



Minding the Gap

Analysis of Arguments Made in the Media for and Against Closing the Breach in Fire Island National Seashore

Natural Resource Report NPS/NCBN/NRR—2020/2147



ON THE COVER

The breach at Fire Island National Seashore, New York.

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Abstract

Adaptive management in coastal systems is in large part achieved through knowledge sharing between the public, research, and management communities. This exchange relies upon bidirectional communication and information exchange. We sought to better understand communication about the 2012 Fire Island breach to inform present and future adaptive management of Fire Island breaches. In our study, we analyzed media content about the breach in Otis Pike Fire Island High Dune Wilderness at Fire Island National Seashore that occurred during Hurricane Sandy. Using media discourse analysis, we identified the arguments mobilized for and against the breach closure in these media accounts. We further identified and grouped these

arguments by their dominant framing, including those based on different types of ecosystem services and disservices. We posit that opposition to leaving the breach open is not solely based on a lack of knowledge by the public—the founding assumption of a deficit model of communication—but in some cases is based on competing values and, in turn, different framing of arguments. We hope that understanding the framing of these arguments can improve communication around the management of breaches both in the National Seashore and on other barrier island systems by preparing managers for the kinds of arguments people will make for and against breach closures and informing more nuanced, bidirectional forms of communication.

Introduction

Hurricane Sandy

Hurricane Sandy hit the east coast on October 29, 2012, causing three breaches on the barrier islands off the coast of Long Island in New York. Two of the three breaches occurred on Fire Island, the other on Cupsogue to the east. Two were mechanically closed within two months of their opening, following the procedures outlined in the Breach Contingency Plan for Fire Island to Montauk Point (U.S. Army Corps of Engineers, 1996). The third breach, however, occurred in the Otis Pike Fire Island High Dune Wilderness (Figure 1) and remained open. Because of the ban on use of equipment in wilderness areas and the belief that breaches are part of the sediment cycle that maintains the structure of barrier islands and their associated ecosystems, the policy prohibited mechanical closure of the breach, unless it posed a direct threat to life and property. Almost immediately following Hurricane Sandy, controversy arose over whether or not the breach should be closed, particularly whether or not the breach caused an increase in flooding in towns along the north shore of Great South Bay.

The controversy that arose around the Fire Island wilderness breach involved precisely the sort of context specified in National Park Service (NPS) policy as warranting public involvement and civic engagement. More specifically, NPS Director's Order 75A gives special regard for "critical" contexts in which local public communities are interconnected with or embedded within park sites (Bomar, 2007, "Policies" #3). Indeed, at the time of Hurricane Sandy, approximately 4,000 people lived within the 17 communities that are physically embedded within the boundaries of Fire Island National Seashore. People from these communities as well as neighboring communities situated on or near the north shore of Great South Bay (see Figure 1) voiced concerns with the wilderness breach and with the policies, scientific research, and processes that would shape decision-making.

NPS Director's Order 75A affirms that effective public engagement is particularly critical in contexts such as this, where multiple interconnected or embedded communities claim and voice a stake in park science and subsequent



Figure 1. Location map of Fire Island National Seashore, Otis Pike Wilderness Area, and the breach.

decision-making. As with natural resource management decisions, informed and effective public engagement strategies begin with systematic inquiry. In particular, quantitative and qualitative methods can be combined to provide reliable analyses of public discourse, in this case, the relevant public concerns, values, attitudes, and preferences in circulation about the wilderness breach. Information generated through such systematic analysis can inform park managers and support their agenda to address the controversy, seek mutually beneficial solutions, and manage park resources in favor of social-ecological resilience (Bomar, 2007, “Policies” #3).

Communication and Public Engagement

The National Park Service (NPS) upholds a formal commitment to civic engagement and public involvement under Director’s Order 75A (Bomar, 2007). This order establishes that NPS strives to engage the public in work, activities, and decision-making and, specifically, to be responsive to the public’s views, values, and concerns. Standards for effective public engagement, such as hearing a multiplicity of perspectives, building trust, and enacting “a ‘no surprises’ ethic” (Bomar, 2007, “Standards”) establish a unified perspective within NPS on the criteria that define successful civic engagement and public involvement. These criteria allow for flexibility and local discretion in approaches, as it is assumed that the situations and contexts calling for public engagement vary widely. Grounded in this assumption, Order 75A defines public involvement as “a process that occurs on a continuum that ranges from providing information and building awareness, to partnering in decision-making” (Bomar, 2007, “Definitions”).

Issues that garner public interest or that provoke public controversy are of particular concern, and in such situations, NPS program managers, superintendents, regional directors and other NPS employees are urged to work together to determine the most fitting strategies and tools for public involvement and to orchestrate public engagement in ways that are tailored to the local context (Bomar, 2017, “Scope”).

Foremost among the many potential benefits of public engagement is the ongoing public investment in and public stewardship of NPS parks and the resources they preserve. A foundational assumption of Order 75A is that the sustainability and resilience of natural, cultural, and structural resources depends upon public understanding of NPS’s science-based decision-making, public stewardship, and public trust (Bomar, 2007, “Policies”). Generating public trust, reciprocal exchange, and public understanding

is, therefore, of consequence to the foremost mission and goals of all park managers and all those who hold the responsibility to preserve and protect NPS natural and cultural resources. On these grounds, it matters that public engagement yields positive outcomes. Although NPS decision-making is predominantly informed by policy and the best available science, civic engagement and public involvement contribute materially to effective resource management precisely because effective public engagement can reinforce stewardship and long-term sustained public commitment to preserve NPS resources.

We believe that Order 75A represents meaningful and productive policy and guidance for shaping effective public engagement. To engage the public successfully, those who are responsible for designing public involvement efforts do well to comply with the standards specified in Order 75A. Among these standards, we bring special emphasis to the importance of systematically studying the existing and evolving public understandings of specific natural resource management issues. According to Order 75A, public involvement may include “Consulting the public to gather valuable and sometimes unexpected sources of information that may substantially contribute to or inform management thinking and options” (Bomar, 2007, “Definitions”). The policy further advocates for “Learning from the public their concerns, values, and preferences as part of an advertised or targeted agenda so that we are better informed” (Bomar, 2007, “Definitions”).

