NAVIGATING A SEA OF VALUES:
UNDERSTANDING PUBLIC ATTITUDES TOWARD
THE OCEAN AND OCEAN ENERGY RESOURCES

by
Jonathan Charles Lilley

A dissertation submitted to the Faculty of the University of Delaware in
partial fulfillment of the requirements for the degree of Doctor of Philosophy in
Marine Studies

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ABSTRACT

In examining ocean values and beliefs, this study investigates the moral and ethical aspects of the relationships that exist between humans and the marine environment. In short, this dissertation explores what the American public thinks of the ocean. The study places a specific focus upon attitudes to ocean energy development. Using both qualitative and quantitative methods, this research: elicits mental models that exist in society regarding the ocean; unearths what philosophies underpin people’s attitudes toward the ocean and offshore energy development; assesses whether these views have any bearing on pro-environmental behavior; and gauges support for offshore drilling and offshore wind development. Despite the fact that the ocean is frequently ranked as a second-tier environmental issue, Americans are concerned about the state of the marine environment. Additionally, the data show that lack of knowledge, rather than apathy, prevents people from undertaking pro-environmental action. With regard to philosophical beliefs, Americans hold slightly more nonanthropocentric than anthropocentric views toward the environment. Neither anthropocentrism nor nonanthropocentrism has any real impact on pro-environmental behavior, although nonanthropocentric attitudes reduce support for offshore wind. This research also uncovers two gaps between scientific and public perceptions of offshore wind power with respect to: 1) overall environmental effects; and 2) the size of the resource. Providing better information to the public in the first area may lead to a shift toward offshore wind support among opponents with nonanthropocentric attitudes, and in both areas, is likely to increase offshore wind support.
Chapter 1

INTRODUCTION

Covering almost three-quarters of the planet’s surface, the ocean has for centuries been thought of as impervious to harm. Indeed, for all but the most recent chapter in human history, it was simply not possible to affect the ocean in any meaningful way. Humans fished, sailed, and utilized the cleansing properties of the ocean, but due to a comparatively small global population and less advanced technologies, had a negligible impact on the marine environment. Those days disappeared during the nineteenth century with the advent of commercial whaling and never returned. Since then, ever increasing population numbers, coupled with new and more efficient technologies, have led to a situation where humans have the capacity to significantly affect the ocean.

Today, the ocean has many uses – fishing, recreation, transportation, energy development, to name just a few – and needs to be managed accordingly. The last of these, development of the ocean’s energy resources, has gained significance in the last couple of years. Stymied for a quarter century by a moratorium on new offshore drilling, changing political views and new technologies (such as offshore wind power) have opened up both non-renewable and renewable resources for potential development. A number of issues – e.g., overfishing, pollution, development of the coastal zone – result from the above uses and traditionally such issues have been tackled through a combination of science and technology. This is partly because problems relating to the environment are frequently complex and require the use of
advanced technologies and also because science is believed to be able to provide objective answers to the questions we ask (Stenmark, 2002). However, although science and technology tell us what can be done to solve a particular problem, they do not tell us what should be done; to believe otherwise is to confuse questions of fact with questions of value. Thinking that because something ‘is’ the case means it ‘ought’ to be the case is one form of the naturalistic fallacy (Dennett, 1995; Singer, 1981), a tendency that is strongly cautioned against (Moore, 1903). Using the best available science and technology is important when addressing environmental issues, but it should be remembered that other aspects of such issues also need consideration.

Rather than focusing solely on science and technology, Mikael Stenmark has suggested that environmental problems have three dimensions – scientific, social and normative (moral or ethical) – all of which need to be considered to address environmental issues effectively (Stenmark, 2002). Stenmark argues that, in addition to scientific and social studies of human/nature relationships, there is the need for “a critical and constructive analysis of people’s various ethical judgments, their views of nature, their world views and of the consequences that all these different positions have” (Stenmark, 2002, p. 13). While there have been many in-depth scientific studies of ocean processes, as well as social and economic studies of how humans impact the marine environment, there has been very little research into what people think of the ocean. As will be seen, the studies that have been conducted focus almost exclusively on ocean knowledge, as opposed to the ethical or value judgments that people possess. Despite this lack of information about ocean values, both the U.S. Commission on Ocean Policy and the Pew Oceans Commission state the need for an engaged citizenry in marine affairs, with the former noting that “[t]o successfully address complex
ocean- and coastal-related issues, balance the use and conservation of marine resources, and realize future benefits from the ocean, an interested, engaged public is essential” (U.S. Commission on Ocean Policy, 2004, p. 123).

1.1 Purpose of the Research

By looking at ocean values and beliefs, this study seeks to investigate the third dimension that Stenmark describes – the moral and ethical aspects of the relationships that exist between humans and the marine environment. In short, this dissertation looks to discover what the American public thinks of the ocean. In addition, given renewed interest in offshore energy, it will focus specifically on attitudes to ocean energy development. It will draw out mental and cultural models that exist in society regarding the ocean and offshore energy development; understand why people think of the ocean as they do; and unearth what (if any) philosophies underpin people’s attitudes toward the ocean. The data generated from the study will provide a better understanding of how society currently perceives the marine environment. While research has previously been conducted into general environmental values (Kempton, Boster, & Hartley, 1995) and ocean knowledge (Steel, Lovrich, Lach, & Fomenko, 2005), no study has focused specifically on ocean values. As such, this work represents new research and will contribute to a general understanding of public perceptions of the marine environment. It is hoped this research will aid policy makers. Policies are far more likely to succeed when they have the weight of public support behind them (Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Theodoulou, 1995), and by understanding how people view the oceans,
policy makers will have better idea of which policies are likely to receive public support and which are not.

Studies have shown that people are more likely to be concerned about an environmental issue if they have higher levels of knowledge about the issue. An investigation into public support for global warming mitigation measures in central Pennsylvania by O’Connor et al. found that a higher level of knowledge of the possible effects of climate change (a lowering of standards of living; an increased level of disease; and potential food shortages) led to greater willingness to make personal sacrifices in order to reduce emissions (O'Connor, Bord, Yarnal, & Wiefek, 2002). With regard to the oceans, work by Steel et al. (2005) supports the Pew Commission’s suggestion that improved ocean literacy would create a better link between people and the marine environment. Using data from a survey they carried out in the Pacific Northwest, Steel et al. note that improving citizen knowledge is “critical to the development of public support for ocean and coastal resource protective policy measures” (Steel, et al., 2005, p. 49). While this is true, in terms of policy acceptance it is important to not only understand levels of public knowledge but also the values that people possess regarding the issue in question. Understanding how the public perceives the ocean and marine-related issues will provide policy makers with a better indication of how society might react to specific policies and allow them to better engage the public when presenting new ocean policy choices. This in turn should reduce the occurrence of conflict and increase rates of policy acceptance.

In addition to aiding policy makers, this research should also benefit ocean educators and the broader scientific community. Both the U.S. Commission on Ocean...
Policy and the Pew Oceans Commission repeatedly stress the importance of education in improving ocean literacy. Work with cultural models has shown that, when it comes to education, it is important to understand what cultural models exist before an education strategy is fully developed. With regard to both formal and informal education, explicitly addressing cultural models is far more effective than simply correcting individual facts (Kempton & Falk, 2000; Staats, Wit, & Midden, 1996) and accordingly, understanding existing cultural models will help educators tailor their programs to connect better with the public. Eliciting beliefs, values, and mental models will also be valuable in terms of uncovering inaccurate perceptions of the ocean. It is entirely possible that the public might hold inconsistent views that result in the support of contradictory ideas, or in people not fully understanding the implications of certain attitudes (Dunlap & Van Liere, 1978; Rokeach, 1973). Knowing where the inaccuracies exist will help guide educators in designing more effective programs. Finally, it is hoped that this research will also be of use to marine scientists. Given vastly different levels of knowledge and differing mental models, scientists and the public often talk past each other. Part of the problem may stem from the application of different mental models by the scientific community and the public. The same piece of information may be interpreted very differently by holders of different mental models. Thus, in the same way that educators can gain from a better knowledge of mental models, scientists can also benefit from understanding why they and the public may not interpret information in the same manner.
1.2 Nomenclature

Before progressing further, it is important to clearly define the terms used within this study – beliefs, values, mental models and cultural models. Kempton et al. (1995) use the term beliefs to “refer to what people think the world is like” and values to “refer to their guiding principles of what is moral, desirable or just” (Kempton, et al., 1995, p. 12) and this distinction will hold for this study. Kempton et al. show that comprehending both beliefs and values is important in understanding mental models. Although not the only factor, they note that beliefs “partially determine which environmental issues people attend to and act upon, and what environmental policies they support” whereas “cultural values are a necessary basis for environmental action, even if they may not be sufficient by themselves” (Kempton, et al., 1995, p. 12).

A mental model can be defined as “a simplified representation of the world that allows one to interpret observations, generate novel inferences, and solve problems” (Kempton, et al., 1995, p. 10). Rather than learn all the specific details of a particular issue, people are far more likely to develop simpler models that aid in their understanding. Usually such models, although basic, are accurate and enable the person to understand and deal with more complex issues in their everyday life. The term cultural model will be used here to describe mental models that are shared by a wider group of people. For example, a cultural model of marine pollution would be one that a significant proportion of the population holds.

1.3 Objectives of Research

This dissertation sets out to understand current ocean attitudes and perceptions. While the national surveys outlined in the following chapter have gone
some way in helping policy makers understand what the public knows about the oceans, they have not shed any light on the more deeply held attitudes that people have regarding the ocean and ocean issues. In fact, no studies have to date investigated ocean beliefs, values and mental models. With this in mind, the overarching goals of this research are: to uncover what people know and think about the ocean, with a specific focus on the development of ocean energy resources; to understand what beliefs and values people have with regard to the ocean; and to identify specific mental and cultural models (whether accurate or not) that people possess with regard to the oceanic systems and processes. These goals can be operationalized by four research questions:

1) What beliefs and values do people have regarding the ocean?
The study attempts to elicit a number of beliefs and values that people have with regard to the ocean (although it is not the intent of the study to generate an exhaustive list of beliefs and values). The research focuses on why people do, or do not, think the ocean is important as well as personal connections to the ocean. In order to look more deeply into people’s values systems, the study delves into the field of environmental ethics in an attempt to ascertain whether people hold a more anthropocentric or nonanthropocentric view of the environment and the ocean. Tied in to values is the question of whether humans have a responsibility toward the ocean and this issue is also investigated. Lastly, comparisons are made between coastal and inland residents to ascertain whether proximity to the ocean affects a person’s point of view.

2) What mental models do people possess regarding the ocean?
After eliciting beliefs and values, it is possible to uncover a number of mental and cultural models that exist in society, toward both the ocean and current ocean issues.
Hopefully this will help in understanding how information is used to develop ocean attitudes and perceptions. Once again, it is not possible to extract mental models of every ocean issue and so, using techniques derived from grounded theory, this study focuses on specific models that are drawn out of qualitative interviews. This process is explained further in Chapter 3; it will suffice to say here that models identified in the interview phase of the project are expanded upon in the national mail survey.

3) What effect (if any) do beliefs and values have on pro-environmental actions?
It is possible to see whether the beliefs and values uncovered by the first research question have any bearing on the actions that people take to help protect the environment and the ocean. There is an ongoing debate in philosophical circles about the kind of environmental ethic that should be adopted – one that focuses only on human values, or one that takes into consideration intrinsic value in nature – and this question asks whether there exist any real-world differences between those who hold these different ethical positions.

4) What effect do beliefs and values have on support for offshore energy development?
Over the past few years the question of whether to develop U.S. offshore energy resources has once again become a hotly debated issue, with both drilling and wind presenting possibilities for offshore power generation. The effects of climate change on the environment in general, and on the ocean specifically, are becoming better understood and, given the differing impacts that fossil fuels and wind power have on climate change, it is critical to know what people think about both energy sources. While a number of opinion polls have enquired about support for offshore drilling, and prior research out of the University of Delaware has been conducted into opinions regarding offshore wind, no study has yet compared the two side by side. This
dissertation not only looks at support for both forms of energy development but also asks why people support or oppose each technology. The survey data allows comparisons to be drawn between different demographics – sex, age, education levels, etc. – as well as between coastal and inland residents.

It should be noted from the outset that this research project was conducted in 2008, well before the Deepwater Horizon/BP oil spill which is currently afflicting the Gulf of Mexico. As with much social science research, data are fluid and change through time. While public opinion may have shifted since this project was carried out, the data contained within nonetheless provide a solid basis for analysis and provide a baseline for future post-oil spill studies. Further implications of the Gulf oil spill are discussed in Chapter 6, along with a suggestion for future research on the matter.

### 1.4 Dissertation Organization

This dissertation is divided into six chapters. Chapter 2 provides background information pertinent to the research project – the chapter summarizes prior surveys of ocean attitudes and provides an introduction to both environmental ethics and mental models. Chapter 3 outlines the methods used in this study. Two methodologies were employed: 35 qualitative interviews were first conducted before a mail survey was designed based on those interviews and then administered to a representative sample of the U.S. population. The fourth chapter details the results of the data (both qualitative and quantitative) relating to ocean beliefs, values, and mental models; and the fifth presents the findings of the ocean energy component of the study. Finally, the dissertation concludes with Chapter 6 which, in addition to
summarizing the results of the study, discusses the policy and philosophical implications of the research.
Chapter 2

BACKGROUND

This chapter covers a number of issues pertinent to this study. It begins by summarizing prior research that has been conducted into ocean attitudes and public opinion about harnessing the ocean’s energy resources – both through wind development and offshore drilling. These studies cover a number of beliefs that people have about the marine environment, albeit at a very superficial level. The chapter then turns to an analysis of environmental values, with a specific focus on the different philosophical positions that exist with regard to human/nature relationships. Anthropocentric and nonanthropocentric ethics are discussed before a third position, environmental pragmatism, is suggested as a way for environmental ethics to have a greater impact on policy making. In addition to beliefs and values, the existence of mental and cultural models is covered, as is the impact that such models have on policy making. The chapter concludes with a brief summary of earlier studies that have been undertaken to better understand the importance of environmental values.

2.1 National Surveys of Ocean Attitudes

In the past few years three national studies have been undertaken to investigate public attitudes toward the ocean. All of the studies used telephone surveys as their primary means of data collection; the studies carried out by SeaWeb and The Ocean Project also used focus groups. The studies provide some interesting
background data for this research project and, while they focus more on uncovering beliefs rather than values, they do provide a useful starting point.

2.1.1 SeaWeb

SeaWeb was established by The Pew Charitable Trust in 1996 to raise levels of public awareness of the ocean. Shortly after its formation, SeaWeb commissioned The Mellman Group (a polling company based in Washington D.C.) to interview a national sample of 1,300 individuals. The survey was carried out by telephone and, in order to ensure people living near the ocean were oversampled, 400 of the 1,300 interviews were conducted with residents of coastal communities (Spruill, 1997).

The SeaWeb study found general agreement with the belief that human activities are threatening the ocean and an overall concern for the health of the ocean now and in the future. Of the respondents interviewed, 82% agreed with the statement that the ‘oceans are being destroyed’ and only 10% believed that the ocean is too vast for humans to damage in any significant way. However, when asked to rate environmental problems in order of their importance, the ocean was tied for sixth (with 14% of respondents mentioning them as either the most important or second most important environmental problem facing the country – the same number that answered ‘unsafe drinking water’). The ocean ranked behind other environmental issues such as: toxic and hazardous waste (33%); air pollution (31%); water pollution (26%); dealing with household garbage and waste (21%); and forests being destroyed (17%). The study found even lower levels of concern for the destruction of coastal habitat. Loss of coastal habitat ranked last on the list with only 4% of respondents
ranking it as either the most, or the second most important environmental problem facing the country. It addition to the other issues mentioned previously, people were more concerned about plant and animal species becoming extinct (12%), global warming (11%), and excessive environmental regulations (8%) than they were about coastal habitat destruction.

Respondents were also asked how serious they thought ocean degradation was. More than half of those interviewed (52%) saw the destruction of the ocean as a very serious threat to society’s current quality of life. When asked whether this might be a problem ten years from now, this number increased with 63% agreeing that it would be a very serious threat. Regarding the personal importance that people place on the ocean, in coastal communities 64% said the ocean was very important to them personally; in non-coastal communities the number of respondents holding this viewpoint fell to 49%. Over half of those asked (58%) believed that the condition of the ocean has declined over the last few years whereas a small minority thought the state of the ocean had improved (6%).

The SeaWeb study also looked at specific issues that impact the health of the ocean. The survey found that a number of issues mentioned by the public as being very serious are different from those generally thought by scientists to be the most important. For example, the study notes that seafood contamination, trash on the beach and dolphins caught in tuna nets were all viewed as more serious by respondents than the destruction of coastal habitat, overfishing and the loss of coral reefs. The study also states that the respondents were aware of these differences with 61% of people asked answering that scientists and citizens disagreed on the problems facing the ocean. When asked whose views should be addressed by the government,
42% believed the public’s concerns should be addressed while 37% thought the government should focus on the opinions of scientists (13% thought the different concerns should be addressed equally).

Regarding action that could be taken to protect the marine environment, 85% thought the government needs to do more, with 72% stating that funding for ocean exploration should take priority over space exploration (17%). In terms of individual action that a person can take, 49% said they would be almost certain to recycle used motor oil and 42% said they would be almost certain to pick up trash on the beach. Much smaller percentages said they would be pay higher water bills to fund better sewage treatment (20%); lobby their politicians to support positive ocean-related actions (18%); join an environmental group (12%); or attend legislative meetings on ocean issues (10%). Regarding the perceived effectiveness of such actions, 70% thought that recycling used motor oil would be very effective in protecting the marine environment and 63% thought that picking up trash on the beach would very effective.

The SeaWeb survey also found a high level of agreement for protecting the ocean for the benefit of future generations. When asked whether people have a ‘responsibility to protect the ocean for future generations,’ 84% strongly agreed. Similarly, 82% strongly agreed that the ‘destruction of the ocean is a threat to the health of future generations.’ In short, the SeaWeb study described the ocean as an “issue waiting to happen” and comments that while the ocean is not seen as a top priority there exists “strong latent, if not manifest, concern for the fate of the ocean” (Spruill, 1997, p. 149).
2.1.2 The Ocean Project

In the summer of 1999, The Ocean Project commissioned Belden Russonello & Stewart in collaboration with American Viewpoint to undertake a national survey in order to “understand what needs to be communicated to build awareness and to increase American’s concerns about the health of the oceans” (Belden Russonello & Stewart & American Viewpoint, 1999, p. 1). As with the SeaWeb survey, respondents were contacted by telephone and 1,500 adults in the continental United States were interviewed. Before conducting the study, Belden Russonello & Stewart organized six focus groups for people who had visited an aquarium, zoo, or science museum in the previous two years. The data from the focus groups were used to identify certain beliefs and values that people might have regarding the ocean. The authors of the report noted that the use of focus groups was extremely useful in helping them understand public attitudes to the ocean and in designing the questions for the national survey (Belden Russonello & Stewart & American Viewpoint, 1999).

The Ocean Project survey found that, overall, Americans have a low level of awareness of the current state of the marine environment, especially of the deeper ocean. When asked about the health of the deep ocean, a majority (47%) of respondents did not know their condition, 3% thought they were in excellent shape, 20% thought they were in good health, 25% fair, and 5% thought they were in a poor condition. When the same question was asked of coastal waters, 27% did not know their condition, 2% thought they were in excellent condition, 21% good, 40% fair, and 10% said they were in poor health. Based on these findings, the authors of the report suggest that respondents neither generally perceived the ocean to be in immediate
danger, nor saw the need for urgent action to protect the marine environment. The survey found that respondents who lived within a two-hour drive of the coast were more familiar with coastal waters but still 40% of them did not have any idea about the condition of the deep ocean. Respondents from the Midwest were less sure about the state of coastal waters than those living in other regions but all who responded – both coastal and non-coastal residents – were unsure of the health of the deep ocean. Those who were more likely to believe the ocean is in excellent health included: men; those between the ages of 30-59; those with a college education; professionals; and those with higher household incomes.

In light of these findings, The Ocean Project describes the ocean as a “second-tier environmental problem” (Belden Russonello & Stewart & American Viewpoint, 1999, p. 20). By this it is meant that while people are concerned about the state of the ocean, they are more worried about other environmental issues. The Ocean Project suggested a number of environmental issues to the respondents and asked them, on a scale of one to ten, to state how serious a problem they thought the issue was. Of the three ocean-related issues, ‘damage to coastal waters’ ranked highest at sixth on the list, with 24% of respondents saying it is an extremely serious problem. The two other ocean-related problems – ‘damage to ocean beaches’ and ‘damage to the open, deep ocean’ – ranked ninth (22%) and eleventh (last at 18%) respectively. Overall, the top five environmental issues were: water pollution (36%); toxic waste (36%); loss of rain forests (32%); air pollution (31%); and land being developed (30%). Over-consumption (24%), extinction (23%), and global climate change (21%) ranked seventh, eighth, and tenth, respectively.
According to The Ocean Project, there is a considerable difference between the perceived seriousness of the three problems that directly relate to the ocean and other, more general, environmental issues. However, the difference may not be as clear-cut as The Ocean Project states. Although many of the environmental problems listed may not be explicitly linked to the ocean, this does not mean they are entirely unrelated. For example, toxic waste, water pollution, air pollution, over-consumption and global climate change all affect the health of the ocean and, in mentioning these, respondents may well have been thinking of (or at least vaguely aware of) the effect on the marine environment of these issues. Survey data such as these cannot tell us the extent to which effects on the ocean affected people’s answers, but it should not be assumed that no thought was give to the ocean at all. Of the respondents who were most explicitly concerned about the ocean, the majority tended to be female; African American or Hispanic; have a lower level of education; and have a low household income.

The Ocean Project also states that people “possess only a superficial knowledge of the oceans, their functions, and their connection to human’s well-being” (Belden Russonello & Stewart & American Viewpoint, 1999, p. 4). In the focus groups, the researchers found a common answer to the question of why the ocean is important to be simply: “we cannot live without them.” In the telephone survey, 75% of respondents strongly agreed with this statement. However, when the respondents were asked specific questions about the role the ocean plays in human survival, few could answer all of the questions correctly. The questions covered issues such as: the role of the ocean in global climate and rainfall patterns; the amount of plant and animal life in the ocean compared to on land; the role of the ocean in the production of
oxygen; the main causes of extinction in the ocean; and the main sources of ocean pollution. Only 1% of those asked answered all five questions correctly; 9% answered four correctly; 20% answered three correctly; 29% knew the answers to two of the questions; 26% answered only one correctly; and 14% did not know any of the right answers at all. The more knowledgeable respondents tended to be male; under the age of 45; white; college graduates; have a higher than average income; professionals; zoo, aquarium or science museum visitors; and live near the ocean.

The Ocean Project survey found that most Americans do not believe that simply because of its size, it is unlikely that humans will cause the ocean lasting damage. The study found that 80% of those polled disagreed with this statement (56% strongly disagreed). Women; those under the age of 45; Hispanics; people who had visited a zoo, aquarium, or science museum in the previous year; and coastal residents were most likely to strongly disagree with the statement. A similar percentage (81%) disagreed with the suggestion that we do not need to worry about the condition of the ocean as society will develop new technologies to clean it (55% strongly disagreed). Again, respondents under the age of 45; middle and upper-income respondents; and those living near the ocean disagreed most strongly. A slightly lower percentage (72%) disagreed with the idea that the ocean is able to keep itself clean (46% strongly disagreed). Those who most strongly disagreed with this last statement were more likely to be female; under the age of 45; Hispanic or African American; less educated; and live by the coast.

Despite the majority of respondents believing that the ocean is susceptible to human damage, The Ocean Project found that “general human responsibility for ocean health does not translate into widespread personal responsibility” (Belden
Russonello & Stewart & American Viewpoint, 1999, p. 31). Overall, 45% agreed and 55% disagreed with the idea that what they do in their lives does not have much of an impact on the state of the ocean. Americans under the age of 45; African Americans; Hispanics; and respondents who had visited a zoo, aquarium, or science museum in the previous year were most likely to believe their actions impact the marine environment. The survey found that most respondents were likely to blame industry for damage to the ocean rather than take responsibility themselves.

Following on from finding low levels of personal responsibility toward the ocean, few respondents in The Ocean Project survey placed a high level of personal importance on protecting the environmental quality of the marine environment. On a scale of one to ten (with ten representing extremely important) only 26% of respondents stated that the ocean is extremely important to them personally. After an analysis of people’s attitudes, The Ocean Project suggests that the people most likely to place high levels of personal importance on the ocean include those who: see the ocean as fun, relaxing or important to their own well-being; disagree with the suggestions that new technology will solve all the problems facing the ocean and that the ocean is too large for humans to damage; and believe that individual actions can cause damage to the marine environment. The Ocean Project’s analysis also suggests that a person’s level of ocean knowledge is not a good predictor of whether the person places personal importance on ocean conservation.

Unlike the other two studies described here The Ocean Project also looked explicitly (albeit briefly) at ocean values. The study investigated the level of support for four value frameworks – a responsibility to future generations (that humans have a duty to protect the ocean for our descendents); the balance of nature (that the ocean is
critical to maintain the balance of nature); *human survival* (that humans need a healthy ocean to survive); and the *beauty of the ocean* (that the ocean should be preserved because it are aesthetically pleasing). Of these four frameworks, the balance of nature was selected by the greatest number of respondents (33%). A duty to future generations and human survival were selected by slightly fewer people (29% each) and the ocean as a place of beauty was only chosen by 7% of those asked. The Ocean Project notes that the appeal of the three main value frameworks (balance of nature; human survival; and duty to future generations) was constant across all of the subgroups in the sample with no one subpopulation likely to be any more or less attracted to these values than any other subpopulation.

The final aspect The Ocean Project investigated was the perceived effectiveness of certain actions in protecting the ocean. The greatest number of people thought that recycling motor oil was the most effective action they could take (78% thought this was very effective and another 18% thought it was somewhat effective). This was followed by: stopping the use of pesticides (47% very effective, 40% somewhat effective); only eating fish farmed or caught in a sustainable manner (44% very effective, 41% somewhat effective); getting involved in local environmental projects (35% very effective, 51% somewhat effective); using less water in the home (33% very effective, 45% somewhat effective); writing to elected officials (30% very effective, 47% somewhat effective); and buying fewer consumer goods (18% very effective, 46% somewhat effective).

It is possible to draw out two recurring themes from the data collected by The Ocean Project. In a number of questions, women were more conscious of issues affecting the ocean in their answers than men – particularly with regard to questions
that asked about the overall health of the ocean, or the effect that humans have on the marine environment. Among other researchers, opinion varies regarding the differences between male and female environmental attitudes. In a cross-national analysis of gender, scientific knowledge, and attitudes toward the environment, Hayes reports little difference between the sexes (Hayes, 2001). However, Caiazza and Barrett report that women are less likely to support cuts in environmental spending, are less sympathetic to businesses regarding environmental regulation, and are more supportive of environmental activists than men (Caiazza & Barrett, 2003). A finding which is more in line with The Ocean Project data.

Another difference that The Ocean Project highlights is that of geographic location. People living closer to the coast were found to be more concerned about ocean issues. While little research has been conducted in this area, it is plausible that those living near to the ocean have a stronger connection to it. The national survey undertaken here includes demographic data and will thus will facilitate an investigation of both of these trends and attempt to understand whether women and people living by the coast have a stronger bond with the ocean.

2.1.3 The American Association for the Advancement of Science

The third national survey of ocean knowledge was carried out by the American Association for the Advancement of Science (AAAS) in November of 2003. Although the survey had more respondents, it was less in-depth that either of the other two studies, with 2,400 adults over the age of 18 being asked ten questions. The respondents were members of Synovate’s (a large market research company) mail
panel. For analysis, the data were weighted to match the population proportions of the U.S. Census.

Respondents were first asked to choose between two statements relating to the impact of humans-induced stresses on the ocean and the ability of the marine environment to sustain itself. Of those polled, 79% agreed with the statement that human induced stresses are endangering coastal regions and the ocean’s ability to sustain itself, which may result in long-term damage. In contrast, 21% thought that ocean and coastal regions overall are vast enough and in a healthy enough state to absorb pollution and other human induced stresses for the foreseeable future. In addition, 31% believed that personal actions can affect the health of the ocean and coastal areas. AAAS found that respondents with a higher level of education were more likely to believe human induced stresses are endangering the marine environment.

Regarding specific actions that people were prepared to take in order to protect the ocean: 60% of respondents said they would be willing to eat less of certain kinds of fish; 47% would support government regulations that restrict the use of the seashore; 46% would support local efforts to reduce economic development of coastal areas; and 56% would support the use of tax dollars for research into new technologies to help reduce pollution. Again, adults with higher levels of education were more likely to say they would eat less fish, support efforts to reduce coastal development, and support the spending of more public funds on research.

The AAAS study also examined whether people thought the ocean should be managed internationally or unilaterally. When asked to make a decision, 71%
believed a global approach was more appropriate, whereas 29% thought it would be better if each country was responsible for their own coasts and did not interfere with the management practices of other nations.

The final questions in the AAAS survey investigated the public’s attitudes towards science. When asked whether they were interested in knowing more about the impact that certain scientific issues (such as cloning, genetically modified food, and ocean pollution) had on their lives, 38% said they were interested in knowing more; 28% were somewhat interested; and 35% were not interested. In a follow-up question, 61% replied that they would know where to look for reliable scientific information and 39% would not. Finally, perhaps most worryingly, the survey found relatively low levels of trust regarding the motives of scientists. Only 34% of respondents believed scientists put societal interests above their own personal goals. These results might help explain why the SeaWeb study found that more people think the government should act on the issues which the public see as a threat to the marine environment, rather than those that concern scientists.

2.1.4 Summary of National Ocean Surveys

Although the three surveys asked different questions, they covered many of the same issues and it is possible to compare a number of the findings. In all three of the surveys, an overwhelming majority of respondents believed that the ocean is vulnerable to human-caused impacts (as opposed to being large enough to absorb any damage that we might do to them). In spite of this however, the ocean was not generally viewed as a pressing environmental concern. In both the SeaWeb and The Ocean Project studies, concern for the ocean ranked below toxic waste, air and water
pollution, and deforestation. Respondents also seemed to possess only a superficial knowledge of ocean issues. In the SeaWeb study, a large number of people thought oil spills, runoff from large farms and improperly treated sewage were serious issues but far fewer believed overfishing, overdevelopment, the loss of coral reefs and shark-finning were issues to be concerned about. When The Ocean Project asked people specific ocean questions, just 1% got all five questions right and only a further 9% got four correct.

The final area where the three surveys found similar results relates to the actions that people believe should be taken to help preserve the marine environment. A majority of respondents in all three studies said the government should invest more money in the ocean. All of the studies also found varying levels of support for a number of individual actions such as recycling used motor oil, picking up trash on the beach, paying more for fish and seafood, and having more beach closures and regulation of the shore. However, despite this general support for taking individual action to protect the ocean, both The Ocean Project and the AAAS surveys found that people did not generally believe their everyday actions impacted the ocean significantly. Similarly, data from The Ocean Project indicate that there exists a significant disconnect between general people’s concern for the ocean and the level of personal responsibility that people feel they have toward the ocean, as well as the amount of personal importance that they place on the marine environment.¹

¹ It should be noted however that the data from The Ocean Project may under-represent the personal importance placed on the marine environment as the published results only showed the responses of those who answered with a ten on a ten point scale. Respondents who answered with an eight or nine may also place a considerable amount of personal importance on the oceans.
In summary, the three national surveys provide a useful account of common public attitudes to ocean issues. However, they fail to provide a deeper understanding of the basis of these attitudes. By not uncovering the beliefs, values and ethical frameworks that people possess, the studies provide no more than a snapshot of public opinion. The studies are helpful in highlighting the areas in which public knowledge is lacking and thereby provide a useful starting point for this research. Although The Ocean Project did begin to look at values, it did not delve any further into the basis of these values. For example, asking why the ocean should be protected for future generations or to preserve the balance of nature would result in a much better understanding of a person’s values. Additionally, understanding the mental models that people possess will provide a more complete picture of how people use the knowledge they have.

2.2 Public Opinion of Offshore Energy Resources

A significant amount of research has been conducted to better understand people’s attitudes to offshore wind (much of it by the University of Delaware) but the bulk of the work has been carried out with regard to specific projects; very little research has been undertaken at the national level. Regarding offshore drilling, there have been national polls questioning people about their views on this subject but no in-depth analyses of attitudes and opinions have been conducted.

2.2.1 Public Opinion of Offshore Wind Development

Despite the potential of offshore wind power to supply a large proportion of this country’s energy needs (Musial, 2007) no offshore wind facilities currently
Various projects have been proposed, most notably, one in Nantucket Sound, Cape Cod, MA, one in Rhode Island, and one off the coast of southern Delaware. As a result, much of the research into public attitudes to offshore wind has focused on these locales.

In comparing support levels for offshore wind in Delaware and Cape Cod, Firestone, Kempton, and Krueger found people were more supportive of wind in Delaware than in Cape Cod. While 77.8% of Delaware residents were in favor of a wind facility located just off the coast, only 43.8% of Cape Cod residents supported the proposed Cape Wind project (Firestone, Kempton, & Krueger, 2009). It should be noted, however, that the Delaware survey asked about a hypothetical wind facility (the survey was conducted before the Delaware project was announced) whereas the Cape Cod survey questioned respondents about the already proposed, and highly contentious, Cape Wind project. Firestone et al. also looked at the factors that most affect people’s decisions to either support or oppose offshore wind. Among Cape Cod residents, the top three factors for supporters were environmental impacts, electricity rates, and foreign oil dependence. For opponents the top three choices were environmental impacts, aesthetics, and fishing impacts/boating safety. The top three issues for supporters in Delaware were electricity rates, environmental impacts, and air quality; for opponents they were aesthetics, environmental impacts, and electricity rates. Interestingly, both supporters and opponents listed environmental impacts and

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2 The Rhode Island project recently suffered a significant setback when the Rhode Island Public Utilities Commission rejected the power purchase agreement between Deepwater Wind, LLC and National Grid, Plc. on the basis of cost. At the time of writing the Cape Cod and the Delaware project are still moving forward.
electricity rates as important factors in their decision – demonstrating that wind power can be thought of as having both negative and positive impacts in these areas.

Findings from a follow-up survey (as yet unpublished) show majority support for local offshore wind projects in both regions (Lilley, Firestone, & Kempton, 2010b). In Cape Cod, support levels rose substantially to 57.2% and in Delaware they remained more or less constant at 80.6% (for this survey Delawareans were asked about the proposed Bluewater wind project, not a hypothetical wind facility). It is generally accepted that support levels for specific projects are lower than for wind power in the abstract sense (Bell, Gray, & Haggett, 2005). This is demonstrated by a recent poll conducted by Monmouth University which found that 82% of Mid-Atlantic residents were in favor of installing wind turbines in the ocean that were not visible from the shoreline; support dropped to 67% for turbines that could be seen in the distance (Monmouth University, 2009). However, the Delaware surveys demonstrate very high levels of support – similar to those one might see for wind power in the general sense.

Using a multiple regression model, Firestone and Kempton (2007) conducted further research into the Cape Cod sample to assess the influence of various factors on support levels for the Cape Wind project. In another study, this technique was also used to analyze the likely effect of a offshore wind facility on out of state beachgoers in Delaware (Lilley, Firestone, & Kempton, 2010a). Firestone and Kempton’s regression analysis showed that supporters of the project are likely to be younger, own their own home, and have higher levels of education. In contrast, opponents are more likely to see the wind facility in their everyday routine and earn over $200,000 per year (Firestone & Kempton, 2007). Klick and Smith also used
regression modeling to examine support for wind power (not offshore specific) at the national level (Klick & Smith, 2010). They looked at a number of demographics including race, age, sex, education levels and political affiliation. In their study, Klick and Smith found that blacks were less likely than whites to support wind power but Asians were more likely; men were more likely to support than women. Interestingly, age, education and political affiliation each had little effect on support levels. Klick and Smith attribute the lack of political differences to the fact that as both Democrat and Republican leaders back greater investment in wind power; unlike offshore drilling, it has not become a partisan issue. Firestone and Kempton found a similar situation in Cape Cod. Although people who voted for John Kerry, the Democrat presidential candidate in the 2004 election, were more likely to support the Cape Wind project than those that voted for George Bush (56.2% in favor compared to 50.7%) the difference was not statistically significant (Firestone & Kempton, 2007).

