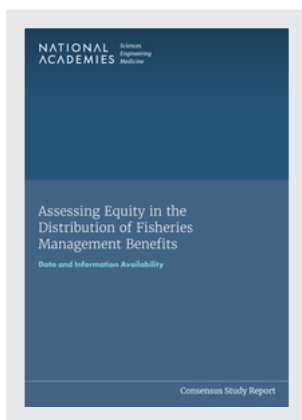


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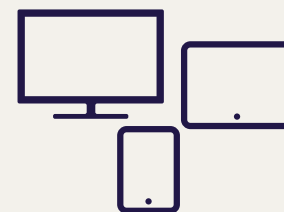
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Assessing Equity in the Distribution of Fisheries Management Benefits

Data and Information Availability

Committee on Assessing Equity in the
Distribution of Fisheries Management
Benefits: Data and Information Availability

Ocean Studies Board

Division on Earth and Life Studies

Consensus Study Report

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This Consensus Study Report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the National Academies of Sciences, Engineering, and Medicine in making each published report as sound as possible and to ensure that it meets the institutional standards for quality, objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

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Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations of this report nor did they see the final draft before its release. The review of this report was overseen by **CYNTHIA JONES**, Old Dominion University, and **BONNIE McCAY (NAS)**, Rutgers University. They were responsible for making certain that an independent examination of this report was carried out in accordance with the standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the authoring committee and the National Academies.

Preface

Ten years ago, at a talk celebrating the opening of a new academic building, I lamented that we were basically using the same techniques to understand the marine environment that were used on *HMS Challenger* in 1872. That is no longer the case. From the fields of genetics to remote observation, new scientific instrumentation and techniques are changing how we sample, measure, and understand the marine environment. We can “fathom the ocean” in ways about which the pioneers described in Helen Rozwadowski’s book by that name could only wonder. The sea is less opaque to us now.

Accompanying these advances, fisheries management in the United States has had to address the question: “Who benefits from fishery management decisions?” How does answering that question affect the management decisions? What is an equitable decision? Initially, these discussions were mostly about allocations among sectors—for example, inshore versus offshore, commercial versus recreational. These discussions were sharpened with the advent of limited access privilege programs that assign rights to a permit to fish. Allocating these rights are explicit decisions about who should benefit.

In May 2023, the National Marine Fisheries Service (NMFS) released a final, national equity and environmental justice strategy, which clearly articulates NMFS’s aim to serve all communities equitably and effectively. The strategy’s stated goals are to “(1) Prioritize identification, equitable treatment and meaningful involvement of underserved communities; (2) Provide equitable delivery of services; and (3) Prioritize equity and environmental justice in meeting its mandated mission.”¹ To achieve these goals, the strategy includes the following objectives²:

¹National Oceanic and Atmospheric Association Fisheries. 2023. *Equity and environmental justice strategy*. See <https://www.fisheries.noaa.gov/s3/2023-05/NOAA-Fisheries-EEJ-Strategy-Final.pdf>. P. 2.

²National Oceanic and Atmospheric Association Fisheries. 2023, May 22. *NOAA Fisheries releases final equity and environmental justice strategy*. See <https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-releases-final-equity-and-environmental-justice-strategy>. Para. 3.

- Provide an empowering environment within our agency to support multiple equity and environmental justice approaches
- Incorporate equity and environmental justice in our agency policies and plans
- Achieve equity in research and researching equity
- Outreach and engage equitably
- Equitably distribute benefits
- Ensure inclusive governance

In the spirit of these objectives and goals, and as evidence of its commitment to furthering equity in its decision-making, NMFS approached the National Academies to conduct this consensus study, which considers the data and information needs for assessing equity in the distribution of fisheries management benefits. In addition to the present study, NMFS has already expressed intent to fund a second study that may examine fisheries management benefits within select, illustrative fisheries. Unlike some studies conducted by the National Academies, neither this study nor the proposed follow-up was congressionally mandated. The committee applauds NMFS for proactively approaching the National Academies with these requests and for being receptive to input on these complex issues.

This committee's report does not provide simple answers; as has become clear through our process, equity is not a simple concept, and thus its measurement and assessment are not straightforward either. Instead, equity is multidimensional. Collecting information to shed light on the multiple facets of equity in fisheries management is made more challenging by obstacles, including both policy and practical considerations. The committee acknowledges these challenges and encourages persistence in the furtherance of understanding despite them.

As chair, I would also like to acknowledge the contributions of my fellow committee members. The committee was composed of individuals with diverse regional and disciplinary expertise, who worked in concert to develop a thorough and thoughtful report that reflects their commitment of time, energy, and insight. Their insights were complemented by those shared during our public, open-session meetings, and we also extend our gratitude to the invited speakers and other participants for their valuable contributions.

Thomas Miller, *Chair*
Committee on Assessing Equity in the Distribution of
Fisheries Management Benefits: Data and Information Availability

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The committee thanks the following individuals for their contributions during the study process, especially for enriching and informing the discussions at its open-session meetings: Leif Anderson (National Oceanic and Atmospheric Administration [NOAA]), Courtney Carothers (University of Alaska Fairbanks), Lisa Colburn (NOAA), Rachel Feeney (New England Fishery Management Council [NEFMC]), Benjamin Fissel (NOAA), Lindsay Fullenkamp (NOAA), Brian Garber-Yonts (NOAA), Kate Haapala (North Pacific Fishery Management Council [NPFMC]), Gretchen Harrington (NOAA), Justin Hospital (NOAA), Min-Yang Lee (NOAA), Frank Lockhart (NOAA), Sarah Malloy (NOAA), Sarah Marrinan (NPFMC), Bonnie McCay (Rutgers University), José L. Montañez (Mid-Atlantic Fishery Management Council), Michael Pentony (NOAA), Carrie Pomeroy (University of California, Santa Cruz), Naresh Pradhan (NEFMC), Jennifer Silver (University of Guelph), Kitty Simonds (Western Pacific Fishery Management Council [WPFMC]), Dale Squires (NOAA), Josh Stoll (University of Maine), Andy Strelcheck (NOAA), Marysia Szymkowiak (NOAA), Adrienne Thomas (NOAA), Michael Travis (NOAA), Christina Wiegand (South Atlantic Fishery Management Council), and Zach Yamada (WPFMC). Their input was critical to the completion of the committee's work.

The committee would also like to thank our primary contacts at NOAA's National Marine Fisheries Service, Lindsay Fullenkamp and Caroline Potter, for their efforts in developing and sponsoring this study and for providing important documents and support upon the committee's request.

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Acronyms and Abbreviations

ACEPO	Annual Community Engagement and Participation Overview
BSAI	Bering Sea and Aleutian Islands
BSFEP	Bering Sea Fishery Ecosystem Plan
BSIA	best scientific information available
CBD	United Nations Convention on Biological Diversity
CDQ	Community Development Quota (Program)
CFEC	Commercial Fisheries Entry Commission
CQE	Community Quota Entity
CSVl	Community Social Vulnerability Index
<i>EEJS</i>	<i>Equity and Environmental Justice Strategy</i>
EEZ	Exclusive Economic Zone
GARFO	Greater Atlantic Regional Fisheries Office
GMFMC	Gulf of Mexico Fishery Management Council
GOA	Gulf of Alaska
LKTKS	Protocol for Identifying, Analyzing, and Incorporating Local Knowledge, Traditional Knowledge, and Subsistence Information
LLC	limited liability corporation
LLP	License Limitation Program
MAFMC	Mid-Atlantic Fishery Management Council
MLMA	Marine Life Management Act
MPA	marine protected area
MSA	Magnuson-Stevens Act

NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
PRA	Paperwork Reduction Act
SAFE	Stock Assessment and Fishery Evaluation (report)
SAGE	Site-Level Assessment of Governance and Equity
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SORN	Systems of Records Notice
USDA	U.S. Department of Agriculture
WPFMC	Western Pacific Fishery Management Council

Summary

In May 2023, the National Oceanic and Atmospheric Administration’s (NOAA’s) National Marine Fisheries Service (NMFS) released its *Equity and Environmental Justice Strategy (EEJS)*. This document guides NMFS staff in their efforts to address various equity issues under the agency’s purview. Three overarching goals are articulated in the EEJS: “(1) Prioritize identification, equitable treatment and meaningful involvement of underserved communities; (2) Provide equitable delivery of services; and (3) Prioritize equity and environmental justice in meeting its mandated mission.”¹

As part of its effort to address the stated goals and advance equity, NMFS requested that the National Academies of Sciences, Engineering, and Medicine provide an independent, third-party review of the data and information needs and availability for assessing equity in the distribution of benefits derived from current fisheries management practices (Box S-1). This study precedes a proposed second study, which would build on this contribution by evaluating equity in select, illustrative fisheries using the information available.