Human dimensions research offers reliable methods of inquiry for learning about and analyzing the concerns, values, attitudes, and preferences of public stakeholders. It is also consistent with NPS’s commitment to decision-making that is informed by the best available science, including sound systematic quantitative and qualitative research in the social sciences. Indeed, NPS has articulated a commitment to human dimensions research, which, “utilizes social science to understand how people value natural resources, how they want resources to be managed, and how they affect or are affected by resource management decisions” (NPS “Human Dimensions”). The knowledge and information gained from human dimensions research, regarded as part of and contributing to the best available science, can be joined together with information from the biophysical sciences, as well as information gathered through the practice of public engagement. Within the limits of policy, such knowledge can reasonably inform NPS’s science communication and public engagement practices as well as the adaptive management of natural resources.

Adaptive management in coastal systems is in large part achieved through knowledge sharing between public, research, and management communities, building upon past successes and failures through iterative experience, learning, and adaptation (Nyberg, 1999; Folke, Hahn, Olsson, & Norberg, 2005). As we have demonstrated above, Order 75A suggests as much. We see adaptive management at Fire Island National Seashore as central to coastal resilience, which can be thought of as the capacity of a system to absorb shocks and either maintain function or reorganize (Folke, 2006). Community resilience to so-called disasters—such as the breaching of a coastal barrier island—includes the ability to learn from these events and to make adjustments in individual and institutional practices and policies (Colten & Sumpter, 2009). Adaptively managing socio-ecological systems for resilience in the face of extreme events requires iteratively listening to and learning from community members and the best available science to promote adaptation.

In this work, we sought to better understand communication about barrier island breaches to inform their adaptive management and ultimately, to improve the resilience of this socio-ecological system.

The research questions we sought to shine light on include:

- What arguments do supporters and opponents of the breach mobilize?
- What sorts of ecosystem services do they refer to in these arguments?
- What is the influence of the media, particularly with regard to communicating about risk?
- What messages are presented in the media?
- What does the public think of breach management?

Literature Review

Our research into public attitudes and arguments about breach management was fundamentally interested in public understanding of the breach and communication about breach science. As such, our research was grounded in a consideration of two major competing models of public understanding of science: the deficit model and the contextual model (Gross, 1994). A central assumption of the deficit model is that public understanding of science emerges strictly from one-way education that experts provide to the public to fill a gap in knowledge about the issue at hand. This knowledge, in turn, is assumed to automatically sway public opinion on an issue in favor of the perspective espoused by the scientist-expert doing the communicating. Long the prevailing model of science communication, the deficit model has come under significant scrutiny within the last 25 years. Scholars in rhetoric of science and environmental and risk communication and, indeed, NPS policy itself have all made contributions toward critically examining and putting in motion a shift away from a deficit model and toward a contextual model of public understanding of science (Blythe, Grabill, & Riley, 2008; Crick & Gabriel, 2010; Endres, 2009; Gross, 1994; Simmons, 2007).

NPS Director's Order 75A makes a commitment to this contextual model of public understanding of science a matter of NPS policy (Bomar, 2007). Similarly, rhetorical studies scholarship and environmental and risk communication research recommend a contextual model for effective public understanding, evidence-based decision-making, and environmental action. The scholarship demonstrates how public beliefs and values have consequences for natural resource management issues and practices. Crucially for the adaptive management of natural systems, beliefs and values, as well as the diverse expertise of public audiences, are knowable. Evidence-based, engaged forms of public science communication can bring these beliefs to light; promote public trust; support shared inquiry between scientists, managers, and communities; and contribute to sound approaches for adaptive management. Both models are discussed in greater detail below.

In a deficit model of public understanding of science, public ignorance is assumed and framed as the fundamental issue to be corrected. The deficit model of communication attributes a lack of public assent to the findings of scientific research as a failure of information delivery. The logic goes that if the public receives the information they need, they will come to the "right" decision. In practice, the deficit model takes

shape as a one-way flow of information from experts to a presumed passive, uninformed public that deeply trusts in scientific expertise.

Fundamentally flawed—at best ineffectual, and at worst destructive—the deficit model obstructs the free-flow of communication, causing a lapse in reciprocal exchange between public audiences and experts. Without dynamic flows of communication, key contextual drivers of change, adaptability, and resilience—including people's values, perceptions, beliefs, and diverse knowledge—are obscured if not completely dismissed. Moreover, the very same model that regards trust as a non-issue causes an erosion of trust between experts and the public.

Alternatively, the contextual model of public understanding of science is conventionally understood to require two-way, iterative interaction between the public and scientists or managers. Unlike the deficit model, the contextual model assumes an active, not passive, public whose trust must be gained. It also places high value on evidence-based understandings and consideration of audience and credibility (Gross, 1994, p. 18), and devotes attention to the many rhetorical factors that influence decision-making, such as local knowledge and public beliefs, attitudes, and values. While a deficit model ignores as irrelevant the ethical and political dimensions of a controversial resource issue, the contextual model elevates the significance of these dimensions, regarding them as consequential aspects of scientific controversy, public debate, evidence-based decision-making, and adaptive management. Although a binary understanding of public understanding of science is limiting, the contextual model, understood as a formative concept, has been shown to support generative public deliberation, to produce shared understanding, and to build relationships of trust among experts and the public (Endres, 2009, p. 67; Gross, 1994, pp. 6, 14, 18; Crick and Gabriel, 2010, pp. 207–208).

Following from an epistemic notion of rhetoric, where communication serves as a means for managers, scientists, and the public to produce emplaced truths, the contextual model affirms that judgments about scientific knowledge claims are not made in logical vacuums, but within local, contingent, complex, value-filled contexts. Without challenging the integrity of scientific inquiry or the veracity of scientific facts themselves, the contextual model affirms the significance of a complex interplay of vital

rhetoical dimensions relevant to all public understanding of science, including the credibility of the communicator. Following Aristotle, who famously elevated the status of ethos, or speaker credibility, to “the controlling factor in persuasion,” Gross (1994) identified judgments of character as a fundamental measure by which non-expert audiences evaluate the truth claims of scientists, and as determining factors in generating public trust (p. 18).

Asserting that the deficit model “fails generally as a ground for public understanding and political action,” Gross (1994) locates the source of this failure in an uninformed authoritarian ethos that is, unfortunately, too often a hallmark of scientific communication (p. 9). Regardless of the legitimacy of the knowledge claims being conveyed, within a deficit model, the partiality of those knowledge claims is underscored by a dependency on a banking model of outreach education; an ignorance of public expertise, attitudes, and values; and a shallow understanding of scientific facts as they circulate within discursive, social contexts.

