviews unfolded in a conversational manner, offering the participants the opportunity to discuss issues that they felt were important and the researcher the chance to explore un-theorized variables (Clifford, French & Valentine, 2010). The local setting and face-to-face contact with each interview subject added cultural context to each of the interviews.

The notes from each interview were transcribed. Interview data were analyzed and presented by country. Information was categorized using an issue-focused approach,

concentrating primarily on what can be learned collectively from the respondents on the issues of spatial conflict and their experiences with each national marine spatial planning process (Weiss, 1994). Key words and concepts were identified from the interview transcripts in each country and sorted by the following subject areas covered by the semi-structured interview format: 1) each national Marine Spatial Planning process; 2) the resource uses in each jurisdiction; 3) the spatial conflicts that arose among OWE projects and other resource uses; and 4) whether and how MSP was effective at addressing the spatial conflicts.

The effectiveness of MSP at resolving spatial conflicts was sorted by the five primary areas of potential conflict that were defined for this study (NOAA Coastal Services Center, 2009) and a sixth area to capture un-theorized variables (Clifford, French & Valentine, 2010). The five primary areas include: a) Facts and Data; b) Goals and Interests; c) Relationships and Structures; d) Methods and Procedures; and e) Values. The sixth category includes: f) Other Un-Theorized Variables.

4. FINDINGS

The findings reported here are derived from the semi-structured interview research collected in each of the studied countries. Each country's results are structured to capture nuances of each national-level planning effort and discern which aspects of the national-level plan helped resolve spatial conflicts among OWE projects and other resource users.

Accordingly, Section 4.1 reports findings from interview research from Germany, Section 4.2 contains the interview findings collected in the Netherlands, and in Section 4.3 reports interview findings from England. Each of these sections begins with a summary of the planning process in effect at the time the interviews were conducted and is followed by a systematic reporting of interview data gathered and sorted into to the six categories described in Section 3. Section 4.4 describes the similarities and differences observed in the spatial prioritization of OWE projects and other resource uses in the three countries.

4.1 Germany

The agency responsible for licensing OWE projects and developing the marine spatial plan for the Exclusive Economic Zone (EEZ) in Germany is the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie) (BSH). Interview subjects in Germany reported that a substantial increase in permit applications for OWE projects in various locations scattered throughout the German EEZ was a driving force in the federal MSP process. At that time, projects were approved on a case-by-case basis; there was no comprehensive spatial guidance from the BSH on where OWE developments could (or could not) be explored. Both the OWE industry and government respondents interviewed reported that

the process of reviewing OWE permit applications on an individual, case-by-case basis was not working; developers wanted the BSH to provide spatial direction and the BSH recognized the need to plan for OWE projects in the context of other resource users.

In 2003 and 2004, the BSH formed working groups to advise on marine spatial planning in Germany. In June 2004, the Federal Spatial Planning Act was expanded to the German EEZ (Drankier, 2012). The government planner interviewed in Germany reported that in early 2005, the BSH sent a questionnaire to existing users of the sea to gather information. The questionnaire revealed that Germany lacked a comprehensive inventory of all sea uses, and that Germany needed a comprehensive marine spatial plan for federal waters. In 2005, the BSH began to prepare a marine spatial plan for the German EEZ (Drankier, 2012).

The BSH also recognized a need for additional information on the environmental resources in the North Sea when permitting and planning for OWE projects. As part early planning efforts, the BSH conducted an initial environmental assessment to gather information on locations suitable for OWE development (Feldmann, 2003, as cited by Drankier, 2012, p. 18)

A draft marine spatial plan was released in 2008. In the draft plan, OWE projects were limited to specifically designated zones. The OWE representative interviewed reported that the OWE industry viewed development zones as too restrictive and launched a strong lobbying effort (supported by the national renewable energy targets) to force the BSH to amend the draft plan. The lobbying effort was successful and the plan was changed to lift the restriction of OWE to specifically designated areas to allow developers to explore all open areas that are not otherwise precluded by another priority use. The areas originally designated for OWE development were reframed as “incentive areas” for OWE development. Because the BSH had conducted initial environmental studies and “pre-approved” those locations, OWE license

applications for projects in the incentive area were more likely to pass the necessary environmental impact assessments needed for licensing.

The Spatial Plan for the German Exclusive Economic Zone in the North Sea became legally binding at the end of 2009 (BSH, 2009).

(a) Facts and Data

As part of the MSP process, the BSH undertook a comprehensive geographic information system (GIS) mapping effort. This was reported to be a very difficult process, both from the standpoint of making spatial planning designations with incomplete or missing spatial data from some industry sectors (e.g. commercial fishing) and determining priorities when incompatible ocean uses spatially overlapped (e.g. OWE and shipping lanes). In making the maps, the BSH drew guidance from the United Nations Convention on the Law of the Sea (UNCLOS) and other international laws and conventions to map the priority areas for specific uses in existence (e.g., navigation routes, oil and gas lines, and existing cables). These priority areas were labeled as “hard constraints” in the planning process. Mapping the “hard constraints” set boundaries and spatially identified areas where OWE projects would not be permitted because it would spatially conflict with an existing ocean use with a higher priority.

In addition to the “hard constraints,” the map for the German MSP process included advisory information, such as locations designated as Natura 2000 sites, where OWE development would not be permitted.

The map did not include fishing grounds because spatial data on that resource use were insufficient. Fishermen chose not to participate in the MSP process for reasons unclear to this

author. The map also does not include nature conservation areas other than the Natura 2000 sites.

Interview subjects from the three different perspectives interviewed in Germany (OWE, Government, and NGO) reported that the GIS mapping in the MSP process was effective in reducing conflicts between competing resource users over facts and data because it set boundaries and identified specific areas where OWE projects would not be developed.

The government planner and OWE industry representative interviewed reported that the mapping effort was also effective at building relationships and reducing conflicts between the different resource users. The OWE representative stated that mapping identified the areas where there would be strong spatial conflicts with other resource users. The Government planner and OWE representative interviewed in Germany reported that there strong national policy against placing OWE in areas designated for nature conservation. The OWE representative reported that once the shipping lanes were designated, and nature conservation areas were designated, the maps created a “steering effect” for the OWE industry on where to site potential projects and eased tensions with other resource users.