The context and circumstances surrounding the study request made clear that advancing equity in the management of the nation’s commercial and for-hire fisheries was a key objective in requesting the committee’s input. Therefore, the committee’s intent has been to both address the statement of task and consider the broader context of equity. Doing so has required examination of the definition of *equity*, the relationship of equity to NOAA’s relevant mandates, and the degree to which filling particular information gaps contributes to NOAA achieving its equity-related objectives.

The committee also wrestled with the term *primary benefits*. In order to understand the questions of where and to whom the primary benefits of fisheries management accrue, which appear to be at the heart of the committee’s first task, the felt it was necessary to understand what *primary benefits* means. At one level, for example, this could mean a geographic and demographic description of who receives the permits and quotas that NMFS allocates. However, while potentially useful, that interpretation may not result in an adequate analysis for multiple reasons: (1) quotas and

¹National Oceanic and Atmospheric Association Fisheries. 2023. *Equity and environmental justice strategy*. See <https://www.fisheries.noaa.gov/s3/2023-05/NOAA-Fisheries-EEJ-Strategy-Final.pdf>. P. 2.

BOX S-1 Statement of Task

An ad hoc Committee of the National Academies of Sciences, Engineering, and Medicine is undertaking a study to:

1. Determine the categories of information required to adequately assess where and to whom the primary benefits of commercial and for-hire fishery management accrue;
2. Determine what information currently exists within those categories and what additional information, if any, NMFS would need to collect;
3. Identify potential obstacles to collecting this additional data; and
4. Identify methodologies the agency could use to assess the relative distribution of benefits from federal commercial and for-hire fishery management based on available information.

allocations vary widely in their nature; (2) a range of benefits may or may not stem from holding permits and quotas; (3) permit and quota holders are not the only potential beneficiaries impacted by allocative decisions; and (4) broader considerations of equity are not limited to distributional concerns. The committee recognized the importance of addressing its statement of task as it was originally interpreted, providing insights on data and information needs for assessing the distribution permits and quotas. As a result, the committee first provided input from this more focused perspective before incorporating discussion of other potential benefits or beneficiaries and the full suite of equity considerations.

WHAT IS EQUITY?

Equity can be thought of as consisting of multiple elements: distributional equity, procedural equity, recognition equity, and a cross-cutting element referred to as contextual equity (Figure S-1).

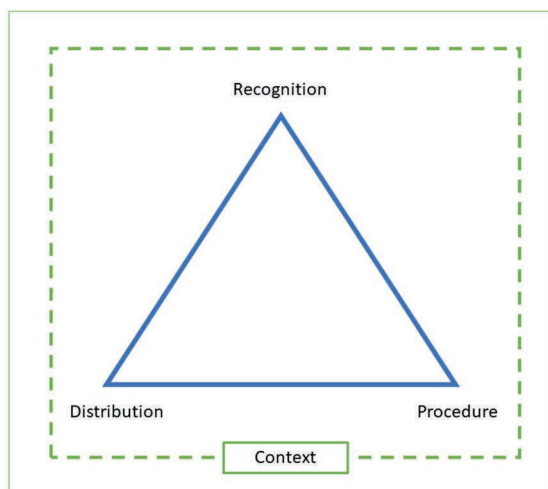


FIGURE S-1 Key components of multidimensional equity.

SOURCES: Adapted from Franks and Schreckenberg (2016) and Schreckenberg et al. (2016). See McDermott et al. (2013) and Pascual et al. (2014) for alternative visualizations.

The first element, or dimension, of equity is distributional equity. In the context of natural resource management, this dimension considers the distribution of benefits and costs to individuals or groups at various scales. While it may seem straightforward, measuring distributional equity can be quite complex. A wide range of goals and criteria can be applied for assessing distributional equity, some of which may focus on equal distribution among all members, while others seek a distribution that maximizes benefits or minimizes costs to the most disadvantaged. Still others may try to account for potential future members or seek to distribute costs and benefits proportionally according to effort, investment, or other factors. In other words, what may be perceived as a “fair” or “equitable” distribution of cost and benefits to one party may not be viewed as such universally.

As originally interpreted, the committee’s statement of task calls for a focus on the distribution of the primary benefits of fisheries management. However, the committee acknowledges the importance of also considering the additional dimensions of equity (i.e., procedural, recognitional, and contextual), in part because the dimensions interrelate and influence one another.

Recognitional equity involves acknowledging the rights, knowledge, values, interests, and priorities of a diverse array of individuals and groups and incorporating them into management considerations. As an example, in the fisheries management context, this may involve recognition of Indigenous rights, including fulfilling the trust obligation to federally recognized Tribes, and the value of Indigenous Knowledge and Traditional Knowledge. As a second example, recognitional equity may involve both the recognition and potential management consequences of the imbalance in power among individuals and groups.

Procedural equity requires consideration of who is involved in the decision-making processes. It involves the inclusive and effective participation of all relevant individuals and groups. This can be difficult to achieve because of challenges associated with identifying those who once were or may in the future be affected by the outcomes of fishery management outcomes. Important goals of procedural equity are to overcome existing power dynamics, and account for the range of capacities and resources needed to enable the participation of all relevant groups in fishery management decision-making.

Cutting across the other elements of equity, *contextual equity* considers the social, economic, environmental, cultural, and political history and circumstances that affect other forms of equity. In part, consideration of context can shape which dimensions of equity are prioritized and how subjects of equity are characterized and identified. Contextual equity recognizes that efforts to achieve equity or mediate inequities do not occur against a blank slate.

No single dimension of equity can itself define an equitable system, instead, a complete assessment of the system that integrates elements from each dimension is necessary.

FINDING 2-1: Equity is multidimensional and is more likely to be realized through an approach that accounts for each of the dimensions: distributional, procedural, recognitional, and contextual. (Figure S-1).

NOAA’S MANDATE FOR EQUITY

The legal, regulatory, and policy context surrounding fisheries management in the United States includes multiple instruments and documents that either influence or mandate equity. The committee did not try to identify or enumerate all such instruments and documents, but rather identified select key examples to illustrate how they may map to the framework of equity described above. In many recent relevant executive orders and strategy documents equity and justice are considered deeply connected, so that a commitment to one presupposes a commitment to the other.

The Magnuson-Stevens Fishery Conservation and Management Act (as amended; the Magnuson-Stevens Act or MSA) serves as the primary legislation governing federal fisheries management

in the United States. The MSA sets forth 10 principles, referred to as National Standards, that are required in fishery management plans. Each of the National Standards is accompanied by supporting guidance for their implementation. National Standard 4 is most obviously linked to equity, but National Standards 1, 2, and 8 (Box S-2), and their respective guidance documents, are also relevant.

National Standard 4 specifically requires fair and equitable allocation of fishing privileges, and the associated guidance² expands on that stating that “An allocation of fishing privileges may impose a hardship on one group if it is outweighed by the total benefits received by another group or groups. An allocation need not preserve the status quo in the fishery to qualify as ‘fair and equitable,’ if a restructuring of fishing privileges would maximize overall benefits.”

National Standard 1 and 2 are also pertinent, as National Standard 1 guidance refers to the “greatest benefits to the nation,” calling for the consideration of who benefits and how. National Standard 1 is also the most directive of the National Standards, without the contingent elements that can be found in other National Standards. National Standard 2 guidelines require the inclusion of “pertinent economic, social, [and] community ... information for assessing the success and impacts of measurement measures” in fisheries Stock Assessment and Fishery Evaluation reports. Finally, National Standard 8 calls for consideration of geographic communities and their participation in fisheries as well as evaluating economic impacts on fishing communities.

BOX S-2 **Select Relevant National Standards**

National Standard 1 – Optimum Yield

“Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.”

National Standard 2 – Scientific Information

“Conservation and management measures shall be based upon the best scientific information available.”

National Standard 4 – Allocations

“Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privilege.”

National Standard 8 – Communities

“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 by utilizing economic and social data that meet the requirement of paragraph (2) [i.e., National Standard 2], in order to (a) provide for the sustained participation of such communities, and (b) to the extent practicable, minimize adverse economic impacts on such communities.”

SOURCE: See <https://www.fisheries.noaa.gov/national/laws-and-policies/national-standard-guidelines>.

²The committee recognizes that revisions to the guidance documents for some national standards, including National Standard 4, are underway. The committee is aware of the Advance Notice of Proposed Rulemaking that was issued in May 2023 (88 F.R. 30934), but for the purposes of this report relied on the existing guidance.

In addition to the MSA, the National Environmental Policy Act includes requirements for meaningful participation in decision-making along with consideration of any social impacts, including equity concerns, that may arise from agency decision-making.

Beyond these key pieces of legislation, a series of executive orders further demands consideration of equity, environmental justice, underserved communities, and Tribes and Indigenous Peoples. Some include definitions of equity with notable procedural, not merely distributional, components.

