A Practitioner's Guide to Fisheries Social Impact Assessment

Patricia M. Clay[1] and Lisa L. Colburn[1, 2]

with Amber Himes-Cornell[3]

[1] NOAA Fisheries' Northeast Fisheries Science Center
[2] NOAA Fisheries' Office of Science and Technology
[3] Food and Agriculture Organization of the United Nations

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I. What is the purpose of this Practitioners Guide?

This Practitioner's Guide to Fisheries Social Impact Assessment (hereafter, the Manual) focuses on Social Impact Assessment (SIA) for US marine fisheries, though much of the basics would apply to any SIA. As United States fishery managers develop and modify fishery management plans (FMPs) and fishery ecosystem plans (FEPs) that implement management actions to protect the Nation's commercially important fish stocks, part of the process, required by law, includes weighing and describing the social impacts associated with of the impacts of these regulatory actions[1]. The recognition that fisheries resource management affects not only the resource, but also the resource users and their communities, highlights the fact that these issues are social in nature. An SIA "provides information to agencies and communities about social and cultural factors[2] that need to be considered in any decision; provides a mechanism for incorporating local knowledge and values into the decision; and can help a decision maker identify the most socially beneficial course of action for local, regional, and national interests" (ICPGSIA 2003).

By providing a standard procedure for producing an SIA, this Manual will further two primary objectives: 1) to assure that all SIAs are based on "the best scientific information available" (per National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)) [3] and 2) help social scientists who have never conducted an SIA or need a brush-up. We assume that anyone planning to conduct an SIA and reading this guide will first have carefully reviewed the official NOAA/NMFS Guidelines for Assessment of the Social Impact of Fishery Management Actions (NMFS 2007).

a. Why a Step-by-Step Guide to SIAs?

Conducting an SIA is a skill. Those entering a job with NOAA Fisheries or one of the Councils may or may not yet have acquired that skill, even if they have a background in social science. This Manual is organized to provide some basic background and then to lead the reader step-by-step through the planning, data collection, and write-up stages of an SIA. It is a guide for both the inexperienced and those who feel a brush-up would be helpful.

There is also need for a description of existing data streams and potential methods for collecting new data in ways that are applicable to a wide range of fisheries management decisions. This Manual provides step-by-step information on making choices about methods and data in order to develop a standardized SIA procedure across federally managed fisheries, while also allowing for regional and fisheries-specific data structures, innovation, and needs.

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[1] N.B. This document does not address NOAA obligations under the Marine Mammal Protection Act or the Endangered Species Act, though many aspects will be applicable to SIAs generally.
[2] In general, cultural practices will be discussed here under the broad mantle of "social factors".
[3] This does not necessarily necessitate collecting new information, but must include sufficient information to make an informed assessment.

Please note that terms used in this Manual and FMPs may vary slightly across regions and Councils. This Manual provides guidance for social scientists throughout NOAA Fisheries (aka the National Marine Fisheries Service (NMFS)) and the Councils, therefore usage of terms in a particular region or Council may deviate from the terms or their usage in this Manual.

b. What is the relationship of this Manual to the official SIA Guidelines?

SIA is a tool for gauging the social and cultural consequences of alternative management or policy measures. The SIA is used in conjunction with economic and environmental impact assessments to facilitate the decision making process by identifying, among the management alternatives that will meet the stated goals, those with the greatest positive or least negative impacts (Vanclay 2002); for NOAA Fisheries (NOAA Fisheries and NMFS will be used interchangeably throughout this document), this includes meeting stock rebuilding requirements and creating positive net national benefits. The objective of this Manual is to provide technical advice for NMFS) and Council staff that streamlines the SIA process while fully capturing relevant social impacts. It is not meant to replace the official NMFS Policy Directive[4] Guidelines for Assessment of the Social Impact of Fishery Management Actions (NMFS 2007). Instead, this Manual responds to the statement in the Guidelines noting: "Individual fisheries and issues will call for a range of social factor analysis methods and techniques, and selection of these tools will require case-by-case judgment. Social factor analysis is an evolving field in applied social science and creative applications may be found to fit different fisheries and their participants." This Manual provides guidelines for making those case-by-case judgments.

II. Why do we do SIAs? Legal and policy framework

Legal requirements for conducting SIAs are found in laws passed by Congress and Executive Orders created by the President. Failure to fully comply with statutory requirements could subject the agency's action to legal challenge. An executive order is an instrument used by the President to carry out functions of the executive office, and, when based on a constitutional or statutory grant of power, it essentially has the force of law, except in instances where it is contradicted by other federal law, and except that it does not generally create any right or benefit enforceable against the United States (Duncan 2010). Policy Directives are "statements of and instructions for implementing important, high-level internal direction and positions that guide organization decisions and actions."[5] These are internal agency requirements and do not have the force of law; however, significant deviation from stated agency policy could also result in a legal challenge to an agency action. We discuss key laws and policies before presenting the

[4] Policy Directives are statements of and instructions for implementing important, high-level internal direction and positions that guide organization decisions and actions." See https://www.fisheries.noaa.gov/national/laws-and-policies/policy-directive-system
[5] https://www.fisheries.noaa.gov/national/laws-and-policies/policy-directive-system

process of conducting an SIA, as these laws and policies form the basis for certain specific topics that an SIA must address when prepared in a federal and especially a federal fisheries context.

a. What are laws that require SIA?

There are two primary laws that require assessment of social impacts in connection with fisheries management actions: the National Environmental Policy Act (NEPA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Other laws or sections of laws (including the MSA) require targeted social assessments when specific populations are impacted, e.g., fishing communities, or under specific circumstances (such as implementation of a particular type of regulation), such as the implementation of limited access.

1. National Environmental Policy Act (NEPA)

NEPA requires federal agencies to prepare an Environmental Impact Statement for any major federal action "significantly affecting the quality of the human environment" (42 U.S.C. § 4332(C)).[6] Section 101(a) of NEPA declares a federal policy to, among other things, "create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." (42 U.S.C. § 4331(a)). This is fleshed out in Section 101(b), which states "…it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may –

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources." (42 U.S.C. § 4331(b)).

Note the specific mention of "aesthetically and culturally pleasing surroundings" and preservation of "important historic, cultural, and natural aspects of our national heritage."

NEPA further requires, under section 102(2)(A), that federal agencies use a "systematic,

[6] If a federal agency determines an action will not have significant effects on the quality of the human environment, the agency can satisfy NEPA by applying a Categorical Exclusion (CE) or preparing an Environmental Assessment and Finding of No Significant Impact (FONSI), as applicable.

interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making which may have an impact on man's environment" (42 U.S.C. § 4331(2)(A)). The Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act interpret the term "human environment" comprehensively to include the relationship of people with their natural and physical environment (40 CFR 1508.14). NEPA also requires consideration of unquantified environmental amenities and values that must be weighed on par with technical and economic considerations (42 U.S.C. § 4331(2)(B)). Unquantified amenities and values may include: angler satisfaction, job satisfaction, and an independent life-style for commercial fishermen, and the opportunity to see species, including finfish, shellfish, crustaceans[7], marine mammals[8], and sea turtles[9], in the wild (non-consumptive use of marine fishery resources). Technical considerations relevant to writers of an SIA may include the management of fishing gear and enforceability of regulatory actions.

2. Magnuson-Stevens Fishery Conservation and Management Act (MSA)

Social science analysis is required, or discussed, in multiple sections of the MSA. Section 303(a)(9)[10] mandates the preparation of *Fishery Impact Statements*[11] and notes that: they "shall assess, specify, and analyze the likely effects, if any, …of the conservation and management measures on…(A) participants in the fisheries and fishing communities affected by the plan or amendment; (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and (C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery." Under section 303(b)(6),[12] if a Council decides to establish a limited access system for a fishery, it must examine: "(A) present participation in the fishery; (B) historical fishing practices in, and dependence on, the fishery; (C) the economics of the fishery; (D) the capability of fishing vessels used in the fishery to engage in other fisheries; (E) the cultural and social framework relevant to the fishery and any affected fishing communities;(F) the fair and equitable distribution of access privileges in the fishery; and (G) any other relevant considerations." Section 303A provides extensive guidelines for implementing social and economic components of *Limited Access Privilege Programs.*

National Standard 8 of the MSA (section 301(a)(8))[13] stipulates that: "conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities… in order to (A) provide for the

[7] All governed under the Magnuson-Stevens Fishery Conservation Management Act (described below).
[8] Marine mammals are governed under the Marine Mammal Protection Act.
[9] Both marine mammals and sea turtles are governed under the Endangered Species Act.
[10] 16 U.S.C. § 1853(a)(9).
[11] In practice, the requirements for Fishery Impact Statements, which include social elements discussed within the MSA, are generally fulfilled through information and analyses in an Environmental Impact Statement or Environmental Assessment under NEPA (see Section III below for additional information about the interaction between these requirements).
[12] *Id.* § 1853(b)(6).
[13] *Id.* § 1851(a)(8)

sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities." "Fishing community" itself is defined in MSA section 3(17)[14] as "a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community."

Sec. 303(a)(2) and (5)[15], addressing the contents of fishery management plans, *requires consideration of recreational fishermen, many of whom may rely on fishing for various levels of food provision*[16] and *Indian treaty fishing rights*, that often include subsistence (sometimes called "traditional and customary use"). So, where relevant to the regulatory action, these factors must be included in an SIA.

In addition, sec. 305(j)(1)[17] directs the Secretary of Commerce to establish "a pilot program for regionally-based marine education and training programs in the Western Pacific and the Northern Pacific to foster understanding, practical use of knowledge (including native Hawaiian, Alaskan Native, and other Pacific Islander-based knowledge), and technical expertise relevant to stewardship of living marine resources." This section supports the gathering of local ecological knowledge (LEK) from fishermen in general and traditional ecological knowledge (TEK) from Alaska Natives, Pacific Islanders, and tribal nations with treaty rights. These are data that may be needed in an SIA.

Also, regarding specifically Alaska Natives and Pacific Islanders, the MSA includes a provision for both an Alaska Community Development Program (CDP) (sec. 305(i)(1))[18] and a Western Pacific CDP (sec. 305(i)(2)). The Alaska CDP established a Community Development Quota Program (CDQ) to facilitate investment by Native Alaskan communities in fisheries in the Bering Sea and Aleutian Islands Management Area in order to provide economic and social benefits and support sustainable and diversified local economies in Western Alaska.

The Western Pacific CDP was created to provide access to fisheries in order to take into account traditional indigenous fishing practices and established the Western Pacific Community Development Program Demonstration Project Program (MSA Sec. 305, note),[19] which provides direct grants to eligible western Pacific communities up to $500,000/fiscal year. In addition, the Indigenous Provisions Pacific Insular Area Fishing Agreements include enforcement provisions for indigenous and federal enforcement entities to work together to enforce regulations in the Pacific Insular Area (sec. 311(g)).[20]

b. What other laws and executive orders relevant to SIA?

A variety of other laws and Executive Orders (E.O.) relate to particular groups or activities within the fisheries and may require specific social analyses that would be included in the SIA.

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[14] *Id.* § 1802(17)
[15] *Id.* § 1853(a)(2) and (5)
[16] Note that recreational fishing may overlap with subsistence (Steinback et al. 2009).
[17] *Id.* § 1855(j)(1)
[18] *Id.* § 1855(i)(1)
[19] *Id.*
[20] *Id.* § 1861(g)

Here we provide a summary. More detail is provided in Appendix A. E.O. 12898 on Environmental Justice requires that federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination under, those programs, policies, and activities because of their minority or low income status. E.O. 12866 on Regulatory Planning and Review requires that federal agencies assess the costs and benefits to the Nation of implementing a regulation. The Regulatory Flexibility Act[21] (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act,[22] requires that, for applicable rules, federal agencies prepare an initial and final regulatory flexibility analysis which "…shall describe the impact of the proposed rule on small entities…" and permits judicial review of agencies' compliance with the RFA to ensure that RFA procedures are accurately followed. Regions with tribes will need to follow E.O. 12875 on Enhancing the Intergovernmental Partnership and E.O. 13175 on Consultation and Coordination with Indian Tribal Governments.

c. What are key NOAA Fisheries policy directives?

The key policy directive for conducting SIA is the official NOAA Fisheries Guidance for Social Impact Assessment (NMFS 2007). The next most critical guidance is the National Standard 8 Guidelines (50 C.F.R. 600.345). These and other NMFS policy directives related to social and economic analysis of regulatory actions can be found here.

1. Official NMFS Guidance for Social Impact Assessment

In 2007, the National Marine Fisheries Service updated its Guidelines for Assessment of the Social Impact of Fishery Management Actions (NMFS 2007). This document provides an overall introduction to SIAs. In particular, it states, "In the context of marine fisheries conservation and management, SIAs focus on the human environment of the fisheries. That is, SIAs consider the effects of changes in resource availability or fishing practices on fishermen, communities, fishing-related businesses and employment, families and other social institutions, regulations and social norms of behavior, and cultural values" (NMFS 2007:5). In addition, NMFS (2007) reviews NOAA Fisheries policy on SIAs, and discusses how to undertake, and the form of, a social factor analysis, the concept of fishing communities, and various special considerations for undertaking an SIA. It provides significant assistance for organizing and conceptualizing how an SIA should be developed. As noted above, we assume that anyone planning to conduct an SIA and reading this guide will first have carefully reviewed the Guidance. Similar to this, though narrower in focus, is the NMFS Guidance for Conducting a Review of Catch Share Programs. Where such a review has been conducted, it will also be a good source of information about that fishery. More detail on this guidance is provided in Appendix B.

[21] 5 U.S.C. § 601 *et seq.*
[22] Pub. L. No. 104-121, Title II

2. NOAA Fisheries National Standard 8 (NS8) Guidelines

NS8 is codified in MSA section 301(a)(8), one of 10 National Standards specified in the MSA and one of 3 National Standards added in 1996 through the Sustainable Fisheries Act. The National Standard 8 Guidelines explain that fisheries managers must take into account the importance of fishery resources to fishing communities, but that this must be within the context of conservation: "All other things being equal, where two alternatives achieve similar conservation goals, the alternative that provides the greater potential for sustained participation of such communities and minimizes the adverse economic impacts on such communities would be the preferred alternative." The Guidelines also note that analyses "should first identify affected fishing communities and then assess their differing levels of dependence on and engagement in the fishery being regulated." Further, both qualitative and quantitative data use are specified as important, including, for commercial fisheries, "information provided by fishermen, dealers, processors, and fisheries organizations and associations." Elsewhere, boatyards, ice suppliers, and tackle shops are given as examples of directly related fisheries-dependent services and industries that may be part of a fishing community.

d. What are other relevant NOAA Fisheries and Executive Branch policy directives?

There are two key policies on environmental justice: guidance from the White House Council on Environmental Quality and the Dept. of Commerce Environmental Justice Strategy. For those in regions with tribes, associated policy directives are also critical, such as Department of Commerce Consultation and Coordination Policy (2013), which implements Departmental Administrative Order 218-8, and the NOAA Consultation Handbook. Also relevant is the Office of Management and Budget guidance for E.O. 12866 and Small Business Administration guidance for the Regulatory Flexibility Act. Finally, we include the policy directive on Ecosystem-based Management, as many regions are moving to Ecosystem Plans rather than Fishery Management Plans. See Appendix B for more detail on these and other relevant policy directives, including the Guidance for Conducting Review of Catch Share Programs.

