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Social Bonds and Recovery:

An Analysis of Hurricane Sandy in the First Year after Landfall

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Abstract

Hurricane Sandy was one of the most devastating hurricanes to hit US shores. The brunt of the impact was felt in New York and New Jersey, especially among coastal towns such as fishing communities. A survey of these two states assessed social and economic impacts to 958 commercial and recreational fishermen and fishing-related business owners 12 months post-storm. Many businesses and communities were still struggling, due to heavy infrastructure damages and revenue losses with low insurance coverage, but also to disrupted fishing patterns for some species. Social bonds were credited by many as a key aid to recovery. Social bonds (sometimes called bonding social capital) have been shown to be critical for evacuation and recovery in other disasters. However, few studies examine social bonds and disasters within the context of fisheries. This paper expands upon that topic.

Keywords: Hurricane Sandy, social bonds, bonding social capital, fishing communities

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Introduction

Hurricane/Post-Tropical Cyclone Sandy (hereafter, Sandy) made landfall in the U.S. at the town of Brigantine, New Jersey on 29 October 2012. While many U.S. states were affected, the worst impacts in terms of deaths and property damage occurred in the New Jersey and its neighboring state, New York [1; 2]. Because of their proximity to the coastline and strong dependence on both coastal infrastructure and ocean structure, fishing communities were among the hardest hit. In fact, the US Dept. of Commerce declared fishery disasters¹ for both New York and New Jersey on November 16, 2012 [3].

With climate change, coastal disasters from hurricanes, as well as flooding due to sea level rise, are expected to increase in severity and/or frequency [4; 5] Federal fishery managers will need to plan for and cope with these and other impacts of climate change on fisheries. One key aspect to community resilience and recovery is the strength of social bonds [6]. This article describes the importance of social bonds to the recovery process of the fishing industry in New York and New Jersey following Sandy, using results from a survey of 958 fishing and fishing-related businesses that was administered in February through March of 2014 and requested information on conditions one year after Sandy (i.e., November/December 2013). Interviewees were fishermen (commercial and recreational for-hire), seafood dealers, bait and tackle store owners/managers, marina owners/managers, and aquaculture facility owners/managers. The disaster literature on social bonds covers topics ranging from preparation/evacuation to impacts, recovery, and future planning. This survey, however, focused primarily on social bonds in relation to impacts and recovery. The survey was organized in five defined sections: 1) general

¹ There were two types of declarations made for each state, a fishery resource disaster (under Sec. 308(d) of the Interjurisdictional Fisheries Act) and a catastrophic fishery resource disaster (under sec. 315 of the Magnuson-Stevens Fishery Conservation and Management Act). There were two types of declarations made for each state, a fishery resource disaster (under Sec. 308(d) of the Interjurisdictional Fisheries Act) and a catastrophic fishery resource disaster (under sec. 315 of the Magnuson-Stevens Fishery Conservation and Management Act).

demographics, 2) business impacts, 3) community recovery, 4) individual well-being and preparedness for future natural disasters, and 5) views on climate change [7]. Here we discuss an issue that arose in response to a question² within the business impacts section on attribution of recovery: the importance of social bonds.

Given the well-documented independence of commercial fishermen in particular [e.g., 8, 9, 10, 11, 12], social bonds might have been less important in fishing communities than other communities. Cooperatives, for instance, are often proposed but rarely successful [13; 14; 15; 16]³. Tempering this is a longstanding tradition of information-sharing networks [e.g., 20; 21; 22; 23; 24; 25; 26], though there is always a balance between expected economic gain/loss from sharing versus social gain/loss from forming bonds that tie people and communities together [27; 21; 28]. Similarly, a commonly found belief in the importance of equity and fairness [29; 30; 31; 32; 33] could lead to strong social bonds, as stronger bonds are common in more homogeneous communities [34; 35; 36].

Social Bonds

The first contemporary analysis of social capital dates to Bourdieu, who defined it as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” [37; though the idea that social cohesion can be beneficial goes back at least to Durkheim and Marx, 38].

Putnam [39, 34] sees these inter-personal relationships as the fabric of society, their most important function being to support and enhance prosperity. Coleman [40] extended the possible

² The specific question was: “If affected by Hurricane Sandy, what do you credit your level of recovery to?” The specific question was: “If affected by Hurricane Sandy, what do you credit your level of recovery to?”