A few criticisms of the MSP process were reported. The OWE representative commented that by the time the German MSP plan was released, the information used to designate incentive areas for OWE development was too old; specifically, that the data used were from 2004, and by the time the plan was released in 2009, the proposed space intended for future OWE development was already claimed by existing developers. Another criticism of the mapping effort came from the NGO representative, who wanted more area designated for conservation.

(b) Goals and Interests

Representatives from the three groups interviewed in Germany all reported that national policy defined the goals and interests in the German MSP process. In particular, the national energy policy and renewable energy targets drove the MSP process in designating areas for OWE development. Competing interests in conservation and tourism pushed back against OWE development interests. The government planner reported that spatial planners had to make compromises; when there are competing interests and limited resources not all expectations can be met. The Government planner reported that it was not possible to fully meet the demands of all industry sectors. However, the MSP process was effective at addressing spatial conflicts by setting priorities based in law and spatially defining areas where OWE projects would not be permitted.

Fishing grounds are not represented in the German plan because of a lack of spatial data and information on fishing areas. Further, it was reported that fishermen have lost all legal battles asserting harm from OWE projects because arguably they still have plenty of space to fish and thus far have been unable to prove negative impacts.

(c) Relationships and Structures

Representatives from all three groups interviewed in Germany reported that relationship building between competing resource groups was a clear benefit of the MSP process. The government planner reported that the MSP process helped to show mutual understandings and helped to identify priorities for the involved stakeholders. The environmental NGO reported that fishermen in Germany chose not to participate in the MSP process and thought this was unfortunate because it benefits all stakeholders to be involved. The OWE representative reported

that it takes “civil courage” to engage with those holding competing interests, and that it benefitted the OWE industry to build relationships with representatives of other industry sectors through the MSP process. Further, the OWE representative emphasized that building relationships with other ocean uses was crucial, and advised that if there is distrust between the user groups, the OWE industry must engage in more consultations than what is legally prescribed (i.e., participating in meetings and planning processes that are not required by law).

Both the OWE industry and an environmental NGO representatives categorized the BSH as neutral and unbiased through the MSP process and reported that these attributes were favorable in both the planning process and final outcome.

(d) Methods and Procedures

Representatives from the three groups interviewed in Germany stated that the formalized procedure of the German MSP process provided structure and reduced conflicts among the sectors. Specifically, the process of speaking with representatives from involved sectors about specific conflicts and then bringing it back to inform the full group reduced potential conflicts among competing resource users.

Both the government planner and NGO representative in Germany commented that MSP needs both a legally binding formal processes and informal processes. The German government planner reported that, in hindsight, it might have been better to hold more side meetings with specific industry groups, like the Dutch process, discussed in further detail in Section 4.2.

The representatives of the three perspectives interviewed agreed that the German MSP process of setting “hard constraints” through legally binding targets and guidelines was effective in making the spatial plan.

The OWE representative interviewed reported that for OWE developers, a five-year adaptive management planning cycle is too long. Developers want their projects to proceed in a cycle, to use information learned from a previous project and apply it to the next project. If the BSH had set a two-year adaptive management cycle for designated wind areas, it would have been harder for the OWE industry to criticize restricting zoning areas. For example, the BSH could have limited OWE development to the designated wind area, and every two years, opened up more area to development. This would show progress toward meeting renewable energy targets and manage the placement of OWE projects. In hindsight, more spatial restrictions could have been placed on the OWE industry to limit the areas where OWE projects could be located. The OWE representative from Germany reported that at the time of our interview, there were between 80-90 license applications for offshore wind parks in the German EEZ that together totaled 40,000 megawatts. This is higher than the 25,000 megawatt energy target for 2030 (Veum et. al., 2011).

Interviewees from all three perspectives in Germany reported that the MSP process came late in addressing OWE development. The original (draft) plan restricted OWE to designated areas determined by the BSH. The OWE industry launched a lobbying effort and convinced the German ministry that the BSH proposal was too restrictive to meet national renewable energy targets. The result was that OWE could not be developed in the “no go” areas, but the rest of the German EEZ was open to potential development.

(e) Values

‘Conservation’ and ‘aesthetics’ were two values discussed in the interviews with German representatives. Both the Government planner and OWE representative reported that spatial

conflicts between OWE projects and conservation areas were settled in part by a firm commitment by the BSH not to license any wind parks in Natura 2000 areas. However, the NGO representative interviewed reported that conflicts with conservation still exist to the extent that the plan does not exclude OWE development in conservation areas of interest other than Natura 2000 sites. The Government planner interviewed reported that a firm commitment by the BSH not to license OWE projects in the territorial sea (within 12 miles of shore) eliminated potential spatial overlaps among OWE interests and tourism waters.

(f) Other un-theorized variables

The Government planner interviewed in Germany reported that the GIS-based maps generated among the nation states through each national MSP process in the North Sea differ in both content and design. Recent attempts to compile a trans-national map of the various activities in the North Sea from the mapping efforts of each country is not working because there is no common, or standardized, legend to piece all the mapping efforts together. The German government planner reported that in order to achieve trans-national MSP on a broader, ecosystem-based level, the neighboring countries needed to agree on the basics, such as colors and intended objectives of the map.

A summary of the findings from the interviews conducted on the MSP process in Germany is presented below in Table 3.

Table 3: Summary of interview findings from Germany

Facts and Data	<ul style="list-style-type: none"> • The mapping process set boundaries and identified specific areas of spatial incompatibility • The mapping process was an aspect of MSP that was most effective in building relationships among different resource groups • By the time the plan was released, some information on the map was out of date
Goals and Interests	<ul style="list-style-type: none"> • National priorities defined goals and interests in the MSP process • Spatial planners must make compromises • MSP did not resolve all conflicts among user groups
Relationships and Structures	<ul style="list-style-type: none"> • The MSP process helped to show mutual understandings and helped to identify priorities • Designating areas where OWE projects would not go (the “no go” areas) improved relationships with other resource users • Mapping was an aspect of MSP that was most effective in building relationships among different resource users
Methods and Procedures	<ul style="list-style-type: none"> • The formalized procedure of MSP provided structure • The process of speaking with people from involved sectors about specific spatial conflicts and reporting the findings to the full group of stakeholders reduced potential conflicts • Legally binding targets and guidelines offer direction for planning • The procedure could have been improved by holding more individual meetings with involved industry groups to resolve specific spatial conflicts (as in the Dutch process) • A 5-year adaptive management planning cycle is too long for OWE project developers. A 2-year adaptive management planning cycle may have given the BSH more control over the placement of OWE projects • The MSP process came too late to proactively plan for OWE developments
Values	<ul style="list-style-type: none"> • A firm commitment that there would be no OWE development in Natura 2000 areas helped settle disagreements between OWE and conservation areas • The plan does not exclude OWE development in conservation areas of interest apart from Natura 2000 sites • A firm commitment not to license OWE projects in coastal areas helped settle disagreements between OWE and tourism sectors
Other	<ul style="list-style-type: none"> • Trans-boundary miscommunications can arise over misinterpretations of different MSP processes