III. Where within an Environmental Impact Statement are social impacts discussed?

The Environmental Impact Statement (EIS) is mandated by NEPA for applicable major federal actions.[23] The MSA similarly mandates a Fishery Impact Statement for a FMP or amendment, to assess the likely effects of any FMP or amendment on participants in applicable fisheries and fishing communities.[24] In practice, the information and analyses in the EIS generally cover both

[23] As noted above, for certain actions, a federal agency can satisfy NEPA by applying a CE or preparing an Environmental Assessment and FONSI, as applicable.
[24] For additional details about the requirements for Fishery Impact Statements, see MSA section 303(a)(9) (16 U.S.C. § 1853(a)(9)) and Section II(a)(2) above.

requirements.[25] There are two primary sections in an EIS where data on social factors is found: the Affected Human Environment (AHE) section and the Social Impact Assessment (SIA) section. In addition, economic factors (which have their own impacts assessment section) are related to social factors, though in social assessments the economic impacts are important because of their concomitant social impacts or because of social factors that influence, e.g., the conduct of commerce. Below we further describe the differences between the AHE and the SIA and their connections to the Economic Impacts section of the EIS.

a. SIA versus Affected Human Environment (AHE) section

The AHE describes the baseline status of the fishery before implementation of any new regulations, including both social and economic information, as well as basic descriptive data such as landings, value, and number of permits by permit category, and indicators such as local and regional quotients and NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). The SIA, on the other hand, analyzes and describes the likely changes, due to proposed regulatory actions, to the social fabric of the fishery. This includes activity and place-based community-level impacts, and takes into account relevant cultural aspects. These changes will vary based on existing capacities and vulnerabilities within the fishery and the fishing communities (as understood from the CSVIs and other indicators listed above), as well as the specific regulatory actions that are proposed. In making this assessment, the SIA will reference or summarize some stage-setting or background information from the AHE.

b. Social versus Economic Impact Assessments

Because both the social and the economic assessments use some of the same data, it is important to understand how the two assessments are different.[26] At the most basic level, social impacts are anything linked to a public or private action [though here we are concerned only with federal actions] that affects or concerns a specific group of individuals. Those impacts may include alterations to the ways in which people live, work or play, their culture, their community, how they relate to one another, their political systems, their environment, their health and well-being, their personal and property rights (or privileges as US quasi-property rights to fish are legally defined), their fears and aspirations, and how they organize to meet their needs and generally cope as members of a society (Vanclay 2003, Vanclay et al. 2015).[27] In addition,

[25] For actions requiring only an EA/FONSI, the requirements for a Fishery Impact Statement are generally covered in the EA, though they may be less detailed than in an EIS.

[26] There are three primary types of economic impact assessments: 1) A general assessment that parallels the SIA, the Economic Impacts section of the EIS, 2) the RFA analysis (see discussion of the Regulatory Flexibility Act, above), which may include elements from the Economic Impacts section, and 3) the Benefit-Cost Analysis required under E.O. 12866 (discussed above) which is provided separately from the EIS and also included in the EIS, often within the Regulatory Impact Review (RIR) or Regulatory Impact Assessment (RIA). Here we are comparing the SIA to the Economic Impacts section.

[27] The ICGSIA (2003), to which NMFS contributed, similarly states that agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect, or cumulative.

social impacts may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general (Hall-Arber et al. 2009).

The SIA will frequently employ or reference some economic data. Predicting changes to occupational opportunities and community infrastructure, for instance, is in part dependent on the analysis of economic impacts. However, "[w]hile SIAs focus on social and cultural values and systems [related to the economy], economic impact assessments focus on market and non-market values and systems" (NMFS 2007), including to firms, fleets and industries. Further, impacts to market and non-market values, in turn, have social impacts for individuals, households, communities, and other social groups.

IV. You are assigned an SIA: What do you do?

Ideally, you are first assigned membership to a Plan Development Team, Fisheries Management Action Team, or similar body of scientists and other experts (some of whom may be fishermen) established by your regional Fishery Management Council (Council) who discuss possible regulatory actions to accomplish a Council goal. In the early stages you will provide input on possible social impacts or likely responses of different categories of fishermen and other stakeholders to these possible regulatory actions, based on your knowledge of the region or your knowledge of social science and the fisheries social science literature. If you have read this Manual beforehand, that will help, though at the beginning you may spend a lot of time just listening and absorbing. The Council will coalesce around a preferred alternative, based largely on input from the plan team and pertinent Council advisory committees. At that point you will need to begin fleshing out the SIA, discussing the preferred and other alternatives and their differing types and/or levels of impact (and usually contributing some tables and discussion to the AHE).

An SIA is context-specific and addresses all issues relevant to the people and the way they live that will be impacted (NMFS 2007). This means you need to figure out what the issues are and who will be impacted. You begin with the type(s) of regulatory actions being considered. This section is a useful reference to help identify the types of impacts that you should consider and inform the relevant data you will want to seek for your fishery. On its own, it will not tell you the level of impact for any given action, but it can be used as a prompt to make sure that the breadth of potential social impacts are comprehensively examined.

In addition, you need to consider your available time and resources. In other words, what is the timeline for preparation of the SIA? With limited time you may have to rely exclusively on a literature review, secondary data, and transcripts from scoping hearings. With more time you may be able to conduct phone interviews. Slightly more might allow for focus groups. If you have at least a full year of advance warning that a specific type of amendment will be considered, you might be able be able to plan and implement a survey – and perhaps even design a before/after survey that will allow you to assess the accuracy of your predicted impacts and potentially learn of impacts you had not anticipated. Second, remember that an amendment will generally have more impact than a framework measure. Thus, the amount of time and research needed will usually be less for a framework than for an amendment. And a major amendment implementing a wholesale change of the management structure, e.g., to a catch

share system, will require more time and research than, say, an amendment changing the required mesh size for a particular species or species complex.

a. What is the regulatory action?

Social impacts can be analyzed based on the types of management actions that are being proposed. Such changes may be administrative changes, like changing rules about paperwork, or regulatory, like changing rules about how and when fishing occurs. Here, we review potential impacts from the following common regulatory actions for fishing activity: allocations; closed areas; gear changes; days-at-sea; catch limits; limited access/entry; and catch shares (including Limited Access Privilege Programs, or LAPPs). A list of types of management included under the term "catch shares" can be found in the NOAA Catch Share Policy (NOAA 2010). See Table 1, below, for a summary of common impacts for each listed regulatory action category. Section IV.b., below, discusses how to know who in the fishery in question might be affected and where and how to find relevant information on those groups (including fishing communities). On its own, this section will not tell you the level of impact for any given action, but it can be used as a prompt to make sure that the breadth of potential social impacts are comprehensively examined. Keep in mind, as well, that the particular context of the fishery you are assessing may create unique impacts or variations on impacts described here.

1. Allocations

To allocate is to distribute between groups. In fisheries the most basic allocation by a Council is usually the division of the Total Allowable Catch or Annual Catch Limit between commercial and recreational fisheries. Allocations to many types of subsistence or customary use groups are handled at a higher level by treaties, though some indigenous group access may be through Councils, e.g., Fishery Ecosystem Plans in the Western Pacific Region (see discussion under II.a.2., MSA, above). The balance of allocations between commercial and recreational fisheries is almost always highly contentious, as are the sub-allocations across states. Because allocations ultimately affect income for both commercial, private, and for-hire recreational vessels (charter and party/head boats[28]), there is a cascade of possible social impacts including job satisfaction (Pollnac and Poggie 1988, Gatewood and McCay 1990, Pollnac and Poggie 2006, Pollnac et al. 2012), time with family, and other impacts. In the commercial sector, these social impacts (and related economic impacts) can, in turn, impact local fisheries-dependent industries and local communities. For recreational anglers the loss is connected more to angler satisfaction (Holland and Ditton 1992, Beardmore et al. 2014, cf. Wilde et al. (1998) on motivations for sportfishermen and Norris-Raynbird (2004) and Colburn et

[28] A charter boat is hired by a group of anglers for a fishing trip. If no one hires the boat for a specific trip on a given day, the boat does not leave dock. Often there are very specific species that the anglers want to target. A party boat or headboat goes out on a regular schedule and individual anglers hire a place on the boat. There may be some minimum number of anglers required for the trip to take place, but it is still a regular trip that anyone can join by paying the per-head fee. There is also often a broader acceptable range of target fish, often for food.

al. 2015) on motivations of for-hire (party/charter) captains), which can have follow-on effects to shoreside recreational industries including marinas, bait-and-tackle shops, hotels, and restaurants. See Jacob et al. (2013) for more on the social impacts of allocations. For more information on allocation processes, see the NOAA Fisheries Allocation Guidance, and related policies found here and here.

2. Closed areas/seasons

Closed areas and other forms of management that attempt to reduce fishing effort spatially (including Marine Protected Areas, Habitat Areas of Particular Concern, Marine Monuments) can take many forms and have many purposes (Liu et al. 2018). Closures that are temporal as well as spatial, such as seasonal closures, identify and protect discrete areas during periods of high species density or during a vulnerable life history stage. Closed areas are also employed as a way of reducing the catch of non-target species by closing areas according to temporary or seasonal shifts in non-target species location. Other closures may be long-term in response to target-species declines. There is also a wide variation in the acceptance of area closures among stakeholders based on the intended goals (e.g., reduce bycatch, protect spawning aggregations, protect essential fish habitat) and duration (temporary, seasonally recurring, or permanent) (Pita et al. 2010), as well as whether Local Ecological Knowledge (LEK) was used in creating the spatial and temporal parameters. The difficulty in defining the social impacts of closed areas is inextricably tied to their variability and differences in how they are perceived by stakeholders (Pomeroy et al. 2007). Marine protected areas provide long-term food security, in the sense that they increase overall fish populations, though local fishermen may experience a relative decrease in catch per unit effort and an increase in the cost associated with fishing due to avoiding that area (Mascia et al. 2010). Fishermen may, however, find area closures to align better than other management measures with their cognitive mapping of the ocean (Clay 1996, Olson 2006, St. Martin and Olson 2017).[29]

Closures can affect both commercial and recreational fishermen. One of the direct consequences of an area closure is the change in fishing behavior as fishermen (commercial and recreational) attempt to adjust to the lack of access to a closed area. For commercial fishermen, Murawski et al. (2005) show that the shift in otter trawl fishing effort associated with seasonal and year-round groundfish closures off the Northeast United States was highly concentrated to the borders of those closed areas. This shift in effort is an attempt to "fish the line," which has been shown to be part of an optimal fishing strategy capitalizing on the biological "spillover" from a closed area (Kellner et al. 2007). Because closed areas do not reduce fishing effort, but only displace it (Halpern et al. 2004), the subsequent concentration of effort localized at the boundaries of closures has led to crowding and gear conflicts among fishermen (Suuronen et al. 2010). Less mobile fishermen may bear a heavier burden as they are less able to easily switch harvest areas (out of closed areas, or into reopened areas). A change in fishing behavior that attempts to employ a more mobile fishing strategy will have

[29] Closed areas can also align better with ecosystem-based management (St. Martin 2001:129) or the narrower ecosystem-based fisheries management (EBFM) that NMFS is implementing currently (NOAA 2018).

additional social costs such as likely disruptions to family and community life, as well as a potential decrease in safety at sea. Recreational and commercial fishermen may incur social costs such as loss of a traditional fishing site. During seasonal closures, fishermen will target other species, which may involve gear changes or changes in timing or duration of trips. Changing gear and duration may have economic impacts, especially for commercial fishermen where gear costs may be quite high. Recreational fishermen may be more likely to switch species than gear. Changing duration can have impacts on family time and other social activities for both commercial and recreational fishermen. All this can lead to economic and related social impacts for shoreside businesses such as bait-and-tackle shops and marinas. These impacts affect both the business owners and the employees.

For commercial fishermen, there are also a number of social impacts that may be associated with opening a previously closed area. For example, closed areas can be reopened to alleviate gear conflicts and mitigate some of the negative social impacts of the closure, as was the case of Closed Area II (CA II) in the Northwest Atlantic. Negative social impacts include starting a derby fishery that results in landings that are too high and occur over too short a time period, causing lower prices and a waste of quota. Positive outcomes from selectively opening closed areas may include increased revenue, number of fishing trips, and number of usable days-at-sea or fishing days.[30]

3. Gear restrictions

Switching between different fisheries by changing gear types is one of the most common adaptive strategies that commercial fishermen employ (Acheson 1981). However, limited access and catch shares (discussed below) have often led to greater specialization in species and therefore gear. A regulation that dictates a gear change is a restriction that limits the use of a particular type of fishing gear as a means of altering the selectivity of a particular sector (e.g., fishery, vessel size) and to control the effort in a fishery. Gear restrictions have been employed as a way of limiting mortality in stocks that are in danger of extreme overfishing. In a trawl or set net fishery, incorporating a minimum mesh size as a gear restriction is an attempt to increase the selectivity of the gear and increase the escapement of smaller species. Additional bycatch reduction technologies incorporated into a fishing gear can also alter selectivity, avoid capture of non-target species (including protected resources such as sea turtles), or facilitate their non-lethal release (Campbell and Cornwell 2008). Some bycatch technologies can impact catch levels (Ward 1994, Pascoe and Revill 2004). By setting a maximum amount of gear used (e.g., number of hooks in a longline fishery, number of nets in a gillnet fishery or the number of pots in a trap fishery), gear restrictions can reduce effort and efficiency within a fishery as a way of controlling overall effort. In addition, they can be an attempt to limit fishermen in one fishery from expanding into others through technological investment.

Commercial fishermen often see gear management as a source of uncertainty about future management. Perhaps more restrictions are coming, or fishermen may later be capped as to total traps/nets/etc. This in turn may lead them to add more gear (e,g., increase their total

[30] Days-at-sea is a specific management tool. Fishing days are simply days that a vessel is able to be on the water.

number of traps, hooks, or nets) or move from part-time to full-time, in an attempt to maximize fishing history in hopes of being "grandfathered" in or assured future fishing privileges. In addition, some fishermen who did not originally follow this path may eventually feel obliged to increase their total amount of gear as a reaction to the pressure of competition with other fishermen that did increase their gear. Keeping up with the competition can help maintain the community's social structure by maintaining relative income. However, competition can also increase social status for the most successful fishermen, thus creating inequality.

Although gear restrictions can have unintended social impacts, they have also been used in commercial fisheries with specific social consequences in mind. When implemented as a means of preserving a "way of life," gear restrictions can protect specific segments of a fishery who would not be able to successfully compete if other fishermen were allowed to competitively improve fishing technology unchecked. To that end, gear restrictions can cause conflict within a sector of a fishery, as the restriction may be seen as hindering the technological innovation of some while providing preferential protection to others. Those fishermen that are above the "ceiling" of a restriction will feel that their competitive advantage is hindered and that the restriction unfairly benefits those beneath it. Restrictions like these can also force different segments of a fishery to "meet in the middle," creating a more uniform fishery and, again, impacting social structure and social status. Commercial fishermen are strong believers in equity (Davis 1991, Durrenberger 1997, Pooley et al. 1998, Olson 2006). But they also have a tradition of "highliners," who are the most successful fishermen and therefore earn more than the average, thus acquiring social status as successful fishermen (Brown 2010, Jenkins 2010:endnote 10).

Like many management regulations, gear restrictions that specify how fish are caught may be perceived as overly restrictive and a sign of too much government involvement. The perception of an overbearing government is matched by a sense of frustration caused by increasing regulatory limits on effort. In general, fishermen want to maintain their own catch per unit effort even if limits are placed on overall effort; however, this is frequently not feasible, leading to increasing frustration on the part of fishermen (Smith 1980).

A positive social impact associated with gear restrictions is the potential reduction in regulatory discards; commercial fishermen find it very frustrating to be required to discard fish, especially if the fish are unlikely to survive release, simply because they are over a bycatch or other limit. A gear change to a more selective form of gear can also make other fishing regulations, such as species size limits, redundant and unnecessary. Avoiding the need to discard as many fish in the first place is a positive impact. Time previously spent in discarding prohibited fish can also be redirected toward catching more of the target species, improving efficiency and the bottom line (Villasante et al. 2016). A gear specifically designed to limit bycatch (including of protected species) is called a bycatch reduction device (Ward 1994, Robins-Troeger 1994, Brewer et al. 2006); however, it may lower the volume (but potentially improve the quality) of directed species catch, in addition to limiting bycatch (Brewer et al. 2006).