Finally, the NMFS *EEJS* released in May 2023, not only sets forth NMFS's goals and objectives related to ensuring equity in their decision-making and management, but also describes the policy landscape in additional detail.

FINDING 2-3: Existing authority granted to NMFS by the MSA, the National Standards, NEPA, executive orders, and other instruments provides the agency with a clear mandate for a multidimensional and contextual approach to centering equity in its work.

RECOMMENDATION 2-1: The National Marine Fisheries Service should develop and implement a contextual, place-based, and participatory approach to identifying and integrating multi-dimensional equity considerations into decision-making processes in ways that balance previous and more recent mandates. Outcomes of these processes should include, among other things, clear identification of the criteria for, and appropriate subjects of, equity considerations.

DISTRIBUTIONAL EQUITY OF FISHERY PERMIT AND QUOTA BENEFITS

The committee provides a stylized model fishery, which is not intended to represent an ideal, equitable fishery, but rather a fishery for which there is substantial available information to assess distributional equity. This model requires several key assumptions, many of which are not met by the realities of U.S. federally managed commercial and for-hire fisheries. The committee uses these assumptions to demonstrate how difficult it can be to collect essential information even for the purpose of measuring the current distribution of permits and quota. In particular, the use of the model fishery illustrates the importance of having a full suite of demographic information to assess the extent and nature of fishery engagement among various groups, but notes this is necessary but not sufficient for assessing distributional equity. For instance, the assessment of equity will require a fair and equitable process for determining the appropriate counterfactual from which to compare and evaluate the distribution across fisheries, time, and regions.

FINDING 3-1: Comprehensive demographic data related to characteristics of permit and quota holders and their geographic locations are required if NMFS is to determine where and to whom the benefits of the issuance of permits and allocations of quota accrue and to meet the intent of Congress expressed in MSA for fair and equitable distribution of benefits as well as to meet commitments made in recent executive orders.

However, various barriers can limit the collection of all the necessary demographic data. Considerable differences exist between regions in their current practices of issuing permits and allocating quota, which can influence whether and how particular categories of information can be collected. For example, additional data collection efforts, beyond what is already being collected, may be subject to the Paperwork Reduction Act or Privacy Act requirements. In other cases, complex permit ownership, such as ownership by vessels, corporations, banks, or LLCs, can make collecting demographic information on “to whom” and “where” benefits accrue either complicated

or impossible. Voluntarily submitted data, despite its potential to provide useful information, creates challenges for assessment, particularly because of concerns regarding the representativeness of the sample provided. Banks, or limited liability corporations, can make collecting demographic information on where and to whom benefits accrue either complicated or impossible. Despite their potential to provide useful information, data submitted voluntarily create challenges for assessment, particularly because of concerns regarding the representativeness of the sample provided.

Adding to the challenge, a common factor impacting data acquisition and analysis is the need for significant investments in capacity in the non-economic social sciences within NMFS. A needs assessment within each fishery management region and at the national offices would provide important direction as the agency looks to fill this capacity. Many approaches, from focusing on hiring entry-level staff social scientists to hiring at the senior scientist level, could be effective. Although the committee does not prescribe a solution, it sees value in ensuring that senior leadership (e.g., a lead social scientist position akin to the lead economist position in NMFS) is working on these issues.

Despite the aforementioned obstacles, important work is under way and additional progress is possible. During the committee's open-session meetings, NMFS and its partners showcased high-quality social science work already being conducted. For example, scientists are expanding and advancing integration of data into dashboards, such those being developed by the Northeast Fisheries Science Center, that provide economic and social metrics for particular fisheries in the region, including supporting continual updates and developing necessary database structures. Others are expanding and enhancing collaborations and partnerships, including developing a community of practice in each region. Partnerships may also provide a solution for overcoming some of the constraints of collecting data within the federal system.

RECOMMENDATION 3-1: The National Marine Fisheries Service should take advantage of current opportunities both within the agency and in academia to expand work on equity by generating dashboards and data summaries that more fully express the distribution of permits and quota holdings in the nation's fisheries. Progress on these activities need not await more comprehensive discussion of equity or wider availability of data.

RECOMMENDATION 3-2: The National Marine Fisheries Service (NMFS) should develop a guidance document(s) to inform and establish principles that lead to definitions of equity (see, e.g., Recommendation 2-1), and processes for measuring and assessing equity over time by NMFS, regional science centers, and Council staff. This document(s) should parallel guidance documents related to the Magnuson-Stevens Act. For example, NMFS has issued technical guidance that provides national, operational definitions of abundance and exploitation thresholds. Accordingly, even though regional methods for evaluating these thresholds may differ, an integrated, national summary of the status of fish stocks is possible. The committee views the suggested equity guidance documents as working in a similar fashion.

RECOMMENDATION 3-3: The National Marine Fisheries Service (NMFS) should undertake a needs assessment in each region and at the national level that can provide guidance on different investment strategies for developing social science capacity and leadership within the agency. These investments could include staffing focused on early-career scientists or a mix of scientists at different career stages with diverse disciplinary expertise and skill sets, including in research design and qualitative and quantitative data collection and analysis. The committee recommends that increasing capacity needs to include, but not be limited to, the leadership level, such as a Senior Scientist for Social Sciences within the NMFS Directorate.

BENEFICIARIES OF FISHERY MANAGEMENT DECISIONS

After examining its task through a focused lens of distributional equity related to benefits that accrue to permit and quota holders, the committee broadened its focus to consider the flow of benefits that accrue from the issuance of permits and quota more comprehensively, recognizing important non-monetary benefits such as cultures, food security, and traditions at the individual, community, and societal scales.

The committee first considered three common categories of beneficiaries: crew, the processing and distributing sector, and communities. Subsequently, the committee considered potential beneficiaries who lost access, who might currently enjoy access and who society may wish to see benefiting were different management policies enacted.

Crew include nonowner captains, deckhands, mates, and those in specialized roles, who are essential fishery participants and who may be significantly impacted by fishery management decisions. While potential benefits associated with serving as a crew member include monetary benefits, studies have also demonstrated the value of job satisfaction, social capital, and identity associated with these roles. Crew positions may also serve as an entry point for new careers in fisheries. However, crew are often highly vulnerable to changes or declines within fisheries, including being only subject to informal employment and pay arrangements. In many regions, crew are generally characterized by lower social mobility, less formal education, and include many immigrant and temporary visa workers.

Beyond those engaged with or on fishing vessels, networks of shoreside facilities, such as processors and distributors, move caught fish to market. Processors and distributors may receive both monetary and nonmonetary benefits that may be impacted by fisheries management decisions. For example, fish processing jobs depend on the status and management of supporting fisheries. Providing seafood to consumers also represents a nonmonetary benefit associated with these sectors. Very few studies focus on the social or demographic dimensions of fish processing and distribution. The studies that exist are generally ethnographic studies of specific cases. NOAA's technical reports are available for some regions, although some are quite dated. NOAA social science reports have articulated several practical and logistical obstacles to characterizing seafood processors and other shoreside businesses.

Communities can also be impacted by fisheries management. According to the National Standard 8 guidelines, "A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops)." Along with monetary benefits, diverse nonmonetary benefits to communities are associated with fisheries management. Fishing communities are diverse, spanning from small artisanal communities in the Western Pacific to large industrial ports in the Northeast—cultural identities across this spectrum are also important.

FINDING 4-1: The beneficiaries of commercial and for-hire fishery management go beyond current permit and quota holders to include others engaged directly in the fishery (e.g., non-permit holding vessel captains and crew), shoreside facilities involved in processing fishery products, the network that distributes fishery product, local and regional businesses that rely directly and indirectly on fishery activity, and local fishing communities.

Efforts to collect the data needed to assess the distribution of benefits among non-permit-holding participants and others have been fragmentary. Data on benefits that accrue to crew come primarily from regional surveys of crew members. Some data related to economic values that accrue in the processing and distribution sectors and in specific fishing communities are available, based

primarily on the value of fish and shellfish landed in particular ports. Fewer data are available pertaining to the processing and distribution network. Work has been conducted to establish indicators of coastal community social vulnerability (CSVI) to inform consideration of the impacts of fishery management on communities. Nevertheless, there are limitations associated with grounding the CSVI and similar analyses in U.S. census data. A primary challenge for NMFS going forward is the need to increase its capacity to design, conduct, and analyze social science data that assess the full flow of benefits from fishery management decisions.

RECOMMENDATION 4-1 The National Marine Fisheries Service should commit to regular collection, analyses, and interpretation of social and economic data to characterize the full flow of benefits and beneficiaries from the nation's fisheries. The committee recommends collecting, and within the extent of the law, disseminating publicly this information at more regular intervals to adequately assess the impacts of management decisions and changes in fisheries.