³ It is important to note that cooperatives fail for many reasons, and not just due to the value fishermen place on independence [9;17;18;11;19.] It is important to note that cooperatives fail for many reasons, and not just due to the value fishermen place on independence [9;17;18;11;19.]

possessors of social capital from natural persons to corporate persons. For our purposes, Adler and Kwon [41] most clearly describe the concept for our purposes: “the breadth of the social capital concept reflects a primordial feature of social life – namely, that social ties of one kind (e.g., friendship) often can be used for different purposes (e.g., moral and material support, work and non-work advice).”

Social capital, which can include or overlap with the concepts of social bonds and social networks [re. 38; 42], helps to reinforce the cohesion and resilience of a community and thus its ability to respond and adapt to a disruptive event, returning to the original or a more desirable state [43; 44]. *Social bonds*, specifically, have been shown to be a key aspect of resilience in times of disaster or other disruption [45; 46; 47; 6]. The same is true of *social networks* [48; 46; 49; 50] and *social capital* [51; 52; 53].

Aldrich and Sawada [54], for instance, found in a quantitative study that social capital was a key factor in lowering deaths from the 2011 tsunami in Japan, while height of seawalls had no statistically discernable impact. Aldrich’s [55] study also found social capital to be the strongest factor in recovery after the 1995 Kobe earthquake in Japan. In follow up studies after Sandy, Tompson et al. [56] similarly found that Sandy-impacted neighborhoods and communities with more “social resources” were more resilient, and AP-NORC [57] found that “family, friends, and neighbors” were the most important source of aid that individuals listed as helping in their recovery after Sandy. Delaney [58], studying a fishing community in Japan, found that “social connections” were important to neighborhood recovery after the 2011 earthquake and tsunami. Similarly, Ingles and McIlvaine-Newsad [59] found that in two fishing communities after Hurricane Katrina, the one with greater “social cohesion” was recovering more quickly.

Schellong [60] explores and recommends the use of local (rather than broader-based) social networking service software as one avenue to increasing social capital for resilience to

disasters [re. 61]. Magsino [62] reports that some practitioners and policy makers are already tapping into existing social networks to distribute disaster-preparedness literature, share coping strategies, and find partners to help staff emergency shelters. Research is ongoing to better understand how social networks are formed and leaders emerge, and the extent to which preparedness within one network (e.g., work) means preparedness within other networks, all this with an aim to create national programs to bolster resilience to disasters. Making communication between government and stakeholders two-way is also important. Adler and Kwon [41] note that “institutional [e.g., 63] and synergy [e.g., 64] views give an important role to government in fostering community-level social capital.” FEMA [65], meanwhile, has established a Neighbor-to-Neighbor program that includes a Community Preparedness Toolkit providing ideas for coming together with neighbors around service projects for disaster preparedness.

However, social bonds are not uniquely positive in their impacts. When geographically close communities have unequal levels or strength of social capital, those communities with strongest social capital can capture disproportionate amounts of aid and actually hinder the access of less fortunate communities, leaving them worse off than they would have been in a situation where all communities had similar levels of social capital [66; 67; 68; 69; 70].

The literature on social capital further differentiates among bonding, bridging, and linking types of social capital [44; 6], each of which serves a somewhat different function in disaster recovery. Hawkins and Maurer [44] provide a particularly succinct and useful comparison of the three:

Bonding social capital refers to relationships amongst members of a network who are similar in some form [34]. *Bridging social capital* refers to relationships amongst people who are dissimilar in a demonstrable fashion, such as age, socio-economic status, race/ethnicity and education [71]. *Linking social capital* is the extent to which individuals

build relationships with institutions and individuals who have relative power over them (e.g. to provide access to services, jobs or resources) [72; 71].

Here we concentrate on bonding social capital, based on relationships among those whose livelihoods depend on fishing, using the term social bonds. Social bonds (or bonding social capital) are defined as being primarily found in groups of friends, family, neighbors, or other close social connections. These are the connections that tend to be activated first [73; 50] and last [50] in a disaster. In fishing communities, crew (who may also be family, friends, or neighbors) and those within the same information-sharing networks (see above), food-sharing networks [e.g., 74], fishing associations, or the few functioning cooperatives [e.g., 75] may have such close social bonds.