As with earlier studies, Klick and Smith found generally high levels of support for wind power although they do note that support levels decreased marginally after survey respondents where asked about the advantages and disadvantages of wind power. The number of people who strongly favored wind dropped from 72% to 53%, whereas the number that somewhat favored wind increased from 15% to 31%. Based on their data, Klick and Smith believe that the American public is “still working out what it thinks about wind energy” (Klick & Smith, 2010, p. 1590). They suggest that while public support is currently high, the lack of knowledge about both wind power and the electricity industry among the public might be inflating support levels. They also warn that support will decline should wind power lose its bipartisan backing. For now, however, wind power continues to receive high levels of public support. A
recent national poll show strong support for investment in alternative sources of energy such wind and solar, with 77% saying they would prefer the government to increase funding in this area. This compares to just 39% who would like to see an increase in funding for traditional sources of energy such as oil and gas (Gallup, 2009).

2.2.2 Public Opinion of Offshore Drilling

Less research has been undertaken into public attitudes toward offshore drilling and the work that has been done has generally utilized poll data rather than more in-depth techniques. A series of polls conducted by Rasmussen Reports have found consistently high levels of support for offshore drilling (although not quite as high as for wind development). In June 2008, support levels were at 67% (Rasmussen Reports, 2008a). They increased marginally to 68% in November of that year (Rasmussen Reports, 2008b) – around the time the ocean attitudes survey herein was conducted – and remained at that level one year later (Rasmussen Reports, 2009). Interestingly, support for drilling specifically offshore appears to be higher than support for oil and gas expansion in general as shown by the above Gallup poll.

Unlike wind development, support for offshore drilling is split along party lines, with Republicans more likely to favor oil and gas drilling than Democrats in each of the three Rasmussen polls – in June 2008, 85% of Republicans supported the practice compared to 57% of Democrats (Rasmussen Reports, 2008a). There are also pronounced differences in the perceived effects offshore drilling will have on gasoline prices. In the same June 2008 poll, 78% of conservatives believed that expansion of U.S. offshore drilling is at least somewhat likely to bring prices down, compared to
just 57% of moderates and 50% of liberals. Although not tested, political differences might also explain the lower levels of support for offshore drilling found among residents of the Mid-Atlantic states. Among residents of coastal counties in New York, New Jersey, Delaware, Maryland, and Virginia, support for oil and gas drilling off the Mid-Atlantic coast was at 46%. New York had the lowest levels of support at 37% and Maryland had the highest at 65%—a figure more in line with the national average (Monmouth University, 2009). The authors of the Monmouth study do note, however, that these support levels were higher in 2009 than in 2007, when just 33% of Mid-Atlantic coastal residents supported drilling in the Atlantic.

2.3 Values and Environmental Ethics

The above sections summarize a significant amount of research that has been conducting regarding broad ocean attitudes and more specific viewpoints regarding the use of ocean resources for energy generation. Although a number of the studies touch on values, in general they tend to focus more on beliefs. As mentioned previously, the term values is used here to refer to the guiding moral principles that people possess and, to better understand the importance that such moral principles have on a person’s environmental attitudes, it is helpful to delve into a branch of philosophy known as environmental ethics. Paul Taylor provides a useful synopsis of this discipline when he states that environmental ethics is “concerned with the moral relations that hold between humans and the natural world. The ethical principles governing those relations determine our duties, obligations, and responsibilities with regard to the Earth’s natural environment and all the animals and plants that inhabit it” (Taylor, 1986, p. 3).
While moral concern for the environment can be traced as far back as the ancient Greeks (Nash, 1989), as a standalone subject area, environmental ethics only come into its own in the 1970s. Since its inception, however, the discipline has been characterized by a number of longstanding debates about the merits of monism versus pluralism, instrumental value versus intrinsic value, and anthropocentrism versus nonanthropocentrism (Minteer, 2004). The last of these three is the most germane to this study and will be addressed in more detail below. First, however, it is worth outlining the differences between instrumental and intrinsic value, as a basic understanding of value is necessary to fully appreciate the anthropocentrism versus nonanthropocentrism debate.

It is generally agreed that there are two different types of value that can be placed on nature – instrumental value and intrinsic, or inherent, value. Instrumental value is the value an object has as a means to obtain something else of value. Perhaps the easiest example to give of instrumental value is money. A ten-dollar bill has little value in itself (it is, after all, just a small piece of paper) but its value is determined by what the ten dollars can be exchanged for – this is its instrumental value. Instrumental value is often referred to as resource value and certain aspects of the environment are often said to have resource value. Intrinsic value on the other hand refers to the value an object has in itself, without consideration to what other objects of value the object in question might be used to attain. For this reason, intrinsic value is often referred to as non-instrumental value (Stenmark, 2002). J. Baird Callicott states that something is intrinsically valuable “if it is valuable in and for itself – if its value is not derived from its utility, but is independent of any use or function it may have in relation to something or someone else” and comments that “[i]n classical philosophical
terminology, an intrinsically valuable entity is said to be an ‘end-in-itself,’ not just a ‘means’ to another’s end” (Callicott, 1989d, p. 131). In traditional ethical thought it is generally assumed that while humans have intrinsic value, nonhuman life does not.

Although the above categorization is commonly used for describing the kind of value nature has, it should be noted that a further distinction can be drawn between intrinsic and inherent value. This distinction is not due to the lexical definitions of the words but rather to how they have been employed by philosophers. Although important, the difference is subtle and, as a result, frequently overlooked. Callicott is one author who differentiates between the two terms. He defines intrinsic value as value that is “objective and independent of all valuing consciousness” and states that inherent value “(while its value is not independent of all valuing consciousness) it is valued for itself and not only and merely because it serves as a means to satisfy the desires, further the interests, or occasion the preferred experiences of the valuers” (Callicott, 1989c, p. 161). In other words, both intrinsic and inherent value should be seen as having value in themselves and not solely as a means to an end. The difference lies in the suggestion that whereas intrinsic value is independent of a valuer, inherent value is not – it requires a ‘valuing consciousness’ to exist. Although definitions vary, other authors also differentiate between intrinsic and inherent value and the two terms should not be used interchangeably (O'Neill, 1997; Stenmark, 2002; Taylor, 1986).

2.3.1 Anthropocentric Environmental Ethics

Anthropocentric environmental ethics, or anthropocentrism, focuses exclusively on the instrumental value that nature possesses. It holds that as humans
are the only beings capable of valuing an object, then ‘value’ relates to the value that humans place on that object. As Bryan Norton puts it, “[v]aluing always occurs from the viewpoint of a conscious valuer” and that “[o]nly humans are valuing agents” (Norton, 1991, p. 251). The value of a plant, an animal or an ecosystem is therefore that which as been assigned by humans. The animal, plant or ecosystem is not a ‘valuer’ – it neither gives itself, nor other objects, value.

Given that above it was stated how instrumental value and resource value are often taken as synonyms, it might be assumed that such an attitude would be anti-environmental – that all of nature is simply seen as a resource for humankind to use. Although it is true that society’s recent exploitation of the environment has been conducted with an anthropocentric mindset, this does not necessarily mean that holding an anthropocentric ethic results in nature being valued only for short-term resource use. There are at least four reasons why this is not the case. First, regarding resource use, there is the issue of posterity and the duties that current society has towards future generations (de-Shalit, 1995; Hardin, 1977). An anthropocentric ethic should: take into account future human generations; and ensure that enough natural resources remain for their use and that the environment is healthy enough for their survival. Second, there is the issue of the essential, life-giving services that the earth provides – over and above the resources humans directly extract from the environment. In 1997, a research group led by Robert Costanza estimated that natural ecosystems provide at least US$33 trillion worth of services annually. They suggested that 63% (US$20.9 trillion yr\(^{-1}\)) of this value stems from marine ecosystems, slightly over half of which (US$10.6 trillion yr\(^{-1}\)) comes from coastal ecosystems (Costanza, et al., 1997). Third, it can be argued that, in addition to providing resources for human
consumption and services for our survival, nature also provides a different set of resources which are necessary for human well-being. Alan Gewirth (2001) notes how “the natural environment, entirely apart from its supplying food and other practical necessities for human beings, fulfills the human need to appreciate and to marvel at the majestic structure of the natural world” (Gewirth, 2001, p. 211). All of these three attitudes are anthropocentric – they all assume that to have value, nature requires a human valuer – yet they all hold that nature is more than simply a resource to be used in any way the present generation deems fit.

The fourth reason why an anthropocentric ethic might be concerned with preserving the environment relates to the Judeo-Christian concept of stewardship. Although Lynn White, in his now well-know article, blamed Christianity for the exploitation of nature (White, 1967), other scholars assert that the Judeo-Christian tradition preaches that nature is a resource to be used wisely. Patrick Dobel, for example, cites numerous passages from the Bible which support the notion that God is the ultimate ruler of the earth, and although God bestowed the earth upon humans as a gift, the “gift comes under covenanted conditions, and the covenant is ‘forever’” (Dobel, 1977, p. 26). This concept thus leads to the idea of stewardship and ties into the notion of intergenerational equity – that humans hold the earth in trust for those yet to come. As Dobel continues “[t]rue stewardship requires both respect for the trusteeship and covenanted imperatives and an active effort to improve the land for the future and to use it in a manner to benefit others” (Dobel, 1977, p. 27). This Judeo-Christian religious attitude to nature should not be confused with other religious concepts such as those found within Pantheism or Buddhism. While these religions
also assert the importance and value of nature, it is more from a nonanthropocentric perspective rather than from an anthropocentric outlook.

The view that anthropocentrism does not necessarily result in resource exploitation is expanded on by Norton who argues that an anthropocentric outlook can lead to a workable environmental ethic. Key to Norton’s thesis are the distinctions between strong and weak anthropocentrism, and felt and considered preferences. According to Norton, a felt preference is “any desire or need of a human individual that can at least be temporarily sated by some specifiable experience of that individual.” In contrast, a considered preference is “any desire or need that a human individual would express after careful deliberation, including a judgment that the desire or need is consistent with a rationally adopted world view – a world view which includes fully supported scientific theories and a metaphysical framework interpreting those theories, as well as a set of rationally supported aesthetic and moral ideals” (Norton, 1984, p. 134).

Norton sees strong anthropocentrism as being grounded in felt preferences and weak anthropocentrism as being based upon considered preferences. In Norton’s words, strong anthropocentrism “takes unquestioned felt preferences of human individuals as determining value” (Norton, 1984, p. 135). It follows that if society values consumption and development, then their felt preferences (or their interests) will result in nature being used in an exploitative fashion. As there are no checks on felt preferences within strong anthropocentrism, then there exists no way to criticize those who used nature solely as a source of raw materials to be used for human development. In contrast, weak anthropocentrism “recognizes that felt preferences can either be rational or not (in the sense that they can be judged not consonant with a
rational world view)” (Norton, 1984, p. 135). Weak anthropocentrism then provides a foundation for the critical assessment of value systems that result in the exploitation of the environment. By stressing the importance of human/nature relationships, weak anthropocentrists can argue for ideals that emphasize living in harmony with nature. Such ideals can in turn be used to criticize more exploitative human preferences. Norton also notes how weak anthropocentrism “places value on human experiences that provide the basis for value formation” (Norton, 1984, p. 135). As weak anthropocentrism places value on both felt preferences and “the process of value formation embodied in the criticism and replacement of felt preferences with more rational ones” it is possible to appeal to the “value of experiences of natural objects and undisturbed places in human value formation” (Norton, 1984, p. 135). Norton argues that if it can be shown that human values are informed by contact with nature, then nature has value in being a source of human values. In Norton’s words, nature “need no longer be seen as a mere satisfier of fixed and often consumptive values – it also becomes an important source of inspiration in value formation” (Norton, 1984, p. 135).

2.3.2 Nonanthropocentric Environmental Ethics

In contrast to anthropocentric environmental ethics, nonanthropocentric environmental ethics (nonanthropocentrism) holds that nature has intrinsic value and inherent worth. As nonhuman organisms have value, they also possess moral standing and the concomitant rights associated with such standing. There exists, however, a further significant philosophical divide among nonanthropocentrists as to what aspects of nature possess moral standing. This has resulted in a division of
nonanthropocentric environmental ethics into a number of subfields – biocentrism, ecocentrism, deep ecology, social ecology and ecofeminism, to name but a few. Sadly, space constraints prevent an in-depth foray into all of these theories so the following discussion will be limited to the two most relevant to this study – biocentrism and ecocentrism.

2.3.2.1 **Biocentrism**

Biocentrism takes the standpoint that all living beings, not just humans, have moral standing. Albert Schweitzer was one of the earliest proponents of biocentric ethics and his ‘reverence for life’ ethic holds that the fundamental principle of morality is that “[i]t is good to maintain and to encourage life; it is bad to destroy life or to obstruct it” (Schweitzer, 1950, p. 309). By life, Schweitzer means a living being which has a “will-to-live … whether it can express itself … or remains dumb” (Schweitzer, 1950, p. 309).

One the most developed arguments for biocentrism has been put forward by Paul Taylor. Taylor defines a biocentrist as “[o]ne who takes the attitude of respect toward the individual organisms, species-populations, and biotic communities of the Earth’s natural ecosystems regards those entities and groups of entities as possessing inherent worth, in the sense that their value or worth does not depend on their being valued for their usefulness in furthering human ends” (Taylor, 1986, p. 46). Taylor argues that, as moral agents, humans have a duty to nonhuman organisms that possess inherent worth – a value that belongs to them by their very existence and which makes it wrong to use them solely as a means to human ends.
A related, but different, concept to inherent worth is the notion of a ‘good of a being.’ An entity can be thought to have a good of its own if something can be said to be good or bad for that entity. It is important to note that the concepts of a good of a being and inherent worth are not interchangeable. Simply because an entity has a good of its own (a normative statement) does not necessarily mean it should be treated in specific fashion (a positivist statement). Taylor then asks what the relationship is between an entity having a good of its own and the duty moral agents have toward the entity. His answer is that if humans are to have a duty toward nonhuman organisms, then the entity must have both a good of its own and inherent worth. When this is the case, the entity is considered to be “worthy of respect on the part of all moral agents.” The attitude of respect is then seen as the “only suitable, appropriate, or fitting attitude to take toward the entity” (Taylor, 1986, p. 72). Adopting this attitude would require one to accept the principle that, all other things being equal, organisms should not be harmed or interfered with. Taylor continues by defining four core beliefs which lie at the heart of his attitude of a respect for nature:

1. The belief that humans are members of Earth’s Community of Life in the same sense and on the same terms in which other living things are members of that Community.

2. The belief that the human species, along with all other species, are integral elements in a system of interdependence such that the survival of each living thing, as well as its chances of faring well or poorly, is determined not only by the physical conditions of its environment but also by its relations to other living things.

3. The belief that all organisms are teleological centers of life in the sense that each is a unique individual pursuing its own way.

4. The belief that humans are not inherently superior to other living beings.

(Taylor, 1986, pp. 99-100)
James Sterba expands on Taylor’s principles by allowing humans to value
themselves over other species out of a need for self-preservation (Sterba, 1998). As
long as this trait only applies to those times when basic need are at stake, then,
according to Sterba, this does not contradict the principle of nonaggression to other
species. Sterba reiterates this point by stating that, “if equality of species is to mean
anything, it must be the case that the basic needs of members of species are protected
against aggressive actions which only serve to meet nonbasic needs” (Sterba, 1998,
pp. 367-368). An example of Sterba’s position is given by Jason Kawall who writes
that the principle of defense allows for action to be taken against a disease-causing
bacteria; it is acceptable to value a fellow human over the bacteria (Kawall, 2003).
Kawall concludes by suggesting that the rules proposed by biocentrists such as Taylor
and Sterba should be used as general guides and that we “simply need to bear in mind
that these rules are not basic, and can be overridden. Thus, even if we have not yet
developed the virtue of reverence for life, we can still make use of advice from the
virtuous and apply prima facie rules” (Kawall, 2003, p. 358).

This form of biocentrism in which priority should be given to humans,
although the well-being of all animals should be considered, has been labeled by
Stenmark as weak biocentrism, in contrast to the strong biocentrism of Paul Taylor
(Stenmark, 2002). Kenneth Goodpaster’s nonegalitarian biocentric outlook is another
example of weak biocentrism. Goodpaster argues that, while having a life makes a
living being morally considerable, it does not mean that the being in question has the
same moral worth as humans (Goodpaster, 1978). A similar argument is put forth by
Louis Lombardi who suggests that while nonhumans do have inherent worth, it is less
that the worth which humans possess. Although it would be wrong to use animals and
plants solely as a means to an end (as this would ignore their inherent worth) this does not mean they should be viewed as being of equal value with humans. Should a situation arise when the good of humans and animals come into conflict then, as humans have greater inherent worth that nonhumans, it would be morally right to allow the good of humans to take priority (Lombardi, 1983).

2.3.2.2 Ecocentrism

A second possible formulation of a nonanthropocentric environmental ethic is ecocentrism. Aldo Leopold is widely held to be the father of modern day ecocentrism and his *Land Ethic*, published as the final chapter of *A Sand County Almanac*, lays out his concept of an ecocentric ethic. In Leopold’s mind, the land ethic simply extends the concept of community so as to include the land community as well as the human community. As Leopold puts it “all ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts …. The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land” (Leopold, 1949, pp. 203-204). With regard to humankind, Leopold states that “a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it” (Leopold, 1949, p. 204). Central to the land ethic is Leopold’s ‘key-log’ principle, which determines whether an action is morally right or not. According to Leopold, “[a] thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise” (Leopold, 1949, pp. 224-225). There are thus two fundamental differences between ecocentrism and biocentrism. First and most obviously, ecocentrism is concerned with the integrity of the entire
ecosystem whereas biocentrism is concerned with the living creatures within the ecosystem. The second difference exists as a corollary of the first. For an ecocentrist it would not be morally wrong to kill a particular animal, provided the integrity, stability and beauty of the biotic community was maintained. As discussed above, biocentrism would object to such killing on the grounds that the animal had the moral right to live.

Stenmark refers to Leopold’s land ethic as an example of radical ecocentrism as it places importance only on ecological wholes (i.e., species, ecosystems or the biotic community). Any value an individual has is determined by how much it contributes to the well-being of the ecological whole (Stenmark, 2002). Radical ecocentrism is so called as humans are not afforded any extra moral value simply by virtue of being human. Our place in the ecosystem, like all other species, should then be judged on the value we bring to the ecological whole. Taken to its extreme, such a position would even advocate a drastic reduction in human numbers as our current population levels are damaging the ecosystem. William Aiken has suggested that a person who holds this outlook would support “massive human die backs” (Aiken, 1984, p. 269). As Stenmark notes, how radical a view this is would depend on how the ‘die backs’ would be administered. Obviously a mass culling of the world’s population would be an extremely radical position to take whereas suggesting the slight decrease in human numbers through a gradual reduction in the birthrate would be somewhat less radical. Not surprisingly, radical ecocentrism is not widely supported as a viable option or as a basis upon which policy decisions should be made. J. Baird Callicott maintains that Leopold did not intend the land ethic to have inhumane or antihumanitarian consequences, although he does note that
“whether he [Leopold] intended them or not, a logically consistent deduction from the theoretical premises of the land ethic might force such untoward conclusions” (Callicott, 1989b, p. 92). Callicott continues by arguing that adherence to the land ethic does not result in such a misanthropic outcome and takes a position which Stenmark describes as strong ecocentrism (Stenmark, 2002).

Strong ecocentrism places more value on the individual than radical ecocentrism and maintains that both ecological wholes and individuals have moral value. However, the ecological whole still has a greater value than its individual members. By moving away from the more radical formulation of ecocentrism, Callicott sees no reason why one cannot belong to the biotic community and remain a member of the human community. The land ethic does not have to override the duties we have as humans to our fellow humans in much the same way that duties to our fellow humans do not necessarily override the duties we have to our immediate family. Indeed, Callicott argues how in the same way “one should not impoverish one’s own children just short of starvation in order to aid actually starving people on another continent” neither should one “promote or even acquiesce in human starvation, no matter how distant, to achieve environmental goals” (Callicott, 1989a, p. 58). Callicott sees our relationship with nature as an extension, rather than a replacement, of our ethical duty to other human beings. As a result, ecocentrism need not be equivalent to “environmental fascism” as Tom Regan argues (Regan, 1983, p. 362). In light of this, Stenmark suggests that “every being on earth which can be reckoned as a moral agent is morally justified, when there is a conflict with equally weighty obligations to other beings with moral standing or to processes such as ecosystems, in giving priority to the obligations which apply to the parties which are
genetically closest and most socially concerned” (Stenmark, 2002, p. 87). However, this is not to say that ecocentrism does not affect human ethics at all. As Callicott states, in adhering to the land ethic “one may well make certain sacrifices oneself or impose certain restrictions on the animal members of one’s mixed community for the sake of ecological integrity” (Callicott, 1989a, p. 58-59).

In short, although strong ecocentrism places a significant amount of importance on ecological wholes, it disposes of the more radical idea that individuals only possess instrumental value. Stenmark notes that, as a general rule, strong ecocentrists view ecological wholes as more important than their individual parts, but in certain circumstances this principle may not hold. Leopold’s key-log principle then becomes the most important, but not the only, factor in determining whether an action that affects the ecological whole should be undertaken. When conflict exists between the good of individuals and the good of the biotic community then, ceteris paribus, the good of the latter should still be given priority (Stenmark, 2002).

Weak ecocentrism echoes the sentiments of its stronger version but switches the priority placed on ecological wholes and individuals. In the weak form, while both wholes and individuals have value, it is human beings which have the highest value (Stenmark, 2002). For weak ecocentrists, Leopold’s key-log principle is watered down still further so that the integrity, stability and beauty becomes an important factor – as opposed to the most important. According to Stenmark, Holmes Rolston symbolizes weak ecocentrism when he states that “an important ethical constraint in environmental decisions is concern for the integrity, stability, and beauty of biotic communities” (Rolston, 1994, p. 82). Although Rolston believes that species can often be more important than individual animals – in Philosophy Gone Wild he
agrees with the decision of the U.S. Fish and Wildlife Service to kill 15,000 goats and remove a further 14,000 from San Clemente Island off the coast of California in order to save three endangered plant species (Rolston, 1986) – elsewhere he assigns humans a greater level of intrinsic value compared to other plants and species. In *Environmental Ethics*, Rolston writes that humans are “of the utmost value in the sense that they are the ecosystem’s most sophisticated product. They have the highest per capita intrinsic value of any life form supported by the system” (Rolston, 1988, p. 73).

Although weak ecocentrism places more value on humans per capita than on other individual organisms, Stenmark notes how the “combined value of other living beings or processes can in certain situations surpass that of human beings and thus weigh more in a possible case of conflict” (Stenmark, 2002, p. 90). As support for this argument, Stenmark again cites Rolston who suggests that, in some cases, it might be better to preserve a million species that currently exist rather than add another million humans (that currently do not exist) to the world’s population (Rolston, 1988). Elsewhere, Rolston discusses the problem of whether to protect the black rhino or to allow poaching (which will allow people to buy food with the money they receive from selling the horns). Rolston argues that if we always chose the welfare of humans over the rhino, then there ultimately there will be no rhinos left. Although he cautions that we must be wary of inhumanity, he concludes that “one ought to put the black rhino as a species first, even if this costs human lives” (Rolston, 1996, p. 262). In response to potential accusations of misanthropy, Rolston argues that driving a species to extinction is a different kind of killing – a “superkilling” which kills species as well as individuals and which “kills collectively, not just
distributively” (Rolston, 1996, p. 265). The killing of a species, Rolston adds, “is the death of birth, not just of an individual life. The historical lineage is stopped forever” (Rolston, 1996, p. 265).

On more than one occasion Rolston has addressed the issue of balancing natural and cultural values. Following on from the above discussion of the black rhino, Rolston turns to the broader question of whether we should feed people or save nature and argues that:

If persons widely demonstrate that they value many other worthwhile things over feeding the hungry (Christmas gifts, college educations, symphony concerts), and if developed countries, to protect what they value, post national boundaries across which the poor may not pass (immigration laws), and if there is unequal and unjust distribution of wealth, and if just redistribution to alleviate poverty is refused, and if charitable redistribution of justified unequal distribution of wealth is refused, and if one fifth of the world continues to consume four fifths of the production of goods and four fifths consumes one, and if escalating birthrates continue so that there are no real gains in alleviating poverty, only larger numbers of poor in the next generation, and if low productivity on domesticated lands continues, and if the natural lands to be sacrificed are likely to be low in productivity, and if significant natural values are at stake, including extinctions of species – then one ought not always to feed people first, but rather one ought sometimes to save nature.

(Rolston, 1996, p. 265)

Rolston comments that many of the ‘ands’ could be changed to ‘ors’ and the statement would remain true, although how many could be changed depends on the context of the situation. Given that many of the ‘ifs’ in the statement are true in today’s society then clearly Rolston believes we should, in many cases, choose preserving nature over saving humans. Without doubt Rolston takes an ecocentric approach to human’s relationship with nature but, in saying that – given his assertion
above that humans have the highest per capita level of intrinsic value, coupled with his views of balancing cultural and natural values – it is apparent his views are weaker than Callicott and other proponents of strong ecocentrism. In short, weak ecocentrism values both ecological wholes and the individual organisms found with the wholes, yet allocates humans the highest individual value (Stenmark, 2002).

2.3.3 Environmental Pragmatism and Policy Relevance

While there is no doubt that environmental ethics has greatly added to our understanding of our relationship with the natural world, a number of philosophers have questioned the real-world impact the discipline has had. The seemingly intransient positions taken by proponents of the various ethical positions has led to much debate, but to little action in terms of policy formation or how humans interact with the nonhuman world. Recently, there has been a call for philosophers to get more involved in the policy arena and conduct interdisciplinary work with public agencies, policy makers, and the private sector (Frodeman, 2006). However, if environmental ethics is to have any real sway in environmental decision making, then there will likely be a need to move away from the traditional, polarizing arguments. As Bryan Norton notes in his book, Towards Unity among Environmentalists, “[i]n the context of political debate, individual rights, moral obligations to protect species, and scientifically articulated thresholds or constraints inherent in fragile ecological systems must all be factored into a process that sets goals, objectives, and standards for environmental programs” (Norton, 1991, p. 190). Norton continues by listing seven worldviews (the Judeo-Christian stewardship ethic, deep ecology, transcendentalism, constrained economics, scientific naturalism, ecofeminism, and
pluralism/pragmatism) which can provide a foundation for either conservation or exploitative tendencies. Taking an obviously pluralistic approach, Norton states that environmentalists often appeal to all seven worldviews to varying degrees.

In defense against those that would argue that this pluralistic approach opens the door for moral chaos, Norton adds that such a mixed worldview would require a number of second-order principles to help determine which of the seven first-order principles to apply in any particular situation. Norton labels such a system an “integrated worldview” in that each of the above worldviews would be “given an appropriate domain of application, according to second-order rules based on a determination of the context of the managerial problem faced” (Norton, 1991, p. 200).

A similar approach has been proposed by those who advocate for the adoption of environmental pragmatism. Anthony Weston stresses the importance of the interrelatedness of values and notes how environmental pragmatism replaces the concept of fixed ends with a “picture of values dynamically interdepending with other values and with beliefs, choices, and exemplars” (Weston, 1985). Elsewhere, Weston talks about the need to think ecologically – that is to think of interrelated systems rather than individual causal relationships – with regard to ideas as well as ecosystems. He notes how ethical ideas are “deeply interwoven with and dependent upon multiple contexts: other prevailing ideas and values, cultural institutions and practices, a vast range of experiences, and natural settings” (Weston, 1992, p. 321). An example of this is provided by Stephen Katz. In looking at a case study of beach replenishment on Fire Island, New York, Katz – who has been described as a “merciless critic of anthropocentrism” (Hettinger, 1998, p.109) – nonetheless concludes that the anthropocentrism versus nonanthropocentrism debate needs to be
framed in non-absolutist terms, allowing for compromise, flexibility, and a pluralism of values. According to Katz, this is because “the choice between anthropocentrism and nonanthropocentrism as the basis of both environmental policy and environmental ethics is highly contextual and thus requires a subtle examination of the concrete policy situation” (Katz, 1999, p. 378-379).

Andrew Light takes the idea of environmental pragmatism one step further and suggests that there are two formations of the concept – a direct philosophical use of pragmatism and a metaphilosophical use (Light, 1996). Light warns against the first formation, which he sees as an attempt to simply create an ethical pluralism to counter anthropocentric or nonanthropocentric arguments – a move which Light believes just adds another intractable side to the environmental ethics debate. He notes that many philosophers believe this to be the only contribution pragmatism has to make in the environmental sphere. However, he argues strongly for the second formation – a metaphilosophical use of pragmatism (the roots of which can be traced to neo-pragmatists such as Richard Rorty). Light comments that “from this metatheoretical perspective, environmental pragmatists are not wedded to any particular theoretical framework from which to evaluate specific problems, but can choose the avenue which best protects the long-term health and stability of the environment, regardless of its theoretical origin” (Light, 1996, p. 172).

Part of the reasoning behind this push for environmental pragmatism relates to the issue of time. Light cites Christopher Manes who argues that European environmentalists simply do not have the time to separate ecology from politics. Light, however, is keen to stress that while environmentalists should publicly adopt a pragmatic outlook in order to move environmental policy forward, privately they
should continue to search for answers to the difficult ethical questions. Light believes that “pragmatic solutions are not something we settle on, they are things we strive for while privately pursuing, if we choose, our individualistic redescriptions of nature in positive, totalizing, or hegemonic terms” (Light, 1996, p. 178). Adopting a pragmatic position frees theorists from the shackles of long-standing philosophical debates and allows environmental ethics to contribute in the political arena.

2.4 Mental and Cultural Models

In order to gain a more rounded understanding of attitudes and behavior toward the ocean, it is helpful to elicit the mental models that people possesses with regard to the ocean, in addition to their beliefs and values. Mental model research is “fundamentally concerned with understanding human knowledge about the world” (Gentner & Stevens, 1983, p. 1) and is therefore ideally suited for investigating human knowledge of the ocean. A mental model is a simplified representation of the world which enables a person to understand more complex issues. Essentially, during the learning process, when a person receives information, rather than it just being stored as random facts in the person’s mind, it is used to build a mental model. The model can then be used to solve a particular problem or make inferences about certain issues. One of the key assumptions of mental model research is that the world is too complex for individuals to understand every aspect of every problem they face. Mental models are therefore used by individuals to address problems that they otherwise could not solve.

Donald Norman lists a number of characteristics of mental models. First, he notes that they are not static but rather evolve over the course of time and new
pieces of information can be added at any time to further refine the mental model. Second, they do not need to be technically accurate (and often they are not) to be workable. Third, mental models are frequently incomplete and are what Norman calls “unstable” – that is people may forget specific details of the model. Forth, mental models do not have set boundaries and can overlap with other models. Fifth, Norman comments that people are often unsure about the validity of their knowledge and may incorporate a certain amount of uncertainty – whether justified or not – into their model (Norman, 1983).

Kempton, Boster, and Hartley (1995) use the example of chain reactions in nature to describe how mental models work. They note that, since the early 1960s and the publishing of Rachel Carson’s *Silent Spring*, the public has received a large amount of information concerning the effects of pesticides on the environment. However, Kempton et al. note that while the public might not know all the intricacies of DDT and other pesticides, or how the chemicals are passed through the food chain and the precise effect the toxins have on different species, they do construct general models of how pesticides move up the food chain and how different species are connected. In their research, Kempton et al. show that these models have since been applied to other aspects of the environment and find that “Americans now have extended from observations like those of Carson to more general models of the interconnectedness of all species and the possibility of what some call ‘chain reactions’ in nature” (Kempton, et al., 1995, p. 11). Paolisso notes how a basic assumption of the use of mental models is that “when individuals engage the world they cannot possibly attend to it in all its complexity” (Paolisso, 2002, p. 229). This assertion is certainly supported by the ‘chain reaction’ mental model findings of
Kempton et al. where a simplified model is used to allow people to accurately understand far more complex systems and processes.

The concept of mental models originated in the field of psychology. Cultural models, on the other hand, are more commonly used in an anthropological context. Despite the terms originating in different disciplines, there is a large amount of overlap between the two concepts and they can be used in tandem to describe the models society possesses. Quinn and Holland define cultural models as “presupposed, taken-for-granted models of the world that are widely shared (although not necessarily to the exclusion of other, alternative models) by the members of a society and that play an enormous role in their understanding of that world and their behavior in it” (Quinn & Holland, 1987, p. 4). In essence, cultural models are mental models scaled up to the societal level. Shared mental models by members of a particular community or society can therefore be referred to as cultural models.

2.4.1 Impact of Mental and Cultural Models on Policy

Mental and cultural models can have an impact on how policies are accepted by a particular community or society in general. If the policy fits with the cultural model then it is likely to have a good chance of being accepted. However, if there is a disconnect between the suggested policy and the dominant cultural models, then it will be difficult to gain the public support that is so vital for successful policy making. Research by Paolisso into the Chesapeake Bay blue crab fishery demonstrates this point. Through his work with the commercial fishermen of the Chesapeake Bay, known as watermen, Paolisso has identified the cultural model that underpins the watermen’s attitudes to the blue crab fishery. Previous attempts at
management of the declining fishery had encountered resistance from the fishermen who do not believe that commercial fishing is the main cause of crab decline. As Paolisso notes, the “cultural model of watermen’s reasoning about the blue crab management provides a critical and essential framework for understanding their opposition to scientific findings and new crab regulations. The model illustrates key relationships among core beliefs and values that help explain watermen’s resistance” (Paolisso, 2002, p. 237). Knowing how the fishermen think of the resource will help managers both engage the watermen better and design better policies to address the declining fishery. According to Paolisso “the model suggests that watermen will resist regulations that interfere with God and nature’s production of crabs, but support science and regulations that improve on what nature provides” (Paolisso, 2002, p. 237). A policy that fits with the watermen’s cultural model will have a much greater chance of success that one that contradicts it.

The Chesapeake blue crab fishery case demonstrates how understanding cultural models can help with the design of policies that have a greater chance of success. However, this does not mean that in all cases policy should be based solely on the prevailing cultural models. It is important to recognize when the cultural models themselves are inaccurate and different strategies – such as education and public awareness raising – are required. Incorrect cultural models can result in inappropriate solutions to a particular problem being sought or accepted, or correct solutions or policies being rejected. Two examples of faulty cultural models – relating to global warming and outbreaks of Pfiesteria – are given below.