As Blythe, Grabill, and Riley (2008) have shown, the failures of the deficit model are evident in the loss of public trust and division that occurs when experts, scientists, and other authorities fail to understand public values or underestimate the knowledge or intelligence of their audience. In their case study of an environmental public engagement project in a town they refer to as “Harbor,” they show how experts working on public engagement failed to pursue an “evidence-driven understanding of this community,” overlooked their audience’s values and knowledge of environmental issues, and consequently, compromised an already tenuous relationship between experts and citizens, thus inspiring further division (Blythe, Grabill, & Riley, 2008, p. 284). Even “best practices” in public engagement fail when an expert communicator fails to understand or undervalues public knowledge or the contributions that public audiences can make. Moreover, this failure to value public knowledge and perspectives becomes evident within any dimension of the rhetorical context, from genre choices and decisions about how to orchestrate engagement, to logical appeals (Blythe, Grabill, & Riley, 2008, pp. 287–288). Finally, public engagement efforts fail when they are not informed by methodical inquiry into the distinct constituent questions and arguments that shape a complex public debate, as well as the subtle but significant ways in which diverse participants bring meaning to the central terms of scientific arguments (Blythe, Grabill, & Riley, 2008, pp. 289–291; Druschke, 2013; Herndl et al., 2011; Peterson & Horton, 1995).

In the field of risk communication, Simmons (2007) demonstrates how deficit approaches fail in two ways: first with the failure to acknowledge that public audiences are the most authoritative sources for discerning their own interests, and second, by dismissing the valuable information that can be gained from users, affected audiences, and publics with diverse expertise relevant to scientific projects (pp. 90–93). In other words, public involvement in science communication fails when it positions scientists as authorities working in the public interest without first consulting affected communities as to their actual diverse values and interests.

Endres (2009) has further shown that even two-way, interactive forms of science communication alone cannot guarantee an increase in public trust (p. 52). Building from the findings of Brossard and Lewenstein (2008), Endres (2009) observes how all models of public understanding of science, from deficit to public engagement, in practice “operate under an assumption of deficit” (p. 52). Too often, Endres (2009) observes, ostensibly interactive styles tacitly marginalize social, ethical, and political concerns, and dismiss cultural and local knowledges, essentially paying lip service to an authentic contextual approach, all at the expense of public trust and shared understandings (pp. 63, 66). The erosion of public trust is intensified when experts rely on public participation merely as a convenient tool for projecting an illusion of accountability, while nevertheless dismissing public concerns. Endres (2009) refers to this practice as “a guise of deliberation” (p. 67).

In their retrospective on twenty years of public understanding of science research, Stilgoe, Lock, and Wilsdon (2014) bring attention to this flaw in public engagement practice as a continued cause for concern in the field: “Public engagement can be seen by institutions as an opportunity not to rethink their policies and practices, but to gain trust for a predetermined approach... Rather than opening up decision-making, public dialogue might be implicated in its closure, by preventing alternative views from surfacing” (p. 6).

Such insights into the damaging ethos of public engagement efforts which fail to depart from deficit assumptions are, at the very least, familiar to many National Park Service staff members. In one article that appeared on the “21st Century Engagement” site that NPS interpretive staff use as an unofficial professional resource, Borchelt and Hudson (2008) argue:

Research organizations have been quite adept at putting together well-researched, tightly scripted opportunities for “public input”—but with no institutionalized mechanisms for reflecting the public’s input in deliberation or policy construction. In fact, one gets the not-so-subtle impression that these engagement events are being held with the hope of staving off public dissatisfaction, or providing just enough semblance of listening to public concerns that the natives don’t get so restless they revolt. (para. 10)

In order to move away from this one-way model of science communication, Cogan proposed a continuum of public involvement in natural resource decision-making (presented in So, Hand, & McDowell, 1986). The spectrum ranges from passive to active, with one end of the spectrum involving simply building public support and disseminating information. More active forms of involvement require collecting information from public input, two-way communication, or listening, followed by iteratively revising plans based on public concerns, which we note sounds an awful lot like an adaptive approach to science communication and public engagement.

Notably, Cogan’s continuum of public involvement dovetails with existing NPS policy. The definition of public involvement established in Director’s Order 75A acknowledges that fundamentally different strategies, tools, and models of communication can function as “public involvement.” That is, simply providing information—a necessary but limited activity that typically exemplifies a one-way, deficit model of communication—may have equal currency as a form of public involvement compared with “partnering in decision-making,” which characteristically, exemplifies a two-way, or contextual, model of communication. Enabling flexibility for situation-specific, context-driven approaches toward public engagement is sensible. However, it also signals the urgency for evidence-based understandings of community needs and values in all public involvement efforts, regardless of where those efforts might fall along the continuum.

Assumptions of deficit are persistent and damaging in any community-engaged problem solving and decision-making that depends on cooperation between experts and public stakeholders. Although the prevailing research on public engagement shows that even “best practices” tied to contextual models can fail, there is promise in public involvement that takes seriously community values and public expertise. As Endres (2009) has shown, non-expert members of the public deploy scientific arguments and contribute significant public expertise to scientific debates. Situated, contextual analyses of public discourse around pressing scientific and environmental issues can make evident community knowledge, values, perspectives, and arguments in circulation and can support ethical and effective public involvement in evidence-based decision-making.

Our research into management of the breach at Fire Island was based in an emphasis on a contextual model of public understanding of science. Specifically, given the logistical challenges of getting approval to conduct research within the confines of the National Parks, we wanted to explore a methodology that could inform management’s understanding of community knowledge, values, perspectives, and arguments in circulation about the contentious issue of breach management. As we describe below, we conducted a media discourse analysis of news media about breach management at Fire Island to explore public understanding of this issue and inform a more responsive, two-way communication and adaptive management of Fire Island National Seashore.

Methods

One of the aims of civic engagement and public involvement, as indicated in Order 75A, is to generate knowledge that could influence decision-making, even as decision-making is simultaneously informed by the best available science. Public knowledge can and should inform management decisions.

We sought to better understand communication about barrier island breaches to inform their adaptive management and ultimately, to improve the resilience of this socio-ecological system. To better understand communication about barrier breaches, we examined the discourse circulating in the media about the Otis Pike wilderness breach in Fire Island National Seashore. Although the media cannot stand in for all public discourse, it represents a partial but also significant cross-section of public discourse, including a multiplicity of perspectives and voices. Moreover, media discourse can be reasonably regarded as influential in stimulating further public discourse and shaping public views about breach management.