For recreational fishermen, gear limits include required use of rod and reel or hook and line, different hook types, and minimum/maximum hook sizes. Depending on the species sought and the source of angler satisfaction for that species (e.g., size of fish vs. number of fish), hook size limits may or may not have a significant impact on angler or for-hire captain satisfaction

(see references under IV.a.1., Allocations).

4. Size limits

Size limits for commercial fishermen may be dealt with through gear modifications, discussed above. Commercial fishermen often fish for a particular size that fits the market they serve, e.g., plate sized fish, for instance, or a large fillet. For recreational fishermen, hook type or size (see IV.a.3., Gear Restrictions) may be employed, but fish of the wrong size may simply be caught and released, or discarded if deceased (depending on individual fishery regulations). In recreational fishing, the impacts would be to angler, sport fisherman and for-hire captain satisfaction (see references under IV.a.1., Allocations) and to anglers who count on bringing fish home to eat, especially to those that may be better categorized as subsistence fishermen (Steinback et al. 2009), as well as to sport/tournament fishermen who are looking to win tournaments with the largest fish by weight or length.

5. Trip and fish-based Limits

Certain size categories of vessels or categories of permit holder may be restricted to specific maximum pounds or numbers of fish. Pound levels are generally associated with commercial fisheries, while limits on numbers of fish are generally associated with recreational fisheries (where they are often known as "bag limits"). In commercial fishing, this may result in more fishing trips per day, week, or month for that species, in order to land a desired or required amount of fish. Resulting impacts may include less onshore time for family or other activities, including community activities, or fishing in more dangerous weather with impacts to health and safety. Alternately, fishermen may fish more of another species, potentially requiring gear changes and/or different patterns of fishing. These can also impact onshore time and may require additional expenditures, with concomitant impacts. Trip limits may also impact processors, who may require a specific amount of a particular species at a time to make processing that species profitable. Processors will sometimes switch to other similar local species, but they may also switch to imported fish. This may affect fishermen's ability to sell their catch in the short-term, or even their long-term marketing relationships with processors for that species. This would have economic and social impacts for fishermen and processors, including combined impacts for communities that are both ports of landing and sites of processing plants. In recreational fishing, the impacts would be to angler satisfaction (see references under IV.a.1., Allocations), to anglers who count on bringing fish home to eat, especially to those that may be better categorized as subsistence fishermen (Steinback et al. 2009), and to charter boats that may lose income if anglers are less likely to take trips for certain sizes of fish.

6. Days-at-Sea

Days-at-Sea (DAS) management is an attempt at controlling the overall effort in a commercial fishery by limiting the amount of time a commercial fisherman/vessel may fish.

When coupled with an overall catch limit, however, DAS can lead to overcapitalization from buying larger vessels to catch more fish within the restricted time period (Hilborn 2007). They can also lead to safety issues from fishing in bad weather to take advantage of all available fishing days. DAS may also be implemented for limiting overall catch or discards. Sometimes DAS may be leased or stacked (as in a single owner with two or more vessels combining the DAS from all the vessels into one). There are usually restrictions on when this can happen and/or who is allowed to do so. Determination of the number of DAS for a vessel may be based either on its annual average of days fished during a specific set of years or by categories such as vessel size or gear type. Issues can arise over complaints of miscounting of historical days fished, especially for small vessels and/or small ports, with appeals potentially resulting in increases in DAS for some vessels. On the other hand, assignment of DAS by category can favor vessels that historically fished fewer than the allocated DAS for their assigned category, while negatively impacting any vessels in any category that historically fished more days. While DAS involve an allocation, they are not a catch share because they do not allocate a portion of the catch, just an opportunity to fish.

7. Overall catch limits

Catch limits may be simply an overall limit for the fishery, with individual fishermen limited only by input methods, such as restrictions on gear or trip length. (See Morison (2004) on issues in defining input and output controls.) Such overall catch limits are frequently called a total allowable catch (TAC) or annual catch limit (ACL). When a fishery exceeds the catch limit, fishing may be halted until the end of the fishing year. Or, fishing may continue in the current year, with the final amount overage taken out of the following year's TAC or with a new and more restrictive TAC is set for that following year. Typically, the TAC is set according to scientific recommendations and based on some interpretation of the basic management objective (e.g., to exert a specific fishing mortality, or to maintain the stock at (or return it to) maximum sustainable yield), together with the biological information on the current stock abundance (Gulland 1984). A more restrictive form of an overall catch limit framework, currently used in the U.S., is the Annual Catch Limit (ACL) accompanied by Accountability Measures (AMs) to prevent ACLs from being exceeded, or to correct or mitigate overages of the ACL if they occur. [31] If a fishery approaches the ACL, specific in-season AMs may be implemented to prevent the ACL from being exceeded. If an ACL is exceeded in a given year, AMs must be implemented as soon as possible to correct the operational issue that caused the ACL overage, as well as any biological consequences to the stock as a result of the overage. Without complementary management tools for commercial fishermen, such as gear restrictions or species size limits, and for recreational fishermen, such as bag and/or size limits, fisheries

[31] Under the MSA, in order to set an annual catch limit, first an acceptable biological catch (ABC) is determined; this is a level within which a catch limit may be set and is based on a control rule that accounts for scientific uncertainty. The ABC should support maximum sustainable yield (MSY) within the fishery. MSY is connected to the MSA term optimum yield (OY) as follows: OY is defined as MSY "as reduced by any relevant economic, social, or ecological factor" [16 United States Code (USC) §1802(33)]. And in practice, OY is often assumed to be equal to MSY.

management that is based on a TAC or ACL can cause an increase in regulatory discarding once the catch limit for a given species has been reached. Fishermen interviewed by Rossiter and Stead (2003) complained that their current management based on catch limits forced them to discard marketable fish. Fishermen felt that an alternative management system based on effort (see IV.a.6., DAS) would allow them to retain those fish and reduce their discards. In some cases, a very restrictive quota on a common bycatch species can limit fishermen's ability to fish their target species. That bycatch species is then often referred to as a "choke" species (Baudron and Fernandes 2015, Mortensen et al. 2018). Fishermen may try to work around this by buying additional quota, though if too many individuals are seeking to buy the price increases and less capitalized enterprises, including many owner-operated vessels, may be priced out of the market. This can lead to targeting other species, if feasible, or simply not fishing for certain periods of time or in certain areas, both of which have economic and social impacts. Alternatively, fishermen may establish "risk pools" that can mitigate financial (and therefore some social) risk (Holland and Jannot 2012).

8. Limited access and limited entry

Limited access can cover a range of management rules for commercial fisheries, "from simple restricted permit programs and limited entry schemes to more detailed transferable quota and effort programs" (Pooley et al. 1998:1), some of which we would now define as catch shares (see below). It contrasts with open access, and "derives from the earlier term *limited entry* which referred to license limitation programs. Limited entry meant controlling the total number of fishing vessels, fishermen, or equipment in a fishery" (Rettig and Ginter 1978). Because many fishermen, especially those who operate at small to medium scales, engage in traditional "annual rounds,"[32] they may be less likely to qualify for limited entry than vessels exclusively targeting the species in question, when entry is based (as is frequent) on historical landings. This can, in turn, disrupt annual rounds and push such fishermen into a smaller number of fisheries, leading to less ecosystem-based patterns of fishing (Stoll et al. 2016). The heavier dependence on fewer species also means greater economic risk in the event that one of those species undergoes a poor recruitment year. Farr et al. (2018) find that this increased specialization can also degrade the quality of Local Ecological Knowledge (LEK) possessed by fishermen, just as LEK becomes more relevant as we move toward managing ecosystems, not simply fish.

9. Catch shares

A catch share in the U.S. is a form of rights-based management, though legally it is not a full property right but a revocable privilege. Per the NOAA Catch Share Policy (2010:1), catch

[32] Because smaller vessels have a more limited geographic range, a common strategy involves fishing multiple species across the course of a year as seasonal ecosystem changes bring different fish into the traditional grounds of these fishermen, as well as targeting the species that seem healthy while taking a break on species that have a low recruitment year.

share "is a general term for several fishery management strategies that allocate a specific portion of the total allowable fishery catch to individuals, cooperatives, communities, or other entities." Each recipient of a catch share is directly accountable to stop fishing when their exclusive allocation is reached. The term includes specific programs referenced in the MSA, such as the "limited access privilege program" (LAPP) (established in 2007) and "individual fishing quota" (IFQ), and other allocation strategies such as Territorial Use Rights Fisheries (TURFs) that grant an exclusive privilege to fish in a geographically designated fishing ground" (ibid.).These types of management programs are set apart from other, more traditional, forms of management because they confer a greater level of "ownership" in the form of quasi-property rights to fishermen or other groups or entities. There are three principal types of allocations under Limited Access Privilege Programs (LAPPs) described in MSA section 303A: allocations to an individual person or entity; allocations to a community; and the grouping of individual and/or community allocations under the umbrella of a regional fishing association (see Stoll and Holliday (2014) for more details, and Wingard (2000) on community allocations).

In the United States, the majority of current catch share programs use individual allocations, including Individual Fishing Quotas (IFQs) and Individual Transferable Quotas (ITQs)[33], each of which can be granted to both individuals and entities. (Hereafter, we will refer simply to IQs rather than differentiate between IFQ and ITQ.) Allocations to entities are relatively rare at this point, though they do occur; for example, processors have received quotas in the Alaska Region (Pautzke and Oliver 1997, Matulich 2009) and the West Coast Region (van Putten 2011, Fina 2011).[34]

In general, catch shares have resulted in consolidation, changed the dynamic between fishermen and the supply chain, possibly increased safety, and changed the employment structure of crews. Following initial allocations, there is considerable consolidation as those who receive small allocations and/or have less capital find themselves to be no longer profitable and lease or sell their quota to those seeking more, leaving only the most efficient (or most heavily capitalized) vessel owners. This leads frequently to the creation of owners and renters, "sea lords" per McCay (2012) who in relation to their crew are much like shareholders and sharecroppers on land (Hersoug et al. 2000, Olson 2011, Griffith 2018). In some cases, these vessel owners no longer fish themselves (or may never have fished), meaning the actual wealth may leave the community. Quota privileges may also tend to redistribute ACL out of the control of other social groups, such as Native Alaskans (Carothers et al. 2010). While some catch share programs do restrict use, transfer, and ownership in an attempt to maintain the character of the fleet these are not always successful (Szymkowiak and Himes-Cornell 2015). Catch shares also often lead to increased costs of entry, making it difficult for young people to enter the fishery (Volz 2005, Christensen et al. 2009, Pinkerton & Edwards 2009, van Putten & Gardner 2010, Lynham 2013). The ability of fishermen to choose when they fish under IQs may change the dynamic between fishermen and processors. Fishermen can wait to harvest their quota when the price is best and they can choose where they sell their fish, as they are no longer limited by

[33] Though initially these were differentiated in that ITQs were transferrable while IFQs were not, this distinction has largely become null.

[34] Those in the Northeast Region should be aware that the Multispecies Sectors Program, while appearing similar to a LAPP, is not a LAPP (for more on this see Clay et al. (2014) and Colburn et al. (2017)) and therefore is not governed under section 303A of the MSA.

which processors have the capacity to process the glut of fish associated with a derby. Longstanding social relations between processors and fishermen (Wilson 1980), the number of processors within a reasonable distance of the fishing grounds, or additional regulatory actions may, however, mitigate this freedom to choose. Safety may improve as fishermen shift from the competitive "race to fish" to longer seasons and as less economically profitable vessels (often older, less safe vessels) are retired. Windle et al. (2008:707), however, found that where there are leasing or certain other agreements between fishermen and processors or other companies, safety may instead be compromised. Lastly, fishery employment patterns generally change: the number of active vessels and crew positions drop dramatically, crew may be transitioned from being paid in shares to salaries, and crew time off to engage in other jobs or activities is often reduced due to longer seasons (Olson 2011). For more detail on the range of potential social impacts from catch shares, see Olson (2011), Lord (2011), Colburn et al. (2017), and Griffith

Table 1. Examples of social impacts that fisheries management changes may produce.

Social impact	Closed areas	Gear changes	Days at Sea	Size Limits	Catch limits	Trip Limits	Limited Access	Catch shares
Relocation of fishing grounds/ displacement of fishing effort	X	X	X		X			X
Increase/decrease crowding	X	X	X		X		X	X
Increase/decrease gear conflicts	X	X	X		X			X
Increase/decrease in CPUE	X				X		X	X
Increase/decrease in food security	X			X		X		X
Increased cost to participate in fishery	X	X			X			X
Change to family and community life	X		X				X	X
Increased/decreased safety at sea	X					X		X
Relocation of fishermen and processing facilities	X							X
Change economic and social structure of community						X	X	X
Change in job/angler satisfaction	X	X	X	X	X	X	X	X
Change in composition and character of fleet							X	X

Social impact	Closed areas	Gear changes	Days at Sea	Size Limits	Catch limits	Trip Limits	Limited Access	Catch shares
Change in composition of fishing support services	X							X
Uncertainty regarding future regulations		X					X	X
Opportunity to expand fishing efforts		X					X	X
Pressure to keep up with competition		X						
Ability to preserve way of life		X		X	X		X	X
Increased criticism of government or perception of overbearing government		X		X			X	X
Changes in occupational opportunities/consolidation			X				X	X
Changes in discarding of marketable fish		X		X	X	X		X
Increased/decreased fishing season					X			X
Change in relationship between fishermen and the supply chain						X		X

(2018).

Further, another factor that may interact with any of the above are the various impacts of climate change as described and measured in, for example, Colburn et al. (2016), Pörtner et al. (2014), and Griffis and Howard (2012).

b. Whom does the regulation affect?

Assessment of impacts begins by looking at the specifics of the regulation, assessing likely social and cultural impacts, and then connecting to the results of the economic impact analysis. The type of regulation will give you a sense of the kinds of social impacts that might occur (see above). The results of the economic analysis will help you to discern those impacted more severely economically, and those economic impacts will have their own associated social impacts. So it is important from the beginning to coordinate with the economist on your plan team. Both long-term and short-term impacts of any particular management measure may be negative or positive (and large or small).

1. Interest/Fleet-based Groups

Changes to current regulations may primarily impact those in certain permit categories, those with certain size categories of vessels, those fishing with certain gear, those fishing in certain areas, or some other sub-group of fishermen. Specific permit categories may be added, eliminated, or have their status changed in some way, e.g., increasing the trip limit, decreasing the allowed days-at-sea, switching to a limited access or catch share status. Smaller vessels, as noted above, may be more impacted by the introduction of closed areas, limited access, and catch shares. Regulatory actions may specifically target vessels using nets by increasing the required mesh size, or pots/traps by limiting total numbers an individual may have in the water at any one time, or trawls/dredges by declaring certain areas of sensitive bottom habitat off limits. Implementation of limited access or catch shares may exclude or severely limit fishing by vessels that do not meet the identified qualifying criteria.

2. Place-based Communities

Only the Western Pacific Region has currently officially defined MSA "fishing communities." NMFS, however, "has provided operational guidance relative to social and community impacts to Regional Fishery Management Councils since 1991" (NMFS 2007:4), prior to the creation of an MSA definition of fishing community. So all regions should analyze at the level of community and assess their relative economic and social dependence on fishing and related industries. For the sake of simplicity, in the remainder of this document we will use the term "fishing community," unless otherwise specified, to mean both an MSA fishing community and in its generic definition as a community involved in fishing.