Survey Methods

The sampling frame for the survey consisted of 4,926 commercial fishing, recreational for-hire fishing, and fishing-related businesses operating in New York and New Jersey. The target sample of 1,158 interviews was calculated based on a 5% confidence interval and a 95% confidence level. A multi-mode survey administration approach including mail, telephone and in-person was used to maximize the number of completed surveys [76] because multi-mode sequential survey administration has been found to improve the response rate [77]. Concern for potential bias due to a multi-mode survey administration approach was considered outweighed by the improved response rate achieved.

Participants were selected for the mail survey using a stratified (by sector, i.e., commercial, for-hire, fishing-related business) random sample approach. A total of 355 responses resulted from the mail survey. The sample frame for the telephone survey consisted of both non-respondents from the mail survey and others who were not selected for the mail survey but had a telephone number. This resulted in an additional 569 completed surveys. Finally, thirty

four in-person interviews were conducted with respondents who had not completed the survey by mail or telephone. All interviews, phone and in-person, were conducted by experienced personnel trained by the authors. In-depth ethnographic information, useful in the interpretation of the survey results, was also collected during the in-person survey administration. Overall, 958 respondents or 83% of the targeted number of respondents completed a survey.

The geographic distribution of survey results showed good coverage across both states. In some cases, the respondent contact information was for an inland community and differed from the coastal community in which the fisherman or business owner/manager operated (see Figure 1). Percentage contributions of each category (commercial fishermen, recreational fishermen, fishing-related businesses) by state to the total sample were representative of their contributions to the overall universe used in this study. Statistical analyses were conducted using SPSS™ and specific tests conducted were based on the data characteristics for each question.

Within US fisheries law [Magnuson-Stevens Fishery Conservation and Management Act or MSA, 16 U.S.C. § 1801 *et seq.*, 78], place-based fishing community is a required unit of analysis. Figure 1 shows the distribution of responses by geographic community. Furthermore, the locations of communities with medium or high dependence on either commercial or recreational fishing can be seen in Figure 2 (See [79] in this issue for climate change vulnerabilities of these same communities.) Other types of communities, while not assessed in this study, are noted in the Discussion section.

