LOOKING FORWARD, LOOKING BACK: SETTING PRIORITIES IN ALASKA FOR HUMAN HEALTH, AND SOCIAL AND ECONOMIC DISRUPTIONS FROM SPILLS

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As an Alaskan, I remember where I was on March 24, 1989, when I learned about the Exxon Valdez oil spill (EVOS) in Prince William Sound. Little did I know that I would be working on the aftermath and impacts of that oil spill off and on over my career. During college, I worked in a law office in downtown Anchorage. I filed away case notes from plaintiffs who had been impacted by EVOS. I skimmed each one to ensure it was going in the right file, correct order. They were stories of lives disrupted, impacts to health, society, and a way of life, but mostly stories of loss. Many years later, I still remember some of those stories. In 2004, as an early career anthropologist, I traveled to Prince William Sound to administer harvest assessment surveys in Cordova and Chenega Bay. We asked questions about the disruption of the subsistence way of life, about the loss of passing on traditions, and how life had changed. The same questions asked in the same way for many years following the spill. In 2015 I was back in Cordova to administer the same survey. During that second visit, I spent time doing in-depth interviews with community members who could tell me about how life had changed for the community of Cordova. Following the Deepwater Horizon spill, the awareness of how profound technological disasters impact local communities and economies became more evident. We learned from EVOS and Deepwater Horizon that although you can never prepare a community for an oil spill, you can learn to mitigate impacts. In 2019 a workshop was held in Anchorage to bring together coastal residents and agencies in Alaska to discuss protocols for working in local communities and priorities for research. The workshop looked to the past to learn from EVOS and evaluated ideas on how to prepare for the future. This paper provides some of these lessons.

METHODOLOGY: EVALUATING IMPACTS TO COASTAL COMMUNITIES

The National Academies of Sciences, Engineering, and Medicine (NASEM) Gulf Research Program's (GRP) *Thriving Communities Initiative* seeks to improve the quality, accessibility, and use of information about how to protect communities from the impacts of oil spills. The Sea Grant Oil Spill Science Outreach Program focuses on synthesizing, translating, and delivering peer-reviewed oil spill science information for people whose livelihoods depend on healthy natural resources.

In 2017, the GRP and the Health and Medical Division of the NASEM hosted a workshop in Washington, D.C. entitled, *Preparing for a Rapid Response to Major Marine Oil Spills: Protecting and Assessing the Health and Well-Being of Communities* (Nicholson, Giammaria, & Snair, 2017). The workshop participants discussed research opportunities for improving public health preparedness, response, and protection associated with oil spills. We also identified potential challenges and opportunities for communities to support preparedness and resiliency after a spill and recommended the GRP gather input at the local level.

To address the recommendations identified in the August 2017 workshop, the GRP collaborated with the Sea Grant Oil Spill Science Outreach Program as well as the Alaska Sea Grant College Program, University of Southern California Sea Grant College Program, and Virginia Sea Grant College Program to conduct a series of regional workshops. The goal was to gather feedback at the local and regional level to identify opportunities for improving preparedness for the public health, social disruption, and economic impacts of oil spills. The regions identified for this national collaborative effort are the West Coast, Mid-Atlantic, Alaska, and the eastern and western Gulf of Mexico. These five workshops focused on three broadly defined topical areas of public health, social disruption, and economic impacts of oil spills.

A pre-workshop summary document informed the development of the workshop series (Sibley & Hale, 2018). An overarching Steering Committee comprised of emergency responders, resource managers, researchers, and outreach professionals, formed in 2018 to guide the development of all workshops. Each Sea Grant program gathered an expert team to organize the workshop for their area.

At each workshop, leaders representing impacted communities, and experts in emergency response and preparedness, oil spill science, and human health and well-being, were invited to share their knowledge with an audience of community stakeholders. Although there was a discussion on lessons learned, the focus was on preparing communities for future events. The purpose was to:

- Raise awareness of the topical areas as they relate to spills,
- Listen to those directly affected by spills,
- Identify regional-level needs and priorities for improving preparedness,
- Promote networking among groups who may not have previously interacted, and
- Identify resources to address gaps.