Once you know, based on the proposed regulations and the economic analyses, the distribution of impacts across fleet-based groups, you can begin to figure out in which

communities these groups are found in the highest concentrations. Analyses at the community level are important because place-based coastal "fishing communities," as defined under the MSA, require specific examination under MSA National Standard 8 (also known as the communities standard) (16 U.S.C. § 1851(a)(8); see also Clay and Olson (2008) and Rowan (2009)). Within the academic literature, Clay and Olson (2007) suggest:

> A number of important themes nonetheless emerge from the literature that appear relevant for artisanal and industrial fisheries, and widespread geographic locations: (1) a certain level of visible connection to the industry (boats, gear, fishing-related businesses) and other infrastructure elements; (2) connections among on-land and at-sea networks[35];(3) the frequent role of kinship in the labor process; (4) multiple household- and family-level ties to fishing (with many fishermen, different generations, and gendered fishing-related tasks); and (5) the frequent persistence of a sense of a cultural connection to fishing through changes from small-boat to large-boat, family to industrial, commercial to recreational fishing and even to fishing-related tourism that involves little actual fishing activity. The infrastructure variable appears especially important, as seen from the perspectives of both fishermen (Jacob et al. 2005; Olson and Clay 2001; Robinson et al. 2003, 2005) and researchers (Hall-Arber et al. 2001:3, Hall-Arber 2007; Ingles and McIlvaine-Newsad 2007).

Aggregating communities can take place by port of landing, principal/primary port of landing, homeport, or home address. The range of these options that are available to you varies by region; some will be in permits databases and others in landings databases. Port of landing is self-explanatory, the port where a vessel lands at the end of a trip. Analyzing fleet-based groups within these communities requires landings databases and sometimes observer databases (e.g., for mesh sizes, or dredge lengths). Principal or primary port of landing is the port of landing where the majority of a vessel's landings take place. A vessel's homeport is where the vessel docks between trips. Home address is the address of the permit owner. Homeport and home address may or may not be the same community. Where they are different, this may be due to gentrification (see Colburn and Jepson 2012) that forces fishermen to move away from the waterfront.

i. Choosing which communities to focus on for the SIA

Multiple factors can be considered in choosing the communities to focus on for the SIA. Ideally, multiple criteria are used, though the ability to use multiple criteria is based on the availability of data, which will vary by region. Minimum types of data to consider are landings, value, unique dealers, and number of permits in the fishery of concern. There are also indicators that include some or all of these: Fishing Engagement, Fishing Reliance (both from the NOAA Community Social Vulnerability Indicators), Regional Quotient, and Local Quotient. Counts of processors and other shore support businesses can also be helpful. The Office of Science and

[35] On this point, also see St. Martin (2001, 2006) and St. Martin and Olson (2017).

Technology's (OST) Fisheries Statistics Division conducts a voluntary Processed Products Survey annually.[36] OST in 2013 conducted a Recreational Bait and Tackle Economic Survey (Hutt et al. 2015).[37] Looking to the academic literature and to NMFS or Council reports (sometimes called "gray literature" can be helpful. There may also be relevant studies in your Region. In the Northeast, for example, infrastructure such as processing, boatyards, and chandleries[38] was identified as increasingly concentrated in a few "hub ports," (Robinson et al. 2003, 2005[39]; Brewer et al. 2004; Hall-Arber et al. 2001; Hall-Arber 2007; Mt. Auburn Associates 2009; Brown et al. 2017). Stakeholder interviews are also useful, and some pertinent interviews may be available on the NMFS oral history site, Voices. In fact, it may be most effective to combine data gathered through more than one method, as each method may measure slightly different aspects of a given issue or topic. In some cases data relevant to your SIA may already exist, but in other cases some new data collection may be needed. These new data may be acquired by a variety of methods of querying stakeholders, as described briefly below. (For more detail on data collection methods, see Appendix C, section 3.). Many or all of these data, depending on the regulatory action in question, should be described in detail in the AHE and then referenced in the SIA as summary data.

- Fishing Engagement and Fishing Reliance

Fishing Engagement measures the importance of fisheries to a given community relative to other coastal communities in a region. Fishing Reliance is a per capita measure of engagement; it allows smaller communities with small fishing fleets to still be represented as having a strong involvement in fishing if a large fraction of their population is involved in fishing, even if they do not appear heavily involved in absolute terms (Jepson and Colburn 2013, Colburn et al. 2017). These indicators can be developed based on the aggregate of all species landed in a community or as individual species/species group Fishing Engagement and Reliance. See Appendix C, section 2 for technical details.

- Regional Quotient and Local Quotient

The Regional Quotient is a measure of a community's contribution to regional landings or value for a particular species or species group. It is expressed as a percentage (community landings of species or species group/total regional landings of species or species group, or community value of species or species group/total regional value of species or species group).

[36] Because it is voluntary it does not necessarily provide a 100% count, but is nonetheless informative. Certain confidentiality rules apply to use of the data. FSD employees can provide details.
[37] https://www.st.nmfs.noaa.gov/economics/fisheries/recreational/Bait-and-Tackle/bt-survey-2014.
[38] A ship chandler (or ship's chandler) is a retail dealer who specializes in supplies or equipment for ships, known as ship's stores. They supply the crew's food, ship's maintenance supplies, cleaning compounds, rope, etc. The advantage of using a chandler is that the captain/crew do not have to find or visit multiple stores in each port where they land, but can use the chandlery as a one-stop shop.
[39] Additional port-based reports for the Northeast Region are available for download at http://seagrant.mit.edu/cmss/comm_mtgs/commmtgs.html.

The Local Quotient is a measure of the importance of a particular species or species group relative to all species landed in a community. It is expressed as a percentage (community landings of the catch share species or species group/total community landings of all species, or community value of the catch share species or species group/total community value for all species) (Colburn et al. 2017).

- Querying stakeholders

The first place to turn for information from stakeholders is the Scoping Meetings held when a Council is planning a regulatory action. These meetings are held in selected fishing communities throughout the region associated with the species or species groups for whom a regulatory action has been determined to be necessary. These are fora where members of the public (including fishermen, processors, town officials, environmental groups, and others) can express their views of likely impacts of the proposed action and offer alternatives they would like to see considered[40]. If at all possible, attend all these meetings. Where this is not possible, the meetings are recorded and audio files or transcripts will be available upon request from the Council. There will also be letters and emails submitted for the public record. It is important to remember, however, that not all fishermen can afford to take the time off and travel to the nearest meeting or feel comfortable writing a letter to the Council. So, opinions and data offered in these ways may not represent either a random sample or complete coverage of the views of expected impacts that may occur.

Direct querying of stakeholders is the next step, as needed. Begin with the communities already identified as important. Due to time considerations, querying stakeholders will often be done primarily through semi-structured interviews and, potentially, focus groups. Both semi-structured interviews and oral histories are discussed in detail in Appendix C, sec. 3. Focus groups are discussed in more detail in Appendix C, section 4.A good place to begin finding people to interview is often the NOAA Fisheries port agents who work for the NMFS Regional Office in many regions (search "port agent" on the regional office website to see if your region has port agents). Each port agent covers a set of communities within a state or several adjacent states. They can usually provide a few names (with contact information) of local fishing industry members who are knowledgeable and also have a wide circle of contacts. Another source may be fishing associations in your region whose members would be affected by the regulation in question. You can then begin with these individuals and use the snowball (or purposive sampling) method (Bernard 2006:192-195) to extend the set of interviewees. More information is found in Appendix C, section 3. In this portion of your data collection, you will be asking fishermen (and possibly dealers or processors) which communities they consider to be the key or most important communities for this fishery – and why. The "why" is as important as the names of the communities, as it may uncover social or cultural values that the other methods do not measure (see Rossiter and Stead 2003, Hall-Arber et al. 2009, Urquhart et al. 2013). If you have sufficient advance notice of a regulatory action, you may be able to field a survey for information you feel to be relevant and that is not already available. For details on requirements

[40] For more on scoping meetings and other procedures related to NEPA, see https://www.nepa.noaa.gov/docs/NOAA-NAO-216-6A-Companion-Manual-01132017.pdf.

under the Paperwork Reduction Act (PRA) see section IV.B.4.iii, below. Also see Appendix C, section 5 for more details on surveys, including Paperwork Reduction Act (PRA) requirements (also see U.S. OPM 2011, Executive Summary), for *any data gathering method in which ten or more people will be asked identical questions.*

3. Social Groups

How is this different from figuring out the fleet-based groups discussed above? These groups are based on social relationships such as membership in particular occupational groups or residence in specific communities. Social impacts of fisheries management actions vary depending on which social groups one analyzes; however, the key groups to study for social impacts of fisheries can be divided into those experiencing *direct* versus *indirect* versus *induced* impacts of the regulations. Those directly impacted may include commercial, recreational, and subsistence fishermen, and minority and low-income fishing populations. Those indirectly impacted may include commercial and/or recreational fishing-related business owners. Those with induced impacts include members of the broader fishing community. The following describes common potential social impacts on each of these groups. Also see Pollnac et al. (2006) for helpful information and clear graphics on flows of impacts.

i. Fishermen – direct impacts

There are three primary categories of fishermen: commercial, recreational, and subsistence[41]. In some regions the subsistence fishing is on purely non-federal fisheries and does not fall under NOAA Fisheries' purview. In others, subsistence fishing may be associated primarily with tribes or other indigenous groups, and may be referred to as customary use fishing. Fishing by tribes and indigenous populations will require familiarizing yourself in detail with the laws, guidance, and procedures related to these groups. Seek out regional experts and the NOAA Tribal Liaison at NOAA Fisheries headquarters. See also Appendix A and Appendix B. Yet a third category of wholly or partly subsistence can be found among recreational fishermen who depend on eating all or part of their catch (Steinback et al. 2009).

- Commercial

The social impacts of fisheries management measures will depend on multiple factors, including the species being managed, the geographic area where the fishery is prosecuted, the relevant fleet-based group characteristics, and the levels of social vulnerability and fishing dependence for the place-based fishing community (as measured by indicators and other methods). There could be significant, long-term social benefits from management measures that end overfishing. When overfishing on these species is stopped and biomass is rebuilt, models

[41] NMFS does not have an overarching definition of subsistence fishing. However, under the Alaska Subsistence Halibut program it is defined thusly: "Subsistence halibut is halibut caught by a rural resident or a member of an Alaska Native tribe for direct personal or family consumption as food, sharing for personal or family consumption as food, or customary trade."

predict that the fish stocks will be of such an amount that fishermen will be able to expend less effort to land the same or similar poundage of fish as they land currently. However, short-term impacts of regulations designed to end overfishing may be positive, negative (and large or small). Any one proposed management action by itself may have long- or short-term impacts on either the recreational or commercial sector, or both. In some locations there may also be impacts to subsistence fishing, either directly or through impacts to those in the recreational sector who may rely on the fish they catch for subsistence purposes. It is also important to remember cumulative impacts: social impacts may be more severe or threatening to the sustainability of fishing communities when considering the entire suite of proposed management actions and other state and regional fishery regulations and community changes. The totality of these management actions could be severe enough to dislocate a substantial number of fishermen, dealers, and related industries and cause changes to the economic and social structures of communities. If this occurs, when the stocks are rebuilt there may not be a fishing industry in place that is structured or has the expertise to take advantage of improved fishing conditions for each species for which reductions in catch were originally implemented. However, such phenomena might also occur should adequate corrective action not be taken immediately and a continued drop in a fish population occur, resulting in more stringent management measures in the future.

- Recreational

As with the commercial sector, the long-term benefits of ending overfishing and rebuilding overfished stocks to the broad group of recreational fishermen (anglers) in a region is hard to predict. As less is generally known about the social structure and aspects of the recreational sector, it is even more difficult to predict what future conditions may be and how recreational fishermen will benefit from more healthy stocks. It is expected that with increasingly healthy stocks, recreational anglers will catch more fish per trip, and thus reap the benefit of increased angler satisfaction. However, similar to the situation with the commercial fishery, the composition of the recreational sector and associated industries may adjust during the recovery period such that the same individuals and entities that bear the short-term adverse impacts may not receive the future benefits. As with commercial fishermen, impacts to the recreational sector will vary across sub-sectors, in this case: private anglers vs. for-hire vessels (charter boats, and party/head boats) and traditional anglers vs. sport fishermen vs. those who depend on catching fish as food. Another way to analyze impacts to recreational fishermen may be women vs. men (Gaynor et al. 2016).

Charter boats charge a group of anglers for a trip. Party/head boats charge individual anglers for a place on a trip. In general, the short-term, adverse social impacts from a proposed management measure may be minimal for the private recreational angler. Charter boats may adapt to lower bag limits and increased size limits by shifting effort to another type of fishing. Headboats or party boats have the least amount of leeway to change their fishing behaviors and, therefore, may experience the most negative impacts, at least in the short-term. However, if stocks rebuild quickly, they and all recreational sectors will experience positive long-term benefits.

- Subsistence

NMFS has no general definition of subsistence. However, the federal halibut fishery has a subsistence category: "Subsistence halibut is halibut caught by a rural resident or a member of an Alaska Native tribe for direct personal or family consumption as food, sharing for personal or family consumption as food, or customary trade."

Subsistence fisheries often support community well-being through food security and cultural importance. In fact, subsistence fishing is so important fishermen may subsidize their fishing with income from a paying job (Veltre and Veltre 1983:185-193; cf. Natcher 2009:88 on subsistence hunting; also see Kruse 1991:324-325 on why subsistence activity persists in the face of available wage income). There are also often interactions between subsistence fisheries and commercial fisheries. For example, in the Bering Sea where subsistence salmon fisheries are crucial for the health of Native Alaskan communities in Western Alaska, there are conflicts with the commercial pollock fishery that has historically caught salmon as bycatch. Conflicts between subsistence and other fishing sectors can cause cascading effects throughout subsistence fishing communities that affect every part of their way of life.

- Tribes

The United States is home to a significant number of federally recognized Native American tribes.[42] As sovereign nations, they are privy to a unique and distinctive relationship with the federal government compared to states and other entities. There are a number of legal requirements that federal fisheries managers must take into account, including respecting the rights of the tribes to set their own priorities and make decisions that affect their resources and distinctive way of life. In order to successfully meet these requirements, effective and open working relationships and regular consultations between fisheries managers and tribal representatives are imperative. Tribes are, in fact, equal partners in managing some fisheries and are entitled to a portion of the allowable catch in their traditional and customary areas.

- Other Indigenous Groups

The Western Pacific Regional Fisheries Management Council has codified the inclusion of social considerations in Fishery Ecosystem Plans (FEP). It is the only region that officially designated MSA fishing communities through the rulemaking process – as amendments to the region's FMPs, now FEPs (64 FR 19067, 68 FR 46112). Fishing communities in Hawaii are defined at the archipelago island scale, with the recognition that individuals who are substantially dependent on or substantially engaged in the harvest or processing of fishery resources are not set apart from island populations as a whole (Environmental Assessment for establishing American Samoa, Guam and Commonwealth of the Northern Marianas Islands fishing communities and Environmental Assessment for establishing Hawaii's communities). An omnibus amendment for all FEPs in the region also created a mechanism for including social, ecological, and management considerations in setting Annual Catch Limits (Environmental

[42] Currently, there are 573 federally recognized Native American tribes. See 84 FR 1200 (Feb. 1, 2019).

Assessment, 50 CFR Part 665.4). In addition, the draft revised FEPs include social and cultural objectives that must be considered when developing new rules (e.g., see Objectives 4 and 7 in the FEP for the American Samoa Archipelago). All these must be taken into account in the SIA.