Media Analysis

Researchers of mass media assume that it can both create and reflect public opinions and that conducting media analyses can help to monitor the “cultural temperament” of society (Max Weber in Macnamara, 2005). Media analysis, particularly analysis of the discursive frames used in media, can shed light on sources, journalists, and audience members (Pan & Kosicki, 1993). While methods such as public forums, focus groups, and surveys have the advantage of bringing researchers into direct contact with public actors, media discourse analysis allows for insights into the arguments and views circulating broadly within diverse and widely distributed groups and can be particularly useful in such complex contexts. In the case of this study, the relevant public audiences include elected officials, journalists, local advocacy groups, fishers, hunters, residents, local business owners, property owners, and other groups that are tenuously grouped, such as seasonal residents and employees, volunteers, and beachgoers. Methods for media discourse analysis offer fitting and effective approaches for contexts, like this one, that involve diverse audiences and complex natural resource controversies. The advantages of media analysis methods include that they can be conducted non-intrusively, can look at information over a long period of time, and can be performed frequently (Macnamara, 2005; Prasad, 2008).

Originally emerging as a method of studying propaganda, media content analysis is conventionally regarded as a quantitative method and fundamentally descriptive. However, by using an integrated approach, media content analysis can leverage the affordances of qualitative methods, as well, to account for complex discursive contexts. Within reasonable limits, an integrated approach to media analysis can effectively facilitate inference precisely because it blends quantitative and qualitative approaches to mitigate the limiting factors of each approach (Macnamara, 2005, pp. 1, 3–5).

Following Neuendorf, Macnamara (2005) articulates the affordances and limits of the method (pp. 2–3). He writes, “The first and most basic role, descriptive, provides insights into the messages . . . represented in mass media. The inferential and predictive roles of content analysis, even though they are ‘facilitating’ rather than conclusive, allow researchers to go further and explore what media content says about a society and the potential effects mass media representations may have on audiences” (Macnamara, 2005, p. 4). Jørgensen and Renöfält (2013) concur that qualitative media analysis explores “only one place that environmental controversies might be represented” and as such cannot provide “a comprehensive analysis” of public discourse, “but rather one piece of that understanding.” However, they add that media analysis is “useful as a way of exposing the actors’ positions and the narratives they tell” about natural resource decision-making.

These qualifications explain why an integrated approach to media analysis is regarded as essential. Drawing from media researchers Newbold et al., Macnamara (2005) cautions against drawing conclusions about social impact strictly from quantitative data. Macnamara (2005) writes, “it is not valid to assume that quantitative factors such as size and frequency of media messages equate to impact. Nor is it valid to assume that these quantitative factors are the only or even the main determinants of media impact” (pp. 4–5). As Macnamara points out, quantitative methods generally offer the promise of scientific reliability, however such methods cannot adequately account for the complex contexts within which media discourse circulates. Qualitative analysis of texts, he writes, “is necessary to understand their deeper meanings and likely interpretations by audiences—surely the ultimate goal of analyzing media content” (p. 5).

Ultimately, Macnamara concludes that a combination of quantitative and qualitative approaches produce “the ideal approach” (p. 5). In short, a mixed methods approach to media analysis, can facilitate the discovery of significant social meanings circulating within public discourse. Such an analysis is best understood not as a method yielding conclusive and generalizable information, but rather, as a methodologically triangulated approach that illuminates nuance within complex discursive contexts, which cannot reliably be reduced to quantitative analysis anyhow.

Indeed, the discursive contexts for natural resource decision-making, climate resilience, and public understandings of climate change impacts are precisely the sorts of contexts that are imbued with complexity and that warrant methods that contextualize discursive data. Media analysis can effectively identify media messages and bring to light the embedded frames and values shaping public arguments, and thus the discursive orientations informing public perceptions.

For example, Bohensky and Leitch (2014) used media analysis to learn about resilience to flooding based on the perceptions of links between flooding and climate change and the role of government in flood management. They analyzed media coverage of a flood event to identify the types of arguments used by media sources and further analyzed these arguments inductively, through key themes. Also, Jørgensen and Renöfält (2013) used media analysis in science communication research of natural resource decision-making, focusing on the issue of four contentious dam removal projects in Sweden. They looked at how proponents and opponents of the projects framed their arguments in terms of the ecosystem services provided by the two alternate ecosystems: dammed reservoirs and free-flowing streams. Their media discourse analysis categorized the arguments contained in 41 newspaper articles by the types of ecosystem services they represented. Notably, this study found that public arguments against dam removal were not simply an issue of knowledge deficiency, but that stakeholders on opposing sides were valuing different kinds of ecosystem services that dammed reservoirs and free-flowing streams provided to them.

As is typical of qualitative discursive research, Jørgensen and Renöfält (2013) constructed a database in order to classify all data and to pursue data analysis methodically. To build their database, Jørgensen and Renöfält classified discursive data from each article according to two rhetorical features. First, they sorted individual statements according to the

orientation toward the issue (for or against), and secondly, they classified each statement according to its coherence with each of six frames. Extending from Jørgensen and Renöfält’s (2013) study, we likewise sought to build a comprehensive database of news media about the Fire Island breach, and to use the framework of ecosystem services for classifying the arguments offered by journalists and local residents by the types of ecosystem services they represented. This method provided a means of learning more about the local community’s concerns, understandings, and values related to the breach, within the reasonable limitations already described above. We supplemented these ecosystem services-based analyses by highlighting other major types of arguments for and against the closing of the breach.

Ecosystem Services

According to the Millennium Ecosystem Assessment (2005):

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits” (p. 27).

An ecosystem services framework is meant to allow for a wide accounting of the benefits of nature, offering a heuristic for understanding the many ways humans directly and indirectly benefit from the natural world. While the ecosystem services framework has been criticized for its anthropocentrism and tendency towards valuation (reviewed in Dempsey & Robertson, 2012), it does offer a typology for understanding the types of concerns, interests, and values that communities hold towards natural resources.

In the context of our study, the ecosystem services typology—provisioning services, regulating services, supporting services, and cultural services—offered a useful framework for analyzing the clusters of arguments that circulated in the media about breach management at Fire Island, allowing us to consider which constituencies were focused more on a regulating service like water quality improvements, a provisioning service like access to shellfishing, or a cultural service like the sense of identity many Fire Island and Long Island residents place on their relationship to Great South Bay or the Otis Pike Wilderness

Area. Understanding which ecosystem services a system provides and who uses and prioritizes those services can serve as an aid to understanding the values or frames behind the opinions expressed in a natural resources controversy. This understanding, in term, can lead to richer public engagement and more appropriate adaptive management.