Note: Comments in red type are shortcomings observed in the MSP process

4.2 The Netherlands

A government planner involved with MSP in the Netherlands reported that applications for OWE projects drove the MSP process in the Netherlands. Prior to the establishment of the MSP process in the Netherlands, licensing for OWE projects was determined on a case-by-case basis. A large increase in OWE permit applications throughout the Dutch portion of the North Sea created a need for a comprehensive spatial plan to inform the permitting and placement of OWE projects in relation to other existing users.

A NGO representative interviewed in the Netherlands reported that MSP in the Netherlands and other countries with an Exclusive Economic Zone (EEZ) in the North Sea was born out of a necessity; the increasing use by different industry sectors raises safety concerns that need to be addressed through spatial planning.

The MSP process in the Netherlands appeared to be more flexible than other jurisdictions to changing the location of existing ocean uses (e.g. shipping lanes) to create space for other resource users (e.g. OWE production). Interview research found that the Dutch government assessed information gaps by holding plenary discussions with representatives from all sectors and by holding individual meetings between the sectors involved in the specific conflict. The government commissioned research studies, cost-benefit analyses and environmental impact assessments. After the information was obtained, the Dutch government held negotiations with the disputing parties until they reached agreement on the spatial plan.

One government planner interviewed from the Netherlands reported the MSP process took about two years to complete and that there was consensus on about 80% of the plan.

(a) Facts and Data

Government planners in the Netherlands reported that disputes over facts and data were identified in the MSP process by holding meetings with all stakeholders, as well as individual meetings with the involved parties. When issues over missing (or inconsistent) data were identified, the government commissioned studies to address the problem. This combination of meetings and commissioned reports resolved potential conflicts among ocean uses over facts and data.

To illustrate, one disagreement that arose during the MSP process was over the safe distance the shipping industry needed for a buffer zone around OWE developments. The wind industry maintained that the safe distance needed was 500 meters. The shipping industry maintained that it needed a 2-nautical mile buffer. To solve this factual disagreement between the sectors, the Dutch government conducted a simulation using shipping captains to test the traffic situation, and concluded that 500 meters was sufficient. In a second example, information was lacking about the impact of offshore wind parks on birds. The Government planner interviewed reported that the Dutch government commissioned a study to address that question.

The MSP process in the Netherlands was also useful in assessing and addressing cumulative effects on the environment. By creating a forum that assembled all resource users, it was possible to discuss an environmental problem (e.g., the adverse effects of increasing noise on marine mammals) and gather input from all resource users that are contributing to the problem (e.g., shipping, sand extraction, and OWE project installations that add noise to the marine environment) and collectively propose solutions to the problem.

One Dutch government planner interviewed expressed caution in dealing with scientific uncertainty in marine spatial planning. The planner reported that a danger of science is that participants can become mired down or paralyzed by the high levels of environmental

uncertainty and information gaps. The government planner advised that in any spatial planning process it is important to bring discussions back to the goals of the MSP process, and frame research questions to address spatial issues.

(b) Goals and Interests

Interview subjects from all three groups in the Netherlands reported that national policy shaped priorities in the MSP process and was a means to settle differences over conflicting goals and interests. Determining areas for OWE development in the Netherlands was driven by the national renewable energy targets.

A government planner in the Netherlands reported that including all user groups in the planning process was a clear benefit of MSP because it prevented one interest from dominating over other interests. The MSP process was a means for the government planners to engage with all the industry sectors and to get the individual sectors to interact with one another. A government planner reported that discussions were held in meetings with all user groups together, as well as one-on-one, through the planning process with a goal of obtaining consensus on the plan.

All interview subjects in the Netherlands commented that ‘negotiations’ are a part of Dutch culture. A government planner interviewed reported that cultural nuances frame the underlying procedures and outcomes of planning process. For example, the Germans are more in favor of formal processes and want things to be legally binding, while the Dutch are negotiators and like to debate. Accordingly, the planning process in the Netherlands contained multiple rounds of negotiations between competing interests, in attempts to reach agreement.

(c) Relationships and Structures

A government planner in the Netherlands reported that the meetings and structured negotiations in the MSP process were effective in improving relationships and resolving potential spatial conflicts between incompatible resource users. Informal one-on-one meetings were also reported to improve relationships between the government planners and industry representatives, as well as the relationships between the different interest groups.

The OWE representative and NGO representative interviewed in the Netherlands gave different responses on the treatment of stakeholders in the MSP process. The OWE representative reported that the government planners were responsive to stakeholder input. However, the NGO representative interviewed criticized the Dutch stakeholder process for not being “balanced and transparent.”

(d) Methods and Procedures

One benefit reported of the MSP process in the Netherlands is that it created a forum for the government to talk to all the resource users and for the resource users to interact with one another. Both the government planner and NGO representative reported that MSP is valuable preparation for more formal legal processes because it allows incompatible sectors to work out differences and before filing formal legal complaints.

A government planner interviewed in the Netherlands emphasized the need to involve all resource users in collective discussions to ensure that agreements to resolve one spatial conflict between two sectors does not result in creating different spatial conflicts with other sectors. To illustrate, a proposed OWE development was located too close to a shipping lane. A preferred solution to the problem was to move the shipping lane, until it was discovered that the new

location of the shipping lane would interfere with an existing oil and gas lease. Negotiations were held with all involved parties to reach an agreement.

The NGO representative interviewed commented that the Dutch plan was “too abstract” and criticized the process for only mapping current activities. The NGO representative reported that marine spatial planning should address future uses of the sea, and that this forward-thinking planning has not yet been accomplished in the Netherlands.