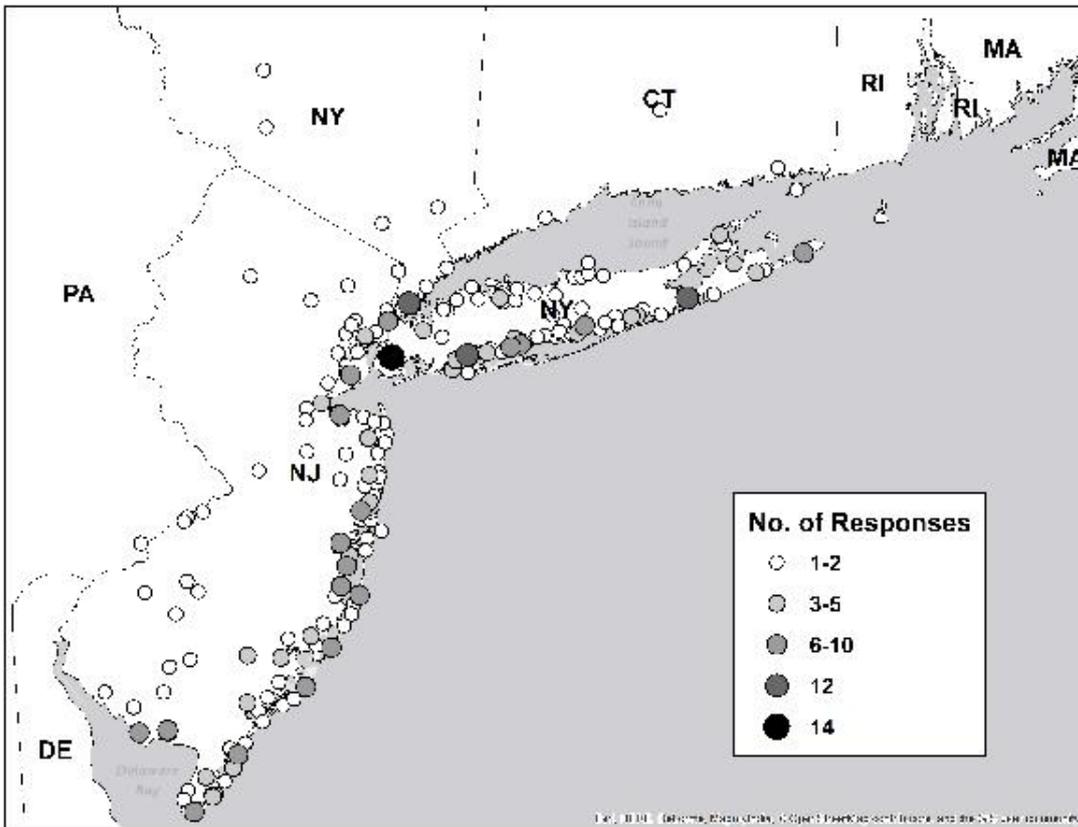


Figure 1. Geographic distribution of survey results at the community level

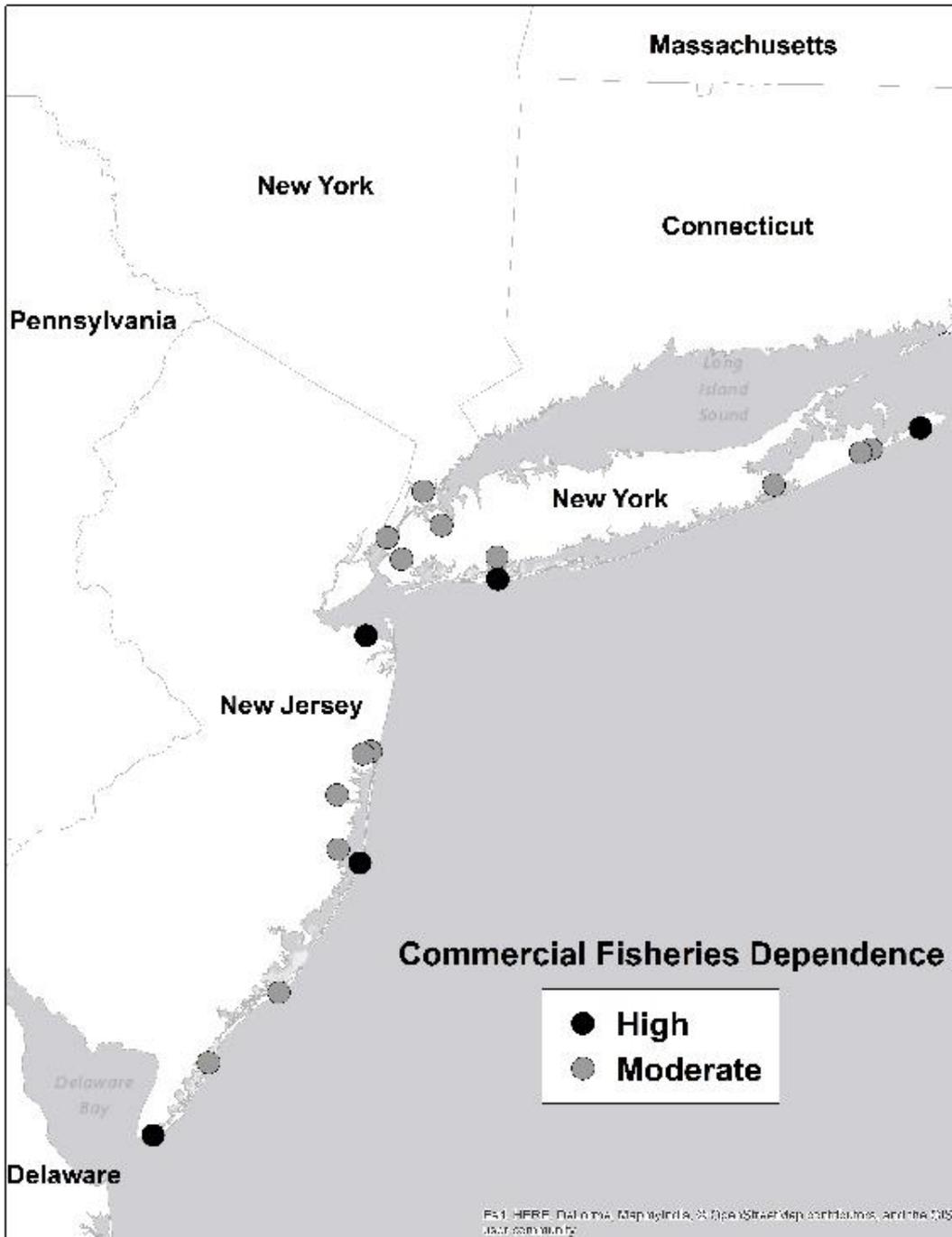


Figure 2a. Commercial Fishing Dependence in New Jersey and New York