Specific deliverables from this collaborative effort are as follows:

- Clearly identified and articulated regional research and outreach priorities.
- Clearly identified and articulated inter-regional research priorities that may be nationally applicable.
- Suggested protocols to include in existing response and regulatory frameworks that address the
- topical issues.
- Pilot project ideas that address local, state, or regional issues.
- Workshop participants increase their understanding of topical issues.
- List of resources available to address topical issues.

- Foundation for future research funding proposals to support research, outreach, and/or pilot projects related to oil spills.
- Five workshop reports and a synthesized summary document.

Alaska Workshop

The workshop in Alaska was held in Anchorage, Alaska's largest city and transportation hub. A steering committee formed representing a broad spectrum of ideas related to the impacts of oil spills on human health, and potential social and economic disruption. The secondary focus was to provide a diversity of representation in terms of geography with expertise in past oil spills such as EVOS in Prince William Sound, and areas such as the Bering Sea and the Arctic, where there is increasing ship traffic as well as oil and gas activities in an environment where hydrocarbon tracing in marine resources is difficult to track (Suprenand, Hoover, Ainsworth, Dornberger, & Johnson, 2018).

Alaska has a unique, highly diverse environment with operational challenges, especially as America's Arctic state. The population, too, is highly diverse but overall has a strong reliance on wild resources to support the commercial and subsistence economy. In rural southcentral Alaska, in Prince William Sound, for example, the harvest of wild resources is estimated at 184 pounds per person per year (Holen et al., 2017, p. 93). In Western Alaska, the Bering Sea region, the average is 425 pounds per person per year (Holen et al., 2017, p. 93). Considering these unique circumstances, the following topics were identified by the planning team as being focal points for the Alaska Workshop:

- Impacts to mixed subsistence economies, commercial fishing, and tourism
- Evaluating current protocol and opportunities for health and social monitoring during an oil spill
- Response at a Community Level

Workshop Participants

Participation in the workshop was initially by invitation with personalized invites sent to each participant. The workshop was advertised to the public by ASG and the Prince William Sound Regional Citizens Advisory Council (PWSRCAC), who partnered with ASG to facilitate this workshop. There was a total of 56 participants in the workshop, including guest speakers, panelists, and individuals who participated in facilitated breakout discussions. For the six months before the workshop, the steering committee put together a list of individuals to invite that represented a broad spectrum of experience, backgrounds, and geographies. Representation included:

- Coastal residents
- Commercial fishing organizations
- Emergency responders
- Environmental non-profit professionals
- Environmental health professionals
- Media representatives
- Natural resource managers
- Oil & gas agency researchers

- Outreach professionals
- Researchers in the social and natural sciences
- Sea Grant Extension agents and specialists
- Tribal members

The funding for this project provided travel for 12 participants from rural communities in Alaska, including five elders from the Bering Sea region. Alaska Sea Grant and other agencies and organizations such as the PWSRCAC also provided travel for participants.

Workshop methods

The two-day workshop led with talks by experts in emergency response, disaster science, human health, environmental science, and subsistence economies. As noted above, Alaska is highly dependent on both commercial fisheries and the subsistence harvest of wild resources for economics and a way of life. Therefore, a central theme included these two topics, including the first panel discussion. For panels two and three, the topics were health and social monitoring during a spill and community response. Each of the three panels included the broadest possible participation.

Breakout discussion groups were facilitated by Sea Grant extension professionals and the steering committee members to document participant responses. For each of the scheduled breakout session topics, participants answered questions designed to foster thought and discussion to produce specific outputs listed as a through d, below. These questions, as well as the general topics, were consistent with the other regional workshops in this collaborative project:

a. What are the suggested protocols to include in existing response and regulatory frameworks that address the topical issue?
b. What pilot project ideas do you have that address the topical issue?
c. What are the research and outreach priorities that address the topical issue?
d. What resources are available that address the topical issue?

At the closing of the workshop, there was an overall general discussion in the group on the technological needs for local community preparation. This discussion helped to bring the entire group back to the central theme of this workshop, which is how to better prepare communities for an oil spill.

A post-workshop evaluation form was distributed to participants to receive additional feedback about the effectiveness of the workshop. The results of this workshop were distributed to workshop participants, the Sea Grant network, the NAS Gulf Research Program, as well as the wider community.