Building the Database

We constructed a database of news media about the Otis Pike Fire Island High Dune Wilderness breach by selecting a time window beginning with a discrete event (the opening of the breach on 10/29/2012) and ending with closure of the public scoping period almost three years later (10/8/2015), which was the initial opportunity in the planning process for the public to inform the development of a draft Environmental Impact Statement (EIS). In fall of 2016, a Draft Breach Plan/EIS was made available for public review. This subsequent public comment period ended in December 2016, and the final plan was released in December 2017.

After an initial scoping of results, our search was primarily performed in the NewsBank database, but we also searched three additional databases—LexisNexis, ProQuest Newspaper Core, and Google News—to fill in any additional missing articles not featured in NewsBank for more complete coverage. We found NewsBank had the most unique articles with few additional news articles identified through LexisNexis, ProQuest, and Google News.

The 2012 breach was covered across scales in international, regional, and local media, so not all media sources about the breach could be found in the databases that focus on international and/or national scales. Because of our interest in local discussions of the breach, after consulting with the Public Information Officer at FIIS for input about which local news sources were important forms of communication about the breach, we supplemented our main database search with articles from a regional paper's individual online database (Newsday) and ordered and subsequently scanned paper copies of an important local paper (Fire Island Tide). Newsday has a daily circulation of over 400,000 readers, while the Fire Island Tide has a biweekly circulation of 60,000 readers.

To select articles from these news databases and the scanned copies of the Fire Island Tide to analyze for this research, we completed a search for the terms ["Fire Island" AND "breach"]. To be sure our media database was as comprehensive as possible, we explored adding search terms including ["Otis Pike"], ["Great South Bay"], ["FINS"],

["FIIS"], and ["Old Inlet"], but no additional articles were identified. Scanned local papers were searched manually for articles about the Otis Pike wilderness breach. All articles that included the terms ["Fire Island" AND "breach"] were imported into coding software (NVivo 10) for ease of analysis.

Only news articles, editorials, or letters to the editor were included in our analysis (n=185); newswires or websites in the database were excluded. Duplicate articles were removed if identified through multiple databases; however, if the same article was published in multiple papers as an Associated Press story, each article was included in the database because we considered that to represent the article reaching multiple readerships. Articles were removed if the content mentioned the search terms ["Fire Island" AND "breach"] but did not actually discuss the Otis Pike wilderness breach.

Coding Articles

To analyze the text and subtext of the articles we employed content analysis—a primarily quantitative process of research design and coding that involves drawing inferences from, and validating analysis of discursive data (Krippendorff, 1989; Hsieh & Shannon, 2005)—and rhetorical analysis—which looks more deeply at both the functions and frames of language (Bazerman & Prior, 2003), the interpretive maps that shape understandings of reality (Goffman, 1974). These methods are intended to investigate and interpret discourse (Hsieh & Shannon, 2005).

We developed an analytic code both deductively—from themes we identified from related research literature, including the ecosystem services framework (MEA, 2005) and discussions with FIIS staff—as well as inductively—from themes that emerged from our multiple readings of database articles. Our research team developed a list of potential themed codes iteratively between researchers. We then normed our coding by comparing a subset of coded articles (n=4) against each other and agreed on the appropriate themed codes for each article. These themed codes were further coded as arguments for, against, or neutral regarding manually closing the breach. (Neutral indicated no suggestion of whether the breach ought to be closed or remain open.) The intention was to capture every type of argument offered about breach management in database articles. Articles tended to be coded for multiple types of arguments to capture the diversity of arguments embedded within individual articles. All sources were coded by one researcher, and a random subset of articles (n=29, 16%) was coded a second time by an additional researcher for the

sake of norming accuracy. Coding between researchers was compared with a kappa statistic (Carletta, 1996) for each code in each article and then averaged to determine inter-rater agreement. Inter-rate agreement across researchers was quite high (kappa=0.96), indicating strong agreement about the interpretation of how to code the various types of arguments occurring in database articles.

Articles

The search resulted in a database of 182 articles relating to the Fire Island wilderness breach. Of those, 132 included text related to arguments about breach closure, which were then coded. (The remaining 50 articles contained no codeable content, including things like announcements about breach related meetings.) Breach articles analyzed for this study came from 34 total news sources: 15 local, 8 regional, and 11 national/international papers (Table 1). The bulk of the articles (70%) came from three sources: Newsday (regional, n=82), Fire Island Tide (local, n=23), and The Long Island Advance (local, n=22). Overall, articles came from 34% local, 53% regional, and 13% national sources. Articles spanned 2012–2015 (Table 2), with the bulk of the articles (79%) appearing in the months and initial year following the opening of the breach (2012 and 2013).

Table 2. Articles (10/29/2012–10/8/2015) with arguments about breach closure in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIIS) that occurred during Hurricane Sandy by year and scale (local, regional, and national).

Scale	Year				Total
	2012	2013	2014	2015	
Local	3	25	11	4	43
Regional	41	53	7	13	114
National	7	14	3	1	25
Total	51	92	21	18	182

Codes

Codes developed correspond either to arguments made about breach closure—for, against, or neutral—or to general themes primarily related to the process of decision-making around the potential closure of the breach. This coding approach resulted in 88 unique codes, applied to database articles to indicate different types of arguments circulating about breach management (Appendix A). These codes allowed us to determine how the media articulated the dominant and subordinate issues at hand, as well as distinct positions, arguments, and values at play.

Table 1. Articles with arguments about breach closure in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIIS) that occurred during Hurricane Sandy by year and scale of publication (local, regional, and national) (10/29/2012–10/8/2015).