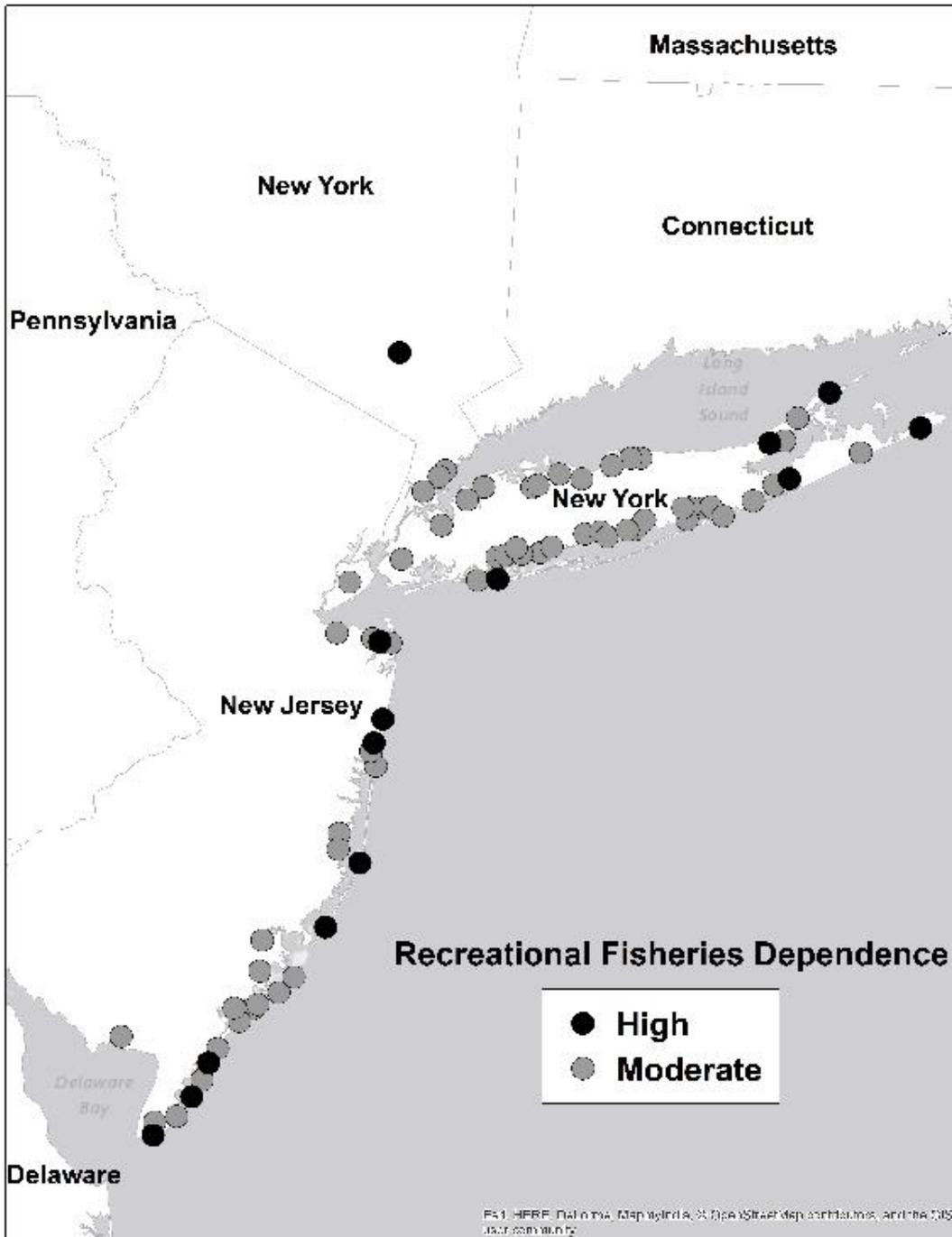


Figure 2b. Recreational Fishing Dependence in New Jersey and New York N.B. The community that appears to be on land is actually on an inlet.