Workshop results

Breakout sessions: Participant feedback summaries

The following tables summarize the fundamental concepts of responses to questions asked during three breakout sessions. In each of the three breakout sessions, participants were asked to 1) suggest protocols, 2) share pilot project ideas, 3) identify research and outreach needs, and 4) identify resources

to address the breakout session topics, noted above. Breakout session notes provided by session facilitators were consolidated into a single document for each of the three topics. These documents were imported into Nvivo 12, a qualitative analysis software. Each response was coded, and the analysis quantified the number of responses for each theme. Codes for responses are consistent for all three sessions as there was overlap in the discussion, i.e., some themes came up during all three breakout group sessions. Only first level topics were covered; however, in the case where a main heading included several bullet points that spanned different topical areas, multiple codes were used to capture the key concepts discussed by the group adequately.

Each list is consistent; therefore, some topics came up during one of the three breakout sessions while not in others, so there may be no mention of that them, which is noted as a 0 in the table. A final table has been included that tabulates the total coded response themes for all three breakout sessions.

Suggested protocols

Table 1. Questions asked about suggested emergency response protocols and frameworks are in italics. Participant answers were summarized as key concepts and listed alongside the number of mentions.

What are some suggested protocols to include in existing response and regulatory frameworks that would help build economic and social resilience to future events?	
Key concept	**Number of mentions**
Baseline studies	4
Claims process	4
Communication and outreach	2
Community inclusion	11
Community/Tribal Liaison	0
Economic resilience	2
Local coordination	1
Monitoring	1
Response	10
Training	2
What are some suggested protocols to include in existing response and regulatory frameworks that could integrate human health, community well-being, and social dynamics into response planning?	
Key concept	**Number of mentions**
Baseline studies	7
Claims process	1
Communication and outreach	7
Community Inclusion	5
Community/Tribal Liaison	2
Economic resilience	0
Local coordination	1
Monitoring	1

Response	9
Training	3

What are some suggested protocols to include in existing response and regulatory frameworks that would improve risk communication and local response capacity?	
Key concept	**Number of mentions**
Baseline studies	1
Claims process	0
Communication and outreach	8
Community Inclusion	6
Community/Tribal Liaison	0
Economic resilience	0
Local coordination	1
Monitoring	1
Response	0
Training	1

Total responses for focus areas for suggested protocols across the three breakout sessions.	
Key concept	**Number of mentions**
Baseline studies	12
Claims process	5
Communication and outreach	17
Community Inclusion	22
Community/Tribal Liaison	2
Economic resilience	2
Local coordination	3
Monitoring	3
Response	19
Training	6

Pilot project ideas

Table 2. Questions asked about ideas for pilot projects are in italics. Participant answers were summarized as key concepts and listed alongside the number of mentions.

What pilot project ideas do you have that would contribute to building economic and social resilience?	
Key concepts	**Number of mentions**
Build local capacity	2
Community health	1
Culturally appropriate communication	2

Economics	3
Environmental Monitoring	1
Gap analysis	0
Response	7
Subsistence	3

What pilot project ideas do you have that would effectively integrate human health, community well-being, and social dynamics into response planning?	
Key concepts	**Number of mentions**
Build local capacity	7
Community health	5
Culturally appropriate communication	0
Economics	0
Environmental Monitoring	1
Gap analysis	0
Response	7
Subsistence	1

What pilot project ideas do you have for improving risk communication and local response capacity?	
Key concepts	**Number of mentions**
Build local capacity	2
Community health	0
Culturally appropriate communication	4
Economics	0
Environmental Monitoring	4
Gap analysis	2
Response	6
Subsistence	0

Total responses for pilot project themes across the three breakout sessions.	
Key concepts	**Number of mentions**
Build local capacity	11
Community health	6
Culturally appropriate communication	6
Economics	3
Environmental Monitoring	6
Gap analysis	2
Response	20
Subsistence	4

Research and outreach priorities

Table 3. Questions asked about research and outreach priorities are in italics. Participant answers are summarized as key concepts and listed alongside the number of mentions.