Scale	Sources	Articles
Local	Amityville Record (NY)	1
	Asbury Park Press	2
	Babylon Beacon (NY)	1
	Charlestown Press, The (RI)	1
	Fire Island Tide	23
	Islip Bulletin (The)	1
	Islip Bulletin, The (NY)	4
	Journal Inquirer (Manchester, CT)	1
	Long Island Advance, The (Patchogue, NY)	22
	Massapequa Post (Massapequa Park, NY)	1
	Statesman (The): SUNY, Stony Brook (NY)	1
	Stony Brook Independent (The)	1
	Westerly Pawcatuck Press, The (RI)	1
	Westerly Sun, The (RI)	1
	Wood River Press, The (Hopkinton, RI)	1
Regional	Cape Cod Times (Hyannis, MA)	1
	Hartford Examiner (CT)	1
	Long Island Business News	1
	Long Island Examiner (NY)	1
	Long Island Press (NY)	8
	New York Post	1
	Newsday: Westchester County Edition (NY)	82
	Suffolk County News (Sayville, NY)	2
National	Al Jazeera America	1
	Atlantic (The)	2
	CBS New York	2
	Green Business	1
	National Geographic	1
	National Parks Traveler	2
	New York Times	7
	NPR	1
	US Fed News (USA)	1
	USA Today	1
	Wall Street Journal	4
Total	-	182

Many of the codes for arguments about the breach (n=36) were deductive and based on the Millennium Ecosystem Assessment structure, including sub-codes under regulating, provisioning, supporting, and cultural services. A

comprehensive listing of each breach-specific service that was coded under each of these four types of ecosystem services is offered in Table 3. The few additions to this ecosystem services structure included non-game ecosystem changes, such as sea turtles (DeGroot, 2010; Chan, 2012). We also added coastal sediment transport as a supporting service (Apitz, 2012).

These ecosystem services arguments were tiered under “for closure,” “against closure,” and “neutral.” Arguments against closure included arguments against immediate closure, even if the opinion expressed openness to closure at another time. Neutral arguments were often information presented about the existing or potential impacts of the breach, but not made in a context for or against closure.

Other arguments about the breach closure were predominantly coded as procedural, economic, and geomorphic, as well as a code for an argument that there were other larger or more pressing issues to deal with.

The general themes not necessarily directly related to an argument about the continued opening or potential closure of the breach included codes for discussion of uncertainty, alternatives, changing breach, and the historic Old Inlet.

Arguments

More articles contained arguments against closing than those for closing or neutral combined (n=163, 79, and 64 respectively) (Table 4).

Primary arguments used about the breach closure in news articles were based on ecosystem services regardless if the arguments used were against closure, for closure, or neutral (57%, 69%, and 62%, respectively, based on the number of articles in which they occurred) (Table 3).

Ecosystem Services Arguments

Ecosystem services arguments for closure were by far predominantly regulating (89%) and were primarily related to water regulation, including flood and storm surge protection. Other less frequent arguments included provisioning transportation, specifically that the breach cut off direct car access to much of Fire Island, and coastal sediment transport.

Conversely, there was more of a variety of types of ecosystem services employed in arguments against the closure of the breach. These arguments were also primarily regulating

Table 3. Count of articles and individual quotes that employed ecosystem services in arguments for, against, or neutral towards closing the breach in in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIS) that occurred during Hurricane Sandy (10/29/2012-10/8/2015).

Argument	Type of Ecosystem Service	Sub-type of Ecosystem Service	Individual Quotes	Articles
Against Closing	Cultural	Aesthetic	3	3
	Cultural	Recreational and Ecotourism	10	10
	Cultural	Sense of Place	1	1
	Provisioning	Food	32	31
	Regulating	Disease Regulation	6	6
	Regulating	Water Purification	101	62
	Regulating	Water Regulation	68	42
	Supporting	Coastal Sediment Transport	10	7
	General	–	1	1
	Total	–	232	163
For Closing	Cultural	Sense of place	1	1
	Provisioning	Transportation	7	6
	Regulating	Disease Regulation	1	1
	Regulating	Water Purification	4	2
	Regulating	Water Regulation	109	67
	Supporting	Coastal Sediment Transport	2	2
	Total	–	124	79
Neutral	Cultural	Aesthetic	3	3
	Cultural	Cultural heritage	5	4
	Cultural	Inspirational	4	3
	Cultural	Recreational and Ecotourism	14	14
	Cultural	Sense of place	3	2
	Provisioning	Food	3	3
	Regulating	Disease Regulation	5	5
	Regulating	Water Purification	19	14
	Regulating	Water Regulation	18	14
	Supporting	Coastal Sediment Transport	2	2
	Total	–	76	64

(67%), regarding water purification and the maintenance of water quality in the bay, water regulation of small impacts or the mitigation of flood and storm surges, and disease regulation by reducing the intensity and extent of brown tides in Great South Bay. There were also arguments made against closure due to post-breach improvements

Table 4. Count of articles and individual quotes for, against, or neutral on closing the wilderness breach in Fire Island National Seashore by broad category. Count of articles and individual quotes arguments for, against, or neutral towards closing the breach in in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIIS) that occurred during Hurricane Sandy by broad category (10/29/2012-10/8/2015).

Argument	Type of Argument	Individual Quotes	Articles
Against Closing	Ecosystem Service	232	163
	Nature Take its Course	59	50
	Process	45	36
	Non-game Ecosystem Changes	13	13
	Economics	10	9
	More Pressing Issues	7	7
	General	2	2
	Abandon Low Lying Areas	1	1
	Dredging	1	1
	May Just Reopen	1	1
	Relatively Small Inlet	1	1
	Stabilized	1	1
	Total	373	285
For Closing	Ecosystem Service	124	79
	Process	18	15
	Economics	12	9
	General	4	4
	Will Get Bigger	5	4
	Non-game Ecosystem Changes	3	3
	Slowing Recovery	1	1
	Total	167	115
Neutral	Ecosystem Service	76	64
	Process	16	14
	Non-game Ecosystem Changes	9	8
	Larger Issues	5	3
	Preparation	3	3
	Ecological	2	2
	Economics	3	2
	Nature Take its Course	2	2
	Dunes	2	1
	Healthier	1	1
	Heavy Equipment	1	1
	Multiple benefits	1	1
	Unsure what to do	1	1
	Total	122	103

in provisioning services through improvements in fish and shellfish stocks (19%). Several articles also made cultural ecosystem services arguments against closure (9%) including recreation and ecotourism opportunities and aesthetic improvements, which were primarily related to improvements in water clarity

Non-Ecosystem Services Arguments

Though employing an ecosystem services framework was useful for as a heuristic for analysis, news media included other illuminating types of arguments about how natural resource decisions were made related to the breach. Other non-ecosystem services arguments employed for closure were arguments about the process and economics of breach closure (Table 4).

Process arguments primarily fell into two categories: those regarding letting nature take its course and those related to the use of science in decision-making. A primary non-ecosystem services argument against closure was that nature should be left to take its course. In part, these arguments reflect NPS policy in the wilderness area to interfere as little as possible with natural processes. Those against closure employing arguments of “let nature take its course” reasoned that the breach may close on its own and that active waiting while more data was amassed was the proper strategy. In other words, this argument seemed to value patience while the best available science was developed to guide decision-making about breach closure.