Survey Results

As background, the vast majority of respondents reported impacts (over 90%), though type and degree of impact varied by business type (e.g., commercial vs. for-hire fishermen, all fishermen vs. onshore fishing-related businesses). See Colburn et al. [7] for details on this topic. However, almost uniformly the most common (plurality) response chosen as contributing to recovery was *family, friends, and community* (22% of responses by all fishermen and 28% by fishing-related businesses), an indicator of social bonds. By sector, only for-hire fishermen did not choose *family, friends, and community* as their top answer. Although *family, friends, and community* were also important to for-hire fishermen (20%), their most common choice was *no contributing factors* to their recovery (34% of responses)⁴. Many fishermen and fishing-related businesses expressed a sense of community by talking in more detail about the “dedication of crew,” “faithful customers,” and “hard-working and willing-to-help people” [re. 76, on the importance of narratives in creating and maintaining social bonds]. One seafood dealer said his recovery was due to “customer loyalty and local fishermen.” The option *employees* was also commonly chosen by fishing-related businesses (16% of overall responses). One quote by a marina owner was emblematic of the majority of responses: “[t]he hard work and dedication of my employees and family.”

Though social bonds were an important factor in recovery, they were not clearly tied to level of impacts. Turning first to fishermen, there was no statistically significant

⁴ This may be related to for-hire fishermen less frequently reporting having had damages/losses than other sectors [7]. This may be related to for-hire fishermen less frequently reporting having had damages/losses than other sectors [7].

correlation, either among all fishermen combined or among commercial and for-hire fishermen separately, between social bond responses and level of impact measured on a scale from 0 to 3 based on responses to the questions: 1) Did you stop fishing because of Sandy; 2) Did you experience physical damages; and 3) Was your revenue affected. Thus, the strength of these social bonds, or bonding social capital, does not vary by level of impact. This may mean the strength of the social bonds is pre-existing and not related to the disaster itself [re. 75]. There may, however, have been increases in bridging or linking social capital [re. 81; 82 on the importance of ‘the strength of weak ties’] that were not captured by this survey, given its focus on bonding social capital and the timing of its implementation.

Among all fishing-related businesses combined, on the other hand, a statistically significant correlation was found between social bond responses and level of impact ($p < 0.05$). When businesses types were analyzed separately (e.g., bait and tackle stores, marinas), however, none of the results were statistically significant. The overall significance may be related to fishing-related businesses suffering larger levels of damages/losses, due perhaps to their greater onshore infrastructure.

Discussion

Social bonds are frequently described in the disaster and resilience literature as key to effective disaster recovery [though cf. 83]. These studies may be surveys, ethnographic interviews, or analyses of secondary data. In the latter case, social resources are measured “through proxies such as levels of trust (in fellow citizens and in government officials), the propensity to expend time and energy on civic duties (such as

voting in local, regional, and national elections), and the ability of citizens to mobilize cooperatively (through demonstrations, neighborhood cleanup days, and other collective action)” [84].

Quantitative studies are less common than those based on analyses of ethnographic interview data. Of quantitative studies, those that use secondary data as proxies for social bonds do not report percentage of individuals manifesting important levels of social bonds [e.g., 54]. Meanwhile, some surveys examine populations of no more than a few dozen or hundred individuals [e.g., 85]. This makes it difficult to assess the quantitative similarity of our results relative to other studies.