What are the research and outreach priorities for building economic and social resilience?	
Key concept	**Number of mentions**
Baseline studies	3
Build local capacity	2
Coastal resilience	1
Community health	1
Community inclusion	3
Culturally appropriate outreach	2
Innovative Arctic response technology/methods	2
Knowledge co-production	1
What are the research and outreach priorities for integrating human health, community well-being, and social dynamics into response planning?	
Key concept	**Number of mentions**
Baseline studies	3
Build local capacity	0
Coastal resilience	1
Community health	4
Community inclusion	5
Culturally appropriate outreach	4
Innovative Arctic response technology/methods	0
Knowledge co-production	0
What are the research and outreach priorities for improving risk communication and local response capacity?	
Key concept	**Number of mentions**
Baseline studies	5
Build local capacity	1
Coastal resilience	1
Community health	2
Community inclusion	9
Culturally appropriate outreach	4
Innovative Arctic response technology/methods	3
Knowledge co-production	10

Total responses for research and outreach priority focus areas.	
Key concept	**Number of mentions**
Baseline studies	11
Build local capacity	4

Coastal resilience	3
Community health	7
Community inclusion	17
Culturally appropriate outreach	10
Innovative Arctic response technology/methods	5
Knowledge co-production	11

Resources

In each breakout session, participants were asked to identify resources that were available in their region that could be utilized to address priority issues. Resources could be anything that participants felt are useful in the short and long term following a spill. Resources were categorized by level, such as Federal, State, etc. The U.S. Coast Guard was broken out from Federal due to the number of specific responses. The Alaska Native Tribal Health Consortium was also broken out from Federal as they receive funding from multiple sources and run many different programs respondents highlighted. In many cases, respondents in the groups noted several resources from different levels demonstrating collaboration between agencies and communities.

Table 4. Categories of resources available that could potentially support emergency response protocols, research, outreach, projects, and recovery of individuals and communities.

What resources are currently available that can aid communities or individuals in maintaining economic and social resilience?	
Key concept	**Number of mentions**
Alaska Native Tribal organization or Corporation	0
Alaska Native Tribal Health Consortium	0
Borough	3
Coast Guard	3
Community (city, municipal, and community organizations)	7
Federal	4
Industry	2
Regional Citizens Advisory Council	1
State of Alaska	4
What resources are currently available that aid in the integration of human health, community well-being, and social dynamics into local and regional response planning?	
Key concept	**Number of mentions**
Alaska Native Tribal organization or Corporation	1
Alaska Native Tribal Health Consortium	3
Borough	1
Coast Guard	1
Community (city, municipal, and community organizations)	3
Federal	4
Industry	0
Regional Citizens Advisory Council	1

State of Alaska	4
What resources are available to support the creation of effective risk communication and local response capacity plan?	
Key concept	**Number of mentions**
Alaska Native Tribal organization or Corporation	2
Alaska Native Tribal Health Consortium	3
Borough	1
Coast Guard	1
Community (city, municipal, and community organizations)	3
Federal	3
Industry	2
Regional Citizens Advisory Council	0
State of Alaska	2

DISCUSSION

LOOKING BACK

The first large scale salmon fishery to open in Alaska each spring is the Copper River Fishery. For generations, Prince William Sound residents located in Cordova, Chenega Bay, Whittier, Valdez, and other coastal Alaska communities harvest salmon to send to markets in Seattle and beyond. Before the early 1990s, these commercial fishers were able to support their annual livelihood by fishing because they also participated in the Prince William Sound herring fishery. Occurring in early spring before the start of the salmon season, the herring fishery added three months to the fishing season, allowing for residents to be full-time commercial fishers. Herring spawning and recruitment has not recovered from the EVOS event, and the commercial fishery in Prince William Sound has been closed since 1993 (Russell, Botz, Haught, & Moffitt, 2017; Ward et al., 2017, p. 2). Before the EVOS event, Cordova was one of the top 10 seafood producers in the United States. By 1993 it had dropped to 54th place and did not return to a top tier status until 2008 (D. A. Gill, Ritchie, & Picou, 2016, p. 2).