- Minority and Low-Income Populations

There are specific federal requirements under Executive Order 12898 for consideration of impacts on minority and low-income populations in federal decision making. (See Appendix A for more on the law and Appendix B for two key policy directives.) These populations must be identified and fully considered in any SIA (NMFS 2007:6). The Interagency Working Group on Environmental Justice (IWGEJ) (further discussed in Appendix A, under E.O. 12898) has published a helpful report for analyzing these populations (IWGEJ & NEPA Committee 2016). Note that this report is not official guidance or a legal requirement.[43] The U.S. Environmental Protection Agency's Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples and the Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity are also useful documents to consult. For guidance on determinations of what is a "low income population," see the definition in Appendix B under CEQ guidance on Environmental Justice under NEPA, as well as this 2015 FEMA procedure:

"A low income or minority population can be identified where either:

- Low income or minority individuals constitute more than 50% of the population of the project area; or
- The percentage of low income or minority individuals in an affected area is twice that as the county or state as a whole (for example: 30% of the project area is low income but only 15% of the county is low income)."

Suggested methods for making this determination include data from American Factfinder and "interviews with [knowledgeable] representatives from local schools, health and human services, places of worship, local businesses, and community representatives and leaders." Number of fishing permits relative to overall population may provide approximate percent fishermen in the community, and total landed value relative to total income for a community may give some sense of relative wealth/poverty. These are, however, very rough methods and care should be taken not to overstate them. Ethnographic data on the specific fishery of interest and its distribution across communities may be compared in a general manner to the overall race/ethnicity distributions within communities; the Population Composition Index within the CSVIs may also prove helpful here.

IWGEJ & NEPA Committee (2016:14) further suggests "scoping meetings", though if "more than 15-20 people are in attendance, breaking into discussion groups may improve the effectiveness of the meeting." To be formal scoping meetings, they would likely need to be held by the regional Council, though these should be separate from the scoping meetings held for specific proposed regulatory actions. An alternative would be a set of focus groups, though this would be a large undertaking. One option to assist in being more generally prepared for assessing environmental justice in SIAs would be to plan for these every 5-10 years, as the results may be relatively stable over time.

[43] See report for full disclaimer.

NOAA Fisheries' Community Social Vulnerability Indicators may also be helpful in this determination. While the CSVIs assess at the full community level, rather than the level of the fishing population within the community, it is notable that fishing communities from Maine to Texas tended overall to have higher levels of poverty and more social vulnerabilities than other coastal communities in that same region of the U.S. coast (Colburn et al. 2016), even though within the set of fishing communities there is still a broad range of poverty and vulnerability levels.

ii. Fishery-Dependent Shoreside Businesses – indirect impacts

Fishing operations and shore-based support infrastructure are interdependent. All fishermen depend on the existence and condition of a variety of support businesses to maintain their fishing activities. Likewise, the owners of fisheries support businesses rely on the health of fish stocks and success of the fishermen for their own well-being. As such, the impacts of fisheries management measures on fisheries support businesses are also important to consider in SIAs (National Standard 8 and the National Standard 8 Guidelines). Businesses related to commercial fishing that fall under this category include: dealers, processors, canneries, chandleries, boatyards, net makers, commercial docks, and ice vendors. Businesses related to recreational fishing that fall under this category include bait-and-tackle shops and marinas. Regarding infrastructure, Brewer et al. (2004:16) note the importance of both quantity and location of infrastructure, and of the critical ties infrastructure placement may create between communities:

> The Gloucester Community Panel identified infrastructure essentials (see their panel Report [Robinson et al. 2003]) for an active fishing port. The Panels Project has found, however, that some fishing communities do not have all of the requisite elements in their own community and must go to a larger fishing port (hub port) to obtain the required services. This may make the dependent ports more vulnerable, having less direct influence on the community upon which they rely but do not live. Moreover, federal regulations require fisheries managers to analyze socio-economic impacts on place-based fishing-dependent communities (National Standard 8 of the Sustainable Fisheries Act), but do not necessarily take into account the networks of dependency between the hub ports and their satellites.

iii. Local Communities – induced effects

Impacts to fisheries affect even the non-fishing residents of a fishing community and local businesses that are not involved in fishing. This is because they benefit from the economic contribution of fisheries to the local economy, services, and infrastructure. For example, the presence of fishing activity in a community may provide the population or economic base that makes operating a grocery store or maintaining a school in the community possible.

4. What are key social factors to examine?

The official SIA guidance describes five types of social factors that should be examined. The five social factors (NMFS 2007, Sec. 2.2, p.1) are quoted below, though placed in a numbered list and emphases added for ease of reading:

1. First, the *size and demographic characteristics of the fishery-related work force* residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.
2. Second, the *cultural issues of attitudes, beliefs and values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding behavior of fishermen on the fishing grounds and in their communities.
3. Third, the effects of proposed actions on *social structure and organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities.
4. Fourth, the non-economic social aspects of the proposed action or policy; these include *life-style issues, health and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats*.
5. In addition to these four variables, one other variable is related to MSA actions. This social factor is the *historical dependence on and participation in the fishery* by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights (N.B. actually, privileges).

i. Do I need to address everything listed?

When writing your SIA, it is not necessary to specifically reference all or any of these five factors as described above in the italicized text. However, you should think about these general categories when planning your SIA and looking at likely impacts, based on your review of the proposed regulatory actions, the fleet-based groups, the social groups, and the place-based communities. Not all may be important for a given regulatory action; those that are not, need not be addressed. Similarly, you may find that single elements of the more extended description, (e.g., employment, attitudes, importance of fisheries to local social structure, safety) are important, while others are not. You can simply address those individual components without describing them as part of the broader social factor.

ii. How do I assess the social factors relevant to my SIA?

For those social factors or their individual elements that do seem relevant to a particular SIA, there are a variety of assessment options available. For instance, some of the size and demographic characteristics may be possible to determine with number of permits (by category, if pertinent) owned by residents and/or number of vessels landing the species in question in a community, as compared with data from the U.S. Census Bureau on number of residents or total employed individuals or data the economists in your region are likely to have from input-

output (I/O) models. Or, landed value could be compared with overall income or employment from the census data. These are, of course, imperfect measures and may or may not be critical to the regulatory impacts you need to discuss in a particular SIA. Many of the cultural issues can be found in the literature for your region, if not always for individual communities. Semi-structured interviews and oral histories can also provide cultural data. Changes in social structure, for example, have been found for catch shares and limited access in a number of different fisheries and cultures (see section IV.a.9. on catch shares, above), and these examples from the literature can be applied as potential outcomes of an SIA that includes these management measures. There is a literature on safety in fisheries that can be applied as possible outcomes (some from the catch shares literature and some more general, see also IV.a.6., Days-at-Sea). There are a number of studies of recreational fishing, including the for-hire vessels (charter boats and party/head boats) that discuss what impacts are most likely within the recreation sector. Historical dependence can be assessed through time series of permits and landings, through the literature, and by looking at the initial FMP documents for the fishery in question. See section VIII, below, and Appendix C for more details on acquiring data.

iii. What are the key methods for finding the data I need?

First, remember that you need to consider your available time and resources. In other words, what is the timeline for preparation of the SIA? What methods are feasible to use within that timeframe? How large is the change being implemented? How many people and communities will be affected? And will any of the methods you are considering require a filing under the Paperwork Reduction Act (described below)?

- The Paperwork Reduction Act (PRA) process

Before beginning any data collection, familiarize yourself with the Paperwork Reduction Act, or PRA[44] (U.S. OPM 2011, Executive Summary), a federal law designed to:

  - Minimize the paperwork burden on the public and other entities.
  - Ensure the greatest possible public benefit from and maximize the utility of information created, collected, maintained, used, shared, and disseminated by or for the Federal Government.
  - Improve the quality and use of Federal information to strengthen decision making, accountability, and openness in Government and society.
  - Minimize the cost to the Federal Government of creating, collecting, maintaining, using, disseminating, and disposing of information.

The PRA applies when a federal agency seeks to collect information using identical questions posed to 10 or more persons. Large-scale surveys, thus, always require PRA clearance. Focus groups for the purpose of beta testing a survey will require PRA, but be

[44] 44 U.S.C. § 3501 *et seq.*

included in the PRA package for the survey rather than require a separate PRA package. This includes any NOAA-funded contracts for external companies or institutions to conduct surveys on NOAA's behalf as well as to Council members and staff, who are considered to be federal employees, for purposes of collecting information from the public, per the Headquarters Office of NOAA General Counsel. Focus groups that are essentially group interviews focusing on general questions, as described here below for oral histories and semi-structured interviews, will not be subject to PRA. Oral histories and semi-structured interviews do not utilize an identical set of questions, but instead a general set of topics, not all of which may be covered with any particular interviewee. As such, PRA does not apply to them.

It is important to keep in mind that preparing a PRA package generally requires time and, once submitted to OMB, the clearance process will generally take four or more months for processing. The package may then be sent back with questions and then need to be resubmitted. All this must be taken into account in survey planning to ensure that the survey can be developed, approved, implemented and analyzed in time for use in the SIA. Find out who the PRA specialist for your region is. They are invaluable sources of information and assistance when preparing a PRA request. For additional information see Appendix C, sections 3, 4, and 5.

- *Literature review*

Literature reviews can be one of the most useful sources of information for an SIA. The purpose of a literature review is to identify existing research and information about the chosen topic. In the case of an SIA, this refers to the fishery of interest and the proposed management alternatives. The literature can include articles in academic journals, NOAA Technical Memoranda and other reports, and "gray literature" such as previous EIS documents for the fishery in question. These can then be summarized and used in the SIA to complement and explain findings based on current fishery-specific data. There are free literature search sources, such as Google Scholar, Researchgate.net and Academia.edu. NOAA also has access to certain databases, such as Wiley, JSTOR, and ScienceDirect, through an agency-wide agreement. Contact your local NOAA Fisheries librarian for details. Other databases, such as AnthroSource, are dependent on membership in a professional society (here, the American Anthropological Association). You may also have access to other specific journals through a professional society membership, such as *Fish and Fisheries* through the American Fisheries Society or *Human Organization* through the Society for Applied Anthropology. Also see Bernard (2006, chapter 4).

For historical perspective on fisheries participation look at available Community Profiles in your region, as well as the original and some more recent FMP documents in your region. Other gray literature may also be available in libraries, including the NOAA Fisheries Science Center libraries, or on your region's NOAA Fisheries Science Center or Regional Office website. Reports will likely be available, for instance, on any social or economic surveys conducted in your region. Results may be published as journal articles, technical memoranda and/or reference documents. Talk to your social scientist[45] and economist colleagues.

[45] Within NMFS "social scientist" is a job title used for any social scientist who is not an economist. Economists have a separate job title.

- Secondary data

Secondary data can include simple counts of landings and permits (including broken out by relevant permit categories) by community. Other potentially useful data includes census data, information on processors, and counts of bait and tackle shops (discussed under VI. Social Groups). There are also various indicators and sets of indicators that can be constructed from these data. These include the regional quotient (RQ), the local quotient (LQ), and the Fishing Engagement and Fishing Reliance indicators from the NOAA Community Social Vulnerability Indicators (CSVIs) that are discussed in V.b.1, "How do you choose which communities to focus on in your SIA?" and on which more detail is provided in Appendix C.

While the individual CSVIs are used in that section to choose the group of communities to examine more closely, in this section the various fishing dependence indicators and the Social Vulnerability and Gentrification Pressure Vulnerability indicators from the CSVIs (Colburn and Jepson 2012, Jepson and Colburn 2013, Colburn et al. 2017) are used to compare communities under each proposed measure. For instance, if individuals with category A permits will be affected, which communities have the most category A permits, and which of those are most involved in fishing (per LQ, RQ, Engagement, Reliance), socially vulnerable, and under gentrification pressure? Or have the most processors, etc.? Further, there are additional CSVIs that provide relative vulnerability of communities to various aspects of climate change, which will increasingly interact with the social and fishing vulnerabilities. Additional detail on all these community vulnerability indicators can be found in Appendix C, section 2.

- Primary data

  - Semi-structured interviews and oral histories

In-person interviews are preferable because you have the added information available through facial expressions and body language. In addition, you develop trust and rapport when you can make eye contact with the narrator and respond physically (but silently) to their statements - smiles, silent laughter, nodding your head, eye contact, etc. Also, the audio is a better quality recording. For an oral history or a long semi-structured interview[46] you should plan, if at all possible, for in-person interviews. There are tools for remote interviews if that is your only option (e.g., Zencaster, Report I), though they are also more expensive. However, for a quick touch base on a single topic, like the expected impact of a particular regulation, a phone interview with notes can suffice. These short, targeted phone calls would not be uploaded to Voices. See discussion above in section V.b.1.iii., Querying Stakeholders, for information on finding people to interview. For more information on conducting interviews, including obtaining proper permissions, see Appendix C, section 3.

[46] What we describe here as a semi-structured interview actually falls somewhere between Bernard's (2006:210-212) definitions of unstructured versus semi-structured interviews. However, conducted as we describe, these interviews are not subject to the PRA.

- *Semi-structured interviews*

A semi-structured interview involves a systematic choosing of interviewees and clear set of questions. In conducting research for an SIA, you will frequently use the semi-structured interview. In this case, rather than asking about key communities you will be asking about regulatory actions. You can ask a few key questions regarding specifics of the proposed regulatory changes or you can list the regulatory changes and ask what they expect would be the impact of these measures, and why. Remember that for fewer than ten people you may ask questions in a survey format. For ten or more, either conduct a formal survey (see section below on Surveys) or use a set of themes (see below on Oral Histories). Depending on what time you have available, you may conduct these in person or by phone. Your initial notes, taken during the interview, can then be fleshed out immediately afterward. General themes will emerge simply from reading through these compiled interview notes.[47] That is often enough for the SIA. If you feel more detailed analysis is needed, see Appendix C, section 2.

- *Oral Histories*

Oral histories are especially helpful for information on cultural values, social structure, local ecological knowledge, and changes over time. They can fill in gaps in the historical record, especially for marginalized groups. They can also be used to look for common impacts to specific regulations like those proposed for the action you are analyzing. The ability to conduct new oral histories for a specific regulation will depend on how much advance notice you have of the likely specifics of an action. Beyond this, using available time unrelated to specific regulatory actions to conduct oral histories is still useful, as they build the available database of oral histories that can be searched at any time and may provide insights to a particular action even if they were not done for that purpose. See additional information in Appendix C, section 2.

- Focus groups

Focus groups that involve a facilitated discussion (facilitated by you, a colleague, or a professional) around a set of topics or themes do not fall under the PRA, section IV.b.4.iii under the Paperwork Reduction Act (PRA), per NOAA General Counsel. These groups are typically between 6 and 12 people. Usually, a set of 3-5 focus groups is held on different dates and in different locations, to allow attendance by geographically dispersed members of the target interview group. Focus groups as a stand-alone method provide valuable insight into understanding the impacts of fisheries management measures through the collection of qualitative data from fishery stakeholders (Lew and Himes-Cornell 2011). For more detail on focus groups, see Appendix C, section 4.

Two variations on a standard focus group are Q-methodology, which involves up to 40-60 people divided across multiple focus groups who pile sort views on a topic, views which are then

[47] Sometimes, for general background or quick confirmation on a point, or to ask just one or two quick questions, all that may be required is a short in-person or phone conversation. This does not generally require a recording or a release form; notes are sufficient.

run through a factor analysis. The other is the Delphi method, in which experts on a topic either conduct multiple rounds of pile sorts or answer multiple short questionnaires[48], with discussion in between, in order to come to a consensus. More detail on these is also provided in Appendix C, section 4.