RECOMMENDATION 4-2 The National Marine Fisheries Service should continue developing community-level indicators of fishing engagement, dependence, and reliance. However, the committee also recommends further developing products that are not geographically constrained or limited by the spatial resolution of census data, which may not always align with a holistic definition of equity.

CHALLENGES TO DEVELOPING A COMPREHENSIVE APPROACH TO EQUITY

Current NMFS processes generally do not adopt an all-inclusive approach to integrating equity in management. The committee explores the challenges associated with a broader approach to equity. These challenges relate to both structure and methodology. Subsequently, the committee outlines elements of several programs and efforts, both within and outside NMFS, that could inform (but would not by themselves constitute) a holistic approach to equity considerations.

Six principal challenges to implementing a comprehensive approach to equity considerations in fisheries management are identified in the *NMFS EEJS* and several recent EOs. The first barrier relates to NMFS's acknowledgment that it has yet to fully identify underserved communities and account for impacts, including past injustices and exclusions, many of which stem from structural barriers within society as well as within the Agency's approach to underserved communities and in some cases fisheries science and management more broadly (see, e.g., White House 2022; Carothers et al., 2021; Silver et al., 2022). A second and somewhat related barrier relates to contextual equity. It recognizes historical processes including the long history of some fishery allocation programs, which will make identifying and obtaining demographic data on those excluded from participation and benefits difficult. Those who currently have access and are thereby empowered within the management regime may resist efforts to address prior inequities. The third barrier restricts engagement and access to services. This barrier relates to procedural equity issues related to costs, language, and other geographic and cultural barriers to meaningful participation in fishery management processes. The fourth barrier relates to the highly hierarchical and complex nature of the fishery management process. This complexity under-emphasizes the more nuanced, often qualitative data or Traditional and Indigenous Knowledge that might best inform implementation and assessment of multidimensional equity in fishery management. An unintended outcome is that social science data collection programs, such as the Fisheries Oral History Project, are difficult to integrate into routine management decisions and thus become lower priorities for funding, even though they may offer important insights. A fifth barrier acknowledges that ocean management policies beyond fisheries, such as area closures to protect biodiversity may become more pressing concerns in some

geographies, leading to an under-engagement in fisheries. The final barrier is that of social science capacity within NMFS (see Recommendation 3-3).

FINDING 5-3: A range of challenges is associated with moving toward comprehensively addressing and integrating equity concerns into fishery management decision-making processes, and their realized outcomes. These challenges include those related to diversity and capacity within NMFS and other management bodies, as well as those that are features of the communities (fishing, underserved, Indigenous), which NMFS impacts, those that are part of the larger social-ecological context, and those that stem from the unavoidably complicated nature of assessing equity.

MEASURING WHAT IS VALUED OR VALUING WHAT IS MEASURED?

Given the emphasis on methodological approaches in the statement of task, the committee also identified challenges associated with data and information and the assessment of equity concerns. For example, contemporary governance often emphasizes management goals and targets and identifying measurable indicators that can be monitored to assess progress. The attention is on outcomes or results, rather than administrative processes of policy delivery. Metrological practices to support outcome-based management—for example, setting and measuring standards, targets, criteria, baselines, benchmarks, and thresholds—are seen as key to good governance, allowing for monitoring, transparency, reporting, and evaluation.

However, this approach emphasizes that which is measurable in standardized, quantified, and comparable ways, thereby reinforcing the importance of the things it purports to measure. Governance action then becomes directed toward identified goals and preference is given to those that are more easily measured.

In contrast, multidimensional equity, embedded in context and with key terms subject to interpretation, fits uneasily within a governing logic of standardized, quantified, comparable, and easy to measure indicators. Efforts to ‘make equity fit’ by adopting universal definitions and measures risk perpetuating inequities, by imposing top-down and western conceptualizations of what constitutes fairness. The committee asks then, “if we leave equity out altogether, is it unlikely to be consistently or meaningfully prioritized?”

MOVING FORWARD: RECENT ADVANCES IN IMPROVING EQUITY IN MANAGEMENT

The committee reviewed five federal, state, and international efforts as examples that may offer lessons for NMFS in moving forward to adopt the broader, multidimensional approach to equity. This review supports Recommendation 3-2, which calls for a technical guidance document to support adoption of a holistic approach to equity. While the place-based approach envisioned in the NMFS *EEJS* is appropriate, it requires NMFS invest in capacity to support regional- and fishery-based approaches. The committee highlights the potential role of social impact assessments, required of fishery management actions, as a framework that could help inform NMFS work on equity in fisheries. The committee also recognizes the *Socioeconomic Guidance for Implementing California’s Marine Life Management Act* and the International Institute on Environment and Development’s (IIED’s) Site-Level Assessment of Governance and Equity (SAGE) as useful examples for NMFS in informing their thinking. For example, although designed to support efforts by the United Nations Convention on Biological Diversity to ensure protected areas are managed equitably, the IIED’s SAGE tool explicitly addresses multiple dimensions of equity, and describes methods to prepare, assess and monitor of management actions.

LEARNING FROM RECENT WORK TO IMPROVE NMFS'S INTEGRATION OF EQUITY IN MANAGEMENT

Recent work on equity supports the development of a comprehensive strategy for incorporating equity into management, tailored within regions. Arguably, devolving management processes and decisions to the regional level positions NMFS ahead of other organizations that lack the power at lower scales.

A starting point would be an evaluation of current decision-making processes in both fisheries governance and NMFS operations. It would be useful to assess recognition equity—meaning who is represented and what views are represented—in decision-making processes related to benefits, and procedural equity—how those processes are structured. A regional fishery management council and its related advisory and decision-making structures could serve as a helpful case study. Such a study would be both tractable and informative. Similarly, it could be useful to assess to what degree participatory (public and otherwise) processes consider and integrate questions of both recognition and procedural equity, although this would expand substantially the scope of an initial case study.

A case study of a regional council would likely identify a lack of representation and inadequate processes, suggesting a need to make progress in procedural and recognition equity. As discussed previously, NMFS's limited capacity constrains its ability to engage in advancing equity considerations. There are also barriers to groups participating in more holistic processes, ranging from costs to histories and cultures of distrust. The latter issue points to the need for NMFS staff to (1) articulate clear plans early on to assure participants their voices will be considered and (2) adopt new forms of outreach that acknowledge these past experiences. These barriers—especially those of time and monetary costs—would be addressed in part by actions to increase NMFS capacity and resources, as described in Recommendation 3-3. This could include NMFS supporting staff to work with and in communities or funding for a more diverse range of participants to travel and engage in management processes. For example, the location of the June meetings of the North Pacific Fishery Management Council rotates to smaller geographic communities.

Technological advances may also provide new opportunities. For example, although the COVID-19 pandemic created short-run challenges for fisheries and fisheries management, it brought about a shift to remote council meetings, which have continued to be livestreamed in some cases. Continuing with or adding remote participation options has the potential to reduce costs of participation and therefore make participation easier. However, unreliable and/or non-existent Internet access, lack of facility with technology, a lack of proficiency with English, and other factors could continue to serve as barriers to inclusion in formal processes.

While a shift toward a more inclusive approach to equity will take time and resources shorter-term and lower-cost changes may help begin to “move the needle.” NMFS can help to indicate its commitment to improving equity by identifying points in the management process that are inconsistent with policy and could be rethought and modified within a more comprehensive approach to equity. For example, this report highlights Stock Assessment and Fishery Evaluation reports for tracking of fishery outcomes and social impact assessments for proposed rulemakings as potential on-ramps to improving equity in fisheries. The committee also suggests that NMFS consider its own structures, composition, collaborative opportunities, and approaches to improve the capacity of NMFS staff at all points in the management process.

RECOMMENDATION 5-1: The National Marine Fisheries Service should continue its work on equity in the nation's fisheries, and it should move beyond a focus on distributional outcomes associated with permit and quota holdings to a more multidimensional assessment of equity. This will require addressing a range of complex challenges that can be informed by existing programs, projects, and frameworks, but will not likely be achieved by minor adjustments to existing efforts. Addressing these challenges will, among other things, demand a contextually based, multidimensional approach and a considerable expansion of the social science capacity within the agency as well as the development of partnerships across a range of governmental and non-governmental sectors.