Often when cultural models are faulty it is not because the model is wrong \textit{per se}, but because an older, otherwise workable model is applied to a new situation to
which it is not suited. Kempton et al. (1995) found cases of this in their study into American environmental values. For example, they report that with regard to global warming, people have a tendency to apply an incorrect ‘pollution’ model to the input of carbon dioxide into the atmosphere. Kempton et al. describe the following four aspects of the pollution model that are generally held by the public: 1) pollution is caused by artificial chemicals, not naturally occurring substances; 2) these chemicals are toxic to humans (although there may be a lag time before negative health effects are observed); 3) pollution is predominately caused by industry and automobiles; and 4) the pollution problem can be solved by installing better filtering technologies (Kempton, et al., 1995). With regard to pollution, this cultural model is more-or-less accurate and provides a simplified, workable description of the issue. However, when applied to global warming the model runs into difficulty and a number of inaccuracies become apparent. For example, many greenhouse gases, such as carbon dioxide, are naturally occurring nontoxic substances (although some greenhouse gases such as methane are toxic, they are too diluted in the atmosphere to pose a health risk). More important, however, are the policy implications of the public believing levels of carbon dioxide can be reduced through the installation of better technologies. Unlike particulate matter, which can be effectively reduced by scrubbers in coal-fired power stations, carbon dioxide cannot be easily removed by improving filtering systems. The only way to be sure of reducing the amount of carbon dioxide in the atmosphere is to reduce the amount put into the atmosphere in the first place. In their study, Kempton et al. found that almost two-thirds of respondents incorrectly applied the pollution model to the issue of global warming. The policy implications of this are clear: people who apply the pollution model to global warming are less likely to
support carbon dioxide reduction policies, such as those that call for a reduction in the country’s dependence on fossil fuels.

Recent outbreaks of *Pfiesteria* provide a second example of an inappropriately applied cultural model. *Pfiesteria piscicida* is a microscopic marine organism with twenty-four known forms of life. Under certain conditions, it can metamorphose into a form that attacks fish by first releasing a neurotoxin into the water to immobilize the fish and then by consuming the fish’s outer tissue. Although only released into the water, the neurotoxin can aerosolize and affect the air immediately above an outbreak. The neurotoxin is not thought to be persistent in the fish, water or air. *Pfiesteria* can be harmful to humans either through direct contact with affected fish, or through inhalation of the neurotoxin (Kempton & Falk, 2000).

In a study conducted into people’s attitudes toward *Pfiesteria*, Kempton and Falk (2000) demonstrate that existing cultural models do not match the threats *Pfiesteria* poses. Imagined threats are overplayed whereas actual threats are either not known or underplayed. Kempton and Falk note that *Pfiesteria* is a new phenomenon and people have not yet developed accurate cultural models to help them understand outbreaks. Instead, in their study, Kempton and Falk discovered that people tend to apply one of four older models – pollution, toxics, diseases of fish, or parasites in fish – to explain the risks of *Pfiesteria*. Kempton and Falk found “conclusively that people are applying inappropriate cultural models to Pfiesteria, and less conclusively that these models lead them to unnecessarily avoid coastal areas, avoid eating seafood, and unsafely risk exposure to aerosoled neurotoxins” (Kempton & Falk, 2000, p. 360).
In order to fully understand public attitudes to a particular issue it is important then to investigate the beliefs, values and mental models that people possess. With regard to broader society, these mental models can be aggregated to form cultural models that can have a significant impact on how policies are viewed and adopted. Beliefs, values and mental models can therefore all have an important impact on public attitudes toward the marine environment.

2.5 Prior Studies of Environmental Values

In addition to the work by Kempton et al. described above, a significant amount of research has been conducted into the effect of values on environmental behavior across various academic disciplines. Within the field of environmental ethics the potential usefulness of environmental pragmatism was put to the test by Ben Minteer and Robert Manning in a study into public environmental beliefs and values. Inspired by Kempton, Boster and Hartley’s investigation of environmental values in American culture, Minteer and Manning suggest that “much of the divisiveness and acrimony surrounding disputes over environmental policy may be overstated” (Minteer & Manning, 1999, p. 196). The authors then set out to examine this idea through the use of mail survey which tested a wide range of ethical positions (anti-environment sentiments, benign indifference, utilitarian conservation, stewardship, and radical environmentalism).

The results of the study indicate that the public (at least in Vermont where the survey was administered) subscribe to a number of ethical theories when it comes to the environment. As Minteer and Manning note, the results of the study “indicate that there is a broad range of moral sentiments about human-nature relationships ‘out
there’ so to speak, a number of which demonstrate a high degree of acceptability in public thinking” (Minteer & Manning, 1999, p. 199). The authors conclude that the public does in fact adhere to a pluralistic formation of environmental ethics, one that includes a wide range of moral sentiments and environmental values. While this study into ocean beliefs and values does not incorporate as many ethical theories as the Minteer and Manning survey, it does use a similar approach to uncover the philosophical foundations of people’s ocean attitudes.

Outside the field of ethics, a number of other studies have been conducted that investigate the effect of anthropocentric and nonanthropocentric attitudes. One of the most well known tools for measuring environmental attitudes is the New Environmental Paradigm scale devised by Dunlap and Van Liere in the late 1970s (Dunlap & Van Liere, 1978) and reworked by Dunlap et al. as the New Ecological Paradigm in 2000 (Dunlap, Van Liere, Mertig, & Jones, 2000). Both scales have been used extensively and a number of questions from the revised scale are included in this study. The revised scale includes a number of anthropocentric/nonanthropocentric questions such as whether plants and animals have the same right to exist as humans; whether humans have the right to modify the natural environment to suit their needs; and whether humans are meant to rule over the rest of nature. However, the scale is not limited to comparisons between anthropocentric and nonanthropocentric beliefs, but rather allows tests of a number of different value frameworks (balance of nature, eco-crisis, antiexemptionalism, limits to growth, and antianthropocentrism).

In the field of environmental psychology a number of studies have investigated differences between ecocentric and anthropocentric attitudes, but it should be noted that the term ecocentric is not used in the same way as described
above. Thompson and Barton (1994) and Kortenkamp and Moore (2001) both undertook studies of this kind and both used the term ecocentric in a more general nonanthropocentric way. Thompson and Barton state the ecocentric individuals “value nature for its own sake, and therefore, judge that it deserves protection because of intrinsic value” (Thompson & Barton, 1994, p. 149). While this definition does represent an ecocentric ethic, it is in a very weak form and in fact many of the questions used by Thompson and Barton to measure ecocentrism are actually more anthropocentric in their outlook (e.g., questions such as: ‘I can enjoy spending time in natural settings just for the sake of being out in nature;’ ‘I need time in nature to be happy;’ and ‘it makes me sad to see natural environments destroyed’). With this caveat in mind, however, Thompson and Barton do conclude that people who hold an ecocentric viewpoint are more likely to act on their pro-environmental values and undertake conservation actions. They associate anthropocentrism with higher levels of apathy to the environment and less conserving behavior.

Kortenkamp and Moore found less convincing results when they tested ecocentric and anthropocentric moral reasoning in cases of ecological moral dilemmas. Through experiments with psychology students they found it difficult to separate out ecocentric and anthropocentric attitudes. Kortenkamp and Moore note that internally motivated pro-environmental attitudes are “positively correlated with the use of both ecocentric and anthropocentric moral reasoning” (Kortenkamp & Moore, 2001, p. 265). Kortenkamp and Moore indicate that this finding mirrors that of Stern et al. (1995) who could not differentiate between ecocentric (or biospheric as they labeled it) and anthropocentric (or altruistic) values. Working in a different field, Stern et al. came to a similar conclusion to the environmental pragmatists, noting that
the theoretical distinctions between different value sets might not exist among the general population (Stern, Dietz, Kalof, & Guagnano, 1995).

2.6 Summary

As can be seen from the above discussion, there exists a large amount of research into environmental values and the effect that they might have on environmental behavior – a literature that transcends disciplines. The literature reviewed here helped guide the development of the survey instrument and places the results of the research and their interpretation into the proper context. The prior surveys and polls into ocean beliefs and attitudes to offshore energy development also help position this survey and provide a useful context to the research.
Chapter 3

METHODS

In order to elicit both widely held opinions and attitudes, and more deeply seated beliefs and values regarding the ocean, the data collection process was split into two phases, with each part utilizing a separate technique. In phase one, 35 semistructured interviews were conducted to obtain detailed information concerning people’s attitudes towards the marine environment and explore why people think and feel the way they do. These in-depth interviews were ideal for obtaining specific data about people’s attitudes and perceptions but were not practical for obtaining a statistically significant, representative sample of the broader population. For phase two of this study, a national survey was employed to discover how widespread specific ocean attitudes and beliefs are. In isolation, neither approach was adequate for the goals of this study, but when combined, the two methods allowed for both detailed beliefs and values, and widely held opinions and attitudes to be uncovered. Although the combination of these two research techniques is somewhat uncommon, interviews and survey data have been used together successfully in the past and their combination is recommended for mental model research (Kempton, et al., 1995; Kempton, Firestone, Lilley, Rouleau, & Whitaker, 2005; Morgan, Fischhoff, Bostrom, & Atman, 2002).
3.1 Semistructured Interviews

When conducting in-person interviews, four different techniques can be used – informal, unstructured, semistructured and structured. Although each method has its strengths, in situations where there will only be one opportunity to speak to a respondent, semistructured interviewing is generally held to be the preferred method (Bernard, 2002) and was used in phase one of the project. A written interview protocol was utilized to provide some structure to the interviews but all respondents were encouraged, through the use of probe questions, to expand on their answers and to provide as much information as possible. While the interview protocol kept the interviews on track and ensured that the same general areas were covered in each interview, the use of probe questions allowed for more in-depth discussions of specific issues and provided more complete data, resulting in a better understanding of people’s beliefs and values.

Prior to the commencement of the data collection, the interview protocol was designed and thoroughly pretested. This was an iterative process with numerous revisions made to the set of questions over a number of weeks. In total, the interview protocol went through 27 drafts before a final version was decided upon (see Appendix I for the final interview protocol). Thirty-five subjects were interviewed over almost a two-year period (November, 2005 to September, 2007). Three were spoken to over the telephone; the remainder were interviewed in-person. Given the small number of respondents in this phase of the project (when compared to the mail survey) and the fact that each interview took a significant amount of time (between 15 and 75 minutes) a non-random sampling method was used. People were approached who looked like they had some time to spare and asked if they would like to
participate in the research project; about 25% of those approached declined. This technique meant that the interviews were conducted with people who were both willing and who had the time to talk for a few minutes. Although not representative of the broader population, a sampling method such as this is useful in exploratory research (Bernard, 2002). Every effort was made to balance these interviews with regard to ethnicity, gender and age range but it is acknowledged that the interviews did not represent a statistically valid sample of the population.

The first five interviews were conducted with knowledgeable individuals in the marine science/policy arena. Three marine scientists were spoken to (two at the University of Delaware and one at the University of Maryland) along with two employees of Non-Governmental Organizations (NGOs) who were both based in Washington D.C. Two interviews were then undertaken with East Coast fishermen – one commercial and one recreational. While not directly involved with the science or policy of marine resource management, the fishermen were highly knowledgeable of the ocean resource and had a unique perspective on marine related issues. These initial interviews provided a base for the ‘lay’ interviews (those conducted with members of the public) and were useful in providing a scientific foundation for the rest of the data gathering process.

Lay interviews were carried out in three broad geographic regions. The first ten respondents were all based on the West Coast. Two subjects were spoken to in San Diego, CA, one in Monterey, CA, one in Newport, OR, and two Port Townsend, WA. In addition, four people vacationing from Glendale, AZ were interviewed (one in San Diego and three in Newport). East Coast interviews were split between Delaware and Rhode Island. Delaware was chosen due to its proximity
to the author and the interviews in Rhode Island were piggy-backed on a two-day conference. Two Delaware interviews were conducted in Lewes and one in Rehoboth. Of the Rhode Island interviews, three were undertaken in Newport, three in Middletown, and two in Kingston. Lastly, seven interviews were undertaken in Midland, TX during another trip. While not as rigorous as randomly selecting interview sites across the country, this technique of combining data collection with pre-arranged travel plans, allowed for interview respondents to be sampled across a wide geographic area while adhering to a minimal travel budget. Interview subjects ranged in age from 19 to 70 and included, among others, two teachers, a truck driver, a shop worker, a social worker, a naval officer, an oil field worker, and a Texas Ranger. A full list of interview subjects can be found in Appendix II. When reported in the text, interviewer comments or questions are written in italics, whereas interviewee responses are written in regular font.

The interviews covered a range of topic areas including: the importance of the ocean to the environment and humanity; whether humans have a responsibility to protect the ocean; uses of the ocean; and issues that affect the ocean. Interview subjects were also asked about any actions that they take to protect the ocean and the environment in general; whether they have a spiritual connection to the ocean; and whether they feel the ocean is more important to them than other areas of the natural world. Due to the evolving nature of the research project, specific questions concerning the use of the ocean for energy generation – offshore oil drilling and wind development – were not included in the semistructured interviews. This topic area was added to the project at a later date, after the completion of the interview phase. As a result, while reported results for ocean energy contain some qualitative data, the
majority of the qualitative data is found in the chapter which presents the ocean values data.

3.2 Qualitative Data Analysis

All of the interviews were recorded and fully transcribed. Using techniques derived from grounded theory analysis (Corbin & Strauss, 1990; Glaser & Strauss, 1967; Strauss & Corbin, 1998) the interview transcripts were coded. Pure grounded theory involves the derivation of theory from the data. Instead of entering into the research project with a preconceived theory, a researcher using grounded theory should allow the theory to emerge from the data. The reasoning for this approach is that grounded theories, “because they are drawn from the data, are likely to offer insight, enhance understanding and provide a meaningful guide to action.” (Strauss & Corbin, 1998, p. 12). Full grounded theory analysis would start with little more than a broad research area. Concepts and ideas are then pulled from the data, refined and re-examined before being developed into a unifying theory.

In grounded theory, coding is employed to categorize qualitative data. The first stage in this process is open coding which involves labeling and identifying the various concepts. Open coding is designed to “open up the text and expose the thoughts, ideas, and meanings contained within” (Strauss & Corbin, 1998, p. 102). During the open coding process, categories contained within the data are examined and labeled. In grounded theory, categories can be defined as related events, issues, objects, actions and thoughts that are significant to the respondents. Subcategories are concepts that relate to a broader category, they provide further detail and can help clarify the category. After open coding has identified the various categories and
subcategories, axial coding is used to link the various themes together. Axial coding looks at how categories are interrelated to one another and highlights the issues that crosscut and link the categories together. This process provides clearer and more complete explanations about the concepts that are contained within the data. In this study, the concepts include beliefs, values and mental models. Using open and axial coding, it is possible to draw out these phenomena from the interviews and then construct a survey instrument based on these concepts.

It should be noted that, in grounded theory, there is one final stage in the coding process. Selective coding integrates the categories and subcategories so as to develop and further refine the theory. Open and axial coding were both used in this research. Selective coding, however, was not employed as developing a true grounded theory was not the intent of the project. Instead, after the interviews had been transcribed, the various categories and subcategories were grouped using Freemind, a mind mapping software program. This process helped the author obtain a good overall understanding of large amounts of qualitative data and allowed the key concepts to be identified and included in the mail survey. Figure 3.1 shows categories and subcategories displayed in Freemind. Here it can be seen that ‘responsibility to the ocean’ is the main category and is broken down in to various sub-categories: ‘humans have a stewardship role,’ ‘balance of nature,’ ‘respect for nature’ etc. Each of these are then further divided and so on. This process was undertaken for over 480 concepts identified in the interviews. The number of times each concept appeared in the data was also tabulated and, together with the mind maps, used to determine which concepts would be incorporated into the mail survey.
Glaser and Strauss view grounded theory as one stage in the research process and note that the next stage involves testing the theory on a separate data set (Glaser & Strauss, 1967). In this case, rather than theory, the concepts drawn from the interviews were tested, through the use of the mail survey, on the broader population. This process resulted in the survey instrument being better targeted to the actual
beliefs and values that exist within society than had it been constructed solely on the author’s concept of what views people might possess.

3.3 National Mail Survey

Phase two of the data collection process was a national mail survey. Work began on the survey design in June 2008 and the survey was mailed out in November and December of that year. Dillman’s Tailored Design Method was used as a general guide to conduct the survey (Dillman, 2007). In his seminal text, Don Dillman states that, with regard to response rates, the implementation of a survey is more important than the actual questionnaire design and multiple contacts are the most effective tool for raising the response rate of mail surveys. In brief, the Tailored Design Method incorporates five elements for achieving a high response rate: 1) a clear and easy to understand questionnaire; 2) multiple contacts; 3) the inclusion of return envelopes with real stamps; 4) personalized correspondence; and 5) the inclusion of a token financial incentive with the survey. For this project, the first four steps of Dillman’s method were followed. Given financial constraints, it was not possible to include a token monetary incentive with each survey. Additionally, other researchers at the University have experienced high response rates, with no discernable drop in population representativeness, without enclosing a financial incentive (Firestone & Kempton, 2007; Firestone, et al., 2009).

3.3.1 Sampling Strategy

The survey instrument was designed to test how widespread the beliefs and values elicited by the interviews are among the wider population. After extensive
pretesting (detailed below) 1,600 surveys were administered to residents of the continental United States. Given cost limitations and the inherent differences (namely geographic and cultural) between Alaska and Hawaii and the rest of the United States, it was decided that the survey would only target residents of the lower forty-eight states. To ensure people from all parts of the continental United States were sampled, and to allow for inter-regional comparisons, a balanced stratified random sample was drawn from the population of these states (Kish, 1995). Stratified random sampling has a number of benefits over simple random sampling. It ensures that important subpopulations are incorporated into the sample and it maximizes the between-group variance and minimizes the within-group variance for the independent variables (Bernard, 2002). In this case, it ensured that a significant number of residents of the coastal regions were sampled. Given the size of the country, it would be unlikely that a simple random sample would include these respondents in as great a number.

Within each coastal region, the sample was drawn with residents of coastal counties. It should be noted that, in this study, the definition of a coastal county differs from the official government definition. The National Oceanic and Atmospheric Administration (NOAA) considers a county to be coastal if it meets one of the two following criteria: 1) at least 15 percent of their total land area is located within the nation's coastal watersheds (as defined by the Office of Ocean Resources Conservation and Assessment’s Coastal Assessment Framework); or 2) the county accounts for at least 15 percent of the land area of a coastal cataloging unit (a U.S. Geological Survey-defined drainage basin) (Culliton, 1998). Given that a number of these counties are a significant distance inland and that this study focuses on coastal residents who actually live near the ocean or the Great Lakes, only counties that
physically border either the open ocean or a major coastal body of water (such as the Chesapeake Bay) were used to provide the samples for the four coastal strata. Hereafter, it is these counties that will be referred to as ‘coastal counties’ or the ‘coastal area.’

In many cases the decision to designate a county as coastal was easy. As mentioned above, counties that bordered the water were classed as coastal. In some cases, however, the designation was not as clear cut. The following guidelines were used in borderline cases to determine whether to categorize a given county as coastal. Counties that border a major river or tributary that flows into a bay or sound were not classed as coastal, nor were counties that had a very narrow band of land linking them to the water. However, counties that include barrier islands or lagoons were designated as coastal.

For the purposes of sampling, the lower forty-eight states were split into five geographic regions. Out of the 1,600 surveys, half were sent to coastal residents and half to non-coastal or ‘inland’ inhabitants. The 800 surveys that were sent to coastal residents were further subdivided into four substrata – East Coast, West Coast, Gulf Coast, and Great Lakes – with each area receiving 200 surveys. Along with the fifth, Inland, subgroup, these strata make up the five regions defined in this study. Oversampling in coastal counties ensured that both coastal and non-coastal residents were well represented in the overall sample (Table 3.1).

In order to obtain a random sample, the help of an outside company was enlisted. By combining and cross-checking multiple public records, Survey Sampling International (SSI) generates samples for various types of surveys and, for a modest
fee, provided a sample broken into five strata according to the distribution shown in Table 3.1. The data obtained by SSI comprised names, addresses and telephone numbers. As the United States Postal Service was the carrier of choice for this survey, the telephone numbers were not needed and thus were discarded. The data file was converted into a Microsoft Excel spreadsheet to allow it to be easily mail merged into the survey cover letters. In addition to the data file, SSI also provided four sets of mailing labels to be used for the various survey and postcard mailings.

Table 3.1  Survey Strata Populations and Sampling Proportion

<table>
<thead>
<tr>
<th>Strata</th>
<th>Population</th>
<th>Proportion of National Population</th>
<th>Proportion of Surveys Sent</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Coast</td>
<td>32,268,111</td>
<td>10.8%</td>
<td>12.5%</td>
</tr>
<tr>
<td>West Coast</td>
<td>28,229,673</td>
<td>9.4%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Gulf Coast</td>
<td>13,591,307</td>
<td>4.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Great Lakes</td>
<td>19,060,485</td>
<td>6.4%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Inland</td>
<td>208,935,657</td>
<td>68.9%</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>302,085,233</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

3.3.2  Survey Design

Like the qualitative interview protocol, the mail survey went through numerous iterations (26 in total) before a final version was settled upon (see Appendix III). The survey was pretested at various stages of its development. Early versions were reviewed by friends and colleagues. This allowed detailed, informal feedback to be obtained both on the overall survey design and on specific questions. Survey questions were taken from a number of sources. A large proportion of the questions
stemmed from the qualitative interviews; some were designed to mirror questions in earlier ocean attitudinal surveys; some questions were taken from Dunlap et al.’s *Revised New Ecological Paradigm* (Dunlap, et al., 2000); and some were used from work conducted by Cordano et al., who analyzed the predictive validity of a number of ecological attitude scales (Cordano, Welcomer, & Scherer, 2003). Most of the attitudinal questions in the survey used a five-point Likert scale to measure respondents’ answers. Three questions asked respondents to rank a number of issues by importance to them and a few questions required a simple Yes/No or Support/Oppose response. Skip logic was utilized on a number of questions – depending how a respondent answered one question he or she would be directed to either the next question or asked to move ahead to the following questions.

As the survey approached its final form, the author undertook more formal pretesting at three Delaware Department of Motor Vehicle (DMV) locations – Wilmington, Dover, and New Castle. This approach provided the opportunity to test the survey on a randomly selected, diverse population, as just about everyone must visit the DMV at some point. The nature of a typical DMV visit (long wait times, little to occupy people) made the setting ideal to test a 20-minute survey. In total, 66 surveys were pretested – 17 at the Wilmington location, 18 at the Dover office, and 31 at the New Castle branch. One drawback with testing the survey implement at DMV offices was that occasionally respondents needed to leave before they get the chance to answer all of the survey questions. Out of the 66 surveys handed out, 16 were handed back incomplete, with the number of questions missed ranging from two or three to, in extreme cases, half the survey. After the author had spent a few hours passing out surveys and observing the speed at which the queues moved, it was possible to better
target DMV patrons who were likely to be waiting at least 20 minutes which reduced the number of uncompleted surveys. No major problems, biases, or issues were uncovered with either the question format or the skip logic and pretest subjects generally responded positively about the project. After attaining confirmation that the survey was clear and easy to understand – thus meeting Dillman’s first guiding principle – the project moved into the survey implementation phase.

3.3.3 Survey Implementation

Following the second recommendation of Dillman, multiple contacts were sent to every person in the sample. Depending on a person’s responsiveness, up to four mailings were sent to each address. On or about November 6, 2008, everybody in the sample received an initial survey packet, which included a cover letter, the survey booklet, and a pre-addressed return envelope upon which was affixed a real stamp (Dillman principle number three). Using the data provided by SSI and the mail merge feature of Microsoft Office, the cover letters were personalized and every one was signed in blue ballpoint pen by hand (principle four). Throughout the mailing process, the names of those that returned their surveys and those that were returned as undeliverable were removed from the mailing list. A follow-up postcard was sent out 11 days after the first mailing, followed by a second survey pack 25 days later, and lastly a second postcard six days after that.

Of the 1,600 surveys mailed out, 613 were completed and sent back. An additional 75 were returned as undeliverable. This bad address rate of less than 5% was better than expected (according to SSI, a rate of 10% is not unusual). Taking these bad addresses into consideration, the survey yielded a response rate of 40%.
3.4 Quantitative Data Analysis

The first stage in the quantitative data analysis process was data entry. First a codebook was developed which assigned a numeric value to each answer – questions which used a five-point Likert scale were given a value between one and five; yes/no or support/oppose questions received a one or a zero; and ranking questions were coded according to the respondent’s scoring. Next, a database was designed and created – in this case in Filemaker Pro – in which to enter the survey data. A database, rather than a spreadsheet, was used for this task because it provided for ease of entry of the 113 data fields and enabled the specification of minimum and maximum parameters in each data field to reduce the possible of data entry error.

During the data entry process, one problem with the survey booklet was uncovered. In a number of instances, respondents skipped two pages of the booklet – seemingly turning two pages instead of one when they were filling out their answers. While 131 surveys were affected, due to the fact that different people skipped different pages, the overall impact on data was significantly lessened. The most frequently skipped page was overlooked on 22 occasions – meaning that only 4% of respondents failed to answer the six questions contained on that page. After all of the survey data had been entered, a quality control check was performed on the database. To check the data, 50 surveys were systematically selected (every twelfth survey was pulled) to look for data entry errors. Only two errors were found in the 50 surveys. Given that each survey contained 101 variables, the error rate was calculated as 0.04% (2/50 x 101).

The final stage in the process was to analyze the data in STATA, a statistical software package. As Filemaker Pro could not export directly to STATA,
the data was first converted into Microsoft Excel and then imported into STATA. Both descriptive statistics and regression analyses were run in STATA. In order to ensure the sample data accurately represented the national population and to thus apply inferences drawn from the sample to the broader population, the data were first weighted according to region, gender, age and income. Weighting by these four characteristics allowed more robust conclusions to be drawn from the data regarding the views and opinions of the American public.
Chapter 4

OCEAN BELIEFS, VALUES, AND ACTIONS

This chapter reviews survey and interview data regarding attitudes toward the ocean. The chapter begins by examining a number of stated beliefs about the ocean, continues by extending this analysis into the realm of values, and concludes by analyzing whether beliefs and actions can predict pro-environmental behavior and actions. Multiple regression modeling is employed to undertake this final analysis. Throughout the chapter quantitative survey data is presented alongside extracts from the qualitative interviews. The results of the survey data are weighted according to region, sex, income, and age. In all cases, pseudonyms are used for interview respondents. Thirty-five interviews were conducted, five with scientists and non-governmental organization (NGO) workers and thirty with members of the general public. The two interviews conducted with fishermen (one commercial, one recreational) are included with the general public data as the fishermen do not have any formal training in the marine sector despite their day-to-day involvement in the field. For the most part, just the data from the public interviews is presented. This chapter aims to uncover beliefs, values, and mental models of the American public and this subset of the interviews provides a more authentic foundation for this task. Where appropriate, data from the scientists and NGO workers is used to compare ‘expert’ views with those of the general public.
4.1 Ocean Beliefs and Mental Models

Previous studies have found Americans to be less worried about the health of the oceans than other environmental issues such as pollution and toxic waste. Indeed this has led to concern for the ocean being seen as a “second-tier environmental problem” (Belden Russonello & Stewart & American Viewpoint, 1999) or “an issue waiting to be made” (Spruill, 1997). The findings from these earlier studies are mirrored in the data presented here. Respondents were asked to rank nine environmental issues in order of importance. Table 4.1 provides the mean rank of each issue; as can be seen, both ocean-related issues rank in the bottom three.

Table 4.1 Ranking of Environmental Issues that the World is Facing

<table>
<thead>
<tr>
<th>Issue</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution</td>
<td>3.23</td>
</tr>
<tr>
<td>Water pollution</td>
<td>3.59</td>
</tr>
<tr>
<td>Toxic waste</td>
<td>4.37</td>
</tr>
<tr>
<td>Climate change</td>
<td>4.58</td>
</tr>
<tr>
<td>Deforestation</td>
<td>4.65</td>
</tr>
<tr>
<td>Extinction of plant and animal species</td>
<td>4.66</td>
</tr>
<tr>
<td><strong>Damage to the open ocean</strong></td>
<td><strong>5.79</strong></td>
</tr>
<tr>
<td>Land being developed</td>
<td>6.76</td>
</tr>
<tr>
<td><strong>Damage to beaches</strong></td>
<td><strong>7.29</strong></td>
</tr>
</tbody>
</table>

However, simply because ocean-related issues do not score highly on a list of broader environmental issues, does not mean the ocean is seen as unimportant. First of all, it should be pointed out that many of the issues on the list that score higher also affect the ocean. Water pollution, toxic waste, climate change, and species
extinction all have impacts on the ocean and it is difficult to know how much these issues reflect a concern for the ocean.\textsuperscript{3} Secondly, and more significantly, acknowledgement among interviewees of the importance of the ocean is universal, regardless of age, gender, race, or location. The following five excerpts give an indication of just how much importance people place on the ocean.\textsuperscript{4} The first two quotations are from the two fishermen interviewed. As might be expected, they both had a good understanding of different ways in which the ocean is essential to life. The following three interviewees did not have as well defined reasoning (and in fact, two of them displayed a lack of knowledge about exactly how the ocean contributes to the overall environment) although in each case the person had a strong belief that the ocean is vital to life.

The ocean is everything; without the ocean we have no environment. \textit{Can you explain that a bit more, what is it about the ocean that makes it so important?} Well basically, first thing it's our water source, it's our food source, it's our transportation source, it controls all of our global weather patterns whether you're inshore or offshore. Wherever you are it's all controlled by the energy that's harnessed by the ocean whether it's in water or wind or however, it's all basically controlled – that controls a lot of the environment, besides the food source and everything else that comes out of the ocean and transportation of goods and everything else. So it's essential to our way of life.

Chris, 47, Commercial Fisherman – Cape May, NJ

Well it's important for our climate, for – hey if the ocean's sick we're all going to be sick. The action of the tides is very, very important to flush out the estuaries and the bays and the movement of the water is very,  

\textsuperscript{3} Despite this ambiguity with question wording, it was decided to keep it this way to allow a better comparison with earlier research in the field.

\textsuperscript{4} In all interview extracts, interviewee comments are written in a regular font, while interviewer comments or questions are in \textit{italics}.  

76
very important. Most of the population, I think a large proportion of the population lives near the seashore. Where I'm at quite a few people depend, their livelihoods depend on the ocean – many commercial fishermen, many, many more recreational fishermen, it's a big industry here, very, very important, lots of money there.

Phillip, 57, Recreational Fisherman – Absecon, NJ

Once the ocean's done, we're done and that would be the true Armageddon right there my friend. Yeah, I mean that affects us in so many ways, I mean that's like the ozone which keeps the sun out and it's like pretty soon we don't have an ozone, we don't have air to breathe, we're dead.

Roger, 45, Maintenance Man – Newport, OR

Well I mean we need, just for our environment you know, it's good to have the ocean, the rivers and I can't tell you scientifically why it's important. I just remember there's importance with the tides and you know the food chains. *How do the food chains work?* Well I'm sure the ocean finds itself important you know from the very smallest plankton on up to the largest, they all depend on each other. *How would you say it's important for the environment?* Again, I wish I were more intelligent on this, our earth has a kind of rhythm and I'm sure the oceans play a pretty big part, an important part to that. I mean don't we have warmer weather here as opposed to other places on the equatorial line consistent with ours because of the Gulf Stream?

Marie, 36, Self-Employed – Lewes, DE

I just don't know that much about the ocean but I do know that without it we'd be in dire straits.

Dale, 63, Customer Service Representative – Monterey, CA

In addition to the general concept of the ocean being vital for life, two specific themes emerge from the above comments concerning the importance of the ocean: first, human survival depends on a healthy ocean, as Phillip put it “if the ocean’s sick we’re all going to be sick” and secondly, the oceans are vital for economic growth. These
concepts were included in the mail survey and, overwhelmingly, respondents agreed with both.5

26. Human survival depends on a healthy ocean.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>64%</td>
<td>26%</td>
<td>6%</td>
<td>2%</td>
<td>1%</td>
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</table>

27. Damaging the ocean will be bad for us economically.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>61%</td>
<td>29%</td>
<td>7%</td>
<td>2%</td>
<td>1%</td>
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</table>

The mail survey was divided into regions to allow for a comparison between coastal and non-coastal, or inland, residents. As described in Chapter 3, the original sampling framework drew the coastal sample from coastal counties. Post-survey stratification was able to further refine the coastal stratum to only include those people living in zip codes that are adjacent to the water. For comparative purposes, the two variations of coastal residents will be reported here. Both coastal county and inland residents feel the same way regarding the importance of the ocean. On a scale of 1-5, with 1 representing disagree and 5 agree, the mean score for coastal residents is 4.46 for whether human survival depends on a healthy ocean, compared to 4.51 for inland residents. In terms of economic importance, the mean scores are identical at 4.46. However, when coastal zips are used to demarcate the sample the results change slightly. There is no difference in answers to the first question, but when asked about whether damaging the ocean would be bad for us economically there is marked difference between those living in coastal zip codes and the rest of the country. The

5 Percentages may not sum to 100% due to rounding.
mean score for coastal zip residents are 4.69 compared to 4.45 for inland areas, a
difference that is significant at the 1% level with a p-value of 0.003. Regarding sex, t-
tests reveal no statistical difference; for men, the mean scores are 4.52 for the first
question and 4.46 for the second, for women, the scores are 4.49 and 4.45,
respectively. These results mirror those of the Ocean Project which found that 93% of
people agree (either very much, or somewhat) with the statement that the ocean is
essential to human survival.

It is interesting that the only significant difference in the above tests is
between residents of coastal zip codes and those living inland, and relates to the
economic impact that damaging the ocean might have. Clearly, people living very
close to the ocean think more in these terms. It is likely that many people who live in
this zone depend on the ocean for their livelihood, or are close to others that do so, and
this factors into their decision making process. In saying this though, this survey
reveals a strong belief among Americans that the ocean is essential to life and this
provides the foundation for a number of cultural models related to the ocean.
Explained below in more detail, these models were drawn out of the qualitative
interviews and validated by the mail survey. Taken together, they cover a wide range
of human/ocean interactions.

4.1.1 Everything is Connected

The idea that everything is connected comes through in the above
comments where both Chris and Marie talked about the ocean in relation to the wider
environment. Although this idea was held by many of the interviewees, as the next
two extracts demonstrate, the actual level of understanding about how things are
connected varied significantly. Some people had a good grasp of the interactions among the ocean, land, and atmosphere; others had no more than a vague idea that somehow the ocean is part of a larger, interconnected system.

Everything feeds into everything – you go into the ground, it gets in to the water supply, it flows into a river which then flows into the ocean and gets into the air and then that air flows over the ocean and the rain goes down and then you get the pollutants that go into the water because of – everything is connected, everything ends up in the ocean.

Samantha, 47, Administrative Assistant – Middletown, RI

Do you think the ocean is important? I guess so, it's part of God's creation. Is it important to you personally? No. Do you think it's important for the environment? I guess it all works together you know …. Do you know how it works together? Not really. But you have some idea that they interact? Well I know the constant rolling and that has something to do with the sea inside, you know underneath – the creatures, the corals and all of that kind of thing.

Teresa, 63, Retired – Glendale, AZ

Taking this train of thought one step further, a number of interview subjects mentioned the existence of chain effects in nature. Roger talked about the presence of such an issue in relation to the problem of overfishing.

It's like, you gotta remember the smaller fishes like salmon and stuff, yeah once you start overfishing it and then, you see it starts a backward chain because then it's like, okay you're screwing up this end of it and now these people don't have nothing to eat, which then that makes these folks have nothing to eat and then onwards and onwards and onwards and pretty soon you know, you've got thrifty people, and fish that are just getting weak and dying off, because they don't have – you know it's just like not having a job; you know pretty soon you're out of a house, pretty soon you don't have a car, next thing you know you're living on the street, you know, and that just destroys all, everything.

Roger, 45, Maintenance Man – Newport, OR
Raul, a Texas Ranger stationed far from the ocean in West Texas, also mentioned chain effects, this time with regard to pollution.

Let’s say a transformer breaks apart and it has oils that contain PCBs or any other, I don’t know, lead or whatever…. They’re going to be concentrating into the systems I mean, you know, like small microbes will eat them I guess and then the fish end up with it and they collect in fish fat tissue and then we eat them.