Focus groups for the purposes of beta testing a survey do fall under the PRA, as described above in section IV.b.4.iii under the Paperwork Reduction Act (PRA), and will need to be part of the PRA package for the survey (more on this in the following section). In this situation, they can also be used in the preliminary stages of survey development to refine answer categories for multiple-choice questions and to narrow questions to those most effective in soliciting the information you are looking for (Bernard 2006).

- Surveys

There is rarely sufficient time to develop a survey focused on a particular management action, unless it is a major action and you are aware of its development a year or more in advance. Your region, however, may have one or more regular periodic socio-economic surveys that provide broadly useful baseline data which can be supplemented by interviews or focus groups. Before undertaking a survey for a specific regulatory action, however, NOAA staff writing SIAs should investigate whether survey research has already been done on the fishery of interest and whether the results of that research would provide insight for the management measure under consideration. If there are no applicable socio-economic surveys, you may be able to secure permission and funding to begin such a survey. Consult your NMFS and Council colleagues in other regions about what surveys they may have fielded and what questions they asked.

Such periodic surveys (or a focused survey on a particular proposed regulatory change) can give insight into potential impacts of a potential or proposed management measure or the impacts of past measures. They can give a better idea of people's expectations of how they would deal with anticipated impacts, how they feel about the fairness of a potential or proposed measure, and how well they understand the specific measure or the general category of that measure (e.g., a particular closure vs. closures in general). They can be used to collect information on the characteristics, attitudes, opinions, and behavior of fisheries stakeholders. Surveys can also be retrospective and help quantify impacts of a management measure that was introduced in the past by collecting the perspectives of fishery participants to better understand what ultimately happened, who was impacted, and how. For more detail see Appendix C, section 5.

c. Writing it up: What is the format of an SIA?

Depending on the Council under which the fishery is governed, the SIA section of the EIS may appear as a single section, be distributed in pieces across the EIS by management measure, or some combination. (See Mengerink et al. (2014) for an overview of the variety of SIA presentations to be found in EIS documents.) Talk with the lead for your plan team or other

[48] To avoid PRA requirements, we suggest you do not use questionnaires.

such group about what the structure of your EIS will be.[49] The structure below will allow you to mix and match as needed.

1. Brief discussion of why we do SIA

Begin with 1-2 short paragraphs providing background on laws that require SIA. The major laws to mention are NEPA and the MSA. Also make note of National Standard 8 and E.O. 12898 on Environmental Justice and any relevant policy directives.

2. Brief description of how key communities were chosen

Describe which individual method or multiple methods discussed under V.b.1., "How do you choose which communities to focus on in your SIA?" you used to make your choices. Include a table of the chosen communities. It may be helpful to divide the communities into Primary and Secondary communities based on data used in the selection process, e.g., one versus two standard deviations from the mean for numerical indicators and/or perceptions data from interviews.

3. Short overview of relevant background data on those communities

Provide a brief overview of important information about the selected communities. Tables and graphics of the selection criteria and the Social and Gentrification Pressure Vulnerability indicators should be included along with short text descriptions of the key points to note, e.g., overall similarities, trends over time, individual ports or vulnerabilities that stand out for some reason. Include climate vulnerability indicators where available and relevant. Radar graphs (see Jepson and Colburn 2013:15-16) and bar graphs with three dimensions (see Colburn et al. 2016:295) can help to portray multiple vulnerabilities at a time.

This information may, instead, be found in the AHE and simply referenced in the SIA. Or, it may be described in more detail in the AHE and summarized here. Or, you may simply use this information in your proposed-action by proposed-action discussion. Again, coordinate with the leader of your plan team.

4. Discussion of those impacted under each proposed action

Use data gathered above and relate it to social and economic analyses of fleet-based groups, discussing impacted place-based communities and social groups. Connect the social analyses to the economic and biological analyses for the managers, especially where there are both qualitative and quantitative data used (Sharp and Lach 2003, Pollnac et al. 2006).

[49] Also, discuss the extent to which you are responsible for the AHE.

For each action, describe which communities are most impacted by each proposed regulatory change due to the impacted permit categories, gear types, areas fished, etc., across social groups and communities, and considering social, economic, and climate vulnerabilities. Which communities have the largest numbers of impacted individuals? Which of these have specific types of vulnerabilities, which have multiple types of vulnerabilities, which have greater versus lesser levels of each of the vulnerabilities? And which communities, because of these combinations, are most impacted by each specific regulatory action? For an example of a very basic SIA, see Monkfish Framework 9[50] (section 7.5). (Also note the AHE in section 6.4, especially 6.4.2 on Ports and Communities.) In addition, note any communities or social groups clearly impacted under E.O. 12898 on environmental justice (see doughnut graph in Colburn et al. (2016, p.293) as a quick way to acquire basic background), or that include treaty tribes or other indigenous peoples.

5. Summary of key points

Examples of questions to address in a summary include:

- Are impacts of this specific regulatory action[51] overall more positive or negative, or are they too variable by individual measure to characterize in an overall way?
- Are impacts (either positive or negative) large or small?
- Are impacts evenly distributed across communities, or are some communities impacted negatively or positively by multiple measures while others are impacted by only one or two measures?
- Where communities are overall more heavily impacted, negatively or positively, is it due to larger fleet-based or social groups present in that community that are negatively or positively impacted, or to higher than average levels of social or climate vulnerabilities, or engagement or reliance on the species in question – or some combination?

And, finally, keep in mind as Rowan (2009:188) notes: "Magnitude criteria look at duration, spatial extent or size, likelihood and reversibility of impacts, and take into account legal standards and professional judgement about wellbeing. *Focusing on wellbeing shows that the core of SIA is about how people are affected by projects* [and, for this Manual, regulatory actions]" (emphasis ours).

[50] Available at: https://s3.amazonaws.com/nefmc.org/160225_Council-formal-submission-Monkfish-Framework-9.pdf

[51] Under NEPA, there is the additional requirement to address cumulative impacts: "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 CFR § 1508.7

V. References

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Appendix A: Other Relevant Laws and Executive Orders

These laws do not require the regulatory analysis of all populations affected by a regulatory action or all relevant social factors. Rather they require analysis of various subsets of populations or specific social factors. Or, they relate to other requirements related to rulemaking.

1. Executive Order 12898 – Environmental Justice

NMFS (2007) states that an SIA must address environmental justice issues, where they exist. E.O. 12898 requires that federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination under, those programs, policies, and activities because of their race, color, or national origin. To evaluate these impacts, information about the vulnerability of certain stakeholders must be better understood. Indicators of vulnerability can include but are not limited to income, race/ethnicity, household structure, education levels, and age. Although some general information related to this issue is available through census and other quantitative data, these sources do not disaggregate those individuals or groups that are affected by changes in marine resource management or the quality of the resource itself. Therefore, other types of data collection tools must be utilized to gather information related to this executive order. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence.[52] The main focus of E.O. 12898 is to consider "the disproportionately high and adverse human health or environmental effects of [an agency's] programs, policies, and activities on minority populations and low-income populations in the United States and its territories…"

In order to implement the E.O., a Memorandum of Understanding (MOU) was signed by seventeen Cabinet members and White House offices in 2011 to facilitate coordination. One item in that MOU is the creation of the Interagency Working Group on Environmental Justice (IWGEJ). The Dept. of Commerce Environmental Justice Strategy (see Appendix B) is also a product of that MOU.

2. Executive Order 13707 – Using Behavioral Science Insights to Better Serve the American People

At the end of 2015, President Obama signed E.O. 13707, which enforces the idea that "behavioral science insights can support a range of national priorities, including helping workers to find better jobs; enabling Americans to lead longer, healthier lives; improving access to educational opportunities and support for success in school; and accelerating the transition to a

[52] For examples, see NOAA (2019), U.S. EPA (2000, 2019), U.S. DOI (2019).

low-carbon economy." The E.O. pushes federal agencies to incorporate behavioral science insights into their activities and policies through: (1) determining access to programs, (2) presenting information to the public, (3) structuring choices within programs, and (4) designing incentives.

3. Executive Orders related to Treaty Tribes

Across the federal government, agencies are required to follow the requirements for regular and meaningful consultation and collaboration with state, local, and tribal governments on federal matters that significantly or uniquely affect their communities laid out in E.O. 12875 – Enhancing the Intergovernmental Partnership and E.O. 13175 – Consultation and Coordination with Indian Tribal Governments.

4. Executive Order 12866 – Regulatory Planning and Review

E.O. 12866 requires that federal agencies assess the costs and benefits to the nation of implementing a regulation, in order to assure for the American people "a regulatory system that protects and improves their health, safety, environment, and well-being and improves the performance of the economy without imposing unacceptable or unreasonable costs on society; regulatory policies that recognize that the private sector and private markets are the best engine for economic growth; regulatory approaches that respect the role of State, local, and tribal governments; and regulations that are effective, consistent, sensible, and understandable." In other words, to assure that "a regulatory action not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society" (NMFS 2007:1).

5. Regulatory Flexibility Act (RFA)

The RFA (sometimes also referred to as RegFlex) requires that, for applicable rules, federal agencies prepare an initial and final regulatory flexibility analysis which "…shall describe the impact of the proposed rule on small entities…" The initial regulatory flexibility analysis "…shall also contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities" (RFA Section 603(b)(5)(c)). In addition, each final regulatory flexibility analysis shall contain, among other things, "…a description of the steps the agency has taken to minimize the significant economic impact on small entities…" (RFA Section 604(a)(6)).

6. Small Business Regulatory Enforcement Fairness Act (SBREFA)

SBREFA (often pronounced [sub ree fuh]) "provides new avenues for small businesses to participate in and have access to the federal regulatory arena. The SBREFA gives small businesses: more influence over the development of regulations; additional compliance

assistance for Federal rules; and new mechanisms for addressing enforcement actions by agencies."[53] Notably, it permits judicial review of agencies' compliance with the RFA to ensure that RFA procedures are accurately followed.

[53] https://www.sba.gov/advocacy/summary-sbrefa

Appendix B: Other Relevant Policy Directives

1. White House Council on Environmental Quality (CEQ) Guidance on Cumulative Effects under the National Environmental Policy Act (NEPA)

This guidance for cumulative effects under NEPA delineates 8 principles (sec. 1, Table 1-2, p.8)[54]:

1. Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions.
2. Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, nonfederal, or private) has taken the actions.
3. Cumulative effects need to be analyzed In terms of the specific resource, ecosystem, and human community being affected.
4. It Is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.
5. Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.
6. Cumulative effects may result from the accumulation of similar effects or the synergistic Interaction of different effects.
7. Cumulative effects may last for many years beyond the Ute of the action that caused the effects.
8. Each affected resource, ecosystem, and human community must be analyzed In terms of its capacity to accommodate additional effects, based on Its own time and space parameters.

For social impact assessments under NEPA, the analysis should be based on the entire affected region and society, not in isolation. CEQ guidance for cumulative effects under NEPA would, in a fisheries context, potentially include those accumulated from impacts of previous and concurrent regulations in the fishery in question, impacts in other fisheries that participants in this fishery also participate in, and the impacts of other non-fisheries regulations or societal forces such as a downturn in the economy. This guidance notes, however: "if the boundaries are defined too broadly, the analysis becomes unwieldy; if they are defined too narrowly, significant issues may be missed" (Executive Summary, p. v). Further, there must be not only a cause-effect relationship present, but the effects must be substantial (Ibid. p. vi). The guidance further states that impact analysis must consider cultural resources when considering the severity of the proposed action, though this is primarily used with reference to tribes and other indigenous peoples.

[54] See referenced table for more details on each principle.

2. White House Council on Environmental Quality (CEQ) Guidance on Environmental Justice under NEPA

The first page of the guidance note that: "In the memorandum to heads of departments and agencies that accompanied Executive Order 12898, the President specifically recognized the importance of procedures under the National Environmental Policy Act (NEPA) (42 U.S.C. §4321 et seq.) for identifying and addressing environmental justice concerns." It further defines the key terms from E.O. 12898 (pp. 25-27) as follows:

Low-income population: Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect.

Minority*:* Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

Disproportionately high and adverse environmental effects: When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

(a) Whether there is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and

(b) Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and

(c) Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

Additional definitions that may be of use are found immediately following, and in subsequent sections.

3. Dept. of Commerce Environmental Justice Strategy

E.O. 12898 requires all federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions…." In this guidance the Dept. of Commerce affirms that "During National Environmental Policy Act reviews of major agency actions, any potential disproportionate and adverse environmental or health effects on low-income or minority populations are considered."

4. Policies and processes regarding tribes

Under current practice, NOAA Fisheries is responsible for formal government-to-government consultation requirements with federally recognized tribes, as described in E.O. 13175 (cited above). The Department of Commerce Consultation and Coordination Policy (2013), providing information on complying with relevant laws regarding treaty tribes. An important resource in these processes is the NOAA Tribal Liaison, based at NOAA headquarters. The Liaison is available to assist regions with tribal engagement in the fisheries management process. The Liaison also manages the NOAA Tribal Engagement Database, which is intended to capture formal consultations, informal engagements (e.g., a series of meetings with a tribe on a topic or group of topics), and events between NOAA and federally recognized tribes. Key information regarding the tribal consultation process and for informal consultations over a controversial issue can be found in the NOAA Consultation Handbook (formally titled NOAA Procedures for Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Natives).

In addition, the North Pacific Council has established a policy priority to reach out to Native Alaska Villages and Corporations. This includes more than 220 federally recognized tribes and over 100 Alaska Native Corporations (which are included in tribal consultations per the Consolidated Appropriations Act that extended the obligations for NMFS under E.O. 13175). In particular, Native Alaska Villages were allocated specific fishing rights through the Community Development Program (MSA Sec. 305(i)), discussed above in section II.a.2.

The west coast of the United States has over 30 tribes with federally recognized treaty/tribal fishing rights (Puget Sound, Washington Coast, Columbia River, Oregon, and Idaho). There are also many other federally recognized tribes in the region who have lost access to salmonids. All of the region's FMPs take into account tribal fishing rights. In particular, the Pacific Council manages the region's fisheries as part of larger group of fisheries and has a membership provision for treaty tribal member and alternate member (MSA Sec. 302(b)(5)(D)).

5. Office of Management and Budget Guidance on Implementing E.O. 12866

This guidance clarifies that "significant" regulatory actions are "those likely to lead to a rule (1) having an annual effect on the economy of $100 million or more or adversely and materially affecting a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) creating a serious inconsistency or otherwise interfering with an action taken or planned by another agency; (3) materially altering the budgetary impact of entitlements, grants, user fees, loan programs; or (4) raising novel legal or policy issues (Sec. 3(f))."

6. The Small Business Administration's Guide for "How to comply with the Regulatory Flexibility Act"

This guidance for RFA clarifies that: "The RFA does not seek preferential treatment for small entities, nor does it require agencies to adopt regulations that impose the least burden on them, or mandate exemptions for them. Rather, it requires agencies to examine public policy issues using an analytical process that identifies barriers to small business competitiveness and seeks a level playing field for small entities, not an unfair advantage."

7. NOAA Ecosystem-Based Fisheries Management (EBFM) Policy

Here, EBFM is defined "as a systematic approach to fisheries management in a geographically specified area that contributes to the resilience and sustainability of the ecosystem; recognizes the physical, biological, economic, and social interactions among the affected fishery-related components of the ecosystem, including humans; and seeks to optimize benefits among a diverse set of societal goals." Furthermore, it recognizes that tradeoffs must be made among these societal goals, based on the expected physical, biological, economic, and social impacts of each.