Regarding the use of science in decision-making, a fundamental divide in media arguments arose around the precautionary principle and the burden of proof. Primarily those calling for closure argued that if there was any chance that flooding could be exacerbated by the breach then the breach should be closed immediately. In one local paper, Suffolk County Executive Steve Ballone, a strong proponent of breach closure, argued:

“There are people here today who will say this breach isn’t the cause of the flooding; there are others who will say it is—I’m not concerned with that debate . . . We want that breach to be closed now.”

This argument for closure would not be remedied with a deficit model of communication—more information about the causes of flooding will not change this opinion.

Conversely, some that argued for closure argued that the scientific community suggested the burden of proof lays on those wanting to close a breach:

“A community of coastal scientists from Maine to Miami have advocated to keep the breach open . . . inlets should be allowed to remain open wherever possible . . . closing inlets in natural areas should require a very, very high burden of proof that the inlet is causing harm.”

There was also disagreement between the statistical and social significance of research findings. In a letter to the editor responding to an article that quoted a researcher who stated that only 8% of the flow of Great South Bay came in and out of the breach, the author argued:

“We should note that 8 percent is a significant flow, especially given the small size to soak up seawater during flood tides. Leave the breach open.”

Economic arguments for the closure included that mechanical closure would cost less soon after the breach occurred and might be finished more quickly when the breach was relatively small and the machinery was already on the island for the closure of the other breaches.

Discussion and Conclusions

Time

Though most of the articles came out in the year of and the year following the breach (October 29, 2012–December 31, 2013), there were some notable changes in the proportion of articles that utilized certain arguments. For example, fewer arguments were made against closure regarding flooding over time. Approximately half of the articles in 2012 and 2013 had arguments for closure based on flooding (0.46 and 0.50 respectively) while there was a sharp drop-off in these arguments employed in 2014–2015 (0.32, 0.11, and 0.0 respectively). This may be due to the findings of independent researchers that though there had been an increase in coastal flooding it was not likely to be due to the breach, because this increase has been seen in other locations along Long Island Sound (Hapke, Stockdon, Schwab, & Foley, 2013).

Scale

We also found that different ecosystem services were employed at different scales—local, regional, or national. Specifically, transportation or emergency access was only discussed in local papers. Further, there was a more nuanced discussion of flooding in local and regional papers including discussion that the breach may relieve flooding and support development of coastal wetlands. There were many more articles at these local and regional scales, so the volume of coverage alone may allow for this more nuanced look at these issues.

Diversity of Arguments

In accordance with Jørgensen and Renöfält's (2013) findings in their media analysis of Swedish dam removals, we found that the arguments employed for and against breach closure were different. Particularly, there was a much wider suite of ecosystem services employed against closure, while those for closure focused much more narrowly on flooding.

Research Challenges

This analysis of the Otis Pike Fire Island High Dune Wilderness sheds some light on the difficulty of following wilderness procedures in the midst of a populated area. Specifically, the arguments against letting nature take its course highlighted these issues. Further, arguments regarding the burden of proof for or against closure highlighted that there were fundamentally different framings of the research and information used in making the decision for or against closure. Those arguing against closure suggest that many coastal systems will face rising water levels and increasing intensity of storms (National Research Council, 2010). In the face of these changes, coastal systems that allow for some of

the dynamism of natural processes may be the most resilient (Hapke et al., 2013). But some that argued for closure were not willing to wait for this long-term return and wanted to see action even if it eventually turned out that the breaches did not cause flooding.

Possibilities for Media Analysis and Ecosystem Service Frameworks

Using media analysis of a natural resource issue can help overcome methodological constraints in the listening aspects of adaptive management. Specifically, regulations make it difficult for federal managers to get input directly from stakeholders. Media analysis is a non-intrusive approach to gleaning information about public discourse, is useful in looking at information over a long period of time, and can be performed frequently (Macnamara, 2005; Prasad, 2008). Also, understanding public concerns through a traditional engagement process of hearings and comments have at times failed in the past to capture an evidence-driven understanding of community perspectives (Blythe, Grabill, & Riley, 2008). Pulling from a diversity of sources, as in a media discourse analysis, can help to identify public concerns outside of tightly scripted public input opportunities that actually erode the public's trust in incorporating their opinions into the decision-making process (Borchelt & Hudson, 2008; Endres, 2009).

Further, specifically using a structured approach—in this case the ecosystem services framework—to organize the collected, public arguments about the breach is a less dismissive approach to collecting and understanding public concerns. Again, it may not simply be a deficit in scientific understanding driving public opinion, but a fundamentally different value. Identifying the ecosystem services arguments for or against the breach can not only help to identify differences in values, but identify common ground between parties that have been pitted as opponents.

Some of the other arguments identified in the analysis, such as the differing views of the use of science and research in the decision-making process, shed light on some of the underlying reasons for strongly held opinions. For example, responding to concerns about the breach purely with scientific facts ignores the reality that some members of the public were operating under a very different level of acceptable risk associated with leaving the breach open. To really address these concerns, risk should more explicitly be discussed and addressed in the process.

Limitations

There are limitations to the work we did particularly our media analysis approach and the use of the analysis in a truly adaptive management application. Focusing on media sources adds the layer of the writers' and editors' perspectives on the story and, in turn, the arguments presented or not presented. Further, more stories may focus on more controversial arguments or feel the need to present "both sides" of an argument even if there is near-consensus on an issue. This obviously has an influence on which arguments are collected and the frequencies with which they are reported (i.e., the percent of stories that presented arguments against beach closure). However, for the purposes of compiling a more comprehensive list of arguments, this approach can at least help to cast a wider net than traditional public forums. Also, this approach could be used to analyze other sources of information, such as meeting minutes, comments on project documents, or content on organizational websites, that may help to round out the arguments captured through media analysis alone (Gobster, 1997).

In terms of adaptive management and true two-way communication, the approach we laid out does help to structure the "listening" of managers to public concerns. However, it alone does not provide truly iterative communication. This type of analysis has to be embedded within a process that facilitates listening and learning from the public and then incorporating those issues and concerns into the decision-making process.

Future Directions

Understanding the framing of arguments made in discussions around the management of breaches both in Fire Island National Seashore and on other barrier island systems can improve communication by:

- Preparing managers for the kinds of arguments people will make for and against breach closures, and
- Informing more nuanced, bidirectional forms of communication between managers and concerned publics that allow for mutually beneficial solutions to natural resource emergencies.