Although the spill had a remarkable effect on commercial fishing and the way of life it provided to year-round Prince William Sound residents, the subsistence economy was also impacted. As Gill et al. relate, "The Exxon Valdez oil spill unleashed disastrous impacts on local communities, especially those with cultural, social, and economic ties to renewable resources damaged or threaded by the oil and clean up" (D. A. Gill et al., 2016, p. 2). Their studies found that commercial fishers, Alaska Native, and other residents of Cordova, were more likely to report personal relationship problems among psychological stresses. In addition, there were declines in the harvest and use of wild resources by local communities, especially the loss of the harvest and sharing of herring (D. Gill, Ritchie, & Picou, 2013; D. A. Gill et al., 2016).

A series of studies in Prince William Sound and the broader region evaluating the impacts to the local mixed subsistence economy were carried out by the Alaska Department of Fish and Game, Division of Subsistence from 1990 to 2015 (Fall & Zimpelman, 2016). Before EVOS, the harvest of wild resources in the local economy was dominated by marine mammals and other aquatic species. One of the

communities with the longest and most complete longitudinal data set of harvest assessments in Alaska is Chenega Bay, a small Chugachmuit Alutiiq community in Prince William Sound. As shown in Figure 1, following EVOS, the overall harvest of resources diminished for two years before harvest levels recovered in 1991. However, the composition of that harvest changed significantly. Non-salmon fish such as halibut and salmon were the majority of the harvest. Harvest levels have fluctuated over several years, but the composition of resources changed and has not returned. This pattern shows a disruption in the traditional harvesting pattern for the local community. Research in 2013 found that very few harvesters were actually participating in marine subsistence activities and that the harvest of salmon, for example, is done by a few residents who then widely distribute the harvest throughout the community (Holen, 2014, 2017). In Cordova in 2015, I interviewed residents who lived and worked in the community at the time of EVOS. They related to me that the local economy changed from a community dependent on commercial fishing and a subsistence economy to one dependent on a disaster economy. Many residents, for several years following the spill, participated in clean-up activities instead of participating in local wild harvest activities. When the clean-up ended, they did not go back to their traditional patterns of harvest. Those patterns had changed (Fall & Zimpelman, 2016).