However, one methodologically comparable study [57] was conducted two years after Sandy with a sample of 2,025 individuals nationwide and an oversample of 1,007 individuals residing in the area affected by Sandy. This study found that 31% of individuals in Sandy-affected areas reported relying on “friends, family, and neighbors” in the aftermath. In addition, 10% relied on “co-workers.” These results are similar to ours that found 22% of fishermen and 28% of those in related industries (or 25% overall) relied on *family, friends, and community*, and an additional 16% of fishing-related businesses relied on *employees*. This similarity between the studies supports our finding that social bonds were an important factor. Moreover, the fact that these two categories of social bonds were relied on by 40-45% of respondents in both studies shows their importance.

Finally, relatively few studies of social capital target fishing communities [though see 85; 59; 86; 58]. Thus, future work is needed in fishing communities, as well as

fishing neighborhoods within larger communities that are not predominantly focused on fishing. Prewitt Diaz and Dayal [87] found that sense of place was an important variable in community recovery from disaster. Both AP-NORC [57] and Tompson et al. [56] looked at social bonds at a neighborhood level after Sandy and found stronger results than at the overall affected area level. Stephens [88], meanwhile, noted the importance of examining differences between neighborhoods in her study of social capital and health. Such studies of coastal communities would ideally include both survey and ethnographic interview data and tie community members to their fishing and fishing-related industries to allow comparisons with the current survey data⁵.

At both the community and neighborhood level, more studies are needed on the exact relationship of levels of resilience and strength of social bonds to levels of impact and recovery. Moreover, we need to better understand how the expression of social bonds might vary across fishing communities. Different types of fishing-related institutions, such as unions, associations, and cooperatives, might help to foster these bonds. Or, levels of impact and certain socio-economic characteristics (e.g., poverty) might mediate the effectiveness of such institutions. Finally, it is important to understand which community members might suffer as a result of not belonging to an organizing institution [re. 69].

⁵ The NMFS Community Social Vulnerability Indicators (that include measures of fisheries dependence, social vulnerability, and gentrification pressure vulnerability) may be useful in choosing which communities to sample. See <http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index> for links to Jepson and Colburn [44], as well as an interactive map of indicators for all US regions. The NMFS Community Social Vulnerability Indicators (that include measures of fisheries dependence, social vulnerability, and gentrification pressure vulnerability) may be useful in choosing which communities to sample. See <http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index> for links to Jepson and Colburn [44], as well as an interactive map of indicators for all US regions.

Further, when examining communities involved in fishing, the coastal town is not the only type of community to which fishermen belong. Numerous studies have emerged of “communities at sea,” based on common area fished and information-sharing networks [23; 90; 91; 92; 33; 93). Not all members of such communities at sea necessarily reside in the same coastal town or even towns in close proximity to one another. It may be of interest to examine the extent to which these social bonds play any role in recovery after disasters, perhaps by helping members to map and understand changes to habitat and fish stocks such as those noted in Colburn et al. [7]. Also of interest, would be whether members of at-sea communities who do reside in the same towns depend more on each other than on other local fishermen with whom they do not share an offshore community.

Finally, our findings suggest that that strength of social bonds may be pre-existing rather than strengthened or weakened in the aftermath of the storm. This means that pre-disaster surveys of the strength of social bonds within and across various institutions and sectors could potentially point to social groups or communities where attention to strengthening social bonds, as well as bridging and linking social capital, might be most important.

Conclusion

The results from our post-Sandy study and the small number of studies specifically of fishing communities in the aftermath of disasters suggest that, despite their well-documented independence, social bonds are important to recovery for fishermen and their communities. With hurricanes likely becoming more intense under climate change [4; 5], the impacts to these communities will likely increase, making recovery more difficult. U.S. law requires federal

managers of marine fisheries to provide for the sustained participation in fishing of fishing communities and the minimization of adverse economic impacts (16 U.S.C. § 1851(a)(8)). Furthermore, Executive Order 13653 calls on federal agencies “to make the Nation's watersheds, natural resources, and ecosystems, and the communities and economies that depend on them, more resilient in the face of a changing climate” [94]. Thus, understanding when and how social bonds strengthen fishing community resilience is increasingly critical for federal fisheries managers. Currently, NOAA’s National Marine Fisheries Service (NMFS) is in the process of examining how best to foster community resilience within the limits of its legal authorities. NMFS cannot work directly in communities, but it can adjust fisheries regulations to allow for greater flexibility (as long as fish stock sustainability is not negatively impacted), and it can provide information to communities that may help them in planning for adaptation and resilience.

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