1

Introduction

BENEFITS TO THE NATION FROM FISHERIES

Fisheries are essential to the global economy and feed billions around the world; they, support individuals and communities, and sustain cultural heritages and livelihoods (Cisneros-Montemayor et al., 2016; Spalding, 2016; Sumaila, 2021). In the United States, in 2020, commercial fisheries landed 8.4 billion pounds of fish, valued at \$4.8 billion (NMFS, 2022). In the same year, commercial fisheries together with the seafood industry supported \$155 billion in sales, contributed \$117 billion to gross domestic product, and supported 1.1 million jobs in the United States (NMFS, 2023a). Additionally, important subsistence fisheries exist, principally in Alaska, the Pacific Northwest, and the Western Pacific, that support cultural practices, values, and identities, and contribute to food security and sovereignty, and multi-dimensional well-being. In addition to these commercial and subsistence values, marine recreational fisheries have become increasingly important (Cisneros-Montemayor and Sumaila, 2010; Ihde et al., 2011). According to estimates, marine recreational anglers took nearly 200 million trips in 2020 (NMFS, 2022). These trips benefit the tourism and hotel sectors, as well as tackle manufacturing and associated retail industries. Beyond economic value, fisheries can provide cultural, social, and other benefits, including food for family gatherings. Participants often gain an appreciation for the natural world, beyond economic values, leading to an increased appreciation of environmental issues, concerns, and stewardship.

These benefits are greatest when fisheries are managed sustainably (Sumaila et al., 2012; World Bank, 2017). The Magnuson-Stevens Fishery Conservation and Management Act (as amended; hereafter the Magnuson-Stevens Act [MSA])¹ seeks to ensure sustainability of fisheries in federal waters. Federal waters extend from the 3-mile offshore limit of state jurisdiction to the 200-mile territorial limit. The MSA delegates to the Department of Commerce the nation's sovereign right to manage fisheries in federal waters. Within the Department of Commerce, management is coordinated and conducted by the National Marine Fisheries Service (NMFS) within the National Oceanic and Atmospheric Administration (NOAA). A small number of fisheries (e.g., highly migratory spe-

¹Magnuson-Stevens Fishery Conservation and Management Act. 16 U.S.C. §§ 1801 et seq.

cies) are managed directly by NMFS. The majority of species, however, are managed under a more distributed structure involving eight regional fishery management councils.

Although U.S. fisheries have been managed for commercial fishing historically (Smith, 1994), there has been an interest more recently in better accounting for and meeting the needs of the diverse individuals, groups, and communities that rely on and participate in fisheries, or aspire to do so. In May 2023, NMFS released its *Equity and Environmental Justice Strategy (EEJS)*, which commits NMFS to three overarching goals: “(1) Prioritize identification, equitable treatment and meaningful involvement of underserved communities; (2) Provide equitable delivery of services; and (3) Prioritize equity and environmental justice in meeting its mandated mission” (NMFS, 2023b). To achieve these goals, NMFS established objectives to incorporate equity and environmental justice into agency policies and plans and to distribute benefits of its actions equitably, amongst other things.

In seeking to make progress on these strategic objectives, NMFS requested that the National Academies of Sciences, Engineering, and Medicine establish an ad hoc committee to conduct a consensus study that considers information needs and data collection for assessing the distribution of fisheries management benefits. In the first of two proposed studies, NMFS requested that the National Academies committee identify information needs, obstacles to collecting information, and potential methodologies for assessing where and to whom the primary benefits of commercial and for-hire fishery management accrue. The full Statement of Task for this study is provided in Box 1-1.

The emphasis of this study is on the information and data needed, and methodologies that may be employed, for conducting an assessment of the distribution of benefits—construed initially as benefits associated with the issuance of permits and the allocation of quota. Importantly, this study does not assess the distribution of benefits that flow from the issuance of permits and allocation of quota. A separate study (“Phase 2”) is expected to follow; as currently anticipated, that study could build from this one by looking at specific fishery case studies and attempt an assessment based on the recommendations provided herein.²

This committee held five open sessions to gather information. It also held closed-session meetings for deliberations and drafting this report. Although most of the information-gathering meetings were held virtually, the committee did meet in an in-person, open session in Washington, DC, on July 17–18, 2023.

BOX 1-1 **Statement of Task**

An ad hoc Committee of the National Academies of Sciences, Engineering, and Medicine is undertaking a study to:

1. Determine the categories of information required to adequately assess where and to whom the primary benefits of commercial and for-hire fishery management accrue;
2. Determine what information currently exists within those categories and what additional information, if any, NMFS would need to collect;
3. Identify potential obstacles to collecting this additional data; and
4. Identify methodologies the agency could use to assess the relative distribution of benefits from federal commercial and for-hire fishery management based on available information.

²Additional information regarding a “Phase 2” study will be posted to the Ocean Studies Board website at <https://www.nationalacademies.org/osb/ocean-studies-board> if and as it becomes available.

STRUCTURE OF THE REPORT

NMFS leadership provided guidance in early briefings to the committee that it intended the committee to interpret “primary benefits” to focus on those associated with fisheries permits and quota. The issuance of permits and the assignment of quota are starting points for considering the benefits that flow from fisheries. This definition of primary benefits considers the term “primary” to mean “first in order of sequence.” Notable challenges exist with this framing. For example, commercial and for-hire sectors, which fulfill different needs for different participants, are managed under different data collection and reporting systems. The task is complicated further by the clear regional differences among the nation’s fisheries. Appropriately, the regional approach to management responds to local conditions. The nature, pattern, and history of fisheries vary across the regions. Who holds permits varies regionally. How allocations of permits and quota are made differ between regions and between fisheries within a region.

Early on the committee considered how our deliberations might change if we considered an interpretation of “primary benefits” as being those “of high importance.” This framing would require consideration of benefits beyond those associated with the receipt of permits or quota and involve assessing equity in the distribution of fishery benefits quite broadly. The challenge in this framing is the identification of importance. Specifically, the flow of benefits from agency actions are complex, involving multiple actors and groups, and accrue over a range of temporal and spatial scales. For example, analyses of the full flow of benefits might evaluate equity considerations throughout the seafood supply chain. Such an analysis might consider questions of food (in)security and sovereignty. Similarly, there is precedence in the fisheries policy literature to consider equity versus economic efficiency tradeoffs (Kroetz et al., 2015). It was necessary for the committee to determine where to draw the line regarding importance in its own work. In balancing the time available for the study and the data demands, the committee determined that it would restrict its work to consider those directly involved in the harvesting and processing of fish caught in response to the issuance of permits and the allocation of quota. This means the committee did not extend their consideration to equity across consumers and taxpayers. The committee recognizes there are equity issues in the seafood supply chain and particularly when considering non-domestic fisheries (Cochrane, 2021). The committee held that many of these questions arise from the harvest of a common pool resource, rather than from the specific issuance of permits and allocation of quota. Accordingly, the committee felt that a natural division exists between the issuance of permits and the processing of harvest product in fishing communities and the subsequent flow of benefits to consumers and companies in the seafood supply chain. In this framing, the committee considers first a narrow interpretation of primary benefits as those accruing directly from the issuance of permits and allocation of quota, but subsequently widens the interpretation to consider important benefits of management that accrue to participants in the fishery and processing sectors subsequent to the issuance of permits and the allocation of permits.

This report comprises five chapters. Following this introduction, Chapter 2 presents a multi-dimensional and contextual definition of *equity* that will be used in subsequent chapters. Chapter 2 also establishes a theoretical grounding for the discussion of equity and maps the dimensions of equity key the work of NMFS as a whole or that of a regional fishery management council. The chapter reviews the legislative mandate contained in the MSA and recent Executive Orders that frame and guide NMFS’s work on equity. Finally, the chapter introduces ways in which equity has been considered in fisheries management.

Returning to the focused lens of permits and quotas, as suggested by NMFS. The committee addressed the first question in our statement of task by considering a stylized fishery in which all necessary data are available to monitor and describe the distribution of permits and quota. The committee asked, “What would the availability of data from such a model system enable us to infer and

understand?” Although few, if any, federally managed fisheries meet the data quantity and quality available in the model fishery, some non-federally managed fisheries come closer—for example, data collected at the State level—but are still far from the stylized, model fishery. Consequently, Chapter 3 then describes information currently available and identifies information gaps that prevent an assessment of to whom and where benefits of permits and quota accrue. The committee did not enter into data access agreements with federal or state agencies. Accordingly, the information summaries and data that the committee presents in Chapter 3 come from publicly available information sources. Chapter 3 emphasizes the general need for improved demographic data and better linking community-level data with fishery-level data. The committee provides examples of the demographic information available for select regions and fisheries, particularly from the Northeast, Gulf of Mexico, and North Pacific, to demonstrate the heterogeneity across fisheries and management regions. The committee did not attempt to comprehensively review fisheries from all regions, in part because the use of regional examples was intended to be illustrative, and in part, because the committee’s examination of regional examples was limited by scope, time, available information, and collective expertise. The committee considers some of the administrative, logistical, and statistical obstacles in current data and in collecting additional data. The chapter concludes with approaches that could be used for collecting the data and information necessary for a focused assessment of to whom and where the benefits of fisheries management, construed as benefits derived from permits and quota, accrue.