Raul, 41, Texas Ranger – Midland, TX

Although the exact details may have been a bit vague, both men showed an understanding that chain effects occur in the ocean and, because of the interconnectedness of the system, ocean related issues can have greater impact than might first be thought.

A single question covering both of these concepts – interconnectedness and chain effects – was posed to survey respondents and, as with the interviews, there was a general appreciation that the ocean is connected to the broader environment.

10. Everything on this planet is connected; changing one thing often has effects elsewhere.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>63%</td>
<td>29%</td>
<td>5%</td>
<td>2%</td>
<td>1%</td>
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</table>

No differences were found between coastal and inland residents regarding this question but women are more likely to think this way than men (p-value = 0.057). This belief in chain effects was also uncovered by Kempton et al. with regards to more general environmental values (Kempton, et al., 1995) and it follows that people also possess a similar model with regard to the ocean.
4.1.2 Personal Impact on the Ocean

Following on from the idea that everything is connected is the question of whether human beings are part of that connection. There are two sides to this question – whether the ocean affects humans and whether humans impact the ocean – and both were asked to survey respondents.

29. The ocean affects everyone, even people who live hundreds of miles inland.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>20%</td>
<td>5%</td>
<td>2%</td>
<td>1%</td>
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</tbody>
</table>

28. Everyone has an impact on the ocean, even people who live hundreds of miles inland.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>63%</td>
<td>28%</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
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In both cases, the data show that over 90% of people believe that humans are closely connected to the marine environment. The mean scores for each question are both high on the 1-5 scale at 4.63 and 4.48, respectively. T-tests reveal only minor differences in attitudes between coastal and inland residents and between males and females. For coastal county versus inland residents there is no statistical difference in responses to whether the ocean affects everyone, coastal county residents have a mean score of 4.65 whereas inland residents score 4.61. There is a borderline significant difference at the 10% level (p-value = 0.076) between these groups for the second question – whether humans impact the ocean – coastal county residents have a mean score of 4.60 compared to inland residents score of 4.43. For coastal zip residents the significant levels are flipped – there is a significant difference at the 10% level for the first question (p-value = 0.069) and no statistical difference for the second question.
In both cases, men have lower scores than women. When asked about whether the ocean affects us, men score an average of 4.54 whereas women score 4.71, a slightly significant difference at the 10% level ($p$-value = 0.056). There is no significant difference with regards to views on whether humans impact the ocean; men average 4.45 and women 4.51.

Given the high level of understanding of the connections between people and the ocean, one might expect to see a similar level of agreement about the individual impact people have on the ocean. However, while the majority did think they have a personal impact on the ocean, the numbers were lower than for the more general ocean connection questions.

18. The decisions I make and the things I do in my everyday life have an impact on the ocean.

<table>
<thead>
<tr>
<th>Agreement Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>37%</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>34%</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>19%</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>5%</td>
</tr>
<tr>
<td>Disagree</td>
<td>6%</td>
</tr>
</tbody>
</table>

Whereas both of the broader ocean connection questions had agreement levels over 90%, only 71% of people believe they personally have an impact on the ocean in their everyday life which, although still high, is a drop of around 20 percentage points. The mean score for this question is 3.92 which is also lower that the earlier questions.

There is no difference between the opinions of coastal county and inland residents on this matter (3.96 and 3.90 respectively) but there is a significant difference between coastal zip and inland residents (4.21 versus 3.90). With a $p$-value of 0.011, this difference is significant at the 5% level. It seems that living close to the ocean does affect a person’s outlook on this question, but the distance to the water needs to be short – once a person moves away from a coastal zip, even to the wider coastal zone,
his or her attitude is on average no different from a person who lives further inland. There is also a significant difference between men and women. Once again, men believe they have less of an impact on the ocean with a score of 3.78, compared to 4.06 for women. With a p-value of 0.035 this difference is statistically significant at the 5% level (p-value = <0.05).

From the survey data, it seems possible to infer that, on the whole, people accept that connections exist within nature and think humans are part of those connections. However, when that idea becomes less abstract and more tangible – personal impact on the ocean for example – people are less likely to see the connections. When asked about their personal impact, a number of interviewees referred to the physical connection they do, or do not, have with the ocean.

Yeah when I've gone out on a boat, not very often though, on the ocean anyway, I don't think I've done much basically other than swim which I don't even do much of that any more. I normally just sit on the beach and look at it.

Marie, 36, Self-Employed – Rehoboth, DE

Of course, if I'm in the water, if I'm using a power boat in the water I'm basically adding to pollution. Other than that, no – just being in the water.

Graham, 44, Computer Technician – Middletown, RI

Well I don't really go in much …. It's a bit cold to go in now! I dip my toes in when it's warm.

Jenny, 59, Teacher – Wrentham, MA

Well I don’t pollute the ocean, I mean I don’t throw my trash in the ocean, I personally don’t have a boat so I don’t have oil spilling into the ocean. I do buy oil so I guess I do affect it at some point.

Angela, 28, Elementary School Teacher – Midland, TX
All four of these quotes show that people often think they need to be physically near the ocean in order to have an impact on it. What is missing is an understanding that a person can affect the ocean without being in close proximity to it. The last person quoted, Angela, appeared to work through the question as she spoke, initially thinking she did not have much of an impact before suggesting that, through the act of buying oil, she does affect the ocean to some degree. When asked to expand on this point she continued.

I don’t know how we would affect it though, I mean ‘cos we can’t control the oil spills, all we do is buy the gas that’s transported from the oil wells …. I want to say pollution overall because if we pollute the ground that we’re in, when it rains it soaks into our water table and that in turn pollutes our water table and our drinking water …. So people even living far from the ocean can still have an effect on it? Indirectly, I mean we’re not directly encountering it but it does all eventually go down into it.

Angela, 28, Elementary School Teacher – Midland, TX

A number of other interview subjects, when asked whether they personally have an impact on the ocean, also made a connection between their everyday actions and the state of the ocean, again focusing on the interdependencies that exist in nature.

Sadly yes but only inasmuch as I'm part of our culture. I mean I don't throw any garbage in the ocean, but I live in Newport and Newport's dealing with a sewage problem apparently and I do use the system in this town and I'm part of the culture here but I personally would never, well anyway. So in that respect, I mean being on the planet, I'm not living as a hermit in a cabin.

Ryan, 44, Social Worker – Newport, RI

Let’s say I release a plastic bag for instance or a six pack holder and it eventually ends up in the ocean or if I was to drain oil into the Rio Grande, you know, and eventually flows into the [ocean].

Raul, 41, Texas Ranger – Midland, TX
Me personally? I haven’t thought about it, I suppose I do. I suppose by the footprint that I leave here, that affects the ocean. Even your footprint here in Midland? Right, yeah, specifically I would say it was offshore oil drilling, so using carbon. Using carbon for what you do in your everyday life? Right, yeah. Anything else? Being complacent I suppose, not doing anything about it. And by that you mean? Yeah, I don’t belong to any PAC group or anything; I’m not a Greenpeace or anything. And I suppose I’m as guilty as the next person of going to aquariums and Sea World and stuff like that where things are out of their natural habitat.

Rosemary, 61, Teacher – Midland, TX

The above interview excerpts list a range of ways in which people affect the ocean. Ryan mentioned sewage, Raul talked about trash being thrown away on land ending up in the ocean, and both Angela and Rosemary saw a connection between offshore oil drilling and their daily lives. Marine pollution, an issue which encompasses all three of these impacts (although trash is more often categorized as marine debris or marine litter), was the most commonly mentioned ocean related problem among the interviewees and is discussed further below.

However, before looking at pollution in more detail, it is worth picking up on one other point that Rosemary made. She talked about being complacent and not doing anything about her perceived impact on the ocean. This idea of complacency was included in the survey when respondents were asked if they thought people take the ocean for granted. Overwhelmingly, they do.

30. People take the ocean for granted.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td>24%</td>
<td>5%</td>
<td>1%</td>
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</table>

Like Rosemary, the vast majority (94%) of survey respondents believe that people do not fully appreciate the value of the ocean. Similarly, most people are also like
Rosemary in that they do not take any concerted action to help solve the problems that the ocean is facing. The actions people do, or do not, take are dealt with in more detail in Section 4.3 but it will suffice to say here that just 27% of survey respondents have ever signed a petition to support stricter environmental laws; only 24% have given money to an environmental organization; and only 9% have ever written a letter to a public official to ask him or her to increase support for environmental protection efforts. As was the case with Rosemary, people appear to be aware of the complacency shown towards the ocean, yet do not seem motivated enough to do much about it themselves.

4.1.3 Marine Pollution

As is evident from the above extracts, during the course of the interviews, people were asked about the impacts they think humans have on the ocean. A number of issues were covered but only one, pollution, was mentioned by every interviewee. Various facets of marine pollution were discussed but there are some common themes that flow through the conversations, one of which was how pollution gets into the system in the first place. Different pathways were listed but by far the most common were ocean dumping and spills directly into the sea.

Oil spills, ocean dumping. I didn't realize until I lived in New York City in the late eighties that garbage was put on barges and just sunk in the ocean, I still can't believe it! *Do they still do that today?* Well I don't know. They were doing that in the eighties because there was this big thing called the garbage barge and it was going to go somewhere down, and then some town, some dump didn't allow it in Virginia so it came back up to New York …. I used to go to the Jersey shore and think where does this stuff all come from – is it coming from the garbage cans in the parking lot – and I realized it was coming from the ocean.

Ryan, 44, Social Worker – Newport, RI
I assume things like barrels that have been dumped in and different toxic wastes, I hope that doesn't happen too often but I've heard of that before. And I guess pollution from oil tankers that have had their spills and, I don't know, I guess just regular boating, I would think that that's adding something because I know that their engines smell awful, so fuel and stuff.

Marie, 36, Self-Employed – Rehoboth, DE

I’m sure that there may be some factories left that still dump that stuff. It depends if somebody’s getting paid off or what. *Can you think what the actual pollutants are?* No idea, I’m certain that there must be some chemicals that get secretly dumped in the ocean. It wouldn’t surprise me if there are ships round here that have gone out there and dumped stuff in there. From what I understand, there’s supposed to be radioactive stuff that’s been dumped into the ocean, weighted down and it goes way down to the bottom. I don’t know if it’s actually leaking or not; I don’t think it is. It’s basically been dumped there; it’s not something that’s supposed to be there.

Dennis, 48, Truck Driver – Amarillo, TX

Oil spills, vessel discharges, and ocean dumping were seen as three of the main pathways through which pollution enters the marine environment, but interviewees also discussed land-based sources such as agricultural runoff.

In the coastal areas, I would think that probably an agricultural runoff or pollution of that sort. As far as the main ocean, you’re going to see the acid rain, the fallout from the coal power plants and like I said, you know a tanker or something like that.

Bruce, 56, Oil Field Worker – Midland, TX

I do worry about the runoff that ends up in the water supply – that might be probably a bigger polluter than I’m even thinking with my other ones, the fertilizers and the farms with, you know, the mass produced animals and all of their wastes that end up, you know. … Pig farms, ugh.

Marie, 36, Self-Employed – Rehoboth, DE
Sewage was another land-based issue mentioned by a number of interviewees. Understandably, as demonstrated by the following comment, it is an issue that can affect people’s interaction with the ocean.

Sewage, they pump the sewage into Imperial Beach, from Mexico into the ocean and then it washes up, that's why we never go down south, never go down south because there's sewage in the water. Raw sewage, raw sewage from Mexico.

Joe – San Diego, CA

Lastly, although not suggested by as many people, atmospheric deposition was also cited as a source of ocean pollution. Bruce mentioned it above and it was also discussed by Roger.

Smoke emissions, cars, toxic dumping. *How do cars affect the ocean?* Because all that goes up into the clouds, the clouds rain; rain goes back right down into the water table, water table runs straight back out to the ocean …. It's like anything we do here affects the ocean because that's where it all eventually goes back to; all water tables run to the ocean.

Roger, 45, Maintenance Man, Newport, RI

Looking at the above interview excerpts it appears that, for the most part, people have a good basic understanding of the various sources of marine pollution. The main ways in which pollution enters the marine environment were discussed and, in that sense, the cultural model people possess of the issue works well. Where the model falters (likely through a lack of information) is with regard to the relative importance of the various pollution sources. Certain pathways were overemphasized, whereas others were not seen to be as important as they actually are. Oil spills and ocean dumping were the two most commonly mentioned forms of pollution whereas today, pollutants from runoff make up the bulk of marine pollution. The National Oceanic and Atmospheric Administration estimates that 80% of all marine pollution
originates on land (National Oceanic and Atmospheric Administration) and both the U.S. Commission on Ocean Policy and the Pew Oceans Commission stress the importance of dealing with land-based, and in particular, non-point source pollutants.

Oil spills were likely seen as more damaging than they are in actuality, due to the shock value to major spills. Images of oil-covered beaches and stricken wildlife can stay in the mind for a long time after the event. This was demonstrated here by the fact that three of the interviewees mentioned the Exxon Valdez spill, an accident that took place over twenty years ago. Annex I of the International Convention for the Prevention of Pollution from Ships (MARPOL), the Oil Pollution Act of 1990, and the advent of new technologies such as double-hull tankers have done much to reduce the amount of oil spilled and, according to the National Research Council, oil tanker accidents now account for only 8% of all the human input of oil into the ocean (this figure rises to 32% if operational discharges are included). As the U.S. Commission on Ocean Policy notes, since the passing of the Oil Pollution Act, vessel spills in U.S. waters have declined by more than 60% – down from 14 gallons per million shipped between 1983 and 1990 to 5 gallons per million shipped between 1991 and 1998 (U.S. Commission on Ocean Policy, 2004). Today, almost half of the oil found in the marine environment occurs naturally (National Research Council, 2003).

Similar shock value no doubt also exists with regard to ocean dumping. Ryan recalled his time in New York City when he heard about barges full of garbage setting out to dump their cargo at sea. Understandably, he then thought the litter he witnessed on the Jersey shore was from the same barges when, more than likely, it originated either from people throwing their trash directly on the beach or from inland
litter being carried out to sea by surface runoff. A 2002 coastal cleanup conducted by the Ocean Conservancy found that shoreline and recreational activities accounted for almost 58% of the 8.2 million pounds of debris collected (U.S. Commission on Ocean Policy, 2004). Both Marie and Dennis also mentioned dumping, with Dennis thinking that factories might still be carrying out this activity depending on whether “somebody’s getting paid off.”

In reality, the dumping of garbage and other waste at sea (in U.S. waters at least) has essentially ceased. In addition to the relevant international legislation, such as Annex V of MARPOL and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (more commonly known as the London Dumping Convention), a number of domestic laws have been enacted to address the issue. The Act to Prevent Pollution from Ships and Title I of the Marine Protection, Research, and Sanctuaries Act (also referred to as the Ocean Dumping Act) have gone a long way to reduce offshore dumping. Indeed, after 1991, the latter of these two pieces of legislation made it illegal to dump sewage sludge or industrial waste into U.S. ocean waters – precisely the type of activity many of the interviewees mentioned (although as Joe pointed out, sometimes the pollutant stems from another country with more relaxed dumping laws).

Although a few interviewees talked about atmospheric deposition of pollutants into the ocean, overall this particular pathway is not well understood. As far back as 1990, the United Nations Environment Programme (UNEP) estimated that 33% of airborne pollution comes from land-based emissions (Joint Group of Experts on the Scientific Aspects of the Marine Environment, 1990). Since then, this issue has risen in importance as our understanding of the effect of excess carbon on the ocean
has increased. While ocean acidification was mentioned by three of the marine experts, not one member of the general public brought it up. One person did talk about changing pH levels but, as the following quote shows, she did not have a good grasp of the acidification issue. Rather, she extrapolated what she knew about pH balance in the human body to the ocean.

pH balance I'm sure is threatened. Do you know why that would be threatened? Well the pH balance of the body is very sensitive; I'm sure it is in the ocean, too. Do you know what would be maybe changing the pH? Again stuff we put in there. So pollution again? I believe that detergents, phosphates and stuff, wasn't that something that was affecting the pH? I'm not sure.

Kate, 53, Spiritual Healer – Port Townsend, WA

This lack of understanding is in stark contrast to the views of those who work more closely with the issue.

I think one thing most people don't recognize is that the carbon dioxide that we're putting in the atmosphere is acidifying the entire ocean and if that's not an impact, a global impact, then I don't know what is. That's frightening to tell you the truth, it's potentially disastrous to the ocean and even to life on earth if it gets carried to far.

Robert, 50, Marine Scientist – Lewes, DE

Well, the ocean absorbs a lot of that carbon dioxide and it's becoming more acidic; it's been measured. The whole global ocean. And what would that do? It will affect the very fundamental basic level of the organisms, the photosynthetic organisms that use the sun to create energy that then feed down the food chain, or up the food chain. If it changes the abundance at the bottom of the food chain, no-one quite knows how it will affect the whole ecosystem.

Linda, NGO Worker – Washington, DC

One area in which the public and experts did not differ in opinion was with regard to the potential dilution of pollution by the ocean. For many years, the ocean was thought to be large enough to dilute and render benign any pollution that
entered it and, while the sheer amount of water in the ocean does still dilute harmful substances, the volume of the material being dumped into it has reached the point where the ocean’s natural ability to clean itself is being threatened (Thurman & Burton, 2001). Mark, one of the two NGO workers interviewed was concerned that this outdated attitude was still prevalent among the general population.

This is getting to the difference between belief and fact, the belief is, and a lot of people hold it, is the ocean is so vast and so bountiful that really there's nothing we can do to hurt it. The fact is, the ocean is vast, it used to be bountiful and we're hurting the hell out of it.

Mark, 51, NGO Worker – Washington, DC

However, despite Mark’s fears, not one of the other interviewees put forward this argument, nor was there much support for the idea among the broader population.

24. The ocean is large enough to dilute any pollution that enters it.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>8%</td>
<td>8%</td>
<td>21%</td>
<td>63%</td>
</tr>
</tbody>
</table>

In terms of the marine environment, respondents completely reject the notion that dilution is the solution to pollution, with 84% either disagreeing or somewhat disagreeing with that suggestion. These proportions are similar to those the Ocean Project found in 1999, when 80% of those asked disagreed with the statement that the oceans are so large, it is unlikely that humans will cause lasting damage. No differences were found between coastal county and inland residents. There is, however, a significant difference in the views of coastal zip residents, who with a mean score of 1.39 compared to 1.63 for inland residents, are less likely to agree with the statement. This difference is significant at the 5% level, with a p-value of 0.025. No differences exist between the attitudes of men and women.
The public also rejects the idea that environmental protection and pollution regulations have become too restrictive. In fact, the vast majority of Americans (73%) not only disagree either fully, or at least somewhat, with the idea that pollution laws have become too strict, but also believe (83%) they should be enforced more strongly. More people have reservations about the impact of environmental regulations on industry, but a majority (64%) still thinks that any such regulatory burden is fair.

8. Pollution laws have gotten too strict in recent years.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>7%</td>
<td>15%</td>
<td>24%</td>
<td>49%</td>
</tr>
</tbody>
</table>

13. Anti-pollution laws should be enforced more strongly.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>58%</td>
<td>25%</td>
<td>12%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

9. Environmental regulations have placed an unfair burden on industry.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7%</td>
<td>17%</td>
<td>11%</td>
<td>21%</td>
<td>43%</td>
</tr>
</tbody>
</table>

There is little difference between the attitudes of coastal and non-coastal residents with regard to whether pollution laws have become too strict. No differences were found between coastal zip and inland residents and only a slightly significant difference was found between the wider coastal county sub-sample (mean score of 1.80) and inland residents (mean score of 2.01). With a p-value of 0.089 this difference is only borderline significant at the 10% level. There is, however, a significant difference between men and women on this issue. With a mean score of
1.75 compared to 2.16 for men, a difference significant at the 1% level (p-value = 0.001), women are less likely to think pollution laws are too strict. This pattern was repeated for the second of these three questions – whether pollution laws should be enforced more strongly. The differences between men and women are again significant at the 1% level with women scoring 4.53 to men’s 4.13 (p-value = 0.0001). There is also a significant difference regarding this issue between coastal county and inland residents (4.50 compared to 4.25, significant at the 5% level with a p-value of 0.018) but not between residents of coastal zips and inland areas. Lastly, no significant differences of any kind were found relating to the question of whether environmental regulations have placed an unfair burden on industry.

On the whole, the interview subjects recognized the requirement for government to regulate the marine environment. A number of interviewees, despite being wary of too much involvement, discussed the need for governmental intervention in ocean related matters.

Being an American you tend to want to think that we shouldn't over-regulate anything and, you know, we should be free and we've got this liberal thing but, and I hate to say it, but I think we just need to regulate a lot of these things until we get back to understanding how much of an effect we human beings have on this whole system.

Colleen, 57, Retired Teacher – Lewes, DE

I suppose you have to have some type of government intervention there, somewhere, to set guidelines and some type of standards but also it comes down to the actual people, you know, obeying that. So we have a responsibility ourselves as an individual? Right … you can have all sorts of restrictions and policies in place but, it's two-thirds of the world – you can't enforce it all, so it does kind of come down to individuals.

Charles, 26, Naval Officer – Middletown, RI
In addition to talking about governmental intervention, Charles’ comment introduces the idea of responsibility to the ocean. While he noted that governmental action is needed to set guidelines and standards, he ultimately saw individuals as having a responsibility towards the ocean. A number of other interview subjects expressed a similar point of view and this idea of humans having a responsibility towards the ocean will be returned to in the following section.

4.2 Environmental Ethics and Ocean Values

Values, as outlined in Chapter 2, refer here to what people think the world should be like. Uncovering societal values aids in our understanding of why people think as they do, why they do or do not take certain actions, or why they believe something to be right or wrong. A number of the survey questions asked about the three forms of environmental ethics outlined in Chapter 2 (anthropocentrism, biocentrism, and ecocentrism), partly to understand where people stand on these complex issues and partly to see if a person’s beliefs have any bearing on the actions they take with regard to the ocean. The survey began by asking about attitudes to human/animal equality. The first question compared humans to animals; the second, a more general question, asked about human equality with regard to other species.

1. Animals have the same right to exist as humans.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>28%</td>
<td>5%</td>
<td>8%</td>
<td>9%</td>
</tr>
</tbody>
</table>

4. Humans are just part of the environment – equal to any other species.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>37%</td>
<td>24%</td>
<td>6%</td>
<td>12%</td>
<td>21%</td>
</tr>
</tbody>
</table>
In both instances, a majority of people either agreed, or somewhat agreed, with the idea that other species are equal to humans – a decidedly nonanthropocentric outlook. The mean scores for these two questions are 4.01 and 3.44, respectively (both measured on the same 1-5 scale described above). Once again, t-tests were conducted to see if a significant difference exists between men and women; in both cases women scored higher on the scale (and therefore agreed more with the statements) than men, 4.12 compared to 3.83 and 3.68 compared to 3.19 respectively. Both of these differences are significant at the 5% level, with p-values of 0.018 and 0.016, respectively. No differences were found between coastal and inland residents, either at the county or coastal zip level.

Three questions – all taken from the Revised New Environmental Paradigm (Dunlap, et al., 2000) – asked about human domination over nature. The questions differed regarding the level of anthropocentrism, starting with a general question about humans being ‘meant’ to rule over nature and ending with a more specific question about the right humans have to modify the environment to suit our needs.

6. **Humans were meant to rule over the rest of nature.**

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>31%</td>
<td>16%</td>
<td>19%</td>
<td>13%</td>
<td>22%</td>
</tr>
</tbody>
</table>

2. **Plants and animals exist primarily to be used by humans.**

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>18%</td>
<td>27%</td>
<td>17%</td>
<td>15%</td>
<td>23%</td>
</tr>
</tbody>
</table>
7. Humans have the right to modify the natural environment to suit their needs.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9%</td>
<td>29%</td>
<td>16%</td>
<td>22%</td>
<td>24%</td>
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</tbody>
</table>

Although more people disagreed with the statements as they became more specific, overall the mean scores of 3.20, 3.03, and 2.75 are each close to the scale’s mid-point. While the responses do not necessarily signify an anthropocentric attitude, they are certainly more anthropocentric than the earlier questions about human/animal equality. The mean scores of men and women are not significantly different for the first two dominion questions; there is, however, a noticeable difference regarding views on the right to modify the environment. Women agree less with this statement (with a mean score of 2.56) than men (2.96). This difference was significant at the 5% level (p-value = 0.021). Once again, no statistically significant difference exists between coastal county and non-coastal residents but, with the first two questions in the set there is a difference (significant at the 5% level) between coastal zip and inland residents. In both cases, coastal zip residents score lower on the scale than their inland counterparts (2.73 compared to 3.23, p-value = 0.035; and 2.59 compared to 3.06, p-value = 0.025 respectively). One final question along these lines, this time with specific regard to the marine environment, was asked.

17. The ocean is a resource to be used for our benefit.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>41%</td>
<td>33%</td>
<td>14%</td>
<td>7%</td>
<td>4%</td>
</tr>
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</table>

The reason that so many more people agreed with this statement is most likely due to the fact that the question wording is less anthropocentric than the previous three questions. This question was not posed in a zero-sum format, it would be quite
possible to use the ocean for our benefit and, at the same time, still protect and preserve it. Still, the answers do give an indication that slightly less than three-quarters of Americans believe the ocean should be used for the benefit of humans. Interestingly, there were no differences in opinions with respect to this idea, either between men and women or between coastal and inland residents.

From looking at the survey data, it appears that, although there is in some sense general agreement across questions, a divergence exists in people’s attitudes to the rights of non-human species. Whereas the vast majority of respondents agreed with the statements that animals have the same right to exist as humans (78% agree or somewhat agree), that the ocean is a resource to be used for our benefit (74% agree/somewhat agree), and that humans are equal to other species (61% agree/somewhat agree), only a plurality agreed with the ideas that humans are meant to rule over nature (47% agree/somewhat agree) and that plants and animals exist primarily to be used by humans (45% agree/somewhat agree). Further, more people disagreed than agreed with the notion that humans have the right to modify the natural environment, with only 38% supporting the idea.

One factor which might help explain these differences is religion, a value not yet accounted for. The human domination questions can be interpreted in a Judeo/Christian context and this may help explain why the responses to these questions were more anthropocentric than the questions concerning human/animal rights. It was Lynn White who first attributed the roots of environmental degradation to the Judeo/Christian attitude of dominion over nature and, while there has been significant debate on the concept of dominion versus the idea of stewardship (Dobel, 1977; Moncrief, 1970; White, 1967), it is possible that there are many people who
think and act as White theorizes. Certainly respondents in this survey overwhelmingly agreed with the notion that God played a role in the creation of the ocean.

16. The ocean is God’s creation.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>74%</td>
<td>4%</td>
<td>14%</td>
<td>0%</td>
<td>8%</td>
</tr>
</tbody>
</table>

It could be argued that the high degree of agreement with the idea that God created the ocean could engender a stewardship mentality toward the marine environment but, as will be seen below, this does not seem to be the case.

Another explanation for the divergence in answers to the equal rights and human domination questions might simply be that the respondents had not thought about these issues in much detail. It is much easier to agree with an idea in the abstract – animals have the same right to exist as humans, for example – than in more concrete terms. It is likely that when answering the questions, respondents did not stop and think for too long about the various connotations and potential outcomes of their answers. While some would no doubt agree that humans are equal to all other species, it seems implausible that 61% would agree with the statement that humans are equal to fish, lobsters, coral, plankton or other marine species. Drilling down to this level of detail was also difficult in the interviews, as these are issues which people do not generally think about in their day-to-day lives. Some respondents though, such as Jack below, did have a clear idea of their value system with regard to human/animal equality.

My motto is if you can't create it, don't destroy it and I don't like to destroy anything. I'm a vegetarian, I don't eat meat, I don't kill bugs and stuff unless, you know, they're affecting me in a way or affecting my family, or rodents and stuff. If I can't make it and create it, which
obviously I can't, I don't like to kill anything. Do you see humans being equal to other life forms? Yes, that's my idea of God, God is everything, in my mind God is energy, everything is energy so yes it's equal. God is learning through us, through us as individuals, through being a tree to being a rock to being a bug, that's how God experiences things so yeah, there's a lot of equality.

Jack, 62, University Lecturer – Lewes, DE

Others, however, were less sure of their views and quickly got tangled up in these difficult moral questions. The following extract from the interview with Angela is longer than most but worth including to exemplify this point.

Talking about the animals in the ocean, you were saying how we have a responsibility to look after them as we should do everyone. Do you see humans being equal with animals or are we superior to them? Do we have a duty to protect them because we’re superior, or do we have a responsibility because we’re the same? I think we’re, I’m not saying we’re like the same as sharks, but I mean everybody on this earth has a purpose and I don’t think humans are superior to the animals. I mean we tend to think ‘oh we’re more superior to sharks’ but that’s because people are afraid of them but they’re there for a reason too, I mean they feed on the lower organisms. I really don’t know! But they have a right to live you’d say? Yes I think so. Some people say well, we’re above them morally or intellectually and therefore we can do we want. I don’t really believe we are intellectually. I think if we were thrown in the same environment, we’d probably have to learn to adapt like they do and I mean, so everything that they do is to adapt for their environment. Do you think it’s okay, say do you eat fish? Yes. So it’s okay to eat them? Oh now you’re getting in to morality and stuff, so you’re saying like if I think it’s okay for us to eat fish, is it okay for fish to eat us? Or if we’re equal with the fish, is it okay for us to eat fish?... You see that’s where I have a problem then, you caught me in a little bind. I don’t know, it’s like I eat fish but I don’t think it’s right that they kill us but also the reasoning behind it, especially for sharks because we look like their prey, I mean from underneath the surface so, I don’t know. I really can’t answer that for you.

Angela, 28, Elementary School Teacher – Midland, TX
It may be the case that the questions which have occupied philosophers for many years are just too complex for people to clearly articulate. People accept broad ideas (that God created the ocean, that animals have the right to exist, and that humans have dominion over other species) and incorporate these into their value frameworks but, for the most part, have not worked through the more complex aspects of these concepts. These general ideas appear to lead to an understanding that humans have a responsibility toward the ocean. This was a common theme throughout the interviews and a number of questions asked about the concept of responsibility.

Before moving on to this subject, however, there is one related survey question that deserves mention. Up until this point, biocentric and ecocentric attitudes have been grouped together under the rubric of nonanthropocentrism. One question did attempt to tease out where people stood on the difference between these views.

3. Protecting individual animals is as important as preventing extinction of entire species.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>49%</td>
<td>22%</td>
<td>7%</td>
<td>10%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Almost three-quarters of respondents either agreed or somewhat agreed with the above statement. With a mean score of 4.17, women agreed more with the statement than men (3.58), a difference that is significant at the 0.1% level (p-value – 0.0004). No differences were found among residents of coastal zip codes and inland residents, although the difference between people in coastal counties and those inland is borderline significant (4.09 versus 3.80, significant at the 10% level with a p-value of 0.083). It is interesting that attitudes are so far skewed towards biocentrism. Many philosophers promote the idea of an ecocentric environmental ethic. Indeed, as
discussed in Chapter 2, Rolston refers to species extinction as a “superkilling” (Rolston, 1996) – however, the survey data suggests that people relate more to a biocentric ethic. Although the interviews did not shed much light on this question, interestingly, half a dozen people talked about the greater importance of species compared to individuals and only one person, Jack, advanced a biocentric point of view.

I'm down to the individual [level]. I don't see why everything doesn't have a right to live, at least I don't want to terminate it. I guess a lot of people feel like animals and lower creatures don't have any feelings and don't care but, I mean, that's not the way I feel. I think they have feelings and we should care.

Jack, 62, University Lecturer – Lewes, DE

Of course, it may just be the case that, once again, people have not thought all of these issues through. Individual animals can have a powerful impact, especially charismatic megafauna such as whales and dolphins, and respondents, when answering the question, may have been thinking more of these types of animals, as opposed to plankton and microbes.

Another way of investigating ocean values is to ask whether people think humans have a responsibility to protect and preserve the ocean. Three survey questions tackled this issue – each with a different focus.

19. Humans have a responsibility to protect and preserve the ocean.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>76%</td>
<td>15%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
7. I have a personal responsibility to protect and preserve the ocean.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>54%</td>
<td>31%</td>
<td>11%</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>

21. It is the government’s responsibility to protect and preserve the ocean.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>43%</td>
<td>14%</td>
<td>6%</td>
<td>6%</td>
</tr>
</tbody>
</table>

In all three questions, people overwhelmingly agreed with the idea that humans have a responsibility toward the ocean. The number of respondents who selected the agree category decreased from 76% in the human responsibility question to 54% and 30% in the personal and governmental responsibility questions respectively. Yet, if one includes those who selected ‘somewhat agree,’ the levels of agreement are all high, at 91%, 85%, and 73%. The mean scores are also all high at 4.67, 4.32, and 3.83, respectively. It is interesting to compare people’s views on personal responsibility to the ocean with their beliefs about their personal impact on the ocean. Whereas there exists a discrepancy between people’s views about their personal impact and their views of the impact of humanity in general, when it comes to responsibility toward the ocean, people’s beliefs about their personal level of responsibility are much more in line with the level of societal responsibility they perceive to exist. Thus, while people may not be cognizant of their individual impact on the marine environment, they are aware of the responsibility they have toward the ocean.

The reduced level of agreement when considering the government’s responsibility appears to be the result of people opposing a role for government in general. Additional analysis shows a significant difference between Republicans and
non-Republicans, with the former scoring 3.56 and the latter 3.93 – a difference significant at the 1% level (p-value = 0.007).

There is no difference between the views of men and women regarding human responsibility to the ocean but women are significantly more likely to believe they have a personal responsibility (4.45 versus 4.20, significant at the 5% level with a p-value of 0.024) and that the government has a responsibility to the ocean (3.95 versus 3.72, borderline significant at the 10% level with a p-value of 0.063). There are no significant differences in any of these questions between coastal county and inland residents. Coastal zip code residents do place greater emphasis than those residing inland on both human responsibility (4.82 versus 4.65, significant at the 5% level with a p-value of 0.038) and personal responsibility (4.50 versus 4.30, significant at the 10% level with a p-value of 0.071).

A follow-up question was posed to people who either agreed or somewhat agreed that humans have a responsibility to the ocean. Those respondents were asked to rank, in order of importance (1 = most important; 6 = least important), six possible reasons why they believe this to be the case. The results are presented in Table 4.2. Once again, nonanthropocentric reasons are deemed as more important than anthropocentric ones. Both of the top two choices, a duty to preserve the balance in nature and a duty to other species, reflect a nonanthropocentric viewpoint. There is a marked drop-off before the most popular anthropocentric reason, a duty to future

_____________________________

6 Unlike most data presented here, as this question asked respondents to rank the issues from 1-6 with 1 being the highest, a low score represents a more widely held belief.
generations, which was ranked third. The other anthropocentric choice, supporting people’s livelihoods, ranked last; in this case, inter-generational equity trumps intra-generational equity. The concept of stewardship also ranked low on the list, further supporting the fact that, in this study at least, there is little evidence of a strong religious stewardship ethic.

Table 4.2  Ranking of Reasons why Humans have a Responsibility to Protect and Preserve the Ocean

<table>
<thead>
<tr>
<th>Issue</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have a duty to preserve the balance that exists in nature</td>
<td>2.34</td>
</tr>
<tr>
<td>We have a duty to other species that depend on the ocean for their survival</td>
<td>2.83</td>
</tr>
<tr>
<td>So people living hundreds of years in the future can use and enjoy the ocean’s resources</td>
<td>3.60</td>
</tr>
<tr>
<td>We have the knowledge and ability to do so</td>
<td>4.01</td>
</tr>
<tr>
<td>We have a duty to God to be good stewards of the ocean</td>
<td>4.05</td>
</tr>
<tr>
<td>Some people depend on the ocean for their livelihood</td>
<td>4.13</td>
</tr>
</tbody>
</table>

The two nonanthropocentric options in the above list both tie back into the notion that everything is connected and clearly, this belief is a basic foundation of people’s ocean values. The next broad research question is whether holding such nonanthropocentric beliefs and values changes the actions people take regarding the ocean and the broader environment? The answer is provided below in Section 4.4, along with the results of the other environmental action questions. Before investigating actions further, however, it is worth quickly summarizing the differences
in beliefs and values between coastal and inland residents and between men and women.