8. NMFS Guidance for Conducting a Review of Catch Share Programs

This guidance is designed to "ensure the reviews of catch share programs (CSPs) are comprehensive and targeted at meeting statutory requirements; coordinated with stakeholders; carried out in a transparent, efficient, and effective manner; and are conducted by applying consistent standards across the country while allowing necessary regional flexibility." In order to conduct an effective review, appropriate data collection plans should be put into place at or before implementation. Similar to an EIS, Catch Share program Reviews must include:

1) a description of biological, ecological/environmental, economic, social, and administrative environments before and since the program's implementation,

2) an analysis of the program's biological, ecological/environmental, economic, social, and administrative effects,

3) an evaluation of those effects with respect to meeting the goals and objectives (i.e., program performance), including a summary of the conclusions arising from the evaluation,

4) a summary of any unexpected effects (positive or negative) which do not fall under the program's goals and objectives.

Appendix C: Tools and Methods

The information presented here is for general information, but needs to be carried out by trained social scientists or under their direct supervision. If you are not a social scientist, talk to the social scientist(s) in your region before implementing any of these tools and methods.

1. General Secondary Data

Secondary data can include simple counts of landings and permits (including broken out by relevant permit categories) by community. Other potentially useful data includes census data, information on processors, and counts of bait and tackle shops (discussed under VI., Social Groups). There are also various indicators and sets of indicators. These include the regional quotient (RQ) and local quotient (LQ), as well as the Fishing Engagement and Fishing Reliance, and Social Vulnerability and Gentrification Pressure Vulnerability indicators from the NOAA Community Social Vulnerability Indicators (CSVIs).

In order to use most secondary data (with the exception of the pre-calculated CSVIs), you will need to understand your region's databases. For example, which variables are in landings, permit, dealer, or other quantitative databases? How do you find the look-up tables that list the possible results, e.g., what are the possible species codes for the variable that pulls species caught, and what species name is associated with each code? What are proper methods for linking these databases correctly? Learn your available databases well and you will be well poised to conduct or request whatever analyses are necessary. Seek help from your fellow social scientists.

Getting data may be your responsibility or your data may be pulled by a central group that works for the lab/office as a whole. This varies by region. If it is your responsibility, it will important to learn the programming language most commonly used by your fellow social and economic colleagues. The most common are SQL plus SAS or SAS Access (which embeds SQL code within SAS) and, increasingly, R. If you are not already familiar with the language(s) in common use in your region, ask for training. And do not hesitate to ask your colleagues specific questions about how to pull a certain subset of data; they will be happy to share code with you. If it is pulled by a central group, you should still learn the data structure as described in the previous paragraph, in order to know what data to ask for. Again, turn to your social and economic colleagues for assistance.

Depending on your region, you may also want to begin collecting the year-by-year permit application forms from your regional office. These will list all the federal fisheries governed by fishery management plans (FMPs) and define the various categories under each. Since these can change over time, it's a handy way to keep a record of changes in categories or category definitions. Each year the current year's application form will be available on the regional office website or from the appropriate regional office. Further, if you call that office they may be able to supply you with at least a subset of previous years' forms. You will find that it is easy to sort by categories that existed within a given year, but more difficult to know what those categories meant. Having annual permit applications, with their concise descriptions of FMP-by-FMP

categories, can be helpful. Contact the NMFS Regional Office and speak with the Permits office to learn how such data are handled in your region.

2. Community Social Vulnerability Indicators (CSVIs)

NOAA Fisheries' social scientists developed the CSVIs in order to analyze relative objective well-being, including Social Vulnerability and Gentrification Pressure Vulnerability. They have been calculated for nearly 4,000 communities in coastal counties from nineteen states in the Eastern U.S. and Gulf Coast -- as well as coastal county communities from the states of Washington, Oregon, California, Alaska and Hawaii (Colburn and Jepson 2012, Himes-Cornell and Kasperski 2016, Jepson and Colburn 2013). These indices were developed based on the work of Jacob et al. (2010, 2012), who operationalized the concepts of social vulnerability and resilience in fishing dependent communities and Cutter (2009) for natural hazards. The CSVIs are the first such measures developed and operationalized at the community level for application to U.S. fisheries policy on a national scale. Given the MSA requirement to take into account place-based fishing communities, 12 indices were developed at the place level (Census Designated Place (CDP) and Minor Civil Division (MCD)), using 77 variables from seven secondary data sources, primarily the U.S. Census' American Community Survey 5-year estimates.

A complete description of the CSVIs, the methodology used to create them, and an exploratory map can be reviewed here: http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/index. See also Jepson and Colburn (2012) and Colburn et al. (2017).

a. Fishing Engagement and Reliance

Commercial Fishing Engagement and Reliance indices can be calculated at the regional level using a common national procedure, and may be created based on the total aggregate of fish landed in each community or broken out by species/species groups. Due to differences in the availability of data, recreational Fisheries Engagement and Reliance indices are calculated on a regional basis. To date, there are recreational fishing indices calculated for the Northeast, Southeast, and Gulf of Mexico communities, based on NOAA Fisheries' Marine Recreational Information Program (MRIP) site survey data (Jepson and Colburn 2013). The Alaska Region, the West Coast Region and the Pacific Islands Region rely upon data unique to each region to construct their recreational indices.

i. Fishing Engagement

The Fishing Engagement indices demonstrate the importance of fisheries to a given community relative to other coastal communities in a region. They include both commercial Fishing Engagement and recreational Fishing Engagement (Table 1).

ii. Fishing reliance

Fishing Reliance represents the per capita values of the variables included in the engagement indices (see Table 1). Including the per capita commercial and recreational Fishing Reliance indices allows smaller communities with small fishing fleets to still be represented as having a strong involvement in fishing if a large fraction of their population is involved in fishing.

Table C1. Variables selected to construct the Commercial Fisheries Indices

Index	Variable
Commercial Fishing Engagement	Pounds and value of program-specific species Number of dealers/processors Number of fishing permits within a community
Commercial Fishing Reliance	Pounds and value of program-specific species per capita Number of dealers/processors per capita Number of fishing permits within a community per capita

b. Social Vulnerability and Gentrification Pressure Vulnerability

The current CSVI social indicators target overall Social Vulnerability (Jepson and Colburn 2013) and Gentrification Pressure Vulnerability (Colburn and Jepson 2012, Jepson and Colburn 2013). Additional social indicators are planned. While not a full measure of community well-being, they are focused on community-level characteristics theorized to influence, though not predict,[55] objective well-being and are considered social-community attributes. Social Vulnerability and Gentrification Pressure Vulnerability represent social factors (Table 2) that can shape either an individual's or a community's ability to adapt to change (Jacob et al. 2010, 2012).

Be aware, however, that these may not be appropriate in areas with large numbers of very small and/or subsistence-based communities, e.g., in the Alaska and Western Pacific Regions. For example, most theorists agree that poverty is an indicator of social vulnerability and can be associated with decreased well-being (e.g. Cutter et al. 2003, Lee 2014, Morrow 1999). Poverty

[55] Indicators of objective well-being (OWB) are a promising tool to aid in planning processes as well as SIA and other forms of regulatory review. However, many studies have demonstrated that OWB measures do not necessarily accurately predict individual-level subjective well-being (Diener and Suh 2000; Inglehart and Klingemann 2000; Marshall and Marshall 2007). Because the CSVIs do not incorporate measures of individual-level subjective well-being, or the relational context in which notions of the "good life" are given meaning, we must emphasize that they do not stand alone as a comprehensive measure of well-being. See Smith and Clay (2010) for more on objective vs. subjective well-being.

is commonly measured based on whether household income is below a specific threshold (set in the U.S. by the Census Bureau). However, individuals engaged in a subsistence way of life may not require cash to meet their basic needs in the same way as individuals fully integrated into a market economy, and income statistics may not prove as reliable an indicator of their material well-being (Robards and Alessa, 2004). In Alaska, a subsistence indicator is calculated, based on surveys conducted by the Alaska Department of Fish and Game (Himes-Cornell and Kasperski 2016, Lavoie et al. 2018). There are specific limitations to the Alaska subsistence indicator due to very infrequent collection of subsistence data by the state, along with not all communities being surveyed in any given year (see Endnote 1 of Himes-Cornell and Kasperski (2016) for details). Nonetheless, subsequent groundtruthing by Lavoie et al. (2018) found that qualitative rankings of vulnerability completely or moderately agreed with quantitative indicator rankings 73.8% of the time "and the results indicate that most of the indices are representative of community vulnerability."

i. Social Vulnerability

Social Vulnerability Indicators (Table 2) characterize factors that over time may indicate a threat to community resilience. It includes indices of Personal Disruption, Population Composition, Poverty, Labor Force, and Housing Characteristics.

ii. Gentrification pressure vulnerability

The Gentrification Pressure Vulnerability Indicators (Table 2) characterize factors that over time may indicate a threat to the viability of a vibrant commercial working waterfront, as non-fishing related businesses compete with the fishing industry for waterfront locations and fishing community populations grow with the influx of new residents often from outside the area. It is comprised of indices of Retiree Migration, Urban Sprawl, and Housing Disruption. The Retiree Migration Index and Urban Sprawl Index were not calculated for Alaska communities due to the lack of regional relevance.

Table C2. Variables selected to construct the social vulnerability and gentrification pressure indices

Index	Variable
Personal Disruption	Percent unemployed Crime index Percent with no diploma Percent in poverty Percent females separated

Population Composition	Percent white alone Percent female single headed households Percent population age 0-5 Percent that speak English less than well
Poverty	Percent receiving assistance Percent of families below poverty level Percent over 65 in poverty Percent under 18 in poverty
Labor Force Structure	Percent females employed Percent population in the labor force Percent of class of worker self employed Percent population receiving social security
Housing Characteristics	Median rent in dollars Median mortgage in dollars Median number of rooms Percent mobile homes
Housing Disruption	Percent change in mortgage Percent change in home values Percent of owners monthly costs 35% of income
Urban Sprawl	Population Density Nearest city w/50k population in miles Cost of living index Median home value
Retiree Migration	Households with one or more over 65 Percent population receiving social security Percent receiving retirement income Percent in labor force

c. Climate vulnerability

The climate vulnerability indicators characterize environmental conditions that may affect the sustainability of essential commercial and recreational fishing businesses and infrastructure. The Sea Level Rise Risk Index was computed using the NOAA Office of Coastal Management coastal land area data at elevations from one to six feet above the mean higher high water mark (Colburn et al. 2016). A Storm Surge Risk Index was calculated using the Sea Lake and Overland Surges from Hurricanes (SLOSH) display program data from the National Hurricane

Center and digital elevation data from the United States Geological Survey. Both indicators were developed using the same methodology as Jepson and Colburn (2013) and Jacob et al. (2010, 2012). Additional climate vulnerability indicators may be available at the regional level.

3. Semi-structured interviews and Oral Histories

In conducting research for an SIA, the semi-structured interview[56] is usually the most immediately useful for information on day-to-day fishing practices, views and understanding of management measures, and likely responses to different management measures. Oral histories are especially helpful for information on cultural values, social structure, local ecological knowledge, and changes over time. They can fill in gaps in the historical record, especially for marginalized groups. In either case, you should prepare an interview guide in advance by choosing either a set of general topics that you are looking for information on (all related to the impacts of the regulation and the related characteristics of the interviewee, in this case).

Remember that if you will be speaking with 10 or more people you cannot ask the same set of identical questions of all of them (per PRA rules, in section IV.b.4.iii. under on the Paperwork Reduction Act process and on Primary data, above, and in section 5 of this Appendix, below). This is why general themes or topics are usually best, e.g., addressed through open-ended questions that allow the interviewee to respond with what they consider to be important on the topic, e.g., "Tell me about fishing for x species", or "Talk to me about your history in fishing" or "thoughts on regulations" or "challenges in fishing today," rather than closed ended questions that provide the interviewee with a limited set of explicit options for answers (e.g., yes/no, multiple choice or drop down, checkboxes, and ranking questions). Don't worry about touching on topics in any particular order.

A semi-structured interview, because you are simply probing for information on likely impacts of a regulation, may well be shorter than an oral history. For an oral history, you will be looking to learn more in-depth and planning for the possibility of new and unexpected insights or local ecological knowledge; this may take an hour or more. You will therefore want to allow the interview to flow more naturally, with you gently guiding but not constantly forcing back to the topics you want to cover. Interesting and useful information that you hadn't thought to look for may emerge in such a less directed conversation. If you are not experienced with interviewing, see Bernard (2006, Chapter 9) and ask your experienced colleagues for coaching. Or, they may be able to do the first few interviews with you to help you learn by example. Voices offers workshops, support and guidance. The site also has an excellent downloadable guide to doing oral history. Remember this for oral histories: "The rule is: Get people onto a topic of interest and get out of the way. Let the informant provide information that he or she thinks is important" (Bernard 2006:216).

[56] What we describe here as a semi-structured interview actually falls somewhere between Bernard's (2006:210-212) definitions of unstructured versus semi-structured interviews. However, conducted as we describe, these interviews are not subject to the PRA.

a. Choosing the interviewees

To find the appropriate interviewees, first list out the key types of people you need to interview based on likely impacted groups, given the regulation and any draft economic analyses available early in the process. Next, ask NMFS port agents (Regional Office staff), other social scientists and economists in your group, social scientists at your regional Fisheries Management Council, or at your regional Sea Grant office for suggestions – and contact information. You may also find initial contacts on your region's FMP planning teams (a Council staff member will be chair for each team), through Council members, and by attending Council meetings. Then, when speaking with those contacts, ask at the end of the interview for suggestions of other groups and/or individuals that you should talk to; this is snowball (Bernard 2006:193) or purposive (Bernard 2006:194) sampling, useful for hard-to-find populations, including those for whom there is no good sample frame.

b. Conducting the interviews

Short semi-structured interviews for your own information do not necessarily require recording. Simple handwritten or typed notes may be sufficient. If, however, you (either during the conversation or later) decide you would like to use a quote from an interviewee, you must have their permission – preferably in an email. This is true whether or not you include their name.

Oral history interviews (whether in-person or by phone) must be recorded. A standard release form should be handed out or emailed in advance. This will give the interviewee the option to approve 1) recording the interview as audio and/or video and/or 2) uploading the interview to Voices, the NMFS oral history site as an audio/video file, and/or a written transcript. It will also specify that these formats can be downloaded and used by researchers. Before you sit down for an interview, the narrator should understand the purpose, scope and possible outlets for the recording. At the interview, before you record, you can introduce the release. Then sign it after the interview as a good-faith measure. It should offer multiple use options, such as transcript and recording may be uploaded to Voices, only transcript may be uploaded, NMFS researchers may keep a non-public file and use the data contained in it for summary statistics only. For assistance in choosing an appropriate release form that will grant permission for public uses of the interview, contact the person listed on the Voices "About Us" page. If permission to record is not given, let them know the interview will not be uploaded to Voices and then take as detailed notes as possible. It is also critical to quickly state, at the top of the tape: "This is an interview with [narrator]. The interview is taking place on [date] in [location]. The interviewer is [interviewer name]." These metadata are essential for the interview to be of use to you and other researchers. You may want to add one or two additional top level questions, such as "what is your primary fishery?" or "how old are you, if I may ask?"

In any case, it can be useful to interview in pairs. This allows one person to concentrate on the interview, while the other is in charge of setting up and dealing with the recording machinery or of taking backup notes.

c. Transcribing and analyzing the interviews

If you have recordings, you will need to transcribe your interviews – either yourself or by hiring someone. The transcription should not include verbal tic - ums, ers, mm-hmm, etc. It makes the transcript harder to read and understand for researchers and, in any case, interviewees often request they be removed. Non-standard pronunciations should also be corrected, e.g. "fishin" for "fishing," as these make searching the transcript more difficult. If these linguistic aspects are important for a researcher, they can listen to the recording; but, for the transcript to be easily read and searched, it should be standardized. Additionally, interviewees must be allowed to review their transcript before granting final approval. They may find they said something that, in retrospect, they do not wish to be made public.