The committee is aware that some very or equally important benefits of management occur subsequent to the issuance of permits and the allocation of permits. These benefits include impacts to non-permit-holding captains and crew, shoreside facilities, distribution networks, fishery-dependent industries, and local communities. The benefits received by these groups are likely both monetary and non-monetary. Chapter 4 considers this more expansive view of the flow of benefits, starting with common categories of beneficiaries. A strong contextual history lies behind to whom and where these benefits flow. Accordingly, Chapter 4 concludes by acknowledging “potential beneficiaries” who were once, or who may be in the future beneficiaries of fisheries management actions.

Chapter 5 returns to the framing of equity presented in Chapter 2, providing examples of efforts that may offer lessons learned or best practices for considering equity in fisheries management decisions and how NMFS could move forward in its important work on equity in the nation’s fisheries.

Within the diverse literatures consulted for this report, the people who participate in and/or are impacted by fisheries management are referred to in a variety of ways, including as actors, stakeholders, beneficiaries, and subjects. Participants may be members of Tribes with sovereign rights to specific natural resources. Each of these terms can be applied to individuals or groups, invokes different connotations, and can be defended or challenged for a variety of reasons. This report employs various terms in ways that reflect the relevant literature. For example, the equity literature often uses the term *subjects*, while the term *stakeholders* is common in reference to participants in resource management—this term is, however, inappropriate when referring to Tribal Nations and citizens. While the committee recognizes the importance of labeling and that our decision to use multiple labels could be confusing, it was beyond the study scope to resolve these broader definitional debates. In attempt to provide some clarity, Box 1-2 provides basic definitions for several of the terms used throughout the report.

BOX 1-2
Report Terminology

- **Actors** are individuals and groups of people within a resource management system who take specific actions to influence the resource or broader system.
- **Beneficiary** describes individuals or groups of people who receive a specific good or service.
- **Benefits** comprise both monetary and nonmonetary gains from fishing. Most directly, fishing provides monetary benefits through the value of the catch, as well as the salaries of people employed in fishing and related industries. However, nonmonetary benefits, including status, job satisfaction, identity, and sense of place, are also important.
- **Environmental justice** is often used interchangeably with *equity* but emerged from specific concerns about the unjust distribution of environmental harms to communities of color and the need to redress these.
- **Equity** is broadly concerned with fairness and recognized as having multiple dimensions. The most commonly recognized dimensions are distributional, recognitional, procedural, and contextual equity.
- **Stakeholders** are individuals or groups of people who are interested in or affected by resource management decisions. While *stakeholder* is among the most commonly used terms in the literature and is considered to be broad, its use can be problematic or offensive in some contexts.
- **Subjects** are people (and sometimes nonhuman entities) who are subjected to inequities or who require consideration in efforts to implement equity.

2

The National Marine Fisheries Service Mandate for Equity

This chapter draws on current literature to highlight the importance of considering the multiple dimensions of equity. It introduces concepts of recognitional, procedural, and contextual dimensions of equity that should be considered in parallel to the distributional questions of equity related to permits and quota. The chapter begins with the concepts of both the subjects of and criteria for equity considerations, and then presents an understanding of the National Marine Fisheries Service (NMFS) mandate for, and understanding of, equity as contained within the Magnuson-Stevens Act (MSA) and the National Environmental Policy Act (NEPA), as well as recent executive orders, strategy documents, and other instruments. Finally, the chapter provides some examples of how these concepts have been conceptualized and applied in fisheries management.

As a whole, this chapter serves as a foundation for the following chapters, providing both an explanation of terms and the committee's rationale for the scope of the report. While the word *equity* does not appear in the statement of task, it is central to the context within which NMFS requested this study. The importance of centering equity in this report was made clear to the committee during the information-gathering meetings, including in presentations by the study sponsors.

WHAT IS EQUITY?

Equity (and the related term *justice*¹) is a multidimensional concept concerned broadly with fairness (Campbell et al., 2021). Although the focus of this report is equity, recent executive orders and strategy documents often link *equity* and *justice*. Chiefly, equity concerns (1) the “distribution of costs, responsibilities, rights, and benefits,” including distribution of noneconomic costs and benefits; (2) “the procedure by which decisions are made and who has a voice” in them; and (3) “recognition—acknowledgement of and respect for the equal status of distinct identities, histories,

¹While the terms are often used interchangeably, *equity* and *justice* emerged in different contexts (Dawson et al., 2018). As reviewed in Campbell et al. (2021), equity emerged as a concern in policy circles as something to be resolved through policy design. Environmental justice emerged external to and in opposition to policymaking bodies that were seen as responsible for environmental harms to low-income communities and communities of color.

values, and interests of different actors” (Friedman et al., 2018, p. 2). Visualizing these dimensions in relation to one another, the equity “triangle” (shown in Figure 2-1) is embedded in a contextual framework. Indeed, context is increasingly recognized as a fourth dimension of equity (Campbell et al., 2021). Contextual equity accounts for social, economic, political, cultural, and historical contexts that influence one’s ability to participate in decision-making, receive a fair share of benefits, and gain recognition (Pascual et al., 2014; Wells et al., 2021). No single dimension is sufficient in itself to represent equity: each is a necessary but insufficient condition in an equitable system.

Distribution

In the context of resource management, *distributional equity* is primarily concerned with who enjoys the benefits or pay the costs of interventions (Schreckenberg et al., 2016). These concerns arise at different scales and within groups (e.g., by race, class, gender, caste, or ethnicity within local communities) that are subject to equity concerns. While no single measure of distributional equity exists, Box 2-1 summarizes some of the criteria and principles that can be used to assess distributional equity. The variety of criteria, all of which are “equally justifiable both in ethical and operative terms” (Pascual et al., 2010), highlights the challenges of achieving distributional equity; what is deemed “fair” by fisheries managers may not be perceived as fair to all or a subset of fishers or to others affected by fishery management decisions. Additionally, fisheries management often involves trade-offs among different kinds of benefits and costs as perceived among different groups according to different values (e.g., fish as food, versus a recreational resource, versus an income generator, versus carbon storage; Campbell et al., 2021). Within the environmental field, when equity has been assessed, distribution of benefits and costs has received most attention. The focus on distribution is challenged by many authors (e.g., Dawson et al., 2018), who argue that procedural

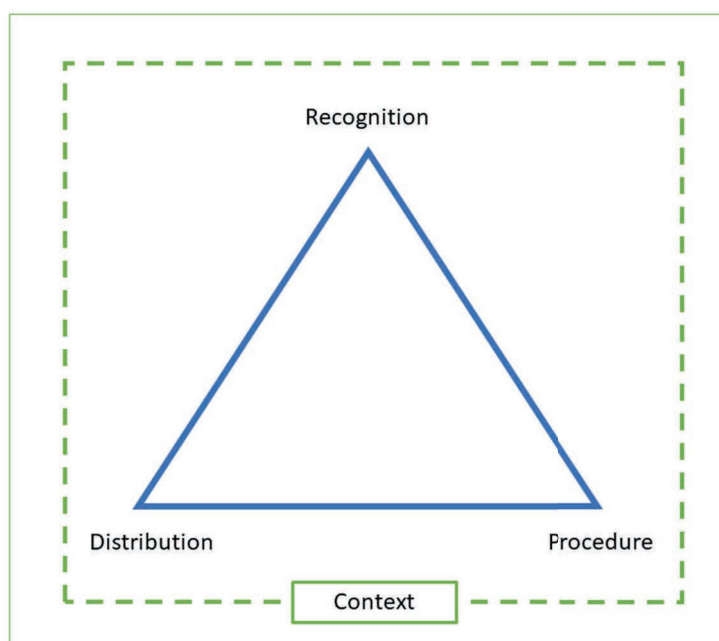


FIGURE 2-1 Key components of multidimensional equity.

SOURCES: Adapted from Franks and Schreckenberg (2016) and Schreckenberg et al. (2016). See McDermott et al. (2013) and Pascual et al. (2014) for alternative visualizations.

BOX 2-1 Example Criteria and Principles for Distributional Equity

Criteria, listed alphabetically, for assessing the equitable distribution of costs and benefits include:

- **Basic needs:** against a baseline that must be achieved by everyone
- **Compensation:** in a way that compensates for previous harms to group members
- **Egalitarian:** equally among group members
- **Future use:** accounting for potential future group members
- **Needs-based:** also called max/min (i.e., maximizing benefits or minimizing costs to the most disadvantaged)
- **Proportionality,** according to:
 - *Accountability:* positive and negative contributions to system (rewards and demerits)
 - *Investment:* levels of investment (capital, labor, etc.)
 - *Effort:* level of activity
 - *Importance:* level of importance, measured in economic, cultural, social, or other terms
- **Rights-based:** in a way that recognizes rights-based claims of some users (e.g., Indigenous Peoples, Tribal Nations)
- **Status quo:** to maintain existing relative distribution among group members
- **Utilitarian:** by averages (e.g., among sub-groups)

SOURCES: Burch et al. (2021); Gurney et al. (2021); Pascual et al. (2010, 2020).

and/or recognition equity are a prerequisite to multiple, culturally informed understandings of distributional equity (Campbell et al., 2021).