4.3 Summary of Coastal/Inland and Male/Female Differences

The above two sections describe a number of differences between coastal and inland residents and between men and women. For easier comparison, Table 4.3 provides a summary of differences in means between coastal and inland residents and between men and women (the actions people take are not listed here as they are summarized later in Table 4.4). In Table 4.3, up and down arrows indicate whether members of the category (coastal county residents, coastal zip residents, and males) agree more or less than the reference category (inland residents and women). An up arrow means members of the listed category agree more with the statement and a down arrow means they agree less. P-values are given for each relationship and significant differences are shown in bold typeface. For example, residents of coastal zips are more likely to agree with the statement that ‘damaging the ocean would be bad for us economically’ and, with a p-value of 0.003, this difference is significant at the 1% level.

Table 4.3 shows that the gap in perceptions between coastal zip and inland residents is greater than the gap between coastal county and inland residents. Between coastal county and inland residents, responses to only four questions are significantly different (three at the 10%) whereas between coastal zip and inland residents eight responses are significantly different, including five at the 5% level and one at the 1% level. In summary, coastal zip residents are statistically more likely than inland residents to believe: damaging the ocean will be bad for economic development; the
ocean affects everyone and they have a personal impact on the ocean; and that both humans in general and they personally have a responsibility to protect and preserve the ocean. They are less likely than inland residents to believe: the ocean is large enough to dilute pollution; that humans were meant to rule over nature; and that plants and animals exist primarily to be used by humans.

There are a number of significant differences between men and women. On the whole, men are statistically more likely to think that pollution laws have become too strict and that humans have the right to modify the environment to suit our needs. Men are less likely to believe that: everything is connected or that the ocean affects everyone; they have a personal impact on the ocean, people take the ocean for granted; anti-pollution laws should be enforced more strongly; animals have the same right to exist as humans; humans are just one part of the environment; the ocean is God’s creation; individual animals have the same right to exist as species; and either they or the government has a responsibility to protect the ocean.
Table 4.3  Summary of Differences between Coastal and Inland Residents and between Men and Women

<table>
<thead>
<tr>
<th>Topic</th>
<th>Coastal County</th>
<th>p-value</th>
<th>Coastal Zips</th>
<th>p-value</th>
<th>Male</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human survival depends on a healthy ocean</td>
<td>✓</td>
<td>0.661</td>
<td>✓</td>
<td>0.489</td>
<td>✓</td>
<td>0.755</td>
</tr>
<tr>
<td>Damaging the ocean would be bad for us economically</td>
<td>✓</td>
<td>0.995</td>
<td>✓</td>
<td>0.003</td>
<td>✓</td>
<td>0.934</td>
</tr>
<tr>
<td>Everything is connected</td>
<td>✓</td>
<td>0.691</td>
<td>✓</td>
<td>0.119</td>
<td>✓</td>
<td>0.057</td>
</tr>
<tr>
<td>The ocean affects everyone</td>
<td>✓</td>
<td>0.741</td>
<td>✓</td>
<td>0.069</td>
<td>✓</td>
<td>0.056</td>
</tr>
<tr>
<td>Everyone has an impact on the ocean</td>
<td>✓</td>
<td>0.076</td>
<td>✓</td>
<td>0.015</td>
<td>✓</td>
<td>0.479</td>
</tr>
<tr>
<td>Personal impact on the ocean</td>
<td>✓</td>
<td>0.655</td>
<td>✓</td>
<td>0.011</td>
<td>✓</td>
<td>0.035</td>
</tr>
<tr>
<td>People take the ocean for granted</td>
<td>✓</td>
<td>0.670</td>
<td>✓</td>
<td>0.581</td>
<td>✓</td>
<td>0.022</td>
</tr>
<tr>
<td>The ocean is large enough to dilute pollution</td>
<td>✓</td>
<td>0.505</td>
<td>✓</td>
<td>0.025</td>
<td>✓</td>
<td>0.771</td>
</tr>
<tr>
<td>Pollution laws have gotten too strict</td>
<td>✓</td>
<td>0.089</td>
<td>✓</td>
<td>0.479</td>
<td>✓</td>
<td>0.001</td>
</tr>
<tr>
<td>Anti-pollution laws should be enforced more strongly</td>
<td>✓</td>
<td>0.017</td>
<td>✓</td>
<td>0.571</td>
<td>✓</td>
<td>0.000</td>
</tr>
<tr>
<td>Environmental regulations have placed an unfair burden on industry</td>
<td>✓</td>
<td>0.863</td>
<td>✓</td>
<td>0.199</td>
<td>✓</td>
<td>0.554</td>
</tr>
<tr>
<td>Animals have the same right to exist as humans</td>
<td>✓</td>
<td>0.243</td>
<td>✓</td>
<td>0.459</td>
<td>✓</td>
<td>0.018</td>
</tr>
<tr>
<td>Humans are just part of the environment</td>
<td>✓</td>
<td>0.933</td>
<td>✓</td>
<td>0.867</td>
<td>✓</td>
<td>0.016</td>
</tr>
<tr>
<td>Humans were meant to rule over nature</td>
<td>✓</td>
<td>0.380</td>
<td>✓</td>
<td>0.035</td>
<td>✓</td>
<td>0.642</td>
</tr>
<tr>
<td>Plants and animals exist primarily to be used by humans</td>
<td>✓</td>
<td>0.350</td>
<td>✓</td>
<td>0.025</td>
<td>✓</td>
<td>0.662</td>
</tr>
<tr>
<td>Humans have the right to modify the environment to suit their needs</td>
<td>✓</td>
<td>0.394</td>
<td>✓</td>
<td>0.235</td>
<td>✓</td>
<td>0.021</td>
</tr>
<tr>
<td>The ocean is a resource to be used for our benefit</td>
<td>✓</td>
<td>0.292</td>
<td>✓</td>
<td>0.162</td>
<td>✓</td>
<td>0.249</td>
</tr>
<tr>
<td>The ocean is God’s creation</td>
<td>✓</td>
<td>0.951</td>
<td>✓</td>
<td>0.692</td>
<td>✓</td>
<td>0.003</td>
</tr>
<tr>
<td>Protecting individual animals is as important as protecting species</td>
<td>✓</td>
<td>0.083</td>
<td>✓</td>
<td>0.813</td>
<td>✓</td>
<td>0.000</td>
</tr>
<tr>
<td>Humans have a responsibility to protect the ocean</td>
<td>✓</td>
<td>0.290</td>
<td>✓</td>
<td>0.038</td>
<td>✓</td>
<td>0.768</td>
</tr>
<tr>
<td>I have a personal responsibility to protect and preserve the ocean</td>
<td>✓</td>
<td>0.850</td>
<td>✓</td>
<td>0.071</td>
<td>✓</td>
<td>0.024</td>
</tr>
<tr>
<td>It is the government’s responsibility to protect and preserve the ocean</td>
<td>✓</td>
<td>0.823</td>
<td>✓</td>
<td>0.979</td>
<td>✓</td>
<td>0.063</td>
</tr>
</tbody>
</table>
4.4 Ocean and Environmental Actions

One section of the mail survey was dedicated to the actions that people can take to help the ocean and the broader environment. Given that many of the actions relate to both the ocean and the environment in general, most questions referred just to the environment. This section will first outline the survey data, before presenting two regression models which attempt to determine that factors result in a person undertaking pro-environmental actions.

4.4.1 Survey Data

In total, the survey contained thirteen questions which asked about the actions people take to help the ocean/environment. These questions can be divided into four subsets, the first of which contain two general self-ranking questions about a person’s overall environmental action levels. The second subset was comprised of four questions asking about actions a person might carry out around the home (screening questions were included to filter out those to whom the questions did not apply). The third subset also contained four questions, all of these dealt with actions which were both beneficial to the environment and which made sense financially. Each of these questions was followed by a request for the respondent to state whether the action is motivated by environmental or financial concerns. The fourth subset contained three questions referred to here as political actions. These questions asked about additional environmental actions one can carry out such as signing a petition or writing to political representatives.
4.4.1 Self-ranking Questions

The survey’s environmental action section began with two general questions that asked people to rank themselves as to whether they lived their lives in a way which was good for the environment and the ocean. Designed to get respondents thinking about actions they take, these questions (although highly subjective) provide an insight into people’s own views on their level of action.

31. I live my life in a way that’s good for the environment.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>24%</td>
<td>52%</td>
<td>15%</td>
<td>7%</td>
<td>1%</td>
</tr>
</tbody>
</table>

32. I live my life in a way that’s good for the ocean.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>21%</td>
<td>47%</td>
<td>25%</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>

For both questions, the results are similar; in each case the majority of respondents feel they living in an environmentally friendly manner. The only real difference is a shift from agreement (agree or somewhat agree) to neither agreeing nor disagreeing with the statement concerning the ocean, as compared to the broader environmental question – a finding which may stem from a lack of knowledge about how their actions affect the ocean. There is no statistical difference between either men and women or coastal and inland residents in either question.

4.4.1.2 Actions in the Home

Four questions asked about environmental actions that people could easily carry out around the home such as recycling and using environmentally friendly household and garden products. Preceding both the recycling and yard questions,
screening questions were asked to remove those people to whom the questions did not apply.\textsuperscript{7}

33. I use environmentally friendly household products (e.g., laundry detergent, dish soap, cleaning supplies).

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>26%</td>
<td>41%</td>
<td>15%</td>
<td>12%</td>
<td>6%</td>
</tr>
</tbody>
</table>

35. I voluntarily recycle as much as I can.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>48%</td>
<td>24%</td>
<td>12%</td>
<td>6%</td>
<td>10%</td>
</tr>
</tbody>
</table>

37. I use environmentally friendly lawn or garden products, or even none at all.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>44%</td>
<td>29%</td>
<td>10%</td>
<td>10%</td>
<td>6%</td>
</tr>
</tbody>
</table>

32. I compost food waste.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>12%</td>
<td>14%</td>
<td>8%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Between two-thirds and three-quarters of respondents agreed or somewhat agreed that they recycle as much as possible and use environmentally friendly products in the home and garden.\textsuperscript{8} Significantly fewer people, just over a third, compost food waste.

\textsuperscript{7} In total, 33\% replied that they had a mandatory recycling program and 16\% did not have a yard.

\textsuperscript{8} Interestingly people are more likely to use environmentally friendly products outside the home than inside. One might expect this to be reversed but it is possible that a combination of advertising and germaphobia have led to people being less willing to use environmentally friendly products indoors.
These percentages are comparable with other national poll results on the subject. In a Harris poll, conducted in May 2008, respondents reported more recycling (91%) than composting (23%) behavior (Corso, 2008). The high recycling proportion is likely attributable to wording. The Harris poll simply asked if people recycle, not if they recycle as much as possible, and did not screen people who were part of a mandatory recycling program. The stated percentages for these four questions are similar to the self-ranking questions asked above and lend weight to the idea that, with regard to these issues at least, the environmental self-image of respondents is not too far removed from their level of action. No significant differences were found between males and females or coastal and inland residents regarding these four actions.

4.4.1.3 Conservation Actions

Four questions were asked about actions people can take to conserve resources. In each case, the actions are both good for the environment and can save the respondent money. Given this, respondents were first asked whether they undertake the action; if they responded affirmatively, they were then asked why they do so.

39. Whenever possible, I drive my car less and use alternative means of transport.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

40. Why do you drive your car less and use alternative means of transport?

<table>
<thead>
<tr>
<th></th>
<th>To save money</th>
<th>To protect the environment</th>
<th>Both equally</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>39%</td>
<td>2%</td>
<td>54%</td>
<td>4%</td>
</tr>
</tbody>
</table>
39. I save energy at home (e.g., turning lights and appliances off when not in use, using energy efficient light bulbs).

   Yes  No  
   96%  4%  

42. Why do you save energy at home?

   To save money  To protect the environment  Both equally  Other  
   36%  4%  60%  0%  

43. I save water (e.g., not leaving faucets or garden houses running unattended, fixing any leaky pipes).

   Yes  No  
   95%  5%  

44. Why do you save water?

   To save money  To protect the environment  Both equally  Other  
   30%  9%  60%  1%  

45. When I next buy a car, its gas mileage will be an important factor in my choice.

   Yes  No  
   92%  8%  

46. Why will gas mileage be an important factor in your choice?

   To save money  To protect the environment  Both equally  Other  
   28%  4%  67%  0%  

With the exception of driving less, people overwhelmingly stated that they undertook the listed actions and generally did so because of a combination of financial and environmental reasons. Very few people carry out these actions solely for the benefit of the environment, but that is not to say that people are not considering the
environment at all. In each case, between one-half and two-thirds of respondents said that protecting the environment and saving money were equal considerations in carrying out the particular action.

No statistical differences were found between men and women regarding the above actions – neither with the ‘yes/no’ questions, nor with the follow up ‘reason why’ questions. There are a number of minor differences between coastal and inland residents. Given the number of questions, these differences are best presented in tabular form. Table 4.4 compares both coastal county and coastal zip code residents to their inland counterparts. As with Table 4.3, the arrows show whether coastal residents are more or less likely to undertake the environmental action. An up arrow indicates that coastal residents (whether coastal county or coastal zip) are more likely to carry out the action, while a down arrow implies they are less likely. P-values are listed to show which of the factors are significant (significant values in bold). As can be seen in Table 4.4, people living in the coastal zone (whether at the county or zip code level) are more likely to undertake the above four environmental actions and to undertake these actions for environmental, rather than financial, reasons.
<table>
<thead>
<tr>
<th>Issue</th>
<th>Coastal County</th>
<th>p-value</th>
<th>Coastal Zips</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive less</td>
<td>✓</td>
<td>0.089</td>
<td>✓</td>
<td>0.038</td>
</tr>
<tr>
<td>For environmental reasons</td>
<td>✓</td>
<td>0.018</td>
<td>✓</td>
<td>0.629</td>
</tr>
<tr>
<td>Save energy</td>
<td>✓</td>
<td>0.047</td>
<td>✓</td>
<td>0.001</td>
</tr>
<tr>
<td>For environmental reasons</td>
<td>✓</td>
<td>0.051</td>
<td>✓</td>
<td>0.776</td>
</tr>
<tr>
<td>Save water</td>
<td>✓</td>
<td>0.440</td>
<td>✓</td>
<td>0.081</td>
</tr>
<tr>
<td>For environmental reasons</td>
<td>✓</td>
<td>0.210</td>
<td>✓</td>
<td>0.065</td>
</tr>
<tr>
<td>MPG important</td>
<td>✓</td>
<td>0.054</td>
<td>✓</td>
<td>0.011</td>
</tr>
<tr>
<td>For environmental reasons</td>
<td>✓</td>
<td>0.079</td>
<td>✓</td>
<td>0.128</td>
</tr>
</tbody>
</table>

### 4.4.1.4 Political Actions

The final three action questions dealt with political actions that people can take. These actions require more of a concerted effort that those listed above and include some financial or time commitment (although the time spent signing a petition can be very brief).

47. Have you ever signed a petition to support stricter environmental laws?

   Yes  No  
   27%   73%

48. Have you ever written a letter to public officials to increase their support of environmental protection efforts?

   Yes  No  
   9%   91%
49. In the last year, have you contributed financially to an environmental organization?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>24%</td>
</tr>
<tr>
<td>No</td>
<td>76%</td>
</tr>
</tbody>
</table>

Considerably fewer people carry out these actions than the other actions listed above. Although around a quarter of respondents have signed a petition or contributed to an environmental organization, only 9% have ever written to a public official to ask for support for environmental protection efforts. With these three political actions, no statistical differences were detected between men and women or between coastal and inland residents.

4.4.2 Multiple Regression Analysis

The preceding section presented the results of the environmental action questions and summarized the amount of action that people take to protect and preserve the environment. However, a more detailed analysis was undertaken in order to better understand the factors that might result in a particular action being taken. A series of regression models, each with one of two dependent variables – CONSERVE and WRITELET – were run. CONSERVE is a composite variable, created by aggregating the four conservation actions listed in Section 4.4.1.3 (drive less, save energy, save water, gas mileage). A scale ranging from 0-4 was generated, with 0 representing no action taken and 4 action taken in each instance. In order to qualify as taking the action, the respondent needed to reply that he or she took the action in question and was motivated either fully, or in part by environmental reasons. People who did not take the action or responded that they undertook the action solely for financial benefit or for some other reason were classed as 0. As CONSERVE is
comprised of ordinal data, an ordered logit regression model was employed to analyze
the variable.

WRITELET is simply the results of the question which asked whether a
respondent had ever written a letter to a public official. In this case a logistic
regression model was used, as the question generated nominal (yes/no) data.
CONSERVE and WRITELET were selected to represent two different levels of
action. As shown above, between one-half and two-thirds of respondents drove less,
conserved energy and water, and valued miles per gallon (MPG) performance,
whereas less that one-tenth of respondents had written to a public official. The two
dependent variables will thus allow for a comparison of the factors that motivate
people to go the extra mile in their pro-environmental behavior.

4.4.2.1 Independent Variables

To allow comparison between people who conserve resources and those
that write letters, the same independent variables were used for both models. Table
4.5 provides a full list of the variables – a combination of demographic and attitudinal
variables were employed in this analysis. For these models, INCOME was kept as
ordinal level data using an eleven point scale. However, instead of using the original
survey data for race, given the low numbers in certain categories, a dichotomous
WHITE variable was created to compare whites with non-whites. Likewise, a
dichotomous COLLEGE variable was generated to measure education levels.
Table 4.5  Independent Variables used in Regression Modeling

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>1 if male; 0 if female</td>
</tr>
<tr>
<td>WHITE</td>
<td>1 if white; 0 if any other race</td>
</tr>
<tr>
<td>AGE</td>
<td>Continuous variable ranging from 20-91</td>
</tr>
<tr>
<td>CHILDREN</td>
<td>1 if have children; 0 if no children</td>
</tr>
<tr>
<td>INCOME</td>
<td>Ordinal measure with 11 categories. Income brackets range from under $10,000 to $250,000+</td>
</tr>
<tr>
<td>COLLEGE</td>
<td>1 if some college education or higher; 0 if no college education</td>
</tr>
<tr>
<td>COASTAL</td>
<td>1 if coastal county; 0 if inland</td>
</tr>
<tr>
<td>DEMOCRAT</td>
<td>1 if Democrat; 0 if not Democrat</td>
</tr>
<tr>
<td>OTHERPOL</td>
<td>1 if Independent, Other, or no party preference; 0 if Democrat or Republican</td>
</tr>
<tr>
<td>ANTHRO</td>
<td>A measure of respondents views of anthropocentrism and nonanthropocentrism: 5 if strongly anthropocentric; 1 if strongly nonanthropocentric</td>
</tr>
<tr>
<td>SPIRITUAL</td>
<td>I have a spiritual connection to the ocean: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>GODCREATE</td>
<td>The ocean is God’s creation: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>ALLIMPACT</td>
<td>Everyone has an impact on the ocean, even people who live hundreds of miles inland: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>THINKOCEAN</td>
<td>1 if respondents visualize the open ocean, semi-enclosed areas, or the Great Lakes when they think of the word ‘ocean’; 0 if respondents think of coastal areas</td>
</tr>
</tbody>
</table>

For the COASTAL variable, it was decided to use the coastal county level division, rather than the coastal zip code split as the data fit the model better. Two other dummy variables were created to determine the effect of political affiliation. DEMOCRAT and OTHERPOL are both dichotomous variables that can be compared to a single reference point, in this case Republicans.
Six attitudinal variables were included in the two models. Three variables—SPIRITUAL, GODCREATE, and ALLIMPACT—are all directly based on survey questions. SPIRITUAL and GODCREATE were chosen to assess whether religious views have an impact on environmental actions; ALLIMPACT was included to assess the extent to which knowledge of the connections in nature influence such action. ANTHRO is a composite variable generated from respondents’ answers to the five human/animal equality and human domination questions outlined in Section 4.2. The ANTHRO answers were aggregated and averaged, thus allowing for comparability with the three prior variables on the same 1-5 scale. Finally, THINKOCEAN was added to the models to see whether a person’s mental image of the ocean has an effect on his or her level of action. This variable splits those who, upon hearing the word ‘ocean’, visualize the open ocean and those who think of coastal areas. People who think of semi-enclosed areas, such as bays and sounds, and the Great Lakes were included in the open ocean category. The 26 respondents who thought of a specific place were categorized, as appropriate, on a case-by-case basis.

4.4.2.2 Modeling Results

To allow for easy comparison between the conservation behavior and the letter writing regression models the results are presented together. Table 4.6 displays, for both models, the odds ratios and p-values for each independent variable (significant variables in bold). The former provide an indication of how great an effect each variable has on support levels for drilling and wind and the latter informs us of the significance of the effect. An odds ratio of exactly one can be interpreted as having no effect on support, an odds ratio greater than one denotes a positive effect,
and a ratio less than one a negative effect. For instance, an odds ratio of 1.90 means that the variable in question results in a person being almost twice as likely to support the energy choice in question. To convert odds ratios less than one into an understandable measure, subtract one from the odds ratio and multiply by 100. For example if the odds ratio is 0.65, for a person with that characteristic, the odds of support change by -$35\%$ $(0.65 - 1 \times 100)$ in other words, they decrease by 35% (Long, 1997).

It is also important to distinguish between the odds ratios of nominal and ordinal data. With a nominal variable the odds ratio refers to the effect on support of a given characteristic, for example being male or white. However, regarding ordinal data (variables that utilize a scale of 1-5, see Table 4.5) the odds ratio describes the effect on support levels as one moves along the scale. For example, an odds ratio of 1.5 in an ordinal variable denotes that a person who ranks as a 4 on the scale is 1.5 times more likely to support the energy choice in question than a person who ranks as a 3 on the scale.

The conservation behavior ordered logit model has a p-value of 0.0000, a pseudo $R^2$ of 0.0693, and seven significant variables. Two of these variables are significant at the 1% level (ANTHRO and ALLIMPACT), three (COASTAL, SPIRITUAL, ALLIMPACT, and THINKOCEAN) at the 5% level, and two (DEMOCRAT, and OTHERPOL) are borderline significant at the 10% level. The letter writing logistic regression model also has a p-value of 0.0000 but has a much higher pseudo $R^2$ of 0.2283. The letter writing model has eight significant variables. Three variables (DEMOCRAT, OTHERPOL, and SPIRITUAL) are significant at the
1% level, four at the 5% level (WHITE, ANTHRO GODCREATE, and ALLIMPACT), and one (THINKOCEAN) is significant at the 10% level.

By comparing the models side by side, it is possible to draw out similarities and differences between the two. Beginning with the demographic variables, there are no significant differences in the level of action, in either model, due to the respondent’s sex, age, income, or parental status. However, WHITE is significant at the 5% level in the letter writing model. With an odds ratio of 4.946, whites are almost five times as likely to write a letter than non-whites. Interestingly, no statistical difference exists between whites and non-whites regarding general conservation actions – a pattern which can, at least in part, be explained by previous research. Although work by Mohai found little variation between races with regards to environmental concern (Mohai & Bryant, 1998), other studies have found differences, with whites being more involved in environmental movements (Mohai, 1992) and in exhibiting higher levels of environmental citizenship (Barkan, 2004). While both of those studies focused solely on the difference between white Americans and African Americans, the results seem consistent with this research – at least with regard to letter writing.
Table 4.6  Conservation Behavior and Letter Writing Regression Modeling Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>CONSERVE</th>
<th></th>
<th>WRITELET</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>p-value</td>
<td>Odds Ratio</td>
<td>p-value</td>
</tr>
<tr>
<td>MALE</td>
<td>0.821</td>
<td>0.460</td>
<td>1.149</td>
<td>0.710</td>
</tr>
<tr>
<td>WHITE</td>
<td>1.402</td>
<td>0.306</td>
<td>4.946</td>
<td>0.046</td>
</tr>
<tr>
<td>AGE</td>
<td>1.003</td>
<td>0.734</td>
<td>1.005</td>
<td>0.722</td>
</tr>
<tr>
<td>CHILDREN</td>
<td>1.358</td>
<td>0.252</td>
<td>1.998</td>
<td>0.240</td>
</tr>
<tr>
<td>INCOME</td>
<td>0.936</td>
<td>0.292</td>
<td>0.979</td>
<td>0.873</td>
</tr>
<tr>
<td>COLLEGE</td>
<td>1.265</td>
<td>0.510</td>
<td>0.757</td>
<td>0.623</td>
</tr>
<tr>
<td>COASTAL</td>
<td>1.777</td>
<td>0.019</td>
<td>1.561</td>
<td>0.302</td>
</tr>
<tr>
<td>DEMOCRAT</td>
<td>1.897</td>
<td>0.057</td>
<td>7.675</td>
<td>0.001</td>
</tr>
<tr>
<td>OTHERPOL</td>
<td>1.644</td>
<td>0.100</td>
<td>7.915</td>
<td>0.001</td>
</tr>
<tr>
<td>ANTHRO</td>
<td>0.929</td>
<td>0.002</td>
<td>0.914</td>
<td>0.044</td>
</tr>
<tr>
<td>SPIRITUAL</td>
<td>1.263</td>
<td>0.026</td>
<td>1.670</td>
<td>0.003</td>
</tr>
<tr>
<td>GODCREATE</td>
<td>0.939</td>
<td>0.548</td>
<td>1.405</td>
<td>0.031</td>
</tr>
<tr>
<td>ALLIMPACT</td>
<td>1.476</td>
<td>0.008</td>
<td>2.582</td>
<td>0.019</td>
</tr>
<tr>
<td>THINKOCEAN</td>
<td>1.729</td>
<td>0.046</td>
<td>2.658</td>
<td>0.070</td>
</tr>
</tbody>
</table>

N        467          490  
Chi²      51.80        82.01 
p-value   0.0000       0.0000  
Pseudo R² 0.0693       0.2283  

Although living in a coastal county does not significantly influence the likelihood of writing a letter specifically, it does increase the likelihood of environmental behavior overall (at the 5% level), with coastal residents 1.8 times more likely to carry out pro-environmental conservation actions than their inland counterparts. While the actions that comprised the CONSERVE variable were not specifically related to the ocean, it may well be the case that living in the coastal zone increases a person’s awareness of the interconnections within the environment, or that
the values of people who live in the coastal zone differ from those who settle elsewhere. If the former is the case, however, it does not appear to be a linear relationship with distance from the coast. A coastal zip code variable was substituted into the model in place of COASTAL and did not prove to be significant or have much of an effect. Had the relationship been linear, then the effect would be expected to be stronger the closer a person resides to the ocean.

While not significant in either model, EDUCATION has a positive effect on conservation behavior and a negative effect on letter writing. It should also be pointed out that the education scale is not an indicator of environmental knowledge but rather simply a measure of the number of years of formal education. For those involved in environmental literacy efforts, these findings will be helpful in at least suggesting that pro-environmental behavior is not contingent on high education levels.

Political affiliations are significant in both regression analyses but much more so in the letter writing model. In the conservation behavior model, both DEMOCRAT and OTHERPOL are borderline significant at the 10% level (although the latter is only barely significant). DEMOCRAT increases the odds of action by 1.9 times and OTHERPOL by 1.6 times. In the letter writing model, however, both DEMOCRAT and OTHERPOL are significant at the 1% level and increase the odds of writing a letter almost eight-fold. This is not to say that Republicans do not write letters to their elected representatives, but rather that they do not tend to write letters in support of stricter environmental legislation.

The composite ANTHRO variable is significant at the 1% level in the conservation behavior model and at the 5% level in the letter writing models. In each
case, ANTHRO has a very slight negative impact. What is interesting is not that the effect is negative – it was expected that people who scored more highly on the human domination questions would feel less inclined to undertake pro-environmental action – but rather that the variable has such a small impact on levels of action. With odds ratios of 0.929 for the conservation behavior model and 0.914 for the letter writing model, it appears that, in terms of general environmental behavior at least, it does not make much difference if someone has an anthropocentric or a nonanthropocentric outlook. There are certainly a number of reasons, both anthropocentric and nonanthropocentric, for protecting the ocean and the environment and, despite the fact that nonanthropocentric reasons resonated most with survey respondents, when it comes to undertaking pro-environmental action, both sets of reasons appear to resonate.

The two variables that addressed spiritual and religious issues were also both significant. The SPIRITUAL variable was designed to include anyone who feels some kind of spiritual connection to the ocean, be that a traditional Judeo/Christian outlook or any non-traditional belief system. GODCREATE, on the other hand, focuses more on the Judeo/Christian creation ethic and was intended to capture the more traditional American religious viewpoint. SPIRITUAL is significant at the 5% level in the conservation behavior model and at the 1% level in the letter writing model. It has a positive effect on each with odds ratios of 1.263 for the former and 1.670 for the latter. GODCREATE is only significant in the letter writing model, at the 5% level with an odds ratio of 1.405. People who feel they have a spiritual connection to the ocean might well be more aware of the connections in nature. If they themselves have a connection to the ocean, then it makes sense that they might
see how their actions affect the broader environment. In terms of letter writing, however, little difference exists between people with a more general spiritual connection to the ocean and those that abide by a more traditional belief system. Regardless of the specific details, it seems that people who have some kind of spiritual/religious connection to the ocean are more likely to make the effort to write to public officials.

ALLIMPACT measures the extent to which people believe humans have an impact on the ocean and can be used to measure opinions regarding the interconnections that exist in nature. While the possible effect of perceived connections in nature has been mentioned above with regard to the COASTAL and SPIRITUAL variable, here it is addressed directly. ALLIMPACT is significant at the 1% level in the conservation behavior model and at the 5% level in the letter writing model. It has a larger impact on the latter of these with an odds ratio of 2.582 compared to 1.476 in the former. These results are to be expected. Believing everything is connected may result in a person being not only more aware of how their behavior impacts the environment, but also more likely to think they can do something about it by writing to elected officials.

Lastly, THINKOCEAN is significant at the 5% level in the conservation behavior model and at the 10% level in the letter writing model, although it has a greater influence in the latter (with an odds ratio of 2.658 versus 1.729). Based on these results, people who visualize the open ocean when they hear the word ‘ocean’ are more likely to undertake pro-environmental actions than those who think of coastal areas. This might be because of the many uses of the coastal zone. Indeed, the area is frequently used for a number of activities – recreation, sunbathing, fishing, and
shipping, among others – and it may be the case that people who think of the coastal zone in this manner see the ocean in a more utilitarian light, rather than as a wilderness that needs protecting.

4.5 Summary

This chapter investigated public attitudes toward the ocean. It looked at beliefs, values, and mental models, as well as the philosophical underpinning of people’s attitudes. The findings reveal little difference between those with an anthropocentric and a nonanthropocentric outlook on life. Additionally, the chapter discussed specific actions people can take to protect the environment. These findings are discussed in more detail in Chapter 6, along with concomitant policy implications and a theory that may help explain why people may, or may not, carry out the listed environmental actions. Having covered broad, general attitudes, the dissertation now turns to a more specific area – that of developing ocean resources for energy generation.
Chapter 5

PUBLIC OPINION OF OFFSHORE ENERGY RESOURCES

This chapter comprises four sections and begins with Section 5.1, which reports data relating to general public attitudes to developing offshore energy resources. Section 5.2 expands on this by comparing levels of support and opposition to both forms of energy development across a number of demographic characteristics. Mean levels of support are contrasted and tested using t-tests to see if any differences between them are statistically significant. Results of logistic regression modeling of public support for offshore drilling and wind development are presented and discussed in Section 5.3, before Section 5.4 rounds out the chapter with some concluding remarks.

5.1 Public Support for and Opposition to Offshore Energy Development

The national mail survey contained a number of questions that asked respondents about their views of developing two forms of offshore energy: oil and offshore wind. Respondents were first asked whether, and secondly why, they support or oppose development of these two energy sources. As can be seen from the reproduced questions in Figure 5.1, the survey provided a number of reasons for both supporting and opposing development and respondents were instructed to pick the one reason they agreed with the most. Supplemental questions asked about the length of time that respondents think it will take for new offshore oil wells to start producing
oil, which of the two energy sources they believe to be larger, and why they think the U.S. has not yet developed any of its offshore wind resource.

57. Congress recently agreed to expand drilling for offshore oil (oil found under the ocean). Do you support or oppose this decision?

☐ Support
☐ Oppose

58. Why do you support expanded drilling for offshore oil?
Check the one box that you agree with the most:

☐ Gas prices are too high and we need to do everything we can to get them down
☐ We need to reduce our dependency on foreign oil
☐ The resource is there – why not use it?
☐ It would be good to have oil wells somewhere else other than in the Gulf, that way oil production won’t be so affected by hurricanes
☐ Expanded drilling would provide the country with extra money
☐ Other (please specify) ______________________________

59. Why do you oppose expanded drilling for offshore oil?
Check the one box that you agree with the most:

☐ Oil is sold in a global market, so any additional oil found will have little effect on prices in the US
☐ The risk of environmental damage is too high
☐ It will take years to get the oil into production and therefore won’t help today’s situation
☐ Oil rigs would spoil the view from the beach
☐ We should be reducing the amount of oil we use, not trying to find new sources
☐ Other (please specify) ______________________________

Figure 5.1 Survey Question about Offshore Oil
61. Do you support or oppose installing wind turbines in the ocean?

- Support
- Oppose

62. Why do you support installing wind turbines in the ocean? Check the one box that you agree with the most:

- They are a source of clean energy
- They will help reduce the effects of climate change
- They will help reduce our dependency on foreign oil
- Green energy is a growth industry and wind farms will provide a lot of new jobs
- The resource is there – why not use it?
- Other (please specify) _________________________

63. Why do you oppose installing wind turbines in the ocean? Check the one box that you agree with the most:

- They would spoil the view from the beach
- They would have a negative impact on birds and other ocean life
- They’re expensive and the power generated by them would be more costly than other sources of power such as coal and gas
- We have enough wind power on land, we don’t need wind turbines in the ocean
- Wind power is unreliable as the wind doesn’t blow all the time
- Other (please specify) _________________________

Figure 5.2 Survey Question about Offshore Wind

By requiring respondents to choose one answer for why they support or oppose oil and wind development, it was possible to elicit people’s most important reasons. This format was therefore preferred over allowing multiple answers. Given constraints over the length of the survey (this section was one out of five that made up
the questionnaire) asking respondents to rank their answers was not feasible. As previously mentioned in Chapter 3, in order to apply inferences drawn from the sample to the broader population, the data were first weighted according to region, gender, age and income to ensure the sample data accurately represented the national population. Weighting by these four characteristics allowed for more robust conclusions to be drawn from the data regarding the views and opinions of the American public.

Figure 5.3  Levels of Support for Offshore Oil Drilling and Wind Development

Figure 5.3 shows that, while the majority of respondents support development of both forms of offshore energy, considerably more Americans support developing offshore wind power than expanding drilling for oil. Whereas 61% of respondents support Congress’ decision to lift the moratorium on offshore oil
exploration, 80% support installing wind turbines in the ocean. This difference is statistically significant at the 1% level (p < 0.01). This finding is also consistent with another recent study which likewise found that while a majority of Mid-Atlantic residents support drilling for offshore oil, levels of support for offshore wind development are consistently higher (Monmouth University, 2009). Support levels for offshore drilling are also similar to the percentages uncovered by other recent polls. A New York Times/CBS poll conducted in August 2008 reported that 62% of those asked supported offshore oil drilling (Cooper & Sussman, 2008). Similarly, a survey undertaken shortly after the 2008 Presidential election by Rasmussen Reports found support levels to be at 68% for oil and gas drilling (Rasmussen Reports, 2008b). Incidentally, feelings remained essentially unchanged one year later according to a follow up survey conducted in December 2009 by the same organization (Rasmussen Reports, 2009).