(e) Values

When speaking with interview subjects in the Netherlands concerning contested issues over core values, all reported that national policy directives and a balancing of interests are part of the process. In the Netherlands, interview subjects reported that OWE and shipping are two industries that rank high on national priorities. However, in balancing energy needs with aesthetic values, a desire to preserve the unobstructed views of the horizon from the shoreline translated into a policy that prohibits new OWE projects from being licensed within 12 miles from the shore.

(f) Other un-theorized variables

The government planners and the NGO representative interviewed in the Netherlands raised trans-boundary miscommunications as issues in the MSP process. Multiple individuals reported that the maps for MSP have different meanings to each country. For example, in Denmark, search areas designated for OWE development are well defined. However, in the Netherlands, an NGO representative reported that the maps are “suggestions”.

One interview subject reported that a dispute between Belgium and the Netherlands over the placement of a wind farm on the Belgium border was in part due to an incorrect interpretation of different color symbols used on the Dutch and Belgian maps, leading to a communication problem. Specifically, the colors used on the Belgium map mean different things than the same colors on the Dutch map, which led to a misunderstanding and a misinformed placement of an OWE project.

A summary of the findings from the interviews conducted on the MSP process in the Netherlands is presented below in Table 4.

Table 4: Summary of interview findings from the Netherlands

Facts and Data	<ul style="list-style-type: none"> Conflicts over facts and data were identified through meetings with industry representatives and interest groups The government commissioned studies and reports to help solve specific questions The approach addresses issues of cumulative effects on the environment by bringing together all groups that are causing similar environmental effects High levels of environmental uncertainty and information gaps still exist
Goals and Interests	<ul style="list-style-type: none"> National priorities defined goals and interests in the MSP process. The process of including representatives from all sectors together prevented one interest from dominating over other interests Understanding the culture of the people in the planning region is necessary in the MSP process
Relationships and Structures	<ul style="list-style-type: none"> MSP creates a forum for improved communication MSP improved relationships among incompatible resource users Agency neutrality was important in getting people to cooperate
Methods and Procedures	<ul style="list-style-type: none"> The MSP meetings were seen as preparation for more formal legal processes Discussions and negotiations between the government and stakeholder groups were central to the process The MSP process brought together all resource users into one forum There were common rules of engagement Mapping current uses does not strategically or adequately plan for future needs The planning boundaries were too abstract Stakeholder process was not a balanced and transparent process MSP should consider future ocean uses and socio-economic needs
Values	<ul style="list-style-type: none"> MSP is based on national priorities. MSP must balance economic uses with conservation values. A firm commitment not to license OWE projects in coastal areas helped settle disagreements between OWE and tourism sectors.
Other	<ul style="list-style-type: none"> Trans-boundary miscommunications can arise over misinterpretations of different MSP processes

Note: Comments in red type are shortcomings observed in the MSP process

4.3 England

The government agency responsible for MSP in England is the Marine Management Organization (MMO). While the MMO was formally established only four years ago by the Marine and Coastal Access Act 2009, interview subjects in England reported that marine planning was triggered as early as 1999 when the government focused attention on marine renewable energy and recognized the need to plan for this new ocean use in an already crowded sea area.

At the time of this study, The MMO was still early in the planning process and had not released a marine plan or a draft plan to the public. The agency was actively engaged in public outreach efforts including stakeholder workshops and national events, and gathering evidence from all ocean uses (MMO, 2012b). Its next step is to develop scenarios to assist in deciding the direction it wants the planning process to go in the next 20 years (MMO, 2012a).

A second entity involved with MSP in England is The Crown Estate. The Crown Estate is a statutory corporation in the UK that was formed under the Crown Estate Act 1961 to manage property that is owned by the Crown in trust (*Crown Estate Act*, 1961). The Crown Estate is independent of the government and the monarch and is charged with managing property assets belonging to the monarch in “a commercial and sustainable way to maintain and enhance their value and the financial return they deliver” (The Crown Estate, 2013a). The marine asset portfolio of The Crown Estate includes nearly the entire seabed from the shore out to the 12 nautical mile territorial limit and approximately one-half of the foreshore in the UK (The Crown Estate, 2013b). The Crown Estate manages and issues licenses or leases for multiple commercial activities on the seabed including marine minerals extraction, OWE projects, wave and tidal renewable energy, aquaculture, cables and pipelines, carbon storage, and natural gas storage (The

Crown Estate, 2013c). It has a commercial mandate to optimize returns from its assets (The Crown Estate, 2013a).

In 2009 The Crown Estate recognized a need for a coordinated approach to its asset planning. As a result, it developed a GIS-based tool called the Marine Resource System (MaRS) to identify areas of opportunity within the marine estate and to promote a long-term decision process. The MaRS system is used internally by The Crown Estate and is available to OWE developers, but is not available to the public. (Seanergy 2020, 2011e).

The Crown Estate and the MMO share common objectives relating to marine planning and development of the seabed in England. In February 2011, The Crown Estate and the MMO signed a Memorandum of Understanding (MOU) that recited the responsibilities of each party and established general principles for their cooperation (*Memorandum of Understanding [MOU]*, 2011). The aim and purpose of the document was to “to encourage cooperation and coordination between the parties in relation to the sustainable development of the seabed and rights managed by The Crown Estate, based on active engagement, shared information and effective marine planning and management by the parties” (*MOU*, 2011, p. 1). The Crown Estate is providing technical assistance to the MMO in England and other government agencies engaged in marine planning in the UK.

The Crown Estate is therefore involved in MSP in England in three different capacities. First, as the manager of the seabed and foreshore in England, The Crown Estate is a “stakeholder” in the MSP process. Second, because of its legal responsibility to manage the marine assets of the Crown, The Crown Estate is an “asset planner” with its own staff and resources developing planning tools to meet its own objectives. Finally, The Crown Estate has

extensive knowledge of key commercial activities in the marine environment and serves as an “advisor” to the MMO, working with the government agency in a spirit of cooperation on MSP.

Because The Crown Estate is significantly engaged in marine asset planning in England, a representative from the Crown Estate was interviewed in addition to representatives from the three different groups.