We hope that this approach to analyzing communication in the media itself can be a useful approach for managers dealing with future controversial management issues and can help the NPS managers reach the goals of engaged public participation outlined in Order 75A. Additionally, we think that using an ecosystem services approach may help to illuminate some of the values involved in a complex management issue.

Again, crucially for adaptive management of natural systems, beliefs and values, as well as the diverse expertise of public audiences, are knowable. Evidence-based, engaged forms of public science communication can bring them to light, promote public trust, support shared inquiry between scientists, managers, and communities, and contribute to sound approaches for adaptive management.



Credit: Handelsman (2013)

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Appendix A: Full list of codes used in textual analysis.

Appendix A Table 1. Full list of nested codes used in textual analysis of arguments used for and against closure of the analyzed media content (10/29/2012-10/8/2015) about the breach in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIIS) that occurred during Hurricane Sandy.

Argument	Type of Argument	Subtype 1	Subtype 2	Subtype 3
Against Closing	Abandon Low Lying Areas	–	–	–
	Dredging	–	–	–
	Economics	Cheaper than other nutrient management	–	–
	Economics	Cost	–	–
	Economics	Healthy Bay is Good for Economy	–	–
	Economics	No Loss of Property	–	–
	Economics	Repeat Breaches	–	–
	Ecosystem Service	Cultural	Aesthetic	–
	Ecosystem Service	Cultural	Recreational and Ecotourism	Boating
	Ecosystem Service	Cultural	Recreational and Ecotourism	Fishing
	Ecosystem Service	Cultural	Recreational and Ecotourism	Swimming
	Ecosystem Service	Cultural	Recreational and Ecotourism	–
	Ecosystem Service	Cultural	Sense of place	–
	Ecosystem Service	Provisioning	Food	Fish
	Ecosystem Service	Provisioning	Food	Shellfish
	Ecosystem Service	Regulating	Disease Regulation	Brown Tide
	Ecosystem Service	Regulating	Water Purification	Quality
	Ecosystem Service	Regulating	Water Regulation	Flooding
	Ecosystem Service	Regulating	Water Regulation	Flow
	Ecosystem Service	Supporting	Coastal Sediment Transport	–
	Ecosystem Service	–	–	–
	General	–	–	–
	May Just Reopen	–	–	–
	More Pressing Issues	–	–	–
	Nature Take its Course	Active Waiting	–	–
	Nature Take its Course	Closing on its own	–	–
	Nature Take its Course	–	–	–
	Non-game Ecosystem Changes	Non-game Fish	–	–
	Non-game Ecosystem Changes	Sea Turtles	–	–
	Non-game Ecosystem Changes	–	–	–
	Process	Follow Science	–	–
	Process	Need More Information First	–	–
	Process	Need to follow EIS	–	–
	Relatively Small Inlet	–	–	–
	Stabilized	–	–	–
For Closing	Economics	Will Cost Less Now	–	–
	Ecosystem Service	Cultural	Sense of place	–

Appendix A Table 1 (continued). Full list of nested codes used in textual analysis of arguments used for and against closure of the analyzed media content (10/29/2012-10/8/2015) about the breach in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIIS) that occurred during Hurricane Sandy.

Argument	Type of Argument	Subtype 1	Subtype 2	Subtype 3
For Closing	Ecosystem Service	Regulating	Disease Regulation	Brown Tide
	Ecosystem Service	Regulating	Water Purification	Quality
	Ecosystem Service	Regulating	Water Regulation	Flooding
	Ecosystem Service	Supporting	Coastal Sediment Transport	–
	Ecosystem Service	Transportation	–	–
	General	–	–	–
	Non-game Ecosystem Changes	Non-game Fish	–	–
	Non-game Ecosystem Changes	–	–	–
	Process	Precautionary Principle	–	–
	Process	Stick to Word	–	–
	Process	Will happen faster now	–	–
	Slowing Recovery	–	–	–
	Will Get Bigger	–	–	–
Neutral	Alternatives	–	–	–
	Breach Changing	–	–	–
	Dunes	–	–	–
	Ecological	–	–	–
	Economics	Costs will increase with time	–	–
	Ecosystem Service	Cultural	Aesthetic	–
	Ecosystem Service	Cultural	Cultural heritage	–
	Ecosystem Service	Cultural	Inspirational	–
	Ecosystem Service	Cultural	Recreational and Ecotourism	Bird Watching
	Ecosystem Service	Cultural	Recreational and Ecotourism	Camping
	Ecosystem Service	Cultural	Recreational and Ecotourism	Fishing
	Ecosystem Service	Cultural	Recreational and Ecotourism	Hunting
	Ecosystem Service	Cultural	Recreational and Ecotourism	Walking or Hiking
	Ecosystem Service	Cultural	Recreational and Ecotourism	–
	Ecosystem Service	Cultural	Sense of Place	–
	Ecosystem Service	Provisioning	Food	Fish
	Ecosystem Service	Provisioning	Food	Shellfish
	Ecosystem Service	Regulating	Disease Regulation	Brown Tide
	Ecosystem Service	Regulating	Water Purification	Quality
	Ecosystem Service	Regulating	Water Regulation	Flooding
	Ecosystem Service	Regulating	Water Regulation	Flow
	Ecosystem Service	Supporting	Coastal Sediment Transport	–
	Healthier	–	–	–
	Heavy Equipment	–	–	–
	Larger Issues	–	–	–
	Multiple benefits	–	–	–
	Nature Take its Course	Closing on its own	–	–

Appendix A Table 1 (continued). Full list of nested codes used in textual analysis of arguments used for and against closure of the analyzed media content (10/29/2012-10/8/2015) about the breach in Otis Pike High Dune Wilderness at Fire Island National Seashore (FIS) that occurred during Hurricane Sandy.

Argument	Type of Argument	Subtype 1	Subtype 2	Subtype 3
Neutral	Non-game Ecosystem Changes	Non-game Fish	–	–
	Non-game Ecosystem Changes	Sea Turtles	–	–
	Non-game Ecosystem Changes	Seals	–	–
	Non-game Ecosystem Changes	–	–	–
	Preparation	–	–	–
	Process	Consensus	–	–
	Process	Follow Science	–	–
	Process	Need More Information	–	–
	Process	Need to follow EIS	–	–
	Process	Will Close on Its Own	–	–
	Uncertainty	–	–	–

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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