Of those who support Congress’ decision to lift the moratorium on offshore oil drilling (Figure 5.4), the vast majority (84%) report they do so because the U.S. needs to reduce its dependency on foreign oil. This makes inherent sense when put into a temporal context. As mentioned above, the survey was administered in the late fall of 2008, at the time of the presidential election. Calls to reduce the U.S. dependence on foreign oil had been heard loudly and frequently during the Fall 2008 Presidential campaign. Although the debate over expanding oil drilling in U.S. waters became extremely partisan (see section 5.2.5 below), supporters of offshore drilling from both political parties ranked reducing U.S. dependency on foreign oil as the most important reason for expanded drilling with 82% of Democrats and 90% of Republicans selecting that answer.
As can be seen from Figure 5.4, no other reason was selected more than 7% of the time. With the high gasoline prices of the summer presumably fresh in people’s minds, one might expect reducing gasoline prices to have been selected by more than 4% of respondents. The lack of support for this reason could be due to a number of factors: respondents might have forgotten about the high summer prices; they might have (correctly) assumed that drilling for oil in U.S. waters would have little impact on the price at the pump; or they might have simply been more concerned with relying on foreign, often unfriendly, countries for oil. It will be seen later that the cost of gasoline is significant in the regression modeling (Section 5.3.3) and, given this, its low ranking here appears to have more to do with people worrying more about dependency on foreign oil than not caring about the price of gasoline.
Figure 5.5 above presents the views of the 39% of respondents who oppose Congress’ decision to expand offshore oil drilling. Two reasons dominate respondents’ answers to why they oppose. The most common reason cited, chosen by 47% of respondents, is a concern over the risk of environmental damage. This apprehension was also reflected in the semistructured interviews. Although the interviews did not specifically cover offshore oil drilling, a third of the interviewees mentioned oil spills. Their concern is exemplified by the following excerpt.

I mean I've seen when there has been an oil spill, when there's been an accident, you know a ship has run aground or whatever has happened that caused the oil spill. The animals, they can't move when they get too much oil on their feathers and their wings – you know the birds in particular I'm thinking of – and you see them up on the shore, you know, dead because they couldn't move because of the oil spill. And
maybe people who don't think too much about it would think it's just a temporary thing but, it's still those animals have died even it if does clear up, or get cleared up, or clears itself up eventually.

Mary, 62 – Glendale, AZ

The second most stated reason, with 40% of respondents selecting it, is a general viewpoint that people should be reducing the amount of oil they use, not trying to find new sources. No other reason for opposing offshore oil drilling received much support among survey respondents. Only 5% selected the small effect U.S. offshore drilling would have on oil prices, or that it would take years for the oil to get to market. Finally, a mere 1% was concerned that oil rigs might spoil the view from the beach.

![Figure 5.6 Reasons for Supporting Offshore Wind Development (Among Wind Supporters Only)](image)

Figure 5.6 Reasons for Supporting Offshore Wind Development (Among Wind Supporters Only)
With regard to public support and opposition to installing offshore wind facilities, as Figure 5.6 shows, of the 80% of respondents who support turbine installation, the most widely-held reason is because wind power is a source of clean energy (55%). The second most chosen reason, selected by 16% of respondents, is the idea that wind power would help reduce the country’s dependency on foreign oil. This amount of support for wind power to reduce foreign oil imports is interesting as it demonstrates a gap in people’s knowledge of wind power and the electric power grid. It is true that, in sufficient quantities, wind power would displace other sources of generation such as the more traditional coal and gas burning power plants. However, wind power alone would do little to reduce the amount of imported oil – the majority of which is used in the transportation, not the electricity, sector. Were some other change to occur, for example the switching of the light vehicle fleet to electricity, then the power generated by wind turbines could help displace oil imports, but the U.S. is a number of years away from that scenario and, for the time being, increasing the country’s installed wind capacity will not impact imports of foreign oil. It is also possible that respondents considered natural gas imports when answering this question. Oil and natural gas are often grouped together when talking about foreign imports and, as natural gas provides 21% of the county’s electricity (Energy Information Administration, 2010), a significant increase in wind power would likely lower natural gas imports. Both the opportunities for new green jobs, and the belief that since the resource is there it should be used, received similar levels of support with 12% and 11% respectively.

Just 5% of respondents selected reducing the effects of climate change as the reason they agreed with the most. Given that approximately 58% of U.S. carbon
dioxide emissions come from the burning of fossil fuels for electricity generation (Energy Information Administration, 2009b), reducing the impacts of climate change is one of the most significant benefits of large scale wind power development. There are a number of explanations for the lack of support that this choice received. It might be due to a lack of understanding about the sources of carbon dioxide emissions, a disbelief that climate change is driven by human activities, not knowing that large scale wind power could appreciably reduce carbon dioxide emissions. Alternatively, the lack of support for this choice might simply be due to the survey design. As mentioned above, respondents were only allowed to choose one reason and it might have been the case that concern about climate change is a secondary or tertiary reason. This finding fits with other research conducted in this field. Prior surveys (Firestone & Kempton, 2007; Firestone, et al., 2009) also found that climate change is low on the list of reasons why people support wind power.

Figure 5.7 below displays the views of the 20% of respondents who oppose offshore wind development. Within this group, two opinions dominate. Exactly half of the wind opponents are worried about the potential negative environmental impact of offshore wind. This number is slightly higher than the percentage of offshore drilling opponents who are likewise concerned about environmental damage (47%, see Figure 5.5). These opinion results are at variance with the real environmental impacts; while some environmental damage will occur from offshore wind power development, the impacts are likely to be far less than other forms of energy extraction or power generation (Jarvis, 2005; Minerals Management Service, 2009). The differences are even greater when one considers potential
environmental damage caused by climate change (Lilley, et al., 2010a), an issue not likely to have been considered by respondents when answering this question.

Figure 5.7 Reasons for Opposing Offshore Wind Development (Wind Opponents Only)

The next largest segment of people (23%) believes the country has enough wind power on land. This statement could be based on one of two beliefs: 1) that there is enough installed wind capacity at present; or 2) the size of the potential land-based resource is so large that the U.S. need not resort to offshore installation. Indeed, the second basis is consistent with resource studies, including the Department of Energy’s 20% Wind by 2030 report which states that “current U.S. land-based and offshore wind resources are estimated to be sufficient to supply the electrical energy needs of the entire country several times over” (Department of Energy, 2008 p. 24). Yet, the statement that we have sufficient wind power on land does not take into
consideration how many wind turbines would be required if only land-based wind 
resources were developed and whether that number of turbines would be acceptable to 
the public. Nor does it account for transmission issues. Much of the nation’s land-
based wind is located far from the load centers on the East Coast. Although costs and 
losses for transmission are relatively modest on a per kWh basis, Eastern governors 
have expressed their preference for offshore wind rather than long transmission lines 
from the west, due to the former’s potential to provide local energy sources and create 
jobs.

The remaining three reasons were offered significantly less frequently, 
with 11% opposing because they believe offshore wind facilities to be too expensive 
and the electricity generated more costly than other sources of power; 7% answering 
that wind power is unreliable as the wind does not blow all the time; and just 6% 
objecting to the impact on viewshed from offshore turbines. Further analysis into this 
last point shows minor variation among regions. Offshore wind opponents from the 
West Coast were most likely to select impact on the view as the most important reason 
to oppose them (12%) followed by those from the Great Lakes region (9%) and people 
living inland (6%). No respondents from either the East Coast or the Gulf Coast 
selected this reason. The fact that, overall, only 6% of those who oppose offshore 
wind do so because of the impact on viewshed is interesting, as many in the industry 
believe that aesthetic impacts pose a significant barrier to public support for the 
technology. The data presented here confirm the findings of other research, that 
aesthetic objections to potential offshore wind development are far from being the 
primary driver of opposition (Firestone & Kempton, 2007; Firestone, et al., 2009; 
Kempton, et al., 2005).
Respondents were asked to state how many years they think it will take for new offshore oil wells to produce oil that can be refined into gasoline. This question was included to obtain a measure of people’s understanding of the length of time it takes for new oil wells to come online. According to the Energy Information Administration (EIA), any new offshore wells are unlikely to start producing oil before 2017 – and this assumes exploration and development of new resources begins as scheduled in 2012 (Energy Information Administration, 2007). This date represents nine years from when the survey was undertaken. Interestingly, the mean response to this question – 7.44 years – is not too far from the EIA’s prediction. The range of answers varied from half a year to 100 years, but both the mean and the median (six years) demonstrate that the majority of Americans have a relatively good idea of the length of time it would take to get oil wells up and running. Those who believe that new wells would start producing earlier (within 7.5 years) are more likely to support offshore oil drilling (72% in favor) than those that think it will take longer (52% in favor). This difference is statistically significant at the 0.01 level. The same trend is seen regarding support for offshore wind, although the difference is not as great (85% versus 75% in favor) and is not statistically significant.

Respondents were next asked which is the larger offshore energy resource – oil or wind. This question was asked to gauge respondents’ perceptions of the size of each resource rather than seeing if they knew the correct answer. The two sources are compared here in terms of energy content. The most recent estimate by the National Renewable Energy Laboratory (NREL) regarding the capacity of the entire U.S. offshore wind resource, extending out to 50 nautical miles but with large exclusions close to shore is 4,150 GW (Schwartz, Heimiller, Haymes, & Musial,
2010). This would convert to approximately 12.4 million GWh of energy per year (4,150 x 8760 hours x 0.3406 capacity factor). Although greater than in previous years, this is still likely to be a low estimate when exclusion areas and depths are more realistically mapped, since 830 GW were found for the Mid-Atlantic Bight alone, only including depths to 100 meters but using empirically-derived exclusion fractions (Kempton, Archer, Dhanju, & Garvine, 2007). Thus, the total U.S. offshore wind resource is likely to be substantially more than the above the NREL estimate.

Regarding oil, as of January 2007, the EIA estimated there to be approximately 93 billion barrels of technically recoverable crude oil in the outer continental shelf (Energy Information Administration, 2009a). Converting this to energy content gives 157.6 million GWh. However, when comparing oil and electricity for transportation purposes, electricity has at least a 3:1 efficiency advantage so the total outer continental shelf oil reserves equates to about 53 million GWh (Kempton, et al., 2007).

Wind, of course, is a continuous renewable power resource whereas offshore oil reserves are a finite energy resource. Thus, using the NREL offshore wind numbers and no efficiency considerations, the oil resource is equivalent to approximately 13 years of wind power, or considering the efficiency of electricity, about 4 years of wind power. Although wind power is being compared here to oil energy, under a wide range of assumptions and with multiple uncertainties, it is reasonable to conclude that the wind resource is the larger of the two.

9 A capacity factor of 0.3406 was used to account for both wind turbine availability and wake effect losses (Firestone, Kempton, Sheridan, & Baker, 2010).
Clearly, this calculation will not have been performed by survey respondents; the relative sizes are known to few analysts. Thus, survey answers would have been based on existing mental models or related background knowledge. Responses are divided almost equally between the two resources with 19% of respondents believing oil to be the bigger resource, compared to 21% who think that wind is the larger of the two. The remaining 60% stated that they simply do not know. These respondents who checked the “Don’t know” option were then asked to guess and when those guesses are combined with the answers of those who thought they do know, one again sees a very even split between the two choices, with 46% thinking oil is the larger resource and 54% wind. What is more interesting is the relationship between people’s beliefs about which resource is larger and their level of support for developing each resource, as shown below in Figure 5.8.

Of those respondents that believe oil to be the larger resource, almost identical numbers favor developing each source of energy (73% support drilling for oil and 74% support developing offshore wind). However, there is a substantial difference (significant at the 0.01 level) in levels of support among those who think wind is the larger resource. In this group, 85% support developing wind but only 53% support expanding drilling. Looked at another way, respondents who believe wind to be the larger resource are more likely to support wind development (85% in favor compared to 74%) and a lot less likely to support drilling for oil (53% in favor compared to 73%).
The final offshore energy development question was concerned with why the U.S. does not currently have any offshore wind facilities. Figure 5.9 presents the answers to this question. Overwhelmingly, respondents blame either the government (which at the time was the Bush administration) for not encouraging investment and development of offshore wind facilities (44%), or opposition from the oil and gas industry (31%). Just 10% ascribe the lack of development to viewshed issues, and even fewer to cost (5%), experimental technology (3%), or the risk of environmental damage (2%). The difference between this last number and the 50% who cite environmental factors as the main reason for opposing wind above (Figure 5.7) is likely attributable to three factors. First, the two questions have a different focus (reasons for personal opposition versus a general viewpoint about national policy).
Second, they were asked of different respondents (those who oppose wind in the former compared to all respondents for this question). Third, the other answer choices – the failure of government, and ‘big oil’ – appear to be seen as more of an issue than the threat of environmental damage.

Figure 5.9  Reasons Given for Why There Are No U.S. Offshore Wind Facilities

5.2 Demographic Variations in Support for Offshore Energy Development

Demographic data were collected from survey respondents. This allows for a comparison of support levels for oil drilling and wind development across societal characteristics (region, gender, race, age, income, education, and political beliefs). The data are presented below and, for each demographic characteristic, differences (or similarities) in levels of support for each energy source are compared.
5.2.1 Regional Differences

The survey was administered to people living in different regions across the country. Half of the surveys were mailed to respondents on the coast and half to people living away from the coast. The coastal sample was further divided into four regions – East Coast, West Coast, Gulf Coast, and the Great Lakes – giving a total of five regions when combined with the Inland or non-coastal sample. This stratification of the sample allows for a regional comparison of respondent’s views regarding offshore energy development.

Figure 5.10 Differences in Support for Offshore Drilling and Wind by Region

Using t-tests it was determined that across regions there is no statistically-significant difference in support for either energy resource. Support for wind development is higher in every region (ranging from a low of 66% in favor in the East
to a high of 90% in favor in the Great Lakes) than that for oil (48% in the Great Lakes to 65% in the Gulf) and this is consistent with the national data presented in Figure 5.3 above.

In Figure 5.10, a discernable difference in offshore wind support is apparent between both the combined Great Lakes and Inland regions, and the rest of the regions. Although the Great Lakes are technically classed as coastal – both in this study and in organizations such as NOAA, Sea Grant, and the Coastal States Organization – residents in the Great Lakes region do not appear to think of the Great Lakes as part of the ocean. In an effort to understand these perceptions, an earlier survey question asked respondents what the word ‘ocean’ means to them. Only 7% of respondents in the Great Lakes sample said they thought of the Great Lakes when asked about the ocean (compared to 69% who said they thought of the open ocean and 21% who thought of coastal areas). Given that the question asked about wind power in the ocean, it is likely that residents in the Great Lakes area took this to mean the Atlantic, Pacific or Gulf of Mexico and thus identified more with inland respondents than coastal ones. Additional analysis was conducted to test this possibility. A new variable was created that was assigned a 1 if the response was from the Great Lakes or Inland strata and a 0 otherwise. Although the new Great Lakes/Inland super-region had higher levels of support for wind than the East/West/Gulf super-region (84% versus 70%) the difference was not statistically significant.

Differences in offshore energy support were investigated, not only across regions, but also between coastal and non-coastal residents. For this analysis, the Great Lakes respondents were returned to the coastal stratum and compared, alongside the East, West and Gulf respondents, to the Inland stratum. As can be seen from
Figure 5.11, noticeably higher support for wind power than for offshore drilling exists in both zones.

Figure 5.11 Differences in Support for Offshore Drilling and Wind between Coastal and Non-Coastal Residents

Given the regional analysis above, this strong support for wind power is to be expected. Additionally, people in the non-coastal zone are more supportive of both forms of energy than their coastal counterparts. Support levels for drilling are 64% in the non-coastal zone compared to 55% in the coastal zone; for wind the numbers are 83% and 74% respectively. Both of these differences are strongly significant at the 1% level (p < 0.01).

These results are what might be expected when comparing coastal and non-coastal residents. It is understandable that people living close to the ocean would
be less supportive of what might be seen as intrusive technologies. While not specifically referring to either oil wells, or wind turbines, such a viewpoint was espoused by one of the interview informants.

I like that it's a break, that nobody can build there … no matter what's behind you, when you're looking at the ocean, that's ocean and it will still be ocean. Yeah, I like that.

Kate, 53, Spiritual Healer – Port Townsend, WA

However, when one looks at the data more closely, one sees an interesting difference between those simply living in the coastal zone and those actually living on the coast. As mentioned above, the coastal sample comprises people living in counties that border the ocean. In many instances, these stretch a number of miles inland. By using zip codes, it is possible to further split the coastal sample into two sub-groups: one group comprising respondents who live in zip codes adjacent to the water (coastal zips), and the other those who live in the coastal zone but not in a coastal zip. When comparing levels of support for energy development between these two groups, one finds that respondents living right by the coast, in coastal zips, actually have higher levels of support for both oil drilling (61% versus 55%) and wind (84% versus 72%) than those living further from the coast. While neither of these differences are statistically significant, the trend is nonetheless interesting and runs counter to the assumption that people living by the ocean are less likely to support ocean energy development.

Taking this analysis one step further, it is possible to compare people living in coastal zips with everyone else (i.e., respondents in coastal zips versus those in non-coastal zips in the coastal sample, combined with people in the inland sample). Here we see that within each region there is a significant difference between support
for oil and wind (Figure 5.12). For coastal zip residents, 63% support drilling and 84% support wind (significant at the 0.05 level); for non-coastal residents the difference is almost identical (63% in favor of oil, 81% in favor or wind, significant at the 0.01 level).10

Figure 5.12 Differences in Support for Offshore Drilling and Wind between Coastal and Non-Coastal Zip Codes

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10 Two other methods were used to compare coastal and non-coastal residents. First, in addition to the method described in the text, coastal zip respondents were compared to just those respondents living in the inland stratum (in other words, respondents in coastal strata but not in a coastal zip were ignored). Second, the coastal zips were extended by one extra zip code to broaden the coastal zone. With the exception of the significant level increasing (p < 0.01) in the difference between support levels for both drilling and wind among residents in this extended coastal zone, no significant differences were found using these methods instead of the one described in the text.
There is, however, no discernible difference between regions when looking at each individual energy source. For oil, the level of support is identical (63%) between respondents living in coastal zips and those living in non-coastal zips and inland areas. For wind power, there is a slight, non-statistically significant difference (84% compared to 81%). Once again, even though this difference is not significant, it is worth noting that, contrary to prevailing wisdom, there are slightly higher levels of support for wind development among residents living adjacent to the coast than among those living further inland. There has been one highly publicized case of strong opposition by a few people living immediately adjacent to the coast, near the Cape Wind project (Williams & Whitcomb, 2007) but the data here suggest this is not the case more broadly, neither at the national level nor in the abstract sense.

5.2.2 Differences in Sex

Figure 5.13 displays differences between men and women in support levels for oil drilling and wind development. Males are more supportive of both forms of energy but the difference is more pronounced with regard to drilling (69% of males in favor compared to 53% of females, significant at the 1% level) than with regard to wind (86% of males in favor versus 75% of females, only borderline significant (p < 0.10).

Within each gender group differential support for wind and oil are relatively similar. With males, 69% support drilling and 86% support wind; with females, the percentages are 53% and 74%, respectively. Both of these differences are significant at the 0.01 level. The fact that males are more likely to support both oil drilling and wind development fits with past research. Studies have shown that, in
general, men are both more willing to extract natural resources from the earth than women (Opinion Research Corporation, 2007) and more eager to adopt new technologies (Accenture, 2009). However, when it comes to supporting specific offshore wind projects as opposed to offshore wind power in general, support levels between men and women appear to be much more similar (Firestone & Kempton, 2007; Lilley, et al., 2010a).

Figure 5.13  Differences in Support for Offshore Drilling and Wind by Sex

5.2.3 Differences in Race

A similar pattern emerges when individual racial groups are considered. Once again, there exists across the board more support for offshore wind than for oil drilling. Figure 5.14 presents these data. Across all groups, support levels for offshore oil did not differ significantly. This same trend was detected with regard to
offshore wind. While these data are not as robust as those displayed above, due to the small number of respondents in some categories,\textsuperscript{11} they do appear to follow a pattern laid out by Mohai and Bryant whose research found little difference in levels of environmental concern between African Americans and white Americans (Mohai & Bryant, 1998). This is understandable as support for wind power – a green source of energy – is undoubtedly linked to higher levels of environmental concern (see Figure 5.6). Support for wind among Hispanics was noticeably lower, but so was support for oil drilling and the difference between the two was similar to that found among the other ethnic groups.

![Figure 5.14 Differences in Support for Offshore Drilling and Wind by Race](image)

\textbf{Figure 5.14} Differences in Support for Offshore Drilling and Wind by Race

\textsuperscript{11} Of the 602 returned surveys that included information on race, the breakdown was as follows: White n=520, Black or African American n=31, Hispanic or Latino n=25, Asian n=19, American Indian n=6, and Native Hawaiians or Pacific Islander n=1.
Further analysis was undertaken to compare whites with a combined variable for all other races (non-white). This test proved significant at the 5% level with regard to support for oil drilling, with whites (66%) being statistically more likely to support drilling than non-whites (42%). Regarding wind development, the differences were only borderline significant (at the 10% level) with 85% of whites in favor versus 66% of non-whites.

5.2.4 Age, Income, and Education Differences

As Figure 5.15 shows, more people supported wind development than drilling for oil across every age group. While the overall trend is not altogether surprising, given the aggregated data presented above, it is interesting to see that in not one age category does support for drilling surpass that for wind development.

Figure 5.15 Differences in Support for Offshore Drilling and Wind by Age
Levels of support for the two energy resources are much closer among respondents over 65, although this is due more to higher levels of support for drilling than to lower levels of support for wind. There exist bigger differences between support for the two energy resources among younger respondents, with those in the 35-44 age group exhibiting the widest gap. Indeed, 93% favor offshore wind, whereas 68% favor oil drilling – a difference that is strongly significant at the 1% level. There also exist significant differences in levels of support in the 20-34 (p < 0.05), 45-54 (p < 0.01), and 55-64 (p < 0.01) age groups. Contrastingly, there is no statistical difference in support levels for oil versus wind among respondents over the age of 65.

![Figure 5.16 Differences in Support for Offshore Drilling and Wind by Income](image)

With the exception of two income brackets, the same pattern is repeated for income. Figure 5.16 displays levels of support for oil and wind broken out by
income group. Support for wind exceeds that for oil in all categories, except the $25,000-$34,999 and the $200,000-$249,999 income groups. In both of these two cases the difference is very slight (84% in favor of oil versus 77% in favor of wind in the lower income category; 82% versus 79% in the higher) and insignificant, and can therefore be discounted.

Figure 5.17 Differences in Support for Offshore Drilling and Wind by Education

Regarding the effect of education levels on support for drilling and wind development, there exists a clear distinction between respondents with lower levels of education and those with higher levels. As can be seen from Figure 5.17, respondents whose formal education did not surpass a High School diploma demonstrate equal support for both forms of energy generation. Those in the lowest education category (no higher than Middle School) favor oil drilling over wind, whereas those who
attended or graduated High School slightly favor wind. None of these differences, however, are statistically significant.

Of those with higher levels of education (at least some college credit) there is a statistical difference between levels of support for wind development and oil drilling, with respondents at higher education levels consistently favoring offshore wind. In the ‘Some College,’ ‘Bachelor’s Degree,’ and ‘Graduate or Professional Degree’ categories this difference is significant at the 0.01 level; in those with Associate’s Degrees, the significance level decreases slightly to 0.05. Although respondents with higher levels of education are significantly more likely to favor offshore wind over offshore drilling, it is important to note that this difference is due to a decreased level of support for oil among those with more education, rather than an increased level of support for wind. This difference is more apparent when education is collapsed into an nominal variable that compares respondents with some college education against those with no college education (Figure 5.18).

Looking at Figure 5.18, it is apparent that respondents with lower levels of education are more supportive of drilling than they are less supportive of wind. Of those without a college education, 72% favor drilling, compared to just 59% of those who have had at least some college education, a difference that is statistically significant at the 5% level (p < 0.05). With respect to wind development, the support levels are 73% and 82% respectively, a different which is not statistically significant.
5.2.5 Political Differences

Support for drilling varies significantly by stated political affiliation. As Figure 5.19 shows, Republicans are significantly (p < 0.01) more likely to support drilling (86% in favor) than Democrats, Independents or those with no party preference (46%, 55%, and 60% in favor respectively). In contrast, no significant difference exists with regard to offshore wind support (86% for Republicans, 85% for Democrats, 82% for Independents, and 74% for those without a political preference).
Republicans and people in the ‘Other’ category are the only respondents who favor drilling more than wind development. It should be noted, however, that the data for those in the Other category are only based on five observations and should not be considered robust. This is not a concern for the analysis, as the remaining categories make up 99.2% of the 598 respondents who listed their political affiliation. In this instance, therefore, the ‘Other’ category can be safely ignored. There is no statistical difference in the slightly lower level of support for wind than for drilling among Republicans. Whereas the higher level of support for wind than for drilling among Democrats is significant at the 0.01 level; the difference among Independents is significant at the 0.05 level; and the difference among those without a party preference is slightly significant at the 0.10 level.
The stark differences between Republicans and Democrats with regard to offshore drilling should not come as a surprise when one considers the political atmosphere at the time the survey was administered. The offshore drilling issue had become very politically partisan and, in the run up to the 2008 Presidential election, shouts of “drill baby, drill” became synonymous first with the campaign of Sarah Palin, the Republican candidate for the Vice-Presidency, and then with the Republican party as a whole (Lakshmanan, 2008). Although both Democrats and Republicans ultimately voted to lift the moratorium on offshore drilling, in the public’s mind – and certainly in the minds of respondents to this survey – support for drilling appears to have struck a partisan chord.

In summary, there are a number of significant differences among Americans based on their demographic characteristics. Which part of the country individuals live in, as well as their sex, race, age, salary, level of education, and political persuasion all affect the extent to which they might support offshore drilling or offshore wind development. In isolation, these variables provide insightful and useful results and can be used to assess levels of support among certain demographics. However, in reality the variables interact with each other and one variable can affect the significance levels of others. In order to discover which variables are significant when many variables are considered simultaneously, a more sophisticated tool is required: multiple regression.

5.3 Multiple Regression Analysis

By controlling for the effect of other variables, multiple regression can help explain the impact that variables of interest have on certain dependent variables –
in this case support for offshore drilling and support for offshore wind. For this analysis, four models were created using logistic regression (chosen because of the dichotomous nature of the dependent variables). For each dependent variable, two models were created – a base model and an attitudinal model. For identification purposes, all the variables discussed below are written in upper case lettering. For example, the two dependent variables will be referred to as SUPPDRILL and SUPPWIND.

5.3.1 Description of Model Variables

Both of the dependent variables are nominal variables where 1 equals support drilling/wind and 0 equals oppose drilling/wind. To enable easy comparison between the drilling and wind models, the same independent variables were used for each model. In the base models, this approach simply meant that the same demographic variables were used. In the case of the attitudinal models, however, it resulted in certain variables that were significant in one model being included in the other, regardless of their significance in the latter. Although this method runs counter to the goal of improving a model’s parsimony, it results in a better comparison of the factors that lead to support for offshore drilling versus offshore wind development. The independent variables can thus be split into two subcategories – demographic variables and attitudinal variables.

5.3.1.1 Demographic Variables

The demographic variables used in the regression models are essentially the same as those described above in Section 5.2, albeit with some minor variations
To test for the impact of race, the dichotomous WHITE variable was employed. INCOMEHIGH compares higher earners to those with a lower income, and AGEMIDDLE contrasts the views held by those in the middle age group (35-64) with those both younger and older.\footnote{Neither the ordinal version of INCOME or the continuous version of AGE proved significant. The continuous variables of age and $age^2$ along with other age cutoff points were tested, but nothing improved the model as much as AGEMIDDLE.}

For the COASTAL variable, it was decided to use the original regional stratum, thus respondents from the East Coast, West Coast, Gulf Coast, and Great Lakes regions were classed as coastal, those from the Inland region were categorized as non-coastal.\footnote{As described in Section 5.2, various combinations of coastal zips were tested, along with individual regions (East, West, etc.) and combination of regions (East and West combined; East, West and Gulf combined). None of these permutations proved significant in any model.} Two other dummy variables were created to determine the effect of political affiliation. DEMOCRAT and OTHERPOL are both nominal variables that can be compared to a single reference point: Republicans.
Table 5.1   Demographic Variables used in Regression Modeling

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>1 if male; 0 if female</td>
</tr>
<tr>
<td>WHITE</td>
<td>1 if white; 0 if all other races</td>
</tr>
<tr>
<td>COLLEGE</td>
<td>1 if some college education or higher; 0 if no college education</td>
</tr>
<tr>
<td>INCOMEHIGH</td>
<td>1 if income is above $200,000; 0 if below</td>
</tr>
<tr>
<td>AGEMIDDLE</td>
<td>1 if age falls between 35-64; 0 if it is either above or below</td>
</tr>
<tr>
<td>CHILDREN</td>
<td>1 if have children; 0 if no children</td>
</tr>
<tr>
<td>COASTAL</td>
<td>1 if coastal; 0 if inland</td>
</tr>
<tr>
<td>DEMOCRAT</td>
<td>1 if Democrat; 0 not Democrat</td>
</tr>
<tr>
<td>OTHERPOL</td>
<td>1 if Independent, Other, or no party preference; 0 if Democrat or Republican</td>
</tr>
</tbody>
</table>

5.3.1.2   Attitudinal Variables

In addition to the above-discussed demographic variables, a number of attitudinal variables were also created (for a complete list of these variables see Table 5.2). The attitudinal variables are concerned with: the relative importance of broad issues that the U.S. is facing, as well as environmental issues the world is facing; whether a respondent is more anthropocentric or more nonanthropocentric; and views of humankind’s effect on the ocean, the ocean’s effect on humans, governmental responsibility, and the effect of environmental regulation on industry. In the interest of parsimony, only those attitudinal variables that had significant explanatory power in at least one model are included.

As discussed above, after answering questions concerning their views on developing offshore oil and wind resources, respondents were asked which of the two resources they thought to be the larger. Given the question’s difficulty, respondents
were initially allowed to state that they did not know the answer. A follow-up question then asked them to provide their best guess. In order to maintain a higher N in the regression models, WINDLARGE includes these best guesses.

The next three variables ECONOMY, COSTGAS, and CRIME all stem from one survey question. Respondents were asked to rank, in order of importance, nine issues that the United States is currently facing. The full list comprised: crime; the cost of gasoline; the economy; the environment; health care; national security; illegal immigration; public education; and the war in Iraq. If a respondent ranked the economy, the cost of gasoline or crime as the first, second or third most important issue, then the corresponding variable (ECONOMY, COSTGAS, and CRIME) was marked with a 1; otherwise it was coded as a 0.

The same technique used to create ECONOMY, COSTGAS, and CRIME was utilized to generate CLIMATE and DEVELOP, although the data for these variable were taken from a different question. Through the same format, respondents were asked to rank nine environmental issues the world is facing: air pollution; climate change; damage to beaches; damage to the open ocean; deforestation; extinction of plant and animal species; land being developed; toxic waste; and water pollution. CLIMATE and DEVELOP were then generated by looking to see whether the respondent chose climate change or land being developed in one of their top three answers.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WINDLARGE</td>
<td>Offshore wind is a larger resource than offshore oil: 1 if agree; 0 if disagree</td>
</tr>
<tr>
<td>ECONOMY</td>
<td>1 if the state of the economy ranks in the top three national issues that the respondent is concerned about; 0 if it does not</td>
</tr>
<tr>
<td>COSTGAS</td>
<td>1 if the cost of gasoline ranks in the top three national issues that the respondent is concerned about; 0 if it does not</td>
</tr>
<tr>
<td>CLIMATE</td>
<td>1 if climate change ranks in the top three environmental issues that the respondent is concerned about; 0 if it does not</td>
</tr>
<tr>
<td>DEVELOP</td>
<td>1 if land being developed ranks in the top three environmental issues that the respondent is concerned about; 0 if it does not</td>
</tr>
<tr>
<td>HUMRESP</td>
<td>Humans have a responsibility to protect the ocean: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>LIVELIHOOD</td>
<td>If humans have a responsibility to protect the ocean, it is because people depend on the ocean for their livelihood: 1 if livelihood ranks in top two choices (out of six); 0 if it does not</td>
</tr>
<tr>
<td>ANTHRO</td>
<td>A measure of respondents’ views of anthropocentrism and nonanthropocentrism: 5 if strongly anthropocentric; 1 if strongly nonanthropocentric</td>
</tr>
<tr>
<td>GOVRESP</td>
<td>It is the government’s responsibility to protect and preserve the ocean: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>POLLUNAVOID</td>
<td>Ocean pollution is an unavoidable effect of ocean development: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>POLLDILUTE</td>
<td>The ocean is large enough to dilute any pollution that enters it: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>ALLIMPACT</td>
<td>Everyone has an impact on the ocean, even people who live hundreds of miles inland: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>TAKEGRANTED</td>
<td>People take the ocean for granted: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>ENVBURDEN</td>
<td>Environmental regulations have placed unfair burdens on industry: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
<tr>
<td>CALMING</td>
<td>Being by the ocean has a calming influence on me: 5 if agree; 4 if somewhat agree; 3 if neither agree nor disagree; 2 if somewhat disagree; 1 if disagree</td>
</tr>
</tbody>
</table>
ANTHRO was generated by aggregating respondents’ answers to five separate survey questions. All of the questions were measures of whether a person holds a more anthropocentric or a more nonanthropocentric attitude towards nature and the environment. The five questions ask whether: animals have the same right to exist as humans; plants and animals exist primarily to be used by humans; humans are just one part of the environment; humans were meant to rule over the rest of nature; and humans have the right to modify the natural environment to suit our needs. The combined answers were summed and then averaged to enable the ANTHRO variable to be compared with the other ordinal variables on the same 1-5 scale.

HUMRESP is an ordinal variable designed to assess whether respondents believe humans have some measure of responsibility to protect and preserve the ocean. In the survey, respondents who chose either the ‘Agree’ or ‘Somewhat agree’ answer were then asked to rank six reasons as to why humans might have such a responsibility. For ease of comprehension, the full question is shown below in Figure 5.20.

LIVELIHOOD was created by seeing whether respondents who indicated humans have a responsibility to protect the ocean, identified as one of their top two reasons the statement that people depend on the ocean for their livelihood. As with the variables generated from the earlier ranking questions, LIVELIHOOD was assigned a 1 if the answer was found in the top two choices and a 0 if it was not. Variables derived from the other answers to this question were tested in the models but none proved significant. It is likely that other attitudes uncovered by the responses, such as the duty humans have to other species and to preserving the balance of nature, are captured by the ANTHRO variable.
19. **Humans have a responsibility to protect and preserve the ocean.**

   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

   Skip to 21

20. **If you circled ‘Agree’ or ‘Somewhat agree’ …**

   Rank the following reasons why humans have a responsibility to protect and preserve the ocean, from most to least compelling, with “1” being most compelling and “6” being the least compelling:

   **Humans have a responsibility to protect and preserve the ocean,**
   
   _ So people living hundreds of years in the future can use and enjoy the ocean’s resources
   _ Because we have a duty to God to be good stewards of the ocean
   _ Because we have the knowledge and the ability to do so
   _ Because some people depend on the ocean for their livelihood
   _ Because we have a duty to other species that depend on the ocean for their survival
   _ Because we have a duty to preserve the balance that exists in nature

---

**Figure 5.20 Survey Question Asking about Human Responsibility to the Ocean**

The seven remaining variables (GOVRESP, POLLUNAVOID, POLLDILUTE, ALLIMPACT, TAKEGRANTED, ENVBURDEN and CALMING) are all relatively self-explanatory. All seven are ordinal variables (using a 1-5 scale), based on individual survey questions.
5.3.2 The Question of Endogeneity

One issue that can potentially arise when attitudinal variables are used as explanatory variables is endogeneity. This happens when a simultaneous, or bidirectional, relationship exists between the dependent variable and specified explanatory variables; the variables in the regression model then become mutually, or jointly, determined (Gujarati, 2003). In essence, this effect makes it hard to be sure whether the independent variables are explaining the dependent variable, or vice versa, or not at all. For example, the regression model might show that someone who is concerned about the threat of climate change is more likely to support the development of offshore wind. However, it could also be the case that because the person thinks offshore wind is a good idea, they are more likely to believe that climate change is an important issue. Alternatively, income, sex, education, race and geographic location could lead a person to support wind power and to believe that climate change is important – that is, both of these outcomes are jointly determined.