(a) Facts and Data

When questioned about whether the MSP process in England reduced conflicts between competing resource sectors over “facts and data,” the representative from the OWE industry interviewed in England reported that transparency with the MMO was the most effective aspect of the English MSP process in resolving potential conflicts between the different industry sectors over facts and data. The representative expanded to say that she felt that the MMO was listening and communicating openly with all stakeholders, and that this open communication was keeping everyone informed of the same information.

A representative interviewed from The Crown Estate reported that the Marine Resource System (MaRS) developed by The Crown Estate addresses issues concerning data and offers a means to reduce risk in the English planning process through GIS mapping. Over the last three years, The Crown Estate has assembled more than 400 data layers from 42 data providers into MaRS. By using 400+ mapping layers in MaRS, The Crown Estate checks for technical constraints, cultural conflicts, physical obstructions, as well as ecological and environmental conflicts. The MaRS system maps areas deemed as “hard constraints” (e.g., cables and pipelines, existing wind farms, existing leases, non-compatible uses, ship wrecks), meaning areas where existing uses are spatially incompatible with new OWE development. It also maps areas that The Crown Estate termed as “soft constraints,” (e.g., fishing and conservation areas) where

existing uses may or may not be compatible with new OWE development. The MaRS system considers government policy, international and national laws, and internal guidelines at The Crown Estate.

To process all data collected, the MaRS system uses a multi-criteria analysis. One result from the analysis is a “Restriction and Exclusion model” that shows potential areas for OWE development ranging from least to most constrained. This model is used to advise both government and industry on where to place OWE considering multiple factors from multiple sources. A researcher interviewed from The Crown Estate reported that the planning tool proactively assesses future potential by flagging areas of interest, such as potential marine renewable energy sites, that need to be preserved for the future.

However, a government planner interviewed in England commented that the MaRS Restriction and Exclusion model may be too conservative for marine planning purposes because it assumes incompatibility between resource users and does not encourage discussion or promote innovation for the co-use of marine space by multiple uses. The government planner reported that such opportunities for co-use couldn’t be fully explored using just the Crown Estate’s MaRS system alone. The GIS-mapping tool is limiting because it prioritizes competing activities in each area and awards exclusive control to one user group uses without exploring opportunities for co-use. At the time of this interview, the MMO was considering the scope of the national marine spatial plan that they will develop, and what maps and resources will be required to fulfill that scope.

(b) Goals and Interests

The topic of “exploring opportunities for co-use ocean space” was discussed in interviews with the NGO representative and government planner. Instead of focusing on incompatibilities between resource uses and establishing zones of exclusion, both interview subjects reported that MSP offers an opportunity to think creatively about how we use ocean space and ask the question: which ocean uses are compatible? For example, can oil and gas exploration coexist with OWE installations? What are the issues of concern? If access to oil and gas platforms by helicopter is an issue of concern, how do we resolve the problem? By thinking creatively about resolving the problems of one industry working with another industry, some spatial conflicts may be resolved.

The government planner interviewed reported that instead of focusing on incompatibility among resource users, the MMO is exploring a more optimistic view of co-use of ocean space. If marine planners, developers and competing resource users can use the MSP process to break through assumptions of incompatibility and think about how the future of one industry can work with the future of another industry, some combinations of ocean uses might not be as much in conflict as is currently thought.

All subjects interviewed in England reported that MSP is a valuable means for the government to determine the attitudes, perceptions, and priorities of the people in the planning region. The government planner stated that, “marine planning is as much a socio-political exercise as it is a technical one.” The OWE representative interviewed reported that social science research on regional values offers valuable guidance to commercial developers on suitable locations and types of developments that will be permitted in the planning area. The

NGO representative expressed that face-to-face meetings and a forum for all industry sectors to engage with one another was a top benefit of the MSP process.

All three groups interviewed in England reported a clear national preference for OWE development in the UK. A NGO representative interviewed reported that the national energy policy target to generate 20% renewable energy by 2020 (EU Directive 2009/29/EC, 2009) is a factor that brought groups with differing goals and interests together. The NGO representative further commented that government says it considers environmental, social, and economic factors when making sustainable development decisions, but it is common that “jobs and money win out.”

The OWE representative in England responded that a shared interest in job creation and stimulation of the economy brought diverging interests together to support OWE development.

The government planner and the NGO sector reported that identifying and respecting the culture of the people in the planning region is necessary in the MSP process.

(c) Relationships and Structures

Both the NGO and OWE representatives interviewed reported that the MMO approached the planning process with honesty and transparency, and that the stakeholder engagement was effective at building relationships among different resource groups. The OWE representative stated that the OWE industry was initially concerned that the planning focus was going to be centered on conservation, but they feel like they get information from the MMO and are part of the process. Both the NGO and OWE representatives interviewed reported that the MMO has done a good job of appearing neutral in the process. The government planner interviewed reported that agency neutrality is necessary in getting the different groups to cooperate.

One NGO representative interviewed in England reported that engaging face-to-face with representatives from different industry sectors was the top benefit of the MSP process in building relationships and reducing potential conflicts. The NGO representative expanded to say that MSP helps to open dialogue among the differing resource users, build mutual trust, and provide the groundwork for discussion.

The NGO representative interviewed emphasized the need to involve all resource user groups in the MSP process, and provided a message to those not willing to participate: “If you don’t get involved, someone else will make the decision for you.”

(d) Methods and Procedures

All interview subjects in England reported that a benefit of MSP was the creation of a forum for dialogue between all resource users.

Representatives from each of the three groups interviewed in England also reported that MSP benefits industry by adding certainty in the planning and permitting processes. The government planner interviewed reported that high levels of environmental uncertainty and tight profit margins early in the development of OWE projects made it difficult for the OWE industry to fund necessary environmental studies. The government planner further reported that marine planning was an approach favored by the OWE industry for a number of reasons: MSP identified key issues early in the planning process and, as a result, reduced costs of litigation by addressing potential conflicts between industry sectors competing for the same spatial areas earlier in the permitting process. The government planner reported, however, that no industry sector wants to have “their hands tied”, or to be limited to development in certain areas.

An NGO representative interviewed expressed concern that the marine plan being created by the MMO will not draw hard, clear boundaries for particular resource uses; that the plan will be a high-level “guidance document” describing what “should” happen and not firmly direct what activities will be allowed in what space. The NGO representative expressed a desire for the MMO to make clear restraints and draw clear boundaries, even if it is controversial. A government planner involved in the MSP process reported that instead of focusing on a designation of restricted use areas on the map, the value of MSP is in the actual planning process.