Recognition

Recognition equity aims to diversify and legitimize different inputs into decision-making, by recognizing the rights, knowledge, values, interests, and priorities of different groups. For example, recognition of Indigenous rights and knowledge systems, encompassing, Indigenous Knowledge and Traditional Knowledge, is receiving renewed attention in federal research, policy, and decision-making (see, e.g., White House [2022], and Executive Order 13175 [White House, 2000] on strengthening Tribal consultation processes). Indigenous Knowledge and diverse ways of knowing have been central to the concept and development of co-management regimes, even though this has seldom been framed as an equity issue (e.g., Hoefnagel et al., 2006; NPFMC, 2023). Indigenous Peoples have deep knowledge of ecosystems (Martin et al., 2016) and worldviews and cultural values that historically have been under-accounted for and marginalized in fishery management. Furthermore, Indigenous worldviews and livelihood practices may provide approaches for more sustainable and just ways of living in the world (Dawson et al., 2018, 2021). As another example, gendered knowledge of the environment or the local knowledge of particular resource users, such as active commercial, subsistence, or recreational fishermen who may be non-Indigenous are also recognized as legitimate and valuable forms of knowledge that should be taken into account in fishery management and decision-making (NPFMC, 2023; see also Belisle et al., 2018). Recognition equity can also involve acknowledging existing structures that may favor particular types of information in decision-making—for example, the management process itself can prioritize certain forms of data while discounting others (e.g., quantitative versus qualitative; Martin et al., 2016; Schreckenberget al., 2016). Thus, recognition equity is intertwined with and has implications for procedural equity, which is discussed next.

Procedure

Procedural equity attends to processes of knowledge collection, decision-making, and management. It is concerned with who is involved in decision-making and how decisions are made. Who decides the criteria for assessing a “fair” distribution? How is the value of a given resource or a particular outcome assessed? What kinds of knowledge are most relevant? Procedural equity draws broadly on principles or best practices for the inclusive and effective participation of all relevant individuals and groups. These questions and principles make procedural equity challenging to implement and achieve in practice, given that the processes for identifying those who should be included, and for structuring engagement, are themselves power laden (Martin et al., 2016). Of particular concern has been the need to identify those who traditionally have not been involved in such processes, or who have been intentionally excluded from past management decisions. In our deliberations, the committee encountered challenges of identifying and considering “who is not in the room” in multiple ways and on multiple occasions.

Even where an inclusive and exhaustive list of individuals and groups is identified, each likely has unequal capacities and resources to participate. Participation is often influenced by broader cultural and social norms and is costly to participants (Cooke and Kothari, 2001; Cornwall, 2008). Participation is sometimes used to “convince” people of the value of particular activities rather than to recognize the legitimacy and value of their input. Thus, poorly designed or intended efforts to encourage participation can increase inequity (Campbell et al., 2021).

Context

Context is increasingly recognized as the fourth dimension of equity, shaping the possibilities for achieving distributional, recognitional, and procedural equity (Campbell et al., 2021). Efforts to realize equity or mediate inequities do not occur against a blank slate, but rather are shaped by both prior and current social, economic, environmental, cultural, and political conditions (e.g., Gurney et al., 2021; Lau et al., 2021; Martin et al., 2016; Sikor et al., 2014; Zafra-Calvo et al., 2017). Context can shape understandings of equity, including its definition, which dimensions are deemed most important, and how subjects of equity are imagined (e.g., individuals, fleets, communities, non-human entities).

Researchers disagree about which component of equity is most important, in the sense of being prerequisite to the others, but this too may be mediated by context. Indeed, the committee would argue that questions regarding the relative importance of the different dimensions of equity are ill-posed. It is abundantly clear from the literature that all four dimensions are important and linked. Single dimensions of equity are neither sufficient nor solely necessary for a complete assessment of equity.

CRITERIA AND SUBJECTS

The four dimensions of equity identified above do not, in and of themselves, define an equitable system. Rather it is how these four dimensions of equity are integrated within a system that identifies both the criteria for how the dimensions of equity are defined and applied, and the “subjects” in the system that is important (Figure 2-2).

Equity is not a universally understood social good to be delivered through well-designed policy. Instead, equity is political and often emerges as a policy priority based on concerns about inequity. As noted by Campbell et al. (2021, emphasis in original), “Pursuing equity often involves mediating *competing* claims about distribution, recognition, and procedure, among diverse ‘subjects’ and according to varied ‘criteria.’” Recognizing diverse equity subjects in a given context

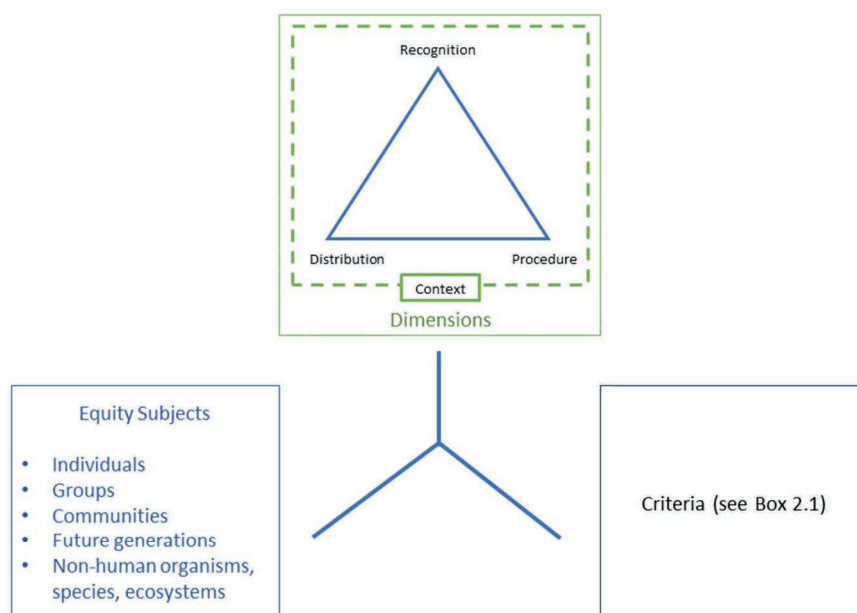


FIGURE 2-2 Dimensions, subjects, and criteria for equity.
SOURCE: Modified from Sikor (2013).

acknowledges that the distribution of benefits or costs is often a redistribution of an existing pool of goods, rather than the distribution of additional or new goods. Identifying the subjects of equity can be complex. The sustainable development literature draws attention to equity concerns among intra- and inter-generational subjects (Baron, 2021). Intergenerational inequities have also been a focal area in the fisheries literature (Donkersloot and Carothers, 2016; Ringer et al., 2018; Sumaila, 2004; Sumaila and Walters, 2005). Sikor et al. (2014) identify subjects as individuals and groups of people who have rights or bear responsibilities, have a role in decision-making or are deserving of recognition and respect from others involved in the process (e.g., Tribal Nations). Some argue that equity should be extended to non-human organisms or nature more broadly (Hardin-Davies et al., 2020).

NMFS MANDATE FOR EQUITY

Several statutes, instruments, and documents related to environmental equity shape the policy and regulatory arena in which NMFS operates. The committee considered a range of authorities including legislation (such as the MSA); codified rules; and guidelines that flow from relevant statutes, regulations (e.g., Code of Federal Regulations), executive orders, and key departmental- and agency-level policy directives and strategies (from the National Oceanic and Atmospheric Administration and other relevant agencies, such as the Environmental Protection Agency). A partial list of authorities is provided in Box 2-2. In particular, the committee sought to ground its work, to the extent possible, in the MSA, as it carries legal weight and is supported by case law. It is increasingly common to align questions of equity and justice. This is particularly true in the most recent executive orders on strengthening Tribal consultation processes and racial equity, and in agency documents, such as the NMFS *Equity and Environmental Justice Strategy (EEJS)* (NMFS, 2023b).