While, intuitively, it may make more sense to think that attitudes to climate change affect support for wind power, rather than the other way around, because of the question of endogeneity, it is important to be aware of this threat to validity. Given that many of the independent variables used in the models below are based on respondents’ attitudes, it was decided to develop two models for each dependent variable. For both drilling and wind, a base model was first produced which includes only explanatory variables that are exogenous. These models were then expanded by including attitudinal explanatory variables. This resulted in models with higher pseudo $R^2$ due to the possible inclusion of endogenous variables.
5.3.3 Modeling Results

The results of the four models are shown in Table 5.3, which facilitates comparison of oil drilling to offshore wind and of the exogenous models to those that also include attitudinal variables (significant variables in bold). Table 5.3 presents odds ratios and p-values for each variable. For an explanation of how to interpret odds ratios see Section 4.4.2.2.

5.3.3.1 Offshore Oil Drilling Base Model

The offshore oil drilling base model is significant at the 1% level, has a pseudo $R^2$ of 0.1189 and five significant variables. Two of these (DEMOCRAT and OTHERPOL) are significant at the 1% level, and one (MALE) at the 5% level. Two variables (CHILDREN and COLLEGE) are only borderline significant at the 10% level. According to the odds ratio, men are about twice as likely to support offshore oil drilling as women (a finding consistent with the simple statistics presented in Section 5.2). This is also in line with the notion that women are more risk-averse than men (Harrant & Vaillant, 2008; Sapienza, Zingales, & Maestripieri, 2009). Similarly, those with children are almost twice as likely to support drilling, suggesting that they want to ensure that their offspring are able to maintain a comparable level of affluence.
Table 5.3  Drilling and Wind Regression Modeling Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Base Models</th>
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<td>SUPPWIND</td>
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<td>MALE</td>
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<td>1.862</td>
<td>1.149</td>
<td>2.110</td>
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<td></td>
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<td>0.493</td>
<td>0.095</td>
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</table>

| N             | 528         | 523              | 408              | 405      |
| Chi²          | 32.86       | 18.79            | 79.62            | 76.09    |
| p-value       | 0.0001      | 0.0270           | 0.0000           | 0.0000   |
| Pseudo R²     | 0.1189      | 0.1033           | 0.3594           | 0.3648   |
The two political variables are highly significant, with both having a negative effect on a person’s support for offshore drilling. For example, respondents identifying themselves as Democrats are about 85% less likely to support drilling for oil offshore than Republicans.\textsuperscript{14} Likewise, it appears that people with at least some college education are less likely to support offshore drilling. The slight significance of COLLEGE makes it difficult to state this unequivocally, but the results of the model mirror the t-tests presented previously.

None of the other variables in the drilling base model are significant. Although the WHITE variable is significant when examined in isolation (see Section 5.2 above) it is not significant in the regression model. The odds ratio points in the same direction, however, as an odds ratio of greater than one implies that whites are more likely to support drilling that non-whites. The odds ratios for INCOME\text{HIGH}, AGEMIDDLE and COASTAL are all very close to one (meaning these variables have little effect on support for drilling) and this is understandable when looking at the histograms (Figures 5.16, 5.15, and 5.11 respectively). For income, support levels for drilling fluctuate with level of income and do not show a clear pattern – those with an income of over $200,000 do not differ very much from those with lower incomes. The same is true with AGEMIDDLE. Although there is a general trend towards older respondents being more likely to support drilling, because AGEMIDDLE compares the 35-64 age group to all others, there is not a clear difference between AGEMIDDLE and the 20-34 and 65+ age groups combined. Despite the significance

\textsuperscript{14} 0.155 – 1 x 100 = -84.5\%. 

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of COASTAL when looked at in isolation, like WHITE, it is not significant when combined with other variables.

5.3.3.2 Offshore Wind Power Base Model

The offshore wind power base model is the weakest of all four models. Whereas all the other models are significant at the 1% level, its p-value is only significant at the 5% level (0.027) and, at 0.1033, its pseudo $R^2$ is the lowest of the four. Nevertheless, the model contains four significant variables. Of these, COLLEGE is the most significant (1% level); MALE and WHITE are both significant at the 5% level; and CHILDREN is significant at the 10% level. The odds ratios for all of these variables are greater than one, meaning that being male, white, having at least some college education, and having children all increase support for offshore wind development.

It is interesting that COLLEGE proves to be the most significant variable in this model (it also has the greatest effect on the odds of support). When looked at in isolation (Figure 5.18), education levels are not significant, but when other factors are controlled for, whether one attended college affects support for offshore wind. Men are more likely to support wind development than women – to a degree similar to that found in the offshore oil drilling model (odds ratio of 1.862 for wind; 1.853 for drilling). Unlike drilling, there is a difference in race, with whites being 2.4 times more likely to support offshore wind than other race groups.

Lastly, having children increases the likelihood of support for offshore wind power in the same way it does for offshore oil drilling. As discussed above, this could be due to people wanting a secure energy future for their offspring or, in this
case, as wind is a clean source of energy it could be because respondents see wind as being less harmful to their children, or both. Given the similarities between the two base models, one might assume that desire for energy security is driving support for both forms of offshore energy. However, as will be seen in the attitudinal models below, having children does, in fact, increase the likelihood of support for offshore wind more so than it does for offshore drilling.

None of the three remaining variables (COASTAL, DEMOCRAT and OTHERPOL) are significant. Whereas the political persuasion of respondents plays an important role in support for drilling, it does not for wind development. This is good news for offshore wind developers and those who support offshore wind development, as when an issue becomes politicized it is takes on an added partisan dimension. It is also worth reiterating the fact that there is no discernible difference between coastal and non-coastal residents when it comes to support for offshore wind.

5.3.3.3 Offshore Oil Drilling Attitudinal Model

Having looked at the two base models, the discussion now turns to the attitudinal models. These models build on those examined above by including the attitudinal variables outlined in Table 5.2.

As can be seen from Table 5.3, the addition of the attitudinal variables greatly increases the explanatory power of the drilling model, raising the pseudo $R^2$ from 0.1189 to 0.3594. Three demographic variables (MALE, COLLEGE, and OTHERPOL) lose their significance after the addition of the new variables but both CHILDREN and DEMOCRAT retain their significance. AGEMIDDLE becomes
significant at the 5% level and has an odd ratio of 2.190 meaning that those in the 35-64 age group are more than twice as likely to support drilling.

Eight of the new variables prove to be significant. Six at the 5% level (COSTGAS, ANTHRO, GOVRESP, POLLDILUTE, CALMING, and LIVELIHOOD) although after further analysis this number will drop to five. Two are significant at the 10% level (DEVELOP and ENVBURDEN). Looking first at those significant at the 5% level, COSTGAS has an odds ratio of 3.329, meaning people who are concerned about the cost of gasoline are more than three times as likely to support offshore drilling. This is particularly interesting given that the cost of gasoline did not rank highly as a reason why respondents support offshore drilling (see Figure 5.4). As mentioned earlier, this discrepancy is likely due to the fact that when answering why they support drilling, people’s desire to reduce U.S. dependency on foreign oil outweighs concern over high gas prices. It may also be that COSTGAS is jointly determined with support for offshore oil drilling.

The scale for the ANTHRO variable ranges from 1-5 with a higher score indicative of a more anthropocentric outlook on humankind’s use of the environment. With a p-value of 0.016 and an odds ratio of 1.677, ANTHRO has a positive effect on support levels for offshore drilling. A respondent who scored a 4 on the scale is almost 1.7 times more likely to support offshore drilling than someone

15 In the survey design some questions asked about anthropocentric attitudes and some about nonanthropocentric attitudes. This meant that sometimes the ‘Agree’ response (5 on a 1-5 scale) implied an anthropocentric view and sometimes a nonanthropocentric one. For ANTHRO, the scales were harmonized so that a ‘5’ always implied an anthropocentric outlook.
who scored a 3 on the scale. It makes sense that ANTHRO has a positive effect as one would expect people with a more anthropocentric view to be more supportive of drilling for oil. As mentioned above, ANTHRO is comprised of five individual questions – all of which attempted to elicit whether a respondent held a predominantly anthropocentric or nonanthropocentric attitude toward the environment.\(^\text{16}\)

The third variable significant at the 5% level is GOVRESP, which has a p-value of 0.050 and an odds ratio of 0.706. This variable thus has a negative effect on support for offshore oil drilling, illustrating that people who believe that it is the government’s responsibility to protect and preserve the ocean are almost 30% less likely to support offshore drilling. Given the high level of concern about the potential for environmental damage from oil production, it follows that people who agree that the government has a responsibility to protect the ocean (a pro-environment opinion) are less likely to support government policies aimed at developing new offshore oil resources.

The significance and odds ratio of POLLDILUTE suggest that respondents who believe that the ocean is large enough to dilute any pollution that enters it are 1.76 times more likely to support offshore drilling. Certainly a belief that

\(^{16}\)In the regression analysis each of the five individual variables were included in the model but none proved significant across both models. This might be due to respondents being inconsistent in their answers or being unsure of their philosophical opinions. Being a composite variable, ANTHRO was designed to smooth out individual responses and obtain a more complete picture of a person’s views – it is easier for one question to misrepresent a person’s opinion than five questions. For this reason and because, as a single variable it is significant in both attitudinal models, it was decided to use ANTHRO over any of the individual anthropocentric variables.
the ocean’s cleansing powers are up to the task of pollution control would remove the primary worry respondents have about expanding offshore drilling: the threat of environmental damage (as Figure 5.5 shows, among opponents, this was the main concern with 47% of respondents selecting it as their primary reason for opposing drilling).

With a p-value of 0.042 and an odds ratio of 0.595, CALMING is the fifth variable significant that the 5% level. Essentially, people who state that the ocean has a calming influence on them are about 40% less likely to support drilling. Presumably, the thought of building new oil wells in the ocean is anathema to those who see the ocean as a source of relaxation and renewal. This concept of the ocean having a calming effect was frequently expressed by interviewees when asked why being near the ocean appeals to them, as exemplified in the excerpts below.

I love being near the ocean and that's part of why we're here. I find it calming. I'm not necessarily a swimmer or a boater but I just like being near the ocean; it's just calming and relaxing and I do my best thinking when I'm near the ocean.

     Jack, 62, University Lecturer – Lewes, DE

Peaceful, tranquil, serene, calming – it's the total reason why I came here. Just the overwhelming feeling, the calmness, as soon as the waves overtake your thoughts – it's like you lose all sense of the world itself and you're just one with nature.

     Roger, 45, Maintenance Man – Newport, OR

I think being near the ocean has a calming effect on people. I think that's possibly why so many people want to vacation near the ocean, just sitting there and listening to the wonderful rhythmic flow.

     Colleen, 57, Retired Teacher – Lewes, DE
It seems the calming properties of the ocean are important to many people and it is understandable why people who think of the ocean this way are less supportive of offshore drilling.

Finally, while LIVELIHOOD registers as significant in the model (p-value = 0.030) the variable requires some further analysis to interpret its effect correctly. As discussed in Section 5.3.1.2, LIVELIHOOD measures whether a respondent stated that humans have a responsibility to protect and preserve the ocean because people depend on it for their livelihood (Figure 5.21). Of course, a respondent had to first agree that humans have such a responsibility; the HUMRESP variable was generated from this question. In order to properly measure LIVELIHOOD, one needs to combine it with HUMRESP to include respondents that disagreed with the original premise of humans having a responsibility to the ocean. To do this, a post-estimation linear combination was used to elicit the joint effect of HUMRESP and LIVELIHOOD. Together these variables have a p-value of 0.928 and an odds ratio of 0.890. So although LIVELIHOOD appears at least somewhat significant in Table 5.3, it is actually not.

Only two variables are significant at the 10% level. ENVBURDEN measures another anthropocentric trait: the belief that environmental regulations have placed an unfair burden on industry. People who believe this to be the case are likely more pro-industry, and thus it is not a surprise that this variable has a positive impact on support levels for offshore drilling. Lastly, DEVELOP is only borderline significant (p-value = 0.086) and, with an odds ratio of 2.957, has a positive effect on levels of support. This is in direct contrast to the wind attitudinal model where it has a strong negative effect. Thus, concern for overdevelopment on land does not reduce
support levels for development of drilling at sea. This issue will be revisited in the ensuing discussion of the wind attitudinal model.

There was one additional variable which proved to be significant in the regression model but which has not been included here. The variable CRIME (generated from the same question as COSTGAS) recorded whether respondents thought crime was one of the top three issues that the country is presently facing. Although the variable was significant at the 5% level, there was no theoretical basis for including it in the model. It was most likely significant only because it was jointly determined with support for oil drilling. Each variable needed to have a viable theory attached to it to support its inclusion in the model.

5.3.3.4 Offshore Wind Power Attitudinal Model

As with the offshore oil drilling model, adding attitudinal variables greatly improves the pseudo $R^2$ of the offshore wind model (0.3648 compared to 0.1033). It also significantly improves the overall p-value, reducing it to 0.0000, which is comparable to the drilling attitudinal model.

Inclusion of the attitudinal variables alters the significance of a number of the demographic variables in the model. MALE and WHITE both drop to the 10% level with new p-values of 0.071 and 0.070, respectively. The significance of other demographic variables increases, sometimes marginally and sometimes substantially. COLLEGE and CHILDREN both become slightly more significant but remain at the same level (1% and 5%, respectively). INCOMEHIGH and AGEMIDDLE become significant, the former at the 10% level (p-value = 0.057) and the latter at the 1% level (p-value = 0.003). With the exception of INCOMEHIGH, all of the significant
demographic variables have odds ratios of over one, indicating a positive effect on support levels for offshore wind. Furthermore, the odds ratios are consistently larger than in the demographic model. Also in the attitudinal model, those with some college education are almost four times more likely to support wind development; men are slightly more than twice as likely to do so; and support levels among those in the middle age bracket and those who have children increase 3.3 and 2.9 times, respectively. Only INCOMEHIGH, with an odds ratio of 0.152, has a negative impact on a person’s support for offshore wind. Here, people with an income over $200,000 are 85% less likely to support offshore wind development.

The fact that INCOMEHIGH is significant mirrors research conducted by Firestone and Kempton in Cape Cod. In their study, conducted in 2005, people with an income below $200,000 were found to be more likely to support the proposed Cape Wind project. However, it is probably too simplistic to simply say that rich people are less likely to support offshore wind. Firestone and Kempton also found that people who fell into $150,000-$200,000 income bracket were most likely to support the project. As they suggest, the stereotype of the rich being opposed to offshore wind development is “is borne out in part statistically, but, only to the extent one considers someone with an annual income of between $150,000 and $200,000 as not being rich” (Firestone & Kempton, 2007, p. 1594, emphasis in original).

Unlike in the offshore wind demographic model, AGEMIDDLE is significant in the attitudinal version – a trend also seen in the drilling models. It appears that people in the 35-64 age group are more supportive of developing offshore energy than either those younger than 35 or those older than 65. The 35-64 age demographic coincides with the age when people are commonly settling down, having
children and acquiring wealth (but as noted, income was controlled for, and had the opposite effect), and this may have an impact on their views of offshore energy development.

Ten of the new attitudinal variables are significant: five at the 1% level (WINDLARGE, CLIMATE, LIVELIHOOD, ALLIMPACT, and POLLAVOID although, as with the drilling model, the LIVELIHOOD variable requires further interpretation); three at the 5% level (ECONOMY, ANTHRO, and TAKEGRANTED); and two at the 10% level (DEVELOP and CALMING). WINDLARGE is one of the most significant variables in the model with a p-value of 0.000. Its odds ratio of 7.229 also reveals it has a large effect on a person’s level of support for wind, with people who believe wind to be the larger resource being more than seven times more likely to support offshore wind development. While it may come as no surprise that someone who thinks the offshore wind resource is larger than its offshore oil counterpart would be more supportive of offshore wind development, what is more interesting is that this variable is not significant for supporters of offshore drilling. This might simply be because people are more familiar with drilling for oil than they are harnessing wind power and, among people who support drilling, the size of the oil resource is taken for granted. With regard to wind, however, this finding does underscore the positive effect that raising awareness of the size of the wind resource has on support levels.

CLIMATE, another highly significant variable with a p-value of 0.008 is more or less self explanatory. This variable measures people who ranked climate change as one of the top three issues facing the country. Given that wind power is a clean source of energy, it is not surprising that support for wind power is related to
concern over climate change and, according to the model, people who think this way are more than three times as likely to support offshore wind development.

    ALLIMPACT is the third attitudinal variable significant at the 1% level (p-value = 0.000). With an odds ratio of 2.749, this variable suggests that people who believe that everybody affects the ocean, no matter where they live, are almost three times as likely to support wind power. At first it is a little puzzling why ALLIMPACT is significant in the wind model and not in the drilling model. It would seem to make more sense that people who thought this way would either support both forms or energy or neither – if everyone affects the ocean regardless, then why not develop the offshore oil resource? It could be that the variable is picking up a sentiment that if everybody affects the ocean (presumably in a negative way) then any technology that can generate clean energy should be promoted in order to reduce that overall impact. Additionally, if everyone affects the ocean, then offshore wind might be seen as comparatively benign compared to other means of energy production, thereby generating support. Conversely, if oil is seen as damaging to the environment, then the knowledge that everyone affects the ocean is unlikely to affect support levels.

    POLLUNAVOID is a measure of a respondent’s view on whether ocean pollution is an unavoidable side effect of economic development. Its odds ratio of 1.556 implies that people who think this is the case are more likely to support wind development. In comparison, this variable is not significant for oil drilling. This makes sense. As was found with ALLIMPACT, if pollution is viewed as unavoidable, support for wind power, but not oil and gas, can be interpreted as supporting comparatively benign technologies over those that are more damaging to the environment.
The last variable that is significant at the 1% level is LIVELIHOOD although once again this variable needs further analysis to interpret correctly its effect. As with the drilling model, a post-estimation linear combination analysis was used to understand the combined effect of HUMRESP and LIVELIHOOD. In the wind model the outcome is similar, although in this case the variable does attain a very small amount of significance (p-value = 0.092). It still possesses a high odds ratio at 9.036, which implies that if people believe that humans have a responsibility to protect the ocean because humans depend on it for their livelihood, they are nine times more likely to support offshore wind. It is difficult to state this with a high degree of certainty, however, due to the variable’s borderline significance. The LIVELIHOOD variable, whether in its individual or combined form, is, in essence, another measure of anthropocentrism.

ECONOMY is the first of the four attitudinal variables significant at the 5% level. With a p-value of 0.039 and an odds ratio of 0.311, it has a negative effect on support levels for offshore wind. Essentially this variable states that people who think the state of the economy is one of the three most important issues the country is facing are 69% less likely to support wind development. While this could be another variable indirectly linked to political persuasion, given the amount of concern over the state of the economy from both Democrats and Republicans alike (Fram & Tompson, 2008), it is unlikely that this is the case here. It seems more probable that the significance of ECONOMY has more to do with the cost of offshore wind projects. Installation of just a few wind facilities in the ocean represents a multi-billion dollar commitment and, among people concerned with the overall state of the economy and unemployment, it might be felt that such investment should be directed elsewhere.
As in the offshore oil drilling attitudinal model, the variable ANTHRO is significant at the 5% level and has approximately the same positive effect on support, with an odds ratio of 1.631 for offshore wind versus 1.677 for offshore oil. While it might be obvious that people who are more anthropocentric in their outlook support drilling, it is somewhat surprising that anthropocentrism has a similar effect on offshore wind development, given the green credentials of the latter. Despite climate change being an important driver of support, it appears that there is still a significant amount of concern regarding offshore wind power’s potential environmental impact. This might be particularly true among those who hold a more biocentric view of nature. Typically, such people care about the wellbeing of individual animals (as opposed to ecocentrist who more concerned with the health of entire ecosystems). Although, as discussed in Section 5.1, studies to date suggest that the environmental impacts of wind will be far less than the impacts from other forms of power generation, offshore wind development will still likely result in some avian, and possibly bat, fatalities and also potentially affect marine mammals. Further, in contrast to the wildlife mortality caused by other forms of energy development, the risks related to offshore wind power are highly visible. This concern for the wellbeing of individual animals and the visibility of avian deaths could help explain why, for even a clean source of energy such as wind, those with a biocentric attitude are less likely to support development of the resource.

TAKEGRANTED is the final variable that is significant at the 5% level. With a p-value of 0.029 and an odds ratio of 0.473, TAKEGRANTED has a negative impact on support levels for offshore wind. It is possible that a respondent who agrees that people take the ocean for granted is likely to be more environmentally minded.
than the average person; that someone who holds environmental values close to their heart is more likely to think that other people take the natural world for granted. However, this does not explain why such people oppose wind power but not drilling for oil. It could be that ocean-based wind power is a new and unknown quantity. Although people may not support drilling for oil, they are at least familiar with it and acknowledge it as an energy source. For many people, offshore wind is an entirely new concept; perhaps people are unsure about its impacts and the fall back position is to oppose rather than support.

Two variables are significant at the 10% level: DEVELOP and CALMING. The latter of these is barely significant (p-value = 0.095) and, as it was investigated in the offshore oil drilling model, it will not be discussed in detail here. As the variable has an odds ratio of less than one in both models, it will suffice to say that the previous interpretation of the variable can likely be applied to the present model. DEVELOP, on the other hand, is only borderline significant in both models. In the wind model it has a p-value of 0.070 and a low odds ratio of 0.323, meaning that people who chose ‘land being developed’ as one of the top three environmental issues facing the country are 68% less likely to support offshore wind. This variable appears to tap into a concern over building new structures, whether on land or at sea. It is true that an offshore oil well is likely to be significantly less visually intrusive than an offshore wind facility. The oil platform may well be out of sight and, even if it is in view, is only one structure. Conversely, individual wind facilities that have been proposed off the East Coast have dozens of turbines and, if multiple sites are approved for development, then hundreds, if not thousands, of turbines could be placed offshore. With this in mind, it follows that a person who is concerned about
sprawl or the loss of habitat would object to wind facilities being built in the ocean, but be less concerned about offshore oil development. Offshore wind power also requires the burying of cables to link offshore wind facilities with onshore transmission, which will require some level of development in coastal areas.

5.4 Summary

Although a majority of respondents support both offshore oil drilling and offshore wind development, the latter receives stronger backing. While no significant differences were found in support levels between coastal and inland residents, there were significant differences in support for wind based on political affiliation, sex, and whether the person has at least some college education. The logistic regression modeling shows that demographic variables play a greater role in support levels for offshore wind than they do for offshore oil drilling and indicate that a person’s philosophical outlook has little impact in support for either form of energy generation. Lastly, it was found that a person’s understanding of the size of each resource also affects support for offshore wind. These findings are discussed in more detail in Chapter 6, where they are placed in a broader policy context.
Chapter 6
CONCLUSION

To conclude this study, this chapter will briefly summarize the findings of the two results chapters, before addressing some policy and philosophical implications of the data. It would be remiss at this stage not to discuss the 2010 oil spill in the Gulf of Mexico. At the time of writing, oil continues to leak into the Gulf of Mexico after an explosion which destroyed the Deepwater Horizon oil well. In addition to summarizing the findings of this survey, conducted in 2008, this chapter will thus also question how that incident might affect both public opinion of offshore drilling and potential policies which might have otherwise been recommended from this study. The chapter will close by suggesting some avenues for further research in this field.

6.1 Ocean Attitudes

Although ocean-related issues do not rank highly on a list of environmental concerns, Americans do see the ocean as important. Both the survey data and the semistructured interviews demonstrate that people believe the ocean is essential to human survival, economic wellbeing and life in general. The fact that ocean issues do not rank highly might simply be explained by the ‘finite pool of worry’ theory. It has been suggested that people only have the capacity to worry about so many issues; that people just do not have the time to think about (and be concerned about) every problem that exists (Hansen, Marx, & Weber, 2004; Linville & Fischer, 1991). Given that the ocean is just one environmental issue out of a host of
environmental issues (climate change, clean air, species extinction, loss of habitat, etc.) and that environmental issues as a whole make up just one issue among a broader range of other issues (national security, the economy, healthcare, etc.) it is understandable that people are not overtly concerned about the ocean. However, when asked specifically about the ocean, people do display high levels of concern.

On the whole, Americans are aware of the connections that exist within nature and understand that the ocean plays a key role in these connections (although understanding of specific details tends to vary significantly). Additionally, people realize that chain effects occur in nature and that changing one part of the environment can have effects elsewhere in the system. It is understood that humans are part of the system and can have an impact on the ocean even if living far inland. However, a disconnect exists between how a person thinks humans affect the ocean in the abstract sense and the impact that person thinks they have individually.

Not surprisingly, pollution is seen as the biggest threat to the marine environment. For the most part, people are aware of the various pathways by which pollutants enter the ocean; what is less understood is the relative importance of the different sources. Oil spills and ocean dumping tend to be overemphasized, whereas the impacts of land-based runoff and atmospheric deposition are not fully appreciated. It is quite understandable why this is the case however. Due to the blanket media coverage of the Gulf oil spill over the last few weeks, it is highly probable that the vast majority of Americans are aware of the disaster. It is also the case that humans are often drawn to catastrophe and pay more attention to an issue when there is a clearly defined villain (in this case BP). All factors which make an event like a large oil spill more likely to stick in people’s minds. From the interview data is does not appear that
ocean acidification is an issue on people’s radar, although this assumption was not tested at the national level.

With regard to environmental beliefs and values, geographic location and sex prove influential. There exist a number of differences between people living in the coastal zone and those who live away from the coast, with the more pronounced differences among those who live within coastal zip codes. These people are more cognizant of the economic importance of the ocean and more likely to feel they have a responsibility to protect and preserve the ocean. People living in coastal zips also hold slightly less anthropocentric attitudes when it comes to humans’ relationship to the environment. Women are also less anthropocentric than men and more likely to understand they have a personal impact on the ocean. Additionally, women feel that anti-pollution laws should be enforced more strongly.

Regarding environmental action, the factors that influence conservation behavior tend to also influence letter writing behavior. Republicans are less likely to either undertake conservation actions or write letters about environmental issues, whereas those who believe everyone affects the ocean and think of the open ocean when they hear the word ‘ocean’ are more likely to do both. In saying this, however, there are a few key differences between people who undertake conservation actions and those who write letters. Models indicate that coastal Democrats are more likely to undertake conservation behaviors, whereas inland Democrats are more likely to write to a political representative. Inland Democrats are more likely to be white and have stronger religious beliefs. While both groups have a spiritual connection to the ocean, inland Democrats are more likely to believe that God created the ocean. The survey data also appears to imply that coastal Democrats have more formal education than
their inland Democrat counterparts (although this particular finding is not significant and would need further research to confirm).

Thus, although both groups comprise Democrats, coastal Democrats may be more liberal (although political ideology was not tested). They are more likely to take everyday actions to help the environment – indeed, saving energy, water, and driving less are all behaviors in which they partake. Furthermore, living in the coastal zone likely gives them better public transportation options, due to less open space and resulting higher population densities. In contrast, the inland group may be more traditional in their outlook, and thus more likely to contact their representatives directly about a specific issue, while less likely, or able, to change their day-to-day behavior.

Regarding philosophical beliefs and their effect on environmental actions, despite survey respondents subscribing to a more nonanthropocentric view of the environment in the abstract sense, when it comes to taking action to help protect and preserve the environment, there is little difference between those with an anthropocentric outlook and those who hold a nonanthropocentric viewpoint.

6.2 Offshore Energy Development

The analysis conducted in Chapter 5 highlights a number of important issues regarding support levels for offshore oil drilling and wind development. The data show that whereas a majority of respondents support both forms of energy development, offshore wind is favored by more. Again these findings relate to public opinion in 2008 – a more detailed discussion of how people’s views might have changed is provided below. Large differences exist between Republicans and
Democrats, men and women, and those with at least some college education and those without. Interestingly, no significant differences between support levels were found among the various regions, and both coastal and inland residents have a similar outlook to offshore energy development.

Of the reasons why people support offshore drilling, reducing the country’s dependence on foreign oil is the clear favorite. For offshore wind, the allure of developing a clean energy source proves to be most popular, although both reducing dependence on foreign oil and creating green jobs resonate with the public as well. Of those who oppose either oil or wind development, the threat of environmental damage is the main concern. The notion that enough wind power exists on land to disregard the need for development offshore is also found in the data, along with the sentiment that the country should be reducing the amount of oil it uses, a finding which in itself is very revealing. The data here strongly imply that the idea of reducing U.S. dependence on foreign oil is starting to take hold. However, neither cost, risk of environmental damage, nor a lack of reliable technology is the reason why people think the U.S. does not currently have any offshore wind facilities. Instead, blame is directed at the government as well as oil and gas companies who many Americans believe, rightly or not, are hindering development of the resource.

The logistic regression modeling allows for a more sophisticated interpretation of the data, and a quick comparison of the two attitudinal models sheds light on some interesting differences. Overall, the demographic variables are far more significant in the wind model than in the drilling version. In the drilling attitudinal model, only the variables measuring whether the person is middle aged, has children, and is a Democrat are significant. In the wind model, conversely, variables measuring
whether a person is middle aged, has children, and has a high income are significant, as well as sex, race, and level of education – demonstrating that demographic characteristics have a much greater impact on support for wind than they do for drilling. The only insignificant factors in the wind model are the two political variables and whether a person lives in a coastal county. This finding that political affiliation does not influence support for offshore wind will likely encourage wind developers, who no doubt benefit from support from both sides of the political aisle. Whether a person lives near the coast or inland has no impact on support for offshore energy development.

One factor that does have a large bearing on support levels for offshore wind is opinion regarding the relative size of the offshore oil and wind resources. People who believe wind to be the larger of the two are overwhelmingly in favor of installing offshore wind turbines and, if offshore wind power is to be pursued as government policy, then this finding underscores the importance of educating the public about the size of the resource. A small amount of work about the energy potential of offshore wind has been published in the academic sphere, and informing wider audiences of these findings would likely increase offshore wind support, if such support is sought.

There is no apparent difference between support for drilling and wind with regard to the philosophical outlook people have on the environment. While it is to be expected that anthropocentrism increases support for offshore oil drilling, it is surprising that it equally increases support for offshore wind power. Offshore wind power is the more environmentally friendly technology and, of the various environmental philosophies, people who hold a nonanthropocentric viewpoint are
generally thought of as been more environmentally minded. Why then is there this disconnect between environmental attitudes and support levels for offshore wind? Why does anthropocentrism also increase the likelihood of supporting offshore wind development?

It is possible that even though offshore wind power is more environmentally friendly than oil drilling, it is not seen as environmentally friendly enough. Despite offshore wind having a much lower environmental impact, it will still have an impact, particularly with regards to individual animals; some birds will hit the turbines, some fish will be displaced, and some marine mammals will likely be affected by underwater noise and vibrations. Perhaps these potential impacts or simply a fear of the unknown (as offshore wind has yet to reach the Americas) are enough to push those with a nonanthropocentric attitude away from supporting offshore wind development. The data from this survey appear to support this suggestion – that offshore wind power is seen by many as a threat to the environment. The high percentage of respondents that chose environmental impacts as the primary reason they oppose offshore wind development, coupled with the fact that certain environmental views (e.g., the belief that people take the ocean for granted, concern about over-development) reduce support for offshore wind, reveal that people are still unsure about its environmental impact.

6.3 Effect of the Gulf Oil Spill on Public Attitudes to Offshore Drilling

At the time of writing, the U.S. is currently struggling to deal with the largest oil spill in its history – significantly eclipsing that caused by the Exxon Valdez in 1989 (USA Today, 2010). Shortly before 10 p.m. on April 20, 2010 a bubble of
methane escaped from the Deepwater Horizon oil well, located in the Gulf of Mexico, and rapidly passed through the drill column, expanding as it went. Upon reaching the drilling platform the gas exploded causing a fire which engulfed, and ultimately destroyed, the drilling platform. The explosion resulted in an oil leak almost a mile under the surface of the ocean. To date, after more than two months, it has not proved possible to stop the leak and it estimated by the Technical Flow Rate Group (a group of government and academic scientists) that between 35,000 and 60,000 barrels (1.5 to 2.5 million gallons) of oil are spilling into the Gulf each day (CNN, 2010). The exact quantity of oil spilled is unknown, however, due to the difficulty of installing measuring sensors as such depths. A surface oil slick approximately the size of Delaware has been observed (Reuters, 2010) and scientists have also discovered large underwater oil plumes spreading throughout the Gulf, some measuring ten miles long, three miles wide, and in places 300 feet thick (Gillis, 2010).

The Deepwater Horizon oil rig was operated by Transocean but leased to BP – the sixth largest oil company in the world – and, as a result, BP is being held accountable for the spill by both the U.S. Government and the general public. One third of Gulf fisheries have been closed by the National Oceanic Atmospheric Administration with an estimate loss of $2.5 billion in Louisiana alone (Walsh, 2010). The Gulf Coast tourism industry is likely to equally hard hit with Florida projected to lose around $3 billion in tourism revenue (Walsh, 2010).

There has been much public anger directed at BP – in one poll conducted a month after the spill, one in eight respondents said they would stop buying BP gasoline (Shelton Group, 2010) – but of more relevance to this study is the question of whether public support for offshore drilling has changed. A number of public opinion
polls have been conducted in the wake of the Deepwater Horizon disaster and, while initial polling showed continued high levels of approval for offshore drilling, more recent public opinion data has detected a drop in support levels. Table 6.1 summarizes a number of these polls. Although exact question wording varies from poll to poll, in essence, all asked whether people favor or oppose expanding offshore drilling in U.S. waters.

Table 6.1  Summary of Post-Gulf Oil Spill Polling Data

<table>
<thead>
<tr>
<th>Poll</th>
<th>Favor Expanded Drilling</th>
<th>Oppose Expanded Drilling</th>
<th>Unsure/No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNN (May 21-23)</td>
<td>57</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>CNN (June 16)</td>
<td>49</td>
<td>51</td>
<td>0</td>
</tr>
<tr>
<td>AP-GfK (May 7-11)</td>
<td>50</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>AP-GfK (June 9-14)</td>
<td>45</td>
<td>41</td>
<td>14</td>
</tr>
<tr>
<td>Fox News (May 18-19)</td>
<td>54</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td>Fox News (June 8-9)</td>
<td>44</td>
<td>48</td>
<td>8</td>
</tr>
<tr>
<td>CBS News (May 20-24)</td>
<td>45</td>
<td>46</td>
<td>9</td>
</tr>
<tr>
<td>CBS News (June 1-3)</td>
<td>40</td>
<td>51</td>
<td>9</td>
</tr>
</tbody>
</table>

(PollingReport.com, 2010)

As Table 6.1 shows, in each pair of polls (CNN, AP-GfK, etc.) public support for expanding offshore drilling decreased by five to ten percentage points between May and June. While polls such as these only provide a brief snapshot in time, the data do appear to suggest that public support for offshore oil is at least temporarily on the wane. One question that should be explored further, however, is
whether people are simply opposed to developing new sources of offshore oil, or whether they are turning against the idea of offshore drilling entirely.