The government planner and the NGO representative interviewed commented that even with a formalized marine spatial plan, spatial conflicts at sea would still exist.

(e) Values

All subjects interviewed in England reported that MSP is an effective means for the government to determine the attitudes, perceptions, and priorities of the people in the planning region. All subjects interviewed also reported that there is strong public support for OWE projects in England. The OWE representative interviewed stated that economic development and job creation were considered more important than the aesthetic values of an open horizon, and OWE projects have been approved within line of sight from the shore.

In addition, interview subjects in England did not view OWE projects as mutually exclusive from nature conservation values. An NGO representative interviewed reported that the spatial compatibility of OWE projects and nature conservation areas depends on the attributes of the protected site; instead of drawing a hard line excluding OWE project development from marine protected areas, evaluate why that particular area is valued for

conservation and whether the presence of an OWE project could preclude the use of more damaging activities. The NGO representative further reported that it is possible that OWE projects could reduce greater impacts that greenhouse gas emissions and climate change may have on marine protected areas.

A summary of the findings from the interviews conducted on the MSP process in England is presented below in Table 5.

Table 5: Summary of interview findings from England










Facts and Data	<ul style="list-style-type: none"> • Agency transparency and information sharing reduces conflicts among conflicting industry sectors over facts and data • The Crown Estate GIS-based mapping system (MaRS) flags areas of conflict and opportunity • The MaRS analysis may be too conservative by not exploring opportunities for co-use
Goals and Interests	<ul style="list-style-type: none"> • Exploring opportunities for co-use in the MSP process is a way to align goals and interests. • National priorities defined goals and interests in the MSP process • Understanding the culture of the people in the planning region is necessary in the MSP process • A shared interest in job creation and stimulation of the economy brought diverging interests together to support OWE project.
Relationships and Structures	<ul style="list-style-type: none"> • Information sharing and agency transparency improves the MSP process • Agency neutrality is necessary in getting user groups to cooperate • Face-to-face meetings help to open dialogue, build mutual trust, and lay the groundwork for discussion • Meetings involving all resource user groups builds
Methods and Procedures	<ul style="list-style-type: none"> • MSP creates a forum for dialogue between the resource users • The MSP process adds certainty to industry for project development • Proactive planning identifies key issues early and reduced potential spatial conflicts • Reduces time and resources needed for litigation • No sector wants a plan that limits use to certain spatial areas • There is a concern that the marine plan released from the MMO will not draw hard, clear boundaries for particular resource uses • MSP will not eliminate all conflicts
Values	<ul style="list-style-type: none"> • Strong public support for OWE projects in England • Nature conservation areas and OWE projects may be compatible
Other	<ul style="list-style-type: none"> • N/A

Note: Comments in red type are shortcomings of the MSP process

4.4 Similarities and differences in national treatment of other ocean uses

In each of the three countries studied, interview subjects reported that MSP was born out of necessity to account for all the different uses in the sea and provide spatial organization and guidance for suitable placement of fixed wind turbines in relation to other ocean uses. OWE project developments present a particular challenge with regard to the marine environment because each project takes up a large amount of physical space and largely excludes other resource users. Table 6 below highlights some reasons why other resource uses are not spatially compatible with OWE projects.

Table 6: Potential spatial conflicts with other resource users

	Offshore wind energy (OWE) development: Requires fixed structures and spatially excludes other ocean uses.
	Tourism and Aesthetics: Many people who travel to the shoreline value the unobstructed view of the open horizon and object to wind turbines offshore.
	Shipping: The fixed location of wind turbines could create navigational hazards, increase safety concerns, and potentially block port access. Shipping is generally prohibited within OWE sites,
	Gravel and Sand Extraction: Extraction of sediments from the seafloor cannot occur under wind turbines or the cables that transmit electricity to shore.
	Oil and Gas: Location of wind turbines could exclude exploration and development of additional resources in the same area, and impede helicopter or boat access.
	Nature Conservation: Environmental impacts of wind turbines on birds, marine mammals, and fish are largely unknown. Some suggest that fish populations increase around OWE installations.
	Military and National Security: Artillery testing areas and explosives can damage wind turbines. Other spatial conflicts may also arise because maneuverability is reduced.
	Fishing: The potential of fishing gear coming in contact with the wind turbines or cables prohibits fishing in offshore wind parks. Fishermen argue that these areas can serve as <i>de facto</i> protected areas from fishing.
	Cables and Pipelines: Wind turbine developments could damage cables (e.g., electricity or telecommunications) and pipelines (e.g., oil and gas transport) on the seabed, and may also block future access for new cables or pipelines.

All interview subjects observed that MSP is valuable mechanism for addressing spatial conflicts among the OWE production projects and competing ocean uses. However, there were differences among the three study countries on how each planning effort prioritized other ocean uses in spatial conflict with OWE project installations:

- Coastal defense. Coastal defense in the form of sand extraction for building material is a high priority resource use in the Netherlands. Accordingly, government planners in the Netherlands reported that the MSP process prioritized the preservation of areas for sand extraction over other uses in Dutch waters. Sand extraction for coastal defense is not as high of a priority use in Germany, and did not spatially preclude the licensing of OWE projects. Sand extraction was not a subject raised by those interviewed in England.
- Nature Conservation. Interviewees from Germany and the Netherlands reported that each of those two countries had a strong national policy that wind farms are not compatible with marine protected areas. One environmental concern is that the establishment of wind farms is considered to be a consumptive use that destroys the natural soft-bottom habitat. In creating the marine spatial plan in Germany, there was a firm commitment by the BSH that there would be no newly permitted wind parks in Natura 2000 sites. In contrast, the UK has opened opportunities for wind energy production development in Natura 2000 sites. The English are exploring the possibility that wind farms and marine protected areas can coexist, depending on the environmental attributes of the protected site. One study suggests that fish populations increase around OWE installations (Leonhard et al., 2011). Licensing of projects in nature conservation areas is still

contingent upon the approval of European Union and national environmental protection laws and environmental impact assessments.