You should also include periodic time codes ("minutes:seconds" elapsed since the start of the recording) at natural breaks such to help readers/listeners. If you are transcribing yourself, you may want to use transcription software such as Trint, Temi, or others. Research the current available software packages, and also consult your colleagues to see if they are using something that your group already has a license for. You will also want to prepare a preliminary list of topics you want to code for. Once you have all the transcriptions you read through them to get a general feel for the common and the important content or themes to see if there are additional codes you want to include. If your transcriptions were done by someone else, this step can also allow you to correct for things like spelling errors of fish names or other common misspellings that would have been introduced by the transcriber. If the transcriber is not familiar with common fisheries acronyms, fish names, etc., such errors can be minimized by providing them a reference list. If you are planning to upload these oral histories or semi-structured interviews to the Voices website, consult the website for materials related to formatting.

Depending on how many interviews you are dealing with, it may be enough to mark up these Word documents and create a matrix in Excel for tracking themes by characteristics such as age, sex, town, and fishery. If you have more than 10-12 interviews, or a large number of codes per interview, you will probably want to analyze the transcripts using a text analysis software package. These programs have procedures for assigning characteristics such as those described above, and lists of these characteristics are generally downloadable. There are many different such software packages available, including MaxQDA, NVivo, and Atlas-ti. Ask your colleagues what they are using, as it will be simpler to work with a package that others already know and can guide you on. If you already have a particular package you are familiar with and your office is amenable to buying a license for that, it may be simplest to continue working with what you already know. If neither of these is the case, do some research to find out what is currently the most recommended software package that fits your needs. Many software packages allow for various types of analysis to help understand the connections. Explore these to help you understand the interview data.

4. Focus Groups

As described above in section IV.b.4.iii under the Paperwork Reduction Act (PRA), Focus groups for the purposes of beta testing a survey fall under the PRA and will need to be part of

the PRA package for the survey (more on this in the following section). In this situation, they can also be used in the preliminary stages of survey development to refine answer categories for multiple-choice questions and to narrow questions to those most effective in soliciting the information you are looking for (Bernard 2006). Other focus groups that involve a facilitated discussion (facilitated by you, a colleague, or a professional) around a set of topics or themes do not fall under the PRA, section IV.b.4.iii under the Paperwork Reduction Act (PRA). These groups are typically between 6 and 12 people. Usually, a set of 3-5 focus groups is held on different dates and in different locations, to allow attendance by geographically dispersed members of the target interview group. Focus groups as a stand-alone method provide valuable insight into understanding the impacts of fisheries management measures through the collection of qualitative data from fishery stakeholders (Lew and Himes-Cornell 2011).

In terms of practicalities, you may take care of all focus group arrangements yourself or you may choose to hire a professional focus group business. There are companies that specialize in setting up focus groups and can handle many of the pre-focus group activities, as well as provide recordings and/or transcripts that facilitate your analysis. If you decide to use a focus group company, ask your colleagues for recommendations. The Division of Economic and Social Analysis within the NMFS headquarters Office of Science and Technology may also have suggestions.

a. Choosing focus group locations and dates

In order maximize attendance by the full range of the target population, you should choose a set of key ports based on your initial analysis of place-based communities, fleet-based groups, and social groups. You will also want to identify a range of dates that both fit your research schedule and are easiest for fishermen. Many elements play into both these factors. Your ability to travel during certain periods may be constrained by budget deadlines or other administrative issues; most commonly, lack of a clear agency budget may mean funds for travel – even local travel (within 50 miles of your home office), are not available until the end of the fiscal year, leaving your travel period heavily constrained. Work- and weather-related issues are the most common constraints for fishermen and other industry members. This is a consideration in planning meetings. For instance, some fisheries in the Northeast are slow in the winter, so fishermen may have more time or flexibility of schedule to attend a meeting then, while on the West coast there is an active winter crab fishery that may make this a bad time for meetings. Speak with colleagues or local fishermen about best times for meetings in your region. Council staff may be especially knowledgeable, as they need to schedule a lot of meetings On the other hand, if snowstorms or hurricanes are common in your region during certain periods, those may not be ideal for those who may have to travel an hour or more to reach the closest focus group. There will be judgement calls involved. Check in with your colleagues for their experiences with best times of the year to connect with fishermen. You, or your focus group company, will then need to secure locations for holding the focus groups and make all necessary arrangements. Some useful resources for planning, conducting, and analyzing focus groups can be found in Bernard (2006:232-239), Morgan (1998), and Chapter 5 of Fowler (1995).

b. Choosing your sample population

Begin with the communities you have chosen to focus on in the SIA. Then locate contact information for a matrix of individuals covering the key fleet-based groups and social groups; home address is usually associated with permits, as is permit number (which should allow connection of permit data to landings data). You may or may not have phone numbers. You or your focus group company will then need to begin mailing invitations (which you need to create) that include the list of focus groups, their dates and locations. Fishermen should be asked to identify first and second choices for which focus group to attend. That allows some flexibility in case of too few people choosing one location or too many another.

c. Setting up the focus groups

For focus groups that do not fall under the PRA, remember that the most common size for a focus group (except for those using the Q-methodology described below) is 6-12 individuals. You will want to invite more than your preferred number, as there will inevitably be some fishermen who need to cancel at the last minute. There is a significant amount of planning that goes into inviting the participants and finding and setting up facilities and materials for the focus group. Be aware that per Department of Commerce General Counsel guidance: "As a general rule, an agency may not expend appropriated funds to provide food to Government employees or other individuals as it is considered an expense personal to the individual." If you wish to provide food or drink during the focus groups, talk with your colleagues about how best to handle this. If using a focus group company: 1) you send them list of ports where you want to conduct the focus groups and the matrix that constitutes the sample frame and 2) they arrange details of specific sites, including recording equipment, and send invitations and track RSVPs.

d. Conducting the focus groups

Focus groups can simply be facilitated or guided discussions on a set of chosen topics. You do not need professional facilitator training to run a focus group, but you should at least have experience in semi-structured interviews or oral histories. A focus group is essentially a group discussion around a set of topics or themes, where you encourage the participants to discuss topics with each other, not just you, while you occasionally interject to keep the discussion flowing without stalling on one topic for too long (see Bernard (2006:232-239), Morgan (1998), and Chapter 5 of Fowler (1995). Apart from general discussion, there are two specific research techniques that can be used in a focus group setting and may be useful in the exploration and comparison of the impacts of fisheries management measures (or other topics): the Delphi technique and Q-methodology. Both methods generally require specialized training in interview facilitation *tec*hniques.

The Delphi technique is used to systematically develop a consensus of expert opinion. The Delphi Method (when used in face-to-face settings technically called a mini-Delphi or Estimate-Talk-Estimate) involves experts on a topic either conducting multiple rounds of pile

sorts or answering multiple rounds of short questionnaires[57] or participating in multiple rounds of semi-structured interviews, with the focus group leader summarizing the overall results for the group in-between rounds. This allows each expert to revise their responses based on the feedback about the group responses. In this way, the group usually moves toward a consensus that can be used by the researchers in making assessments about the topic, e,g, proposed regulations or local ecological knowledge, that was the focus of the process. You need a representative set of experts; the size of the fishery will determine how many individuals this is. Examples of using the Delphi technique in fisheries can be found in Lin et al. (2014), Moutopoulos et al. (2017), Leite and Gasalla (2013), and de Groot et al. (2014). Training in the techniques is desirable before implementing it.

Q-methodology combines the benefits of both qualitative and quantitative research for the trained researcher. Group interviews or focus groups can use this methodology to investigate the in-depth perspectives of stakeholders, where interview participants are requested to systematically rank amenity values (e.g., characteristics of management measures or of fish species) to be explored and indicate the outcomes or states that they most prefer. This method assesses patterns of attitudes and shared perceptions and produces 'typical' sets of views by averaging out different individuals' views. It begins with researchers searching out strong and differing views on the topic of interest. For a fisheries regulatory action the hearings held for the scoping process are a rich source of data on perceptions and beliefs, or what in Q-methodology are called "subjectivities." The range of opinions is represented by a set of statements that cover the range of common views on the subject. Individual participants (selected for their strong and differing views on the topic of interest) are asked to pile sort these onto a basically parabola-shaped grid, with statements they strongly agree with to one side, those they strongly disagree with to the other side, and those they are indifferent to or ambivalent about in the center. You need a representative set of the full range of opinions on the topic; the size of the fishery and complexity of views on your topic (here, likely a regulation) will determine how many individuals this is. However, 30-40 participants is a common number. After the pile sorts, researchers conduct a semi-structured interview with each participant to better understand why they have sorted as they have. Then the results of the sorts (as clarified through the semi-structured interviews) are run through a factor analysis to find similarities and differences and allow researchers to group the various views into a smaller number of meaningful bins. For a short description of the Q-methodology and how to use it, see Defra (2007:61) and Ozdemiroglu et al. (2006, section 3.2.5, pp. 27-28). See also a short video at: https://qmethod.org/resources/how2q/. Examples of the use of Q-methodology in fisheries include MacDonald et al. (2015), Albizua and Zografos (2014), and Wainger et al. (2017).

e. Analyzing the focus group data

For general discussion, focus group transcripts can be analyzed in the same way as semi-structured interview transcripts (described above), either simply as Word documents or with qualitative data analysis software. For Delphi and Q Methodology, see discussion and references above, under 4.d.,"Conducting the focus groups."

[57] To avoid PRA requirements, we recommend that you do not use questionnaires.

5. Surveys

In general, there are five main stages to a survey research project: (1) initial planning and project set-up, (2) survey development and testing, (3) testing survey protocols and making final approvals, (4) full survey implementation, and (5) post-implementation activities. With specific application to surveys conducted for U.S. fisheries, Lew and Himes-Cornell (2011) provide general protocols and best practices for each of these stages. This Manual notes some of the key considerations.

We especially note the issue of final approvals (part of stage (3), in the previous paragraph). This refers to required actions under the Paperwork Reduction Act (PRA). A package of information specific to the PRA (the PRA package) must be submitted to the federal Office of Management and Budget (OMB) for approval prior to conducting the survey. Sometimes your PRA package may be sent back for revisions before approval is granted. See section IV, b., 4., iii. "The PRA Process," above, for more detail.

a. Creating the survey

In order to develop a survey of fisheries stakeholders, there are a number of things to keep in mind. First of all, an important consideration in survey research is the length of time it takes to develop and test a survey instrument and obtain any necessary approvals. Further, a survey aimed at fisheries stakeholders should be developed with the buy-in of key members of the target population and fisheries management agencies (NMFS, the Council, tribes and other indigenous groups, perhaps state fisheries management agencies or regional Marine Fishery Commissions) to minimize duplication and implementation challenges (Lew and Himes-Cornell 2011). Depending on your relationship with the fishery participants and how supportive they are of the management measure of interest, it may be quick to get their buy in or it may take a lot of time to gain their trust and convince them that it is worthwhile to participate in the survey.

Surveys should generally have modules that are cohesive and attempt to gather specific data to answer particular research questions. A key problem here to be aware of is that surveys often become too long when there are too many research questions being addressed and too many modules included as a result. It is best to keep the survey as focused as possible on a few key research questions and tailor the modules to those. Of course, include all the usual suspects (demographics, etc.). Finally, there are a number of different types of surveys one might consider depending upon what research question is being asked. Replicating a cross-sectional or intercept survey over time is one way to gather data using new modules, while keeping a few core modules as well.

b. Beta testing

Before finalizing the survey, it must be beta tested. This process can help to refine answer categories for multiple-choice questions and to narrow questions to those most effective in soliciting the information you are looking for. One way to do this is by surveying 9 or fewer people with one survey instrument or dividing the questions into more than one instrument and

testing each of these with 9 or fewer people. Each version can include a small number of identifying or sorting questions, in addition to the actual survey questions themselves. Another is by holding a focus group of no more than 9 people or two focus groups of fewer than 9 people total (e.g., one of 4 people and one of 5).

c. Choosing a sampling strategy

Two basic sampling strategies are appropriate for large-scale surveys: random sampling, and intercept sampling. Random sampling is the gold standard, but requires a known sample frame: a list of permit holders, for example. However, for some populations such as fishing vessel crew in most U.S. regions, there is no sample frame. Even in Alaska, where there are state crew licenses to create a frame, NMFS does not have access to contact information for those crew. In addition, for some tribal and other indigenous groups, fishing permits are not required. In these cases, intercept sampling may be the only option. An intercept survey can be conducted at docks, marinas and other locations where fishermen tend to congregate. All available fishermen found in places where fishermen congregate can be approached, at random times and locations within ports systematically selected using multivariate criteria, e.g., taking the total number of vessel owners in a fishery that landed fish in each port in the previous year and multiplying that by an average number of crew per vessel (as estimated by NMFS or other experts). From this an estimated sample frame can be created and a target sample size assigned. Pollnac and Poggie (1978:365) found this an effective method for achieving a high respondent participation rate, and a sample obtained in this manner can be conceptualized as a sample from the universe of all hypothetically possible data sets collected under the same conditions (cf. Chein 1976, Thomas 1976, Freund 1960). Vessel owners and permit holders can also be asked for lists of employees and/or permission to contact their employees. In general, when approaching crew at their vessel, it is customary to seek approval from captains, if they are available, to speak to their crew. When appropriate, appointments can be made at a time and location of the interviewee's choosing.

d. Choosing a survey method

There are many options when choosing a survey method. Some of the primary methods are: In-person, Phone, Mail, Internet, or some combination of these. Bernard (2006, Chapter 10) provides an extensive description of various survey methods and the advantages and disadvantages of each. Dillman (2009, 2011, 2014) provide excellent advice as well, especially on how to conduct multi-method surveys.

e. Analysis of survey data

Analysis of survey data will require familiarity with more than simple descriptive statistics. For those not familiar with statistical analysis, it will be important to connect with colleagues, including statisticians and/or economists, to make a plan for analysis. It is necessary to report the overall survey response rate and describe the potential for any bias in the results from non-

response. And regardless of how the data are analyzed, it will be necessary to assess the accuracy and validity of the responses. To do this, one key procedure is to analyze the pool of respondents. Some things to consider are the evenness of coverage of the target population; the suitability of the sampling strategy in the light of field experience and findings, sophistication, and uniformity of response elicitation and accuracy of recording survey responses; efficacy of measures to prevent, compensate for, and understand non-response to the survey or individual questions; and the quality of data entry, cleaning, and metadata recording. In some cases, it may be necessary to weight the survey responses in order to correct for potential biases in the sample population that filled out the survey as compared with the whole population. See Colburn et al. (2015:9-13) for an example of a Research Methods section for a survey report.

At the most basic level, survey question responses should be presented with summary statistics and variance (e.g., standard error and confidence intervals). Additional analysis will have to be tailored to the type of questions the survey asks. Three common types of questions are multiple choice, open-ended, and Likert scale. With multiple choice questions, data can be explored and reported in one-way tables (simple tables providing frequency counts of responses) and cross tabulations (one table per question with the first column as respondent categories and the column headers as the possible answers). For purely qualitative survey responses, such as those collected in open-ended questions, it is possible to convert the answers into quantitative data by grouping responses into nominal codes and then analyzing the frequency of use of those codes. The responses can be broken down into mutually exclusive codes. The frequency of these codes in the responses can be reported in the same types of tables described above for multiple choice questions. For the more statistically inclined, the responses can be used to create more complex statistical models. For Likert scale data, responses can be reported in terms of which responses were chosen most frequently.

There are many resources available that present general best practices for analyzing survey responses, maximizing item and unit response, minimizing biases, and generally producing surveys that will yield high quality information. For more details on conducting surveys and analyzing data from them, the following resources may be useful: Lew and Himes-Cornell (2011), Dillman et al. (2009), Rea and Parker (2005), Groves et al. (2011), URSSC (2001), Dillman et al. (2014), and Lew et al. (2015).