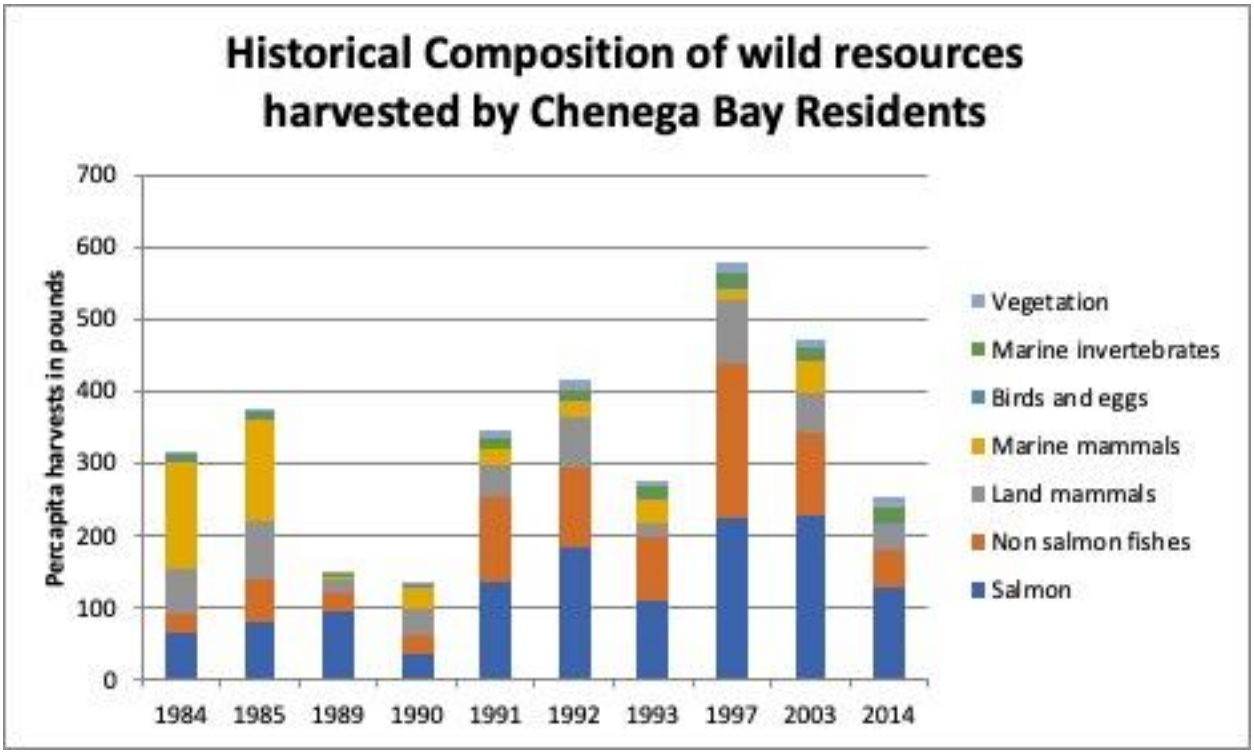

Figure 1. Historical composition of wild resources harvested by Chenega Bay

Looking Forward

The workshop in Anchorage included coastal residents from many parts of Alaska, especially the Bering Sea region. Residents of coastal communities in Alaska, especially in the Bering Sea, feel a sense of urgency due to the dramatic changes that are impacting their way of life and the need to build community resilience and capacity for response in the changing Arctic. The seasonal ice pack in the

Bering and Chukchi Seas has retreated in recent years, and there is increasing ship traffic and oil and gas exploration. Communities are also seeing an increase in cruise ships. For the participants in the workshop, it was not a question of if a technological disaster occurs, but when. As shown in Figure 2, residents in the Bering Sea harvest and use wild resources in all coastal areas (aoos.org). These data sets are not comprehensive of all communities in the region (29 communities are represented for a one-year snapshot of harvest and use by each community[1]), but even with the reduced data set, you can see that the entire coastline is used. In addition, the Bering Sea fishery is one of the largest in the world with abundant non-salmon fish such as pollock and cod harvested, as well as an abundant shellfish fishery for crab (NPFMC, 2019). A technological disaster would have a profound impact on an area that is highly dependent on wild resources for household consumption, and a fishery important for food security for the nation. The lessons learned from EVOS are profound in how a technological disaster can impact local communities.

[1] See the data portal at aoos.org for the tool *Wild Resource Harvest and Use by Bering Sea Communities* under the Socioeconomic data catalogue.