- Aesthetics. In Germany and the Netherlands, wind parks are not (any longer) being licensed in the coastal areas within sight of the shore. The public sentiment against seeing a wind turbine from the shore in the Netherlands and preserving an unobstructed view of the coast is so strong that new OWE projects will not be permitted within a 12 miles of the shore (Ministries of Transport, Public Works and Water Management, 2009b). In Germany, wind farms are not licensed in the coastal areas (within 12 nautical miles from shore), because of conflicts with the tourism sector and concerns about oil spills and accidents. This is not the case in the UK; existing and future offshore wind farms are licensed in areas within sight of the shoreline.
- Fishing. While there is a spatial dimension to fishing, it is not a static use and is difficult to plot on a marine spatial plan. None of the three countries studied allows fishing in offshore wind farm areas, and no compensation is paid to fishermen for displacement from space occupied by wind farms. Fishermen argue that offshore wind farms are de facto marine protected areas as far as fishing is concerned. In Germany, fishermen have lost all legal battles, because arguably they still have plenty of space to fish and thus far have been unable to prove negative impacts. In Germany, the spatial map does not include fishing grounds because of a lack of spatial data and information on fishing areas.

- Shipping. Shipping in the North Sea and a major concern is the amount of space needed as a “buffer zone” between shipping lanes and offshore wind farms to ensure that vessels can safely navigate the waters. Germany and the UK have each set a two nautical mile buffer zone around shipping lanes to protect against vessels accidentally losing their maneuverability. The Netherlands determined that two nautical miles was not necessary and that a 500-meter buffer zone, in most cases, was sufficient. In addition, the BSH and The Crown Estate mapped existing shipping lanes in Germany and the UK as a “hard constraint” that excludes offshore wind development. In the Netherlands, shipping lanes are not considered to be hard constraints, and if needed, can be changed following the proper formal processes with the International Maritime Organization (IMO).

In summary, the expansion of economic development offshore results in both an increasing demand for ocean space by each interest group and increased conflicts over space and resources. No planning process is perfect; interview subjects from all three countries reported that marine planning came much too late to proactively address the siting of OWE projects. In Germany, interview subjects reported that MSP did not develop quick enough to fully inform national planning and permitting decisions for OWE. In the UK, the MMO is in the process of developing marine plans while Forewind is already proceeding with OWE development on the Dogger Bank. In the Netherlands, interview subjects expressed concern that the marine spatial plan was too vague and lacking specificity for OWE development.

5. DISCUSSION

The primary lesson derived from this qualitative study is that marine spatial planning (MSP) is an important tool for anticipating and managing conflicts that arise between OWE and other ocean users. Information gathered from multiple subjects indicates that MSP in three European nations was born out of necessity to account for multiple competing uses of the sea in order to provide spatial organization and guidance for suitable placement of fixed wind turbines in relation to other ocean uses. While OWE served as an initial driver in the MSP process, current drivers also include the need to protect nature and biodiversity in the marine environment, and address cumulative environmental effects of the increasing activities at sea (Seanergy 2020, 2011d). Key findings on how MSP addresses spatial conflicts among the OWE production projects and competing ocean uses are highlighted below:

“MSP is as much a socio-political exercise as a technical one” --Marine Planner, England

Common themes from the interviews suggest that the greatest value added emerge from issues around relationships and structure and around methods and process. First, building trust between the different stakeholder groups is a theme that ran through all interviews in each country. Advice from a German OWE representative was to “build relationships” with representatives from different industry sectors. Second, building trust with the planning authority was also a common theme; interview subjects in all three countries listed “agency neutrality” as an important aspect of marine spatial planning. One Dutch planner remarked, “Neutrality is very important in getting people to cooperate. Train your staff to be neutral and learn how to deal with difficult people.”

“The greatest benefit of MSP was face-to-face meetings” --NGO representative, England

The benefits of MSP are realized in both the formal and informal elements of the process. Formal elements, such as a legal mandate helped to implement vision for the MSP process. The fixed procedure helped bring resource users together. By having all user groups in one place, government agencies could work with all sectors to address spatial conflicts between specific groups. In addition to the formal processes, most individuals interviewed for this study remarked on the benefits of informal processes surrounding the formal MSP process. One respondent reported, “People relaxed because it was not an official process, and talked. It developed information for the formal process to follow.” Having all the people in one place and managing human expectations through a clearly defined formal process is a key component of any MSP effort, but having alternative informal engagement made the formal processes more productive.

“Marine Spatial Planning is more than just crude lines drawn on a map”

In each country studied, GIS-based maps were used to make the marine spatial plans. However, the maps have limitations, in that a set of data-layers to a map created for MSP in one country does not necessarily correspond to the content of maps used for MSP in a neighboring country. In the Netherlands, for example, the maps used for marine spatial planning are not as detailed as the German MSP or The Crown Estate MaRS system. One Dutch ENGO stated, “For the Dutch, the maps are suggestions.” As a result, trans-national marine planning for the whole North Sea ecosystem continues to be a challenge because the national-level maps do not connect with one another. In order to use GIS-based maps on a larger, trans-boundary scale, multiple

interview subjects report that neighboring countries need to agree on the basics, such as color and symbol designations for particular ocean uses and/or features, as well as the planning objectives for the map.

“We used law and policy to define priorities” --Marine Planner, Germany

International and national laws, government policies, and internal guidelines provided a working framework to each of the national MSP processes, and assisted in resolving spatial conflicts among competing ocean uses.

National policy was a topic of discussion in all the interviews. A government official from the Netherlands opined that national energy policy and renewable energy targets drove the priorities in the Dutch marine spatial plan. Interview subjects from all three sectors in England remarked that there is a clear national policy preference for renewable energy production in the UK. Similarly, all interview subjects from Germany commented that the German government is in favor of offshore wind energy production development.

“Culture and regional priorities matters” --Marine Planner, the Netherlands

Culture must always be respected in the planning process. As one Dutch official told me: “the Germans are more in favor of formal processes and want things to be legally binding. The Dutch are negotiators; they follow underlying principles (i.e., precautionary principle) and like to debate.” The English, still in the initial MSP process, are seeking a middle ground. One English interviewee commented that “the British tend to be more waffly.” Because of the cultural differences between the Netherlands, Germany and the UK, each has different styles in the

national approach to the planning process, and the different nuances came through in the interviews. The German planning process, for example, was founded on “hard constraints” derived from international law and policy guidance, while the Dutch process appeared to focus more on rounds of meetings and settlement negotiations with involved industry sectors. English process is not finished at the time of this study, but the impression of this author is that the intensive outreach and stakeholder engagement by the MMO suggests the makings of a well-informed, forward-thinking planning effort.