Unlike the polls listed in Table 6.1, the Pew Center for Research, asked about both banning all offshore oil development and prohibiting new development but allowing existing wells to keep operating. The poll, carried out between June 10-13, found that 22% believed the U.S. should ban offshore drilling completely and 35% thought that new drilling should be banned but existing wells should be allowed to continue their production. Slightly less that one-third (31%) believed that offshore drilling should be expanded, 12% refused to answer or had no opinion on the matter (The Pew Research Center for the People & the Press, 2010). These findings were mirrored by a poll conducted by ABC and the Washington Post a few days earlier (June 3-6) where 41% of respondents thought that offshore drilling should be kept at current levels, 31% wanted fewer wells offshore, and just 25% backed expanding offshore production (Eilperin & Cohen, 2010).

It seems clear that the Gulf oil spill has had an effect on public attitudes to offshore drilling. It remains to be seen by how much support levels will ultimately fall and whether the fall will be permanent or transient. BP is in the process of drilling two relief wells intended to alleviate the pressure at the leak but there is no guarantee this strategy will work. A similar leak at the Ixtoc I exploratory oil well in June 1979 took nine months to cap. Rather ominously, the Ixtoc I was operating in just 160 feet of water; the Deepwater Horizon was working in water 5,000 feet deep (Hawley, 2010). Should the current Gulf spill continue past August when the relief wells will be completed it is possible, if not likely, that public support for offshore drilling will decrease still further.
6.4 Policy Implications

It was noted at the beginning of this study that for policies to succeed they must have public backing and it seems clear from the data here that, at least in the abstract, policies aimed at protecting and preserving the ocean would have high levels of public support. However, it appears equally apparent that if ocean-related issues are placed against other issues, then public support for the ocean would be less robust. In terms of framing ocean issues, it is thus important to recognize this difference. The high level of support for ocean issues overall bodes well for those involved in ocean literacy. As Steel et al. (2005) note, improving public knowledge is vital for increasing public support for ocean policies, and the findings of this study support this assertion. Given the high levels of responsibility felt toward the ocean, it appears it is not apathy that is preventing the public from undertaking more pro-ocean behavior, but rather a lack of knowledge – in particular, knowledge regarding an individual’s personal impact on the ocean. In a general sense, most people (both coastal and inland residents) understand that one can affect the marine environment even when living far from it but people living inland are less likely to think their personal actions have an impact on the ocean. However, in saying this, it is important to acknowledge that despite levels of awareness concerning individual action being lower than those relating to societal responsibility toward the ocean, at 71% they are still remarkably high. The fact that seven in ten people believe their actions do affect the ocean provides a lever for advocacy that could be used by those working on ocean conservation efforts.

Pollution is still an area where knowledge is lacking. Although people have a good grasp of basic facts, they do not generally understand specific details.
Given how much ocean pollution stems from runoff and atmospheric deposition, education efforts should be increased regarding these pathways.

Unsurprisingly, people are much more likely to take environmental action if there is a financial benefit in doing so. Many people reported undertaking actions for both environmental and financial reasons (e.g., driving less, saving energy, water, etc.). Fewer people carry out actions that solely benefit the environment (e.g., recycling and composting). Therefore, if the government decides to pursue pro-environmental policies, then those involved in ocean education activities should seek out ways to highlight any financial benefits of environmental/ocean action. For example, given the impact of atmospheric deposition, much of which stems from automobiles and power plants, connecting the financial benefits of saving energy and driving less, with the environmental benefits of such actions (e.g., reduced marine pollution) might be a more effective way to combat the issue. While some issues are subject to high level of public awareness – oil spills, marine debris, overfishing – others are not on people’s radars at all. One such issue is ocean acidification which, despite being listed as a problem by two of the five experts interviewed in this study, was hardly mentioned at all by the public interviewees. Some scientists believe ocean acidification might be the most serious threat from climate change and, although the issue has gained some ground since the interviews in this study were conducted, it is still one of the least well known problems currently facing the marine environment.

Americans are generally unaware of land-based ocean issues. Coastal development and runoff are seen by many scientists and policy makers as major threats to the ocean (in this study alone, three of the experts mentioned development of the coastal zone as a serious concern). However, awareness of this problem is
practically non-existent in the public arena. Not one member of the general public interviewed raised the issue and the only person, other than a scientist or an NGO worker, who did mention development was one of the two fishermen. Likewise, while a number of interviewees were aware of the problem of non-point source pollution, only one person listed runoff as an issue. With regard to ocean environmental issues, there appears to be a large disconnect between the issues that the public thinks are important and those that experts and policy makers are concerned about. This finding mirrors SeaWeb’s results, which reveal that the general public and scientists differ on which issues are the most threatening to the marine environment. While this is not an issue in itself, it can become problematic if people do not trust scientists (as the AAAS study, summarized in Chapter 2, implies) and believe that the government should focus on issues that concern the public, not scientists.

On the whole, people agree that the government has a responsibility to protect and preserve the ocean. This is a positive finding, as the extent of government involvement in the public sphere is a hotly debated issue. While individual states certainly have a role to play in coastal policy formation, it is important for the federal government to play a leading role in setting ocean policy, given the fact that marine ecosystems are not defined by state boundaries. The fact that the public support the government’s role is this field adds further legitimacy to both national policy and ocean literacy efforts. That being said, agreement on the extent of governmental responsibility was lower than personal responsibility, indicating that people still see conserving the ocean as an issue that should not solely (or even primarily) be left to the government. This finding adds further weight to the benefits that could be realized
from educating people about their individual impacts on the ocean; people believe they have a responsibility to look after the ocean, they just need to know how to do so.

Offshore wind development enjoys strong public support. Although some specific projects, such as Cape Wind, have come under criticism from local opposition groups, others enjoy considerable support (e.g., Bluewater Wind), and overall there is broad support among both coastal and inland residents for installing offshore wind turbines. The issue also appears to be apolitical, with high levels of support from both Democrats and Republicans. While the survey also found that a majority supported (at least in 2008) offshore drilling, both coastal and inland residents are less enthusiastic about drilling than they are about wind development. Additionally, offshore drilling does not enjoy the same level of cross-party support that wind power does.

If society sees offshore wind power as beneficial, as this survey suggests, two potential roadblocks to its wider adoption relating to public perception of the technology need to be addressed. First, the public needs to be better informed of the net environmental benefits of installing turbines in the ocean. Exactly half of the offshore wind opponents cited the potential for negative environmental impacts as the main reason why they are against moving forward with wind facilities in the ocean. Although it can be argued that the positive impact of wind power on climate change outweighs any negative impact on specific species, it appears that this argument does not resonate with the general public. Given that only 5% of supporters cited a reduction in the effects of climate change as the main reason why they were in favor of offshore wind, it does not seem that benefits to climate change are a significant selling point of the technology. With this in mind, the (non-climate change related)
environmental impacts of offshore wind should be compared like-for-like with those from conventional power generation. Research in this area has found that properly sited wind projects compare favorably with fossil fuel generation (Jarvis, 2005; Lilley & Firestone, 2008) but the results need to be better disseminated among the general population. Again, given the current situation in the Gulf, the public may be more receptive to this comparison today than they might have been before the Deepwater Horizon platform exploded.

Second, public awareness needs to be raised regarding the size of the offshore wind resource. The data imply that support for wind is higher among people who believe that offshore wind has the potential for more energy generation than offshore oil. Additionally, within this group, support for offshore drilling is significantly lower, resulting in a much larger gap in support for the two technologies than among those who believe offshore oil to be the larger resource. Although not significant in the regression analysis it appears that resource size perception could be an important factor in whether people support offshore wind development.

In terms of more direct policy measures, legislation could be introduced to better support offshore wind. Although there are a number of U.S. projects at various stages of the development process, America lags far behind Europe in offshore wind development. Cost continues to be a barrier to renewable energy’s widespread adoption and, for technologies such as offshore wind to be competitive with traditional forms of generation, some form of financial incentive is required. If the installation of renewable energy generation is decided upon as a political objective (as the current administration has announced) then policies that increase the economic viability of offshore wind are required. There are a number of policy tools to achieve this goal
including tax rebates, grants, Renewable Portfolio Standards with Renewable Energy Credits, and production-based incentives such as feed-in tariffs.

Since the late 1990s, the U.S. has offered financial incentives to wind developers through a Production Tax Credit (PTC) and, while this has encouraged wind growth, its main disadvantage is the short-term nature of the credit. The PTC has tended to result in a boom-bust cycle with new wind development growing at an extremely fast rate when the credit is available and then coming to a shuddering halt when the credits are exhausted or the subsidy is removed (Union of Concerned Scientists, 2010). Given the capital intensive nature of large scale wind power, investors need longer-term security and, without such guarantees, development will cease. This is especially true of offshore wind development given the greater capital costs as compared to land-based wind. The current PTC was extended under the American Recovery and Reinvestment Act of 2009 and runs through the end of 2012. Due to the lack of need for tax credits in the face of the severe economic recession that began in 2008, Congress also adopted an Investment Tax Credit (ITC), and an alternative Treasury grant program.

For wind power to see continued growth in the United States, more stable support measures are needed. In Europe, feed-in tariffs have proved highly successful in stimulating the growth of renewable energy, partly because of the tariff rate (around 13 €/kWh for offshore wind) but also because of the long-term nature of the tariffs (15-20 years). In 2009, Ontario launched a similar feed-in tariff program which, in the first six months, awarded contracts for 2,500 MW of renewable energy generation, including one offshore wind project (Ontario Power Authority, 2010).
Whether or not the U.S. adopts feed-in tariffs (some small scale programs have been developed in Vermont and Gainesville, FL) or continues with tax incentives, it is clear that greater long-term security is needed if wind development is to reach its potential. With high levels of support for offshore wind and the public losing its appetite for offshore drilling, seemingly by the month, the time might be right for Congress to pass more robust incentives for offshore wind development.

Furthermore, Congress should reconsider its 2008 decision to lift the moratorium on expanded offshore drilling. On May 28, in the wake of the Gulf disaster, Kenneth Salazar, the U.S. Secretary of the Interior, imposed a six-month temporary ban on deepwater drilling (at depths of 500 feet or more) to allow for an investigation into the safety of the practice (Straub, 2010b). However, this ban was lifted barely one month later, on June 23, by U.S. District Judge Martin Feldman. The Obama administration immediately challenged the ruling but their appeal for an emergency stay of the judge’s decision was rejected on July 9 by the U.S. Court of Appeals for the Fifth Circuit (Straub, 2010a). On July 12, Salazar issued a new order which suspended deepwater drilling in both the Gulf of Mexico and off the coast of California until November 30, 2010. Unlike the first moratorium, the new order suspends drilling based on drilling configurations and technologies, rather than using drilling depth as the determining factor (Broder, 2010).

Although it likely would not be feasible to immediately cease all production offshore, a re-imposition of the Congressional moratorium on all new offshore drilling might be prudent. If Congress wanted to go one step further it could consider phasing out existing offshore oil rigs over a set time period, 10-20 years for example. Despite domestic production accounting for approximately one-third of U.S.
oil consumption, as prices are set in a global market, reducing domestic production would not increase gasoline costs any more than they would rise due to external events (although as was seen in the summer of 2008, an externally driven price increase could be substantial). It is true that reducing offshore production would increase U.S. dependency of foreign imports, however, if the goal is to free the country from such dependence then more drastic policy measures would be required – regardless of the state of domestic offshore drilling. In addition to policies designed encourage renewable energy growth, such as those outline above, incentives would need to be created to shift the U.S. light vehicle fleet away from gasoline and to electricity. Electric vehicles have now advanced to the stage where they can meet many people’s daily driving needs and, if America is serious about reducing foreign oil dependence, then this is the path which needs to be taken.

Lastly, another argument to reduce offshore oil drilling is the “minimax regret rule.” Initially proposed by Savage over 50 years ago, the minimax rule is a strategy that seeks to minimize the maximum regret we might suffer as a result of a policy decision. In the absence of adequate information concerning the costs and benefits of a particular course of action, the minimax rule assesses the amount of regret that each policy option might entail. It then requires a course of action to be taken which minimizes the maximum amount of potential regret (Goodin, 1992). Given that the Gulf spill appears to entail a large amount of regret, such a policy approach would seek to minimize the possibility of an event like this occurring by not drilling at such a depth in the first place and maybe even by not drilling offshore at all. Whether the benefits of offshore drilling outweigh the costs is a decision that
ultimately will be made by Congress. Looking at the public opinion data gathered since the Gulf spill, it appears that Americans are beginning to think they do not.

6.5 Philosophical Implications

The findings of this study add weight to the argument of those who advocate a pragmatic environmental ethic. While more people state that they hold a nonanthropocentric attitude on life, in actuality, there exists very little difference in pro-environmental action between people who hold a nonanthropocentric ethic and those that adhere to an anthropocentric point of view. It is entirely possible that the survey was not able to fully capture the complexities of the different ethical positions, but the fact that people have likely not taken the time to think through the various arguments and arrive at a single monistic theory by which to live, suggests that trying to develop policies along specific philosophical lines may not be the best way to proceed.

When it comes to support for offshore energy, anthropocentrists are more likely to support both offshore drilling and offshore wind development. Whereas advocating for a nonanthropocentric attitude would make little difference regarding environmental action, in this case it would actually be detrimental to moving forward with offshore wind. It may simply be the case that educating the public about the environmental benefits of offshore wind would allay nonanthropocentrists fears, but again, a pragmatic approach would seem to be the way to help offshore wind move forward in the near term.
6.6 Further Research

This research project has a broad scope and intentionally covered a number of different issues; as such, there is plenty of room for future research. More work could be undertaken in any of the topical areas to delve deeper into the data. Regarding philosophical attitudes and the impact they have on environmental behavior, it would be interesting to ask similar questions using a more detailed anthropocentric/nonanthropocentric scale, for example the one developed by Minteer and Manning (1999). A scale such as this would allow for a more in-depth analysis of the ethical belief systems to which people adhere. It would also have been interesting to ask more probing questions about political ideology. The survey questioned people on their party preference but did not ask directly about liberal/conservative attitudes. A question such as this might have given better insight into the difference between coastal and inland Democrats, as would have a question asking whether the respondent was part of a labor union.

Another angle to take would be to expand this study’s use of qualitative data in this area. While this study attempted to draw out the philosophical positions of interview subjects, the complexity of the issue, coupled with the other topics that were explored, made it difficult to analyze people’s thinking. Focus groups might be a more appropriate research technique for such questions, it is possible that hearing others talk about their thoughts would help people formulate their own opinions.

In terms of offshore energy development, this study obtained a national perspective on the issue, albeit based only on survey data. Unfortunately, given that this study’s focus on offshore energy did not arise until the issue became part of the presidential debate, people were not asked about their views on this subject during the
semistructured interview phase, which occurred earlier in the research process. Attitudes to offshore oil and wind development could form the basis of an entire qualitative research project, and it would be very interesting to obtain a deeper understanding of where people stand on these issues. In particular, further questions could be asked about whether resource size perceptions influence support for offshore wind. If this turns out to be the case, then one simple way to garner more support for offshore wind development would be to educate people about the size of the resource.

The most obvious area for further research, however, is a follow-up study to investigate whether attitudes to both offshore oil drilling and wind development have changed in light of the events in the Gulf. As was shown above, it appears that the public is less in favor of offshore oil extraction but no studies have yet asked about the impact the oil spill has had on support for wind power. Given high levels of support for offshore wind in the abstract sense, it might be difficult to find any significant differences in support levels at a national level but where individual projects are concerned there may be a significant change in attitudes. Typically, specific projects – such as Cape Wind – experience lower levels of support and it is in cases such as these, that the oil spill could change people’s opinion of offshore wind.

6.7 Summary

This dissertation set out to better understand attitudes toward the ocean and the use of ocean resources for energy generation. In doing so, it attempted to uncover the beliefs and values that people have regarding the marine environment and their support for offshore drilling and wind development. At the beginning of this study, it was noted how Mikael Stenmark suggested that there are three sides to
environmental problems – scientific, social and normative. To ensure that ethics are accounted for in the decision-making process, Stenmark (2002) called for an analysis of people’s different ethical positions and their views of nature. Such an analysis was attempted by this research project. The data show that while people tend to hold slightly nonanthropocentric attitudes to the environment, differences in ethical beliefs do not have any real impact on pro-environmental behavior and in fact can reduce support for offshore wind. The frustration voiced by environmental pragmatists concerning the lack of impact environmental ethics has had on real-world policy issues is a valid concern and, while the merits of different environmental ethics will no doubt be debated in philosophical circles for years to come, it is important not to let such arguments hijack the policy process.
REFERENCES


Appendix I

INTERVIEW PROTOCOL

Presented here is the final version of the protocol used during the qualitative interview process. The set of questions underwent 28 revisions during the course of the interview phase of the research project. Based on earlier responses, some questions were dropped while some were amended to better uncover people’s attitudes toward the ocean. For example, earlier versions of the protocol asked interviewees to describe in more detail their knowledge about specific marine issues. This last question was initially structured around the issues that the person mentioned earlier in the interview. Over time it became apparent that the only issue which people had at least some in-depth knowledge of was pollution and this question was amended to ask specifically about marine pollution. As the offshore energy debate had not risen to prominence when the interviews were conducted (November 2005 to September 2007) interviewees were not asked about their opinions on offshore drilling and wind development.
Hello, my name is Jon Lilley and I’m a graduate student at the University of Delaware. For my dissertation I’m looking at what people think of the oceans. May I ask you a few questions about your views of the ocean? There are no right or wrong answers – I just want to hear what you think. The interview will probably last about 30 minutes. [Await response] Do you mind if I use a tape recorder? It’ll save me writing everything down and should help speed things up. The interview is anonymous.

1. In your own words could you describe the ocean for me?
   - [For each unusual word mentioned i.e. other than big, blue etc.] Why do you say ____?

2. Do you think the ocean is important? [Wait for response] Why?
   - [If not mentioned] Do you think the ocean is important for the environment? Why?
   - [If not mentioned] Do you think the ocean is important for people? Why?
   - [If not mentioned] Is the ocean important to you personally? Why?

3. Do you think the ocean is more or less important to you than other aspects of the natural world such as national parks, wilderness areas, and mountains?
   - Why do you say that?

4. Would you say you have a spiritual connection to the ocean?
   - [If yes] Could you describe it for me?

5. Do you think people have a responsibility to look after the ocean?
   - Why/why not?
   - [If not mentioned] What about the animals in the ocean, do people have a responsibility to look after them? [Await response] Why/why not?

6. Can you tell me some ways how people use the ocean?
   - Do you think these activities have an impact on the ocean?
   - Do you think you personally affect the ocean? [Await response] How/why not?

7. What kind of condition would you say the ocean is in?
   - Why do you say that?

8. Can you think of any specific problems that affect the ocean? [Write list]
   - Can you think of any more?
9. What should be done about the problems that affect the ocean?
   • Whose responsibility is it to address the problems?
   • Do you feel you have a responsibility to do anything about the problems?
     Why/why not?

10. Do you do anything to help the ocean?
    • [If yes] Can you tell me what you do?
    • [If no] Why not?

11. Do you do anything to help the environment in general?
    • [If yes] What do you do?
    • [If no] Why not?
    • [If little response] What about things like recycling; using environmentally friendly products; changing your light bulbs; using less paper; driving less; contributing to environmental groups?

[If have enough time]
12. I’d like to talk to you a bit more about marine pollution. Imagine that you’re talking to someone who has never heard of marine pollution before and you’re explaining it to them for the first time.
   • What is marine pollution?
   • What are the main pollutants in the ocean?
   • Where does pollution come from?
   • Why is it a problem?
   • Is it a serious problem?
   • Who/what does it affect & how?
   • Why should we care about it?
   • What should be done about it?

Demographics/Extras:
   • Sex
   • Age
   • Ethnicity
   • Occupation
   • Place of residence
   • Distance from ocean
   • Ever lived by ocean

Well that’s all the questions I have, I was wondering if there is anything you think I missed that you would like to add?
Appendix II

INTERVIEW SUBJECTS

This appendix provides a list of all 35 interview subject. Names have been changed to protect subject identities and abide by human subject requirements. The subject’s age, occupation and interview location were not altered. In some cases the subject lived in a different place from where the interview was conducted, in these situations the subject’s home city is given in parentheses. Occasionally the age of the interviewee was not obtained, in these instances a best guess was used to gauge age.
<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Age</th>
<th>Occupation</th>
<th>Location</th>
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<tr>
<td>1</td>
<td>Matt</td>
<td>62</td>
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<tr>
<td>2</td>
<td>Robert</td>
<td>50</td>
<td>Scientist (Marine Biosciences)</td>
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<tr>
<td>3</td>
<td>Mark</td>
<td>51</td>
<td>NGO Worker</td>
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</tr>
<tr>
<td>4</td>
<td>Linda</td>
<td>42?</td>
<td>NGO Worker</td>
<td>Washington, DC</td>
</tr>
<tr>
<td>5</td>
<td>Tom</td>
<td>52</td>
<td>Scientist (Oceanography)</td>
<td>Cambridge, MD (by phone)</td>
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<tr>
<td>6</td>
<td>Chris</td>
<td>47</td>
<td>Commercial Fisherman</td>
<td>Cape May, NJ (by phone)</td>
</tr>
<tr>
<td>7</td>
<td>Phillip</td>
<td>57</td>
<td>Recreational Fisherman</td>
<td>Absecon, NJ (by phone)</td>
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<td>8</td>
<td>Mary</td>
<td>~62</td>
<td>Retired</td>
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<tr>
<td>9</td>
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<td>~66</td>
<td>Retired</td>
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<tr>
<td>10</td>
<td>Annie</td>
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<td>Dale</td>
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<td>Monterey, CA</td>
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<tr>
<td>12</td>
<td>Roger</td>
<td>45</td>
<td>Maintenance Man</td>
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</tr>
<tr>
<td>13</td>
<td>Teresa</td>
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<td>Retired</td>
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<tr>
<td>14</td>
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<td>College Student</td>
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<tr>
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<td>Shop Keeper</td>
<td>Port Townsend, WA</td>
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<tr>
<td>17</td>
<td>Kate</td>
<td>53</td>
<td>Spiritual Healer</td>
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<td>Naval Officer</td>
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</tr>
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<td>Sarah</td>
<td>22</td>
<td>Student</td>
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<td>Truck Driver</td>
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<td>Bruce</td>
<td>56</td>
<td>Oil Field Worker</td>
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<td>31</td>
<td>Angela</td>
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<td>Elementary School Teacher</td>
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<td>32</td>
<td>Raul</td>
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<td>Texas Ranger</td>
<td>Midland, TX</td>
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<tr>
<td>33</td>
<td>Trisha</td>
<td>19</td>
<td>Sales Representative</td>
<td>Midland, TX (Odessa, TX)</td>
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<tr>
<td>34</td>
<td>Rosemary</td>
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<td>Teacher</td>
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<td>35</td>
<td>Heather</td>
<td>42</td>
<td>Substitute Teacher</td>
<td>Midland, TX</td>
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</table>
Appendix III

NATIONAL MAIL SURVEY

This appendix reproduces the mail survey which was sent to 1,600 representatively sampled residents of the contiguous United States. Respondents received the survey as a 5.5” x 8.5” booklet, it is displayed here in 8.5” x 11” form. Other than resizing and some minor pagination changes, the survey presented here is unchanged from the version that was used in the study.
What will the future hold?
You are one of 1,600 people randomly chosen to participate in this study on the environment and the ocean.

Your thoughts and opinions are important!

Your help is voluntary and your answers are completely confidential. The survey will take about 20-25 minutes to complete.

Instructions:
Please answer the questions in the order they are written. Sometimes you will be asked to skip a question if it does not apply to you. In those cases, simply follow the arrows to the next relevant question.

Thank you for your time.
Section 1 – Your Opinions about the Environment

Below are some statements that some people agree with and some do not. For each statement, please tell us what you think by circling the choice that best matches your opinion.

1. **Animals have the same right to exist as humans do.**
   - Agree
   - Somewhat agree
   - Neither agree nor disagree
   - Somewhat disagree
   - Disagree

2. **Plants and animals exist primarily to be used by humans.**
   - Agree
   - Somewhat agree
   - Neither agree nor disagree
   - Somewhat disagree
   - Disagree

3. **Protecting individual animals is as important as preventing extinction of entire species.**
   - Agree
   - Somewhat agree
   - Neither agree nor disagree
   - Somewhat disagree
   - Disagree

4. **Humans are just one part of the environment – equal to any other species.**
   - Agree
   - Somewhat agree
   - Neither agree nor disagree
   - Somewhat disagree
   - Disagree

5. **There are many issues that the country has to deal with. In your opinion, rank the following issues from most to least important, with “1” being the most important, “2” the second most important and so on, down to “9” being the least important.**
   - __ Crime
   - __ The cost of gasoline
   - __ The economy
   - __ The environment
   - __ Health care
   - __ National security
   - __ Illegal immigration
   - __ Public education
   - __ The war in Iraq

226
6. **Humans were meant to rule over the rest of nature.**
   
<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
</table>

7. **Humans have the right to modify the natural environment to suit their needs.**
   
<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
</table>

8. **Pollution laws have gotten too strict in recent years.**
   
<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
</table>

9. **Environmental regulations have placed unfair burdens on industry.**
   
<table>
<thead>
<tr>
<th>Agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Disagree</th>
</tr>
</thead>
</table>

10. **Everything on this planet is connected; changing one thing often has effects elsewhere.**
    
    | Agree | Somewhat agree | Neither agree nor disagree | Somewhat disagree | Disagree |
    |-------|----------------|---------------------------|------------------|---------|

11. **There are many environmental issues that the world is facing. In your opinion, rank the following issues from most to least important, with “1” being the most important, “2” the second most important and so on, down to “9” being the least important.**
    
    __ Air pollution
    __ Climate change
    __ Damage to beaches
    __ Damage to the open ocean
    __ Deforestation
    __ Extinction of plant and animal species
    __ Land being developed
    __ Toxic waste
    __ Water pollution
12. **We must take stronger measures to conserve our nation’s resources.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

13. **Anti-pollution laws should be enforced more strongly.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

---

**Section 2 – Your Opinions about the Ocean**

14. **The word ‘ocean’ means different things to different people. When you think of the ocean, what do you first think of? (Please check one box only).**
   - The open ocean (out of sight of land)
   - Coastal areas (e.g., beaches, rocky shorelines)
   - Semi-enclosed areas (e.g., Chesapeake Bay, Puget Sound)
   - The Great Lakes
   - A particular place (please say where) ____________________________

15. **The ocean belongs to everyone.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

16. **The ocean is God’s creation.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

17. **The ocean is a resource to be used for our benefit.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

18. **The decisions I make and the things I do in my everyday life have an impact on the ocean.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree
19. **Humans have a responsibility to protect and preserve the ocean.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

   20. **If you circled ‘Agree’ or ‘Somewhat agree’ …**
   Rank the following reasons why humans have a responsibility to protect and preserve the ocean, from most to least compelling, with “1” being most compelling and “6” being the least compelling:

   Humans have a responsibility to protect and preserve the ocean,
   
   __  So people living hundreds of years in the future can use and enjoy the ocean’s resources
   __  Because we have a duty to God to be good stewards of the ocean
   __  Because we have the knowledge and the ability to do so
   __  Because some people depend on the ocean for their livelihood
   __  Because we have a duty to other species that depend on the ocean for their survival
   __  Because we have a duty to preserve the balance that exists in nature

   21. **It is the government’s responsibility to protect and preserve the ocean.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

   22. **I have a personal responsibility to protect and preserve the ocean.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

   23. **Ocean pollution is an unavoidable side effect of economic development.**
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree
24. **The ocean is large enough to dilute any pollution that enters it.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

25. **It doesn’t matter what we do to the ocean now; in the future we’ll be able to fix any damage we cause by inventing new technologies.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

26. **Human survival depends on a healthy ocean.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

27. **Damaging the ocean will be bad for us economically.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

28. **Everyone has an impact on the ocean, even people who live hundreds of miles inland.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

29. **The ocean affects everyone, even people who live hundreds of miles inland.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

30. **People take the ocean for granted.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

---

**Section 3 – Environmental Actions**

31. **I live my life in a way that’s good for the environment.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree

32. **I live my life in a way that’s good for the ocean.**
   Agree Somewhat agree Neither agree nor disagree Somewhat disagree Disagree
33. I use environmentally friendly household products (e.g., laundry detergent, dish soap, cleaning supplies).
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

34. Do you have a mandatory recycling program where you live?
   ❑ Yes  ➔ Skip to 36
   ❑ No

35. I voluntarily recycle as much as I can.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

36. Do you have a yard, a garden, or a lawn?
   ❑ Yes  ➔ Skip to 39
   ❑ No

37. I use environmentally friendly lawn or garden products, or even none at all.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

38. I compost food waste.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree
The next four questions ask about things you can do that are both good for the environment and can save you money. If you check ‘Yes’ to any of these four questions, please state whether you do this more to save money; more to protect the environment; both to save money and protect the environment equally; or for another reason.

39. Whenever possible, I drive my car less and use alternative means of transport.
   □ No  ➔ Skip to 41
   □ Yes ➔ 40. Why do you drive your car less and use alternative means of transport?

40. Why do you drive your car less and use alternative means of transport?
   To save money  To protect the environment  Both equally  Other

41. I save energy at home (e.g., turning lights and appliances off when not in use, using energy efficient light bulbs).
   □ No  ➔ Skip to 43
   □ Yes ➔ 42. Why do you save energy at home?

42. Why do you save energy at home?
   To save money  To protect the environment  Both equally  Other

43. I save water (e.g., not leaving faucets or garden hoses running unattended, fixing any leaky pipes).
   □ No  ➔ Skip to 45
   □ Yes ➔ 44. Why do you save water?

44. Why do you save water?
   To save money  To protect the environment  Both equally  Other
45. When I next buy a car, its gas mileage will be an important factor in my choice.
   ☐ No  ➔ Skip to 47
   ☐ Yes

46. Why will gas mileage be an important factor in your choice?
   To save money  To protect the environment  Both equally  Other

47. Have you ever signed a petition to support stricter environmental laws?
   ☐ No
   ☐ Yes

48. Have you ever written a letter to public officials to increase their support of environmental protection efforts?
   ☐ No
   ☐ Yes

49. In the last year, have you contributed financially to an environmental organization?
   ☐ No
   ☐ Yes
Section 4 – Your Personal Connection to the Ocean

50. Have you ever lived within a two-hour drive of the ocean?
   □ No
   □ Yes

51. Have you ever been to the ocean, the coast or a beach?
   □ No   → Skip to 55
   □ Yes

52. Being by the ocean has a calming influence on me.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

53. Being by the ocean makes me feel more alive.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

54. I enjoy being by the ocean more than being in other natural areas such as mountains and forests.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

55. I have a spiritual connection to the ocean.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree

56. The ocean is a frightening place.
   Agree  Somewhat agree  Neither agree nor disagree  Somewhat disagree  Disagree
Section 5 – Your Views about Ocean Energy Resources

Recently, there has been a lot of talk about using the energy resources in the ocean, both renewable and non-renewable. These next few questions ask about your views on ocean energy resources.

57. Congress recently agreed to expand drilling for offshore oil (oil found under the ocean). Do you support or oppose this decision?

☐ Support
☐ Oppose

58. Why do you support expanded drilling for offshore oil?
Check the one box that you agree with the most:

☐ Gas prices are too high and we need to do everything we can to get them down
☐ We need to reduce our dependency on foreign oil
☐ The resource is there – why not use it?
☐ It would be good to have oil wells somewhere else other than in the Gulf, that way oil production won’t be so affected by hurricanes
☐ Expanded drilling would provide the country with extra money
☐ Other (please specify) ____________________________

59. Why do you oppose expanded drilling for offshore oil?
Check the one box that you agree with the most:

☐ Oil is sold in a global market, so any additional oil found will have little effect on prices in the US
☐ The risk of environmental damage is too high
☐ It will take years to get the oil into production and therefore won’t help today’s situation
☐ Oil rigs would spoil the view from the beach
☐ We should be reducing the amount of oil we use, not trying to find new sources
☐ Other (please specify) ____________________________
60. About how long do you think it will take for new offshore oil wells to produce oil that can be refined into gasoline?

_____ Years

61. Do you support or oppose installing wind turbines in the ocean?

☐ Support
☐ Oppose

62. Why do you support installing wind turbines in the ocean?
Check the one box that you agree with the most:

☐ They are a source of clean energy
☐ They will help reduce the effects of climate change
☐ They will help reduce our dependency on foreign oil
☐ Green energy is a growth industry and wind farms will provide a lot of new jobs
☐ The resource is there – why not use it?
☐ Other (please specify) _____________________________

63. Why do you oppose installing wind turbines in the ocean?
Check the one box that you agree with the most:

☐ They would spoil the view from the beach
☐ They would have a negative impact on birds and other ocean life
☐ They’re expensive and the power generated by them would be more costly than other sources of power such as coal and gas
☐ We have enough wind power on land, we don’t need wind turbines in the ocean
☐ Wind power is unreliable as the wind doesn’t blow all the time
☐ Other (please specify) _____________________________
64. Which is the larger domestic energy resource: ocean wind energy or offshore oil?
   - Ocean wind energy is the larger energy resource
   - Offshore oil is the larger energy resource
   - Don’t know

65. If you answered ‘Don’t know’…
   If you had to guess, which would you say is the larger domestic energy resource?
   - Ocean wind energy
   - Offshore oil

66. Offshore turbines have existed in Europe since 1991; at present there are no offshore wind power projects in US waters. Why do you think the US has not built any? Please check the one box that you agree with the most:
   - They are too expensive
   - They would do too much damage to the environment
   - The technology is experimental and risky
   - People don’t like looking at wind turbines in the ocean
   - The oil and gas industry doesn’t want them
   - The US government has not done enough to encourage development of offshore wind in US waters
   - Other (please specify) ____________________________

Section 6 – Household Information

The next few questions are about you and your household. This information will be used for statistical purposes only.

67. Are you male or female?
   - Male
   - Female
68. What is your age?
   _____ Years

69. Where is your primary residence?
   City/Town ______________________
   State _____
   Zip Code __________

70. What is your ethnicity?
   - American Indian or Alaska Native
   - Asian
   - Black or African American
   - Hispanic or Latino
   - Native Hawaiian or Other Pacific Islander
   - White

71. What is the highest degree or level of school that you have completed? (Check one box only)
   - Elementary or middle school
   - Some high school
   - High school graduate
   - Some college credit
   - Associate degree
   - Bachelor’s degree
   - Graduate or professional degree

72. What is your current employment status?
   - Employed full time
   - Employed part time
   - Out of work
   - A homemaker
   - Student
   - Retired
73. **How many persons, including yourself, live in your household?**
   Number of adults (18+ years) ____
   Number of children (0 - 18 years) ____

74. **What category best describes your household income (before taxes) in 2007?**
   - [ ] Less than $10,000
   - [ ] $10,000 - $14,999
   - [ ] $15,000 - $24,999
   - [ ] $25,000 - $34,999
   - [ ] $35,000 - $49,999
   - [ ] $50,000 - $74,999
   - [ ] $75,000 - $99,999
   - [ ] $100,000 - $149,999
   - [ ] $150,000 - $199,999
   - [ ] $200,000 - $249,999
   - [ ] $250,000 and above

75. **How do you identify yourself politically?**
   - [ ] Democrat
   - [ ] Republican
   - [ ] Independent
   - [ ] Other
   - [ ] No party preference
If you would like to make any additional comments, please write them in the space below:

If you have any questions about this study, you can call Professor Jeremy Firestone at (302) 831-0228 or email him at jf@udel.edu

Please return your completed survey to this address. An addressed envelope is enclosed for your convenience.

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*Your contribution to this effort is greatly appreciated.*

*Thank you!*