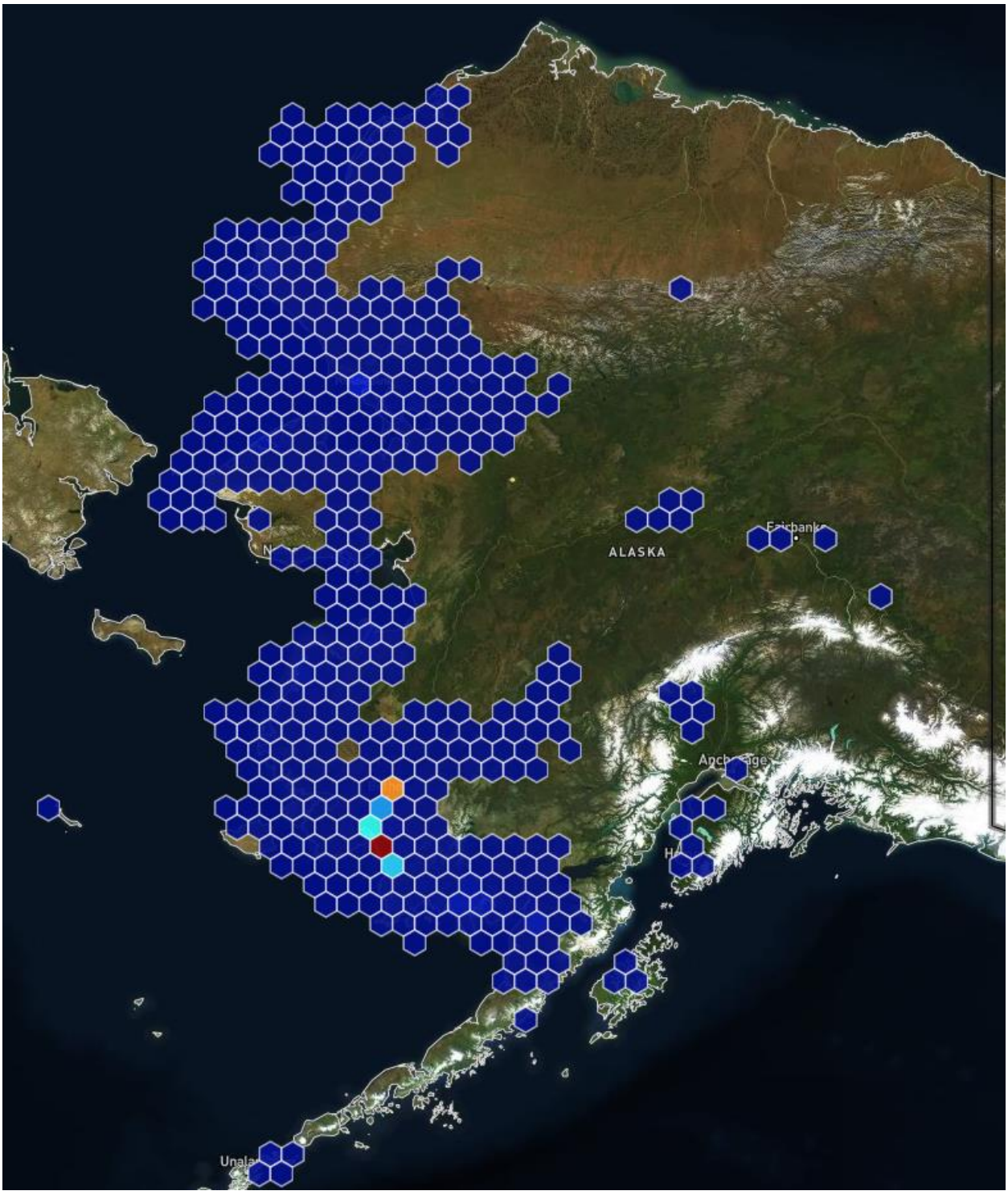

Figure 2. Harvest and use areas by Bering Sea Communities

SUMMARY

The EVOS had a profound impact on how a technological disaster could affect communities at the local level in terms of economy and socioeconomic patterns. Voices from other areas of Alaska helped to

articulate the concern that coastal residents have of increasing ship traffic and oil and gas exploration and the potential for a technological disaster. As shown in the tables, the most common theme that emerged from the workshop is the need to better inform and include communities in research and response. In addition, this communication and inclusion needs to occur in culturally appropriate and meaningful ways. The co-production of knowledge is also essential, so researchers understand the subsistence way of life in Alaska communities, and the value of local and traditional knowledge. Furthermore, communities feel that they are the first line of response to an incident as there are few federal resources capable of rapid response in the region.

The focus on health at this workshop was a new lens for looking at oil and gas activity and potential response for many participants. As shown in the tables, there is a desire by respondents for more baseline studies on human health in coastal Alaska. More environmental monitoring is also requested along with studies to adequately describe the subsistence way of life and value of this healthy way of life in terms of both economics and culture. As noted above, there is a concern that more vessel traffic in the Bering and Chukchi seas especially, as well as other parts of Alaska, could lead to a vessel adrift or spill that could impact resources significant for the subsistence way of life.

In summary, the following are ideas for potential investments in research and community preparedness:

- Research activities that dramatically increase engagement with communities and include key questions derived from community consultation.
- Studies on best practices for response in rural coastal communities in Alaska, especially in areas where there are currently few response capabilities.
- Invest in research in the Bering Sea region, where shipping is expected to increase in the coming years.
- Invest in the research of innovative technology that benefits locally based response to a technological disaster.
- Baseline studies on the potential impacts of oil spills on local economies in Alaska.
- Baseline studies on the potential impacts of oil spills on resources necessary for subsistence.

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Holen, D. (2019). Setting Priorities for Health, Social, and Economic Disruptions from Spills in Alaska: Learning from the Past, Preparing for the Future. https://gulfseagrant.org

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