6. RECOMMENDATIONS

With the growing demand for domestic sources of renewable energy, advances in technology, and the existence of strong steady waves, winds and tidal flows off U.S. coastlines, it is foreseeable that the number of offshore renewable energy projects proposed and ultimately installed in U.S. waters will also increase. Experiences gathered from offshore wind developers, government officials, and individuals from environmental non-government organizations from the UK, the Netherlands, and Germany strongly suggest that MSP is a valuable mechanism for addressing spatial conflicts with competing or conflicting ocean uses, and that in hindsight, the MSP process should have been started earlier to better inform placement of OWE projects. It is not practical to assume that one marine plan from another country can be directly transposed to work in one or all of the state and federal processes in the United States (Adolino & Blake, 2011). However, by looking at the three different national processes from three different perspectives, four essential lessons for improving marine planning efforts in U.S. have emerged and are highlighted below:

1. Focus on the planning process in addition to addressing matters of content:

This study finds that MSP is effective at identifying and resolving spatial conflicts among competing interests by improving relationships and spatially accounting for and defining locations suitable for particular types of activities in one comprehensive management plan. The fundamental core components for the planning process include defining and communicating purpose, goals, and methods. Before addressing matters of content, it is useful to structure rules of engagement to encourage direct dialogue between the industry sectors as well as concerned

NGOs. It is also necessary to include all sectors in the MSP process. Creating a forum in which all interests are represented is a means to define scope, identify areas of potential or actual spatial conflict among user groups, and work towards a workable solution.

2. Decision-making and implementation of MSP should be on appropriate scales:

The United States has 95,471 miles of coastline (NOAA Shoreline Website, n.d.). This is too large of an area for one marine spatial plan. U.S. federal MSP efforts would be best implemented on a spatial scale small enough to capture the cultural nuances and the differing ecological, social and economic priorities of the states and regions. This recommendation supports the current direction of the National Ocean Council to develop and implement federal marine spatial plans over nine regions in the United States. National guidance should provide flexibility that recognizes appropriate scale but at the same time allows for overarching guidance and objectives for scaling up of regional plans.

3. Harmonize data processing tools and content with neighboring jurisdictions:

Many ocean uses (i.e., commercial fishing and shipping) extend beyond individual state and national jurisdictional boundaries. For this reason, trans-state and/or trans-national MSP is a valuable “next-step” needed to sensibly plan for ocean uses that either utilize or impact multiple jurisdictions. Because MSP is relatively new in the United States, marine planners are in a good position to learn from the miscommunications and sector conflicts that have arisen along jurisdictional boundaries in Europe and, therefore, proactively plan to avoid similar foreseeable problems. Marine planners in neighboring states and regions in the United States should cooperate to 1) standardize methods for data collection and data reporting to an extent

practicable, and 2) understand MSP goals, objectives, and policy intentions behind the data collection efforts in the neighboring jurisdiction. This includes areas within the United States as well as beyond national boundaries (e.g., Canada, Mexico, Cuba, and other Caribbean nations). By establishing a common legend for GIS mapping and data collection, and by opening lines of communication between the multiple state and/or countries that govern space within in a larger common ecosystem, research gathered in one jurisdiction can be understood and used by others in foreign and neighboring jurisdictions to address cross-border impacts.

4. Utilize multi-disciplinary teams in the planning process:

Conflicts among competing and conflicting resource users were effectively avoided and/or resolved through existing legal and policy instruments. Social science research on local values offers valuable guidance to both government regulators and resource users on suitable locations and types of developments that will be permitted in particular areas. Gauging impacts of different activities, as well as cumulative impacts from multiple activities, in the marine environment requires scientific input and analysis. Multi-disciplinary teams are therefore needed with experts in international and domestic law and policy to advise on legal constraints and opportunities, social sciences to assess the socio-economic factors and priorities in the jurisdiction, and natural sciences to ensure that the best available environmental data is incorporated into spatial planning decisions.

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APPENDIX A: SEMI-STRUCTURED INTERVIEW QUESTIONS

About the Interview Subject:

- Q: Do you have experience or knowledge about the development of the national marine spatial plan?
- Q: Are you involved or familiar with the planning or permitting of offshore wind energy (OWE) projects?

About competing ocean uses:

- Q: What are the main ocean uses/users in these jurisdictional waters?
- Q: Which ocean uses/users would you consider most likely to be "competing" or "incompatible" uses with OWE projects in this country?
- Q: Which ocean uses do you think are possibly compatible with OWE projects in this country?

About the use of marine spatial planning to resolve user-user spatial conflicts.

- Q: Why was a marine spatial plan created? What was the primary “driver” or drivers”?
- Q: Tell me about your experience with marine spatial planning in this country.

I would like to ask about your experience with the following five different ways in which disagreements can occur:

1. Facts and Data: Disagreements can arise over the use of different data sources, assessment methods, or interpretations.
2. Goals and Interests: Disagreements can arise when different parties have different interests and objectives.
3. Relationships between parties and institutional relationships: Disagreements can arise when the parties see themselves in competition for limited resources.
4. Methods and Procedures: Disagreement can arise when parties disagree on strategies for achieving goals.
5. Values: Disagreements can arise when contested issues affect the core values of the parties.

Questions repeated for each of the five categories above:

- Q: What were the disagreements between offshore wind development and competing ocean uses over [category] before the marine spatial plan was implemented?
- Q: Did marine spatial planning reduce disagreements between offshore wind energy development and competing ocean uses over [category] during project permitting and siting?
- Q: If "yes," what aspect of the plan accomplished this? How did that aspect lessen the disagreement?
- Q: If "no," why not? How did the plan perform?

- Q: Did the marine spatial planning process cause more disagreements over [category]?
- Q: Have any disagreements between offshore wind development and competing ocean uses over [category] arisen after projects have gone in the water?
- Q: In hindsight, what could have (or should have) been done differently in the marine spatial planning process to help reduce any disagreements over [category]?
- Q: If the marine spatial planning was not an effective means to reduce disagreements with other ocean users over [category] what was effective?

Summary questions

- Q: Do you have anything else that you would like to add?
- Q: Do you have any recommendations on other people I should interview on this subject?