This section maps the policy arena onto the conceptual framework for equity derived from the literature, with the goal of comparing NMFS's stated conceptualization of, and perceived mandate

BOX 2-2
Selected Executive Orders, Policy Documents, and Technical
Guidance Documents Related to Equity in Fisheries

- National Oceanic and Atmospheric Administration Fisheries *Equity and Environmental Justice Strategy* (May 2023), <https://www.fisheries.noaa.gov/s3/2023-05/NOAA-Fisheries-EEJ-Strategy-Final.pdf>
- *Equity and Environmental Justice in Fisheries Management: Brief Overview—A Report to the Council Coordination Committee by an Informal CCC and NOAA Staff Workgroup* (May 2022)
- Executive Order (EO) 14008: Tackling the Climate Crisis at Home and Abroad, <https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad> (February 2021)
- EO 14096: Revitalizing Our Nation's Commitment to Environmental Justice for All (April 2023), <https://www.federalregister.gov/documents/2023/04/26/2023-08955/revitalizing-our-nations-commitment-to-environmental-justice-for-all>
- EO 14091: Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (February 2023), <https://www.federalregister.gov/documents/2023/02/22/2023-03779/further-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal>
- EO 14031: Advancing Equity, Justice, and Opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders (June 2021), <https://www.federalregister.gov/documents/2021/06/03/2021-11792/advancing-equity-justice-and-opportunity-for-asian-americans-native-hawaiians-and-pacific-islanders>
- EO 13175: Consultation and Coordination with Indian Tribal Governments (November 2000), <https://www.federalregister.gov/documents/2000/11/09/00-29003/consultation-and-coordination-with-indian-tribal-governments>
- EO 13985 Executive Order on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce (June 2021), <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/06/25/executive-order-on-diversity-equity-inclusion-and-accessibility-in-the-federal-workforce/>
- Department of Commerce *Equity Action Plan* (as directed by EO 13985), <https://www.commerce.gov/sites/default/files/2022-04/DOC-Equity-Action-Plan.pdf>
- Department of Commerce *Environmental Justice Strategy* (2012), https://www.osec.doc.gov/opog/OG/Archive/sites/default/files/DOC_Environmental_Justice_Strategy.pdf
- EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 1994), <https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf>
- Environmental Justice: Guidance Under the National Environmental Policy Act (Council on Environmental Quality, 1997), <https://www.epa.gov/environmentaljustice/ceq-environmental-justice-guidance-under-national-environmental-policy-act>

for, equity and environmental justice in the fisheries context with the conceptualizations and critical issues raised in the wider academic literature. The committee notes three caveats: First, this is not an attempt to evaluate what NMFS has done or currently does; rather, it provides a basis for the analysis in subsequent chapters. Second, the committee is not attempting to be comprehensive and map all possible instruments (or all aspects of each instrument) onto this conceptual framework. Rather, it provides examples from key instruments, often definitions, that illustrate a fit with the various components in the framework. Third, while we sometimes associate specific instruments with particular aspects of the conceptual framework, many instruments fit with more than one aspect.

The MSA defines the framework for management of federal fisheries (Figure 2-3) and establishes a regional approach to fisheries management through eight regional fishery management councils. Each council is required to manage the fisheries within federal waters in its jurisdiction to meet the 10 principles that the MSA codifies as National Standards (Box 2-3). Each is accompanied by supporting guidance for its implementation. In general, the MSA requires that federal fisher-

ies are managed under an approved fishery management plan. Plans can be for single or multiple species and are overseen by regional fishery management councils. Each fishery management plan must comply with the National Standards. Four of the 8 Regional Fishery Management Councils have released Fishery Ecosystem Plans, which seek to ensure management across fisheries is coordinated to achieve sustainability goals for the ecosystem.

Each fishery management plan establishes the permit structure, what rights are associated with a permit, the nature of fishery reference points used to set the quota (e.g., allowable biological catch and annual catch limit, as defined in National Standard 1), and how the fishery will operate. Once established, permits are approved by NMFS regional fishery offices, and quota are set by the relevant regional fishery management council using the best scientific information available, as required in National Standard 2.

The MSA includes a number of requirements and references relevant to the study statement of task and equity in fisheries more generally. Several requirements relate to the “fair and equitable” distribution of benefits (e.g., National Standard 4), as well as the economics and social and cultural framework of a fishery. Collectively, these lay important groundwork for thinking about both fishery benefits broadly and the dimensions and subjects of equity (introduced above and elaborated on below) in the specific context of federal fisheries, and potential categories of information as identified in the statement of task.

National Standard 4 is perhaps the most obviously connected to equity and requires the fair and equitable allocation of fishing privileges, including limiting a particular individual, corporation, or other entity from acquiring an excessive share of such privileges.² Equity considerations

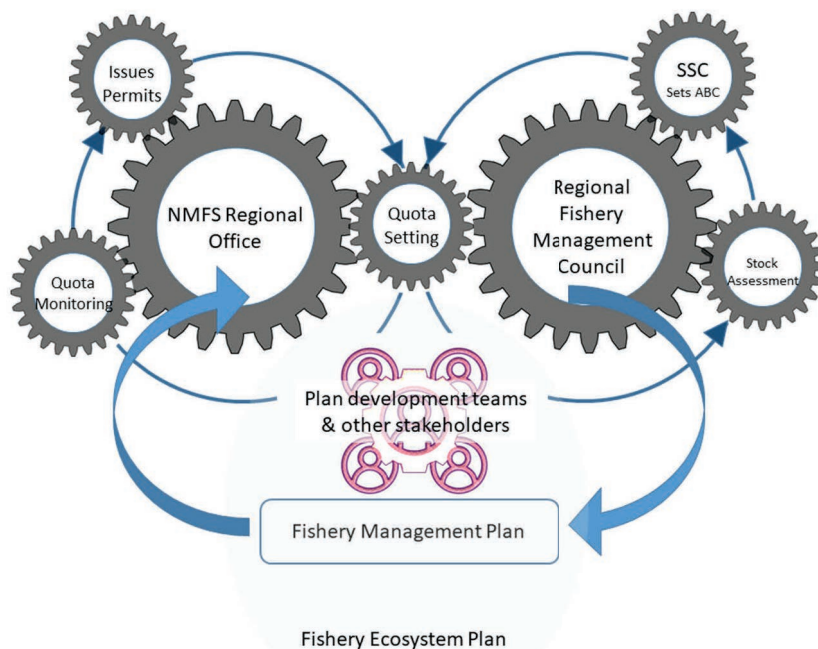


FIGURE 2-3 Simplified schematic of fishery management in the United States.

NOTES: The upper half of the figure focuses the administration and setting of quota. The lower portion focuses on the establishment, allocation, and administration of permits via fishery management plans. ABC = allowable biological catch; NMFS = National Marine Fisheries Service; SSC = Science and Statistical Committee.

²16 U.S.C. § 1851(a)(4).

BOX 2-3 National Standards

National Standard 1 – Optimum Yield

“Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.”

National Standard 2 – Scientific Information

“Conservation and management measures shall be based upon the best scientific information available.”

National Standard 3 – Management Units

“To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.”

National Standard 4 – Allocations

“Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privilege.”

National Standard 5 – Efficiency

“Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.”

National Standard 6 – Variations and Contingencies

“Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.”

National Standard 7 – Costs and Benefits

“Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.”

National Standard 8 – Communities

“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 by utilizing economic and social data that meet the requirement of paragraph (2) [i.e., National Standard 2], in order to (a) provide for the sustained participation of such communities, and (b) to the extent practicable, minimize adverse economic impacts on such communities.”

National Standard 9 – Bycatch

“Conservation and management measures shall, to the extent practicable, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.”

National Standard 10 – Safety of Life at Sea

“Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.”

SOURCE: Excerpted from National Marine Fisheries Service, see <https://www.fisheries.noaa.gov/national/laws-and-policies/national-standard-guidelines>.

outlined in this standard raise challenging questions, especially when the current conditions represent significant restrictions on participation compared with the past (Turner et al., 2008)—or when approaches to maximizing overall benefits further displace marginalized people or exclude local communities from pursuing future options (Adams et al., 2004; Sikor et al., 2014). This tension may be especially pronounced as NMFS works to better address inequities associated with underserved communities (see below), as the need to consider “present participants and coastal communities” in allocation decisions could affect considerations of equity and environmental justice if past allocations were inequitable. On the other hand, guidance³ associated with National Standard 4 states:

An allocation of fishing privileges may impose a hardship on one group if it is outweighed by the total benefits received by another group or groups. An allocation need not preserve the status quo in the fishery to qualify as “fair and equitable,” if a restructuring of fishing privileges would maximize overall benefits. The Council should make an initial estimate of the relative benefits and hardships imposed by the allocation, and compare its consequences with those of alternative allocation schemes, including the status quo. Where relevant, judicial guidance and government policy concerning the rights of treaty Indians and aboriginal Americans must be considered in determining whether an allocation is fair and equitable.⁴

The NMFS *EEJS* acknowledges the above tension, noting that “considerations [about resource allocations] could include assessment of impacts and benefits to underserved communities and prioritization of actions that benefit or correct a disparity among communities” (NMFS, 2023b).

National Standards 1, 2, and 8 are also pertinent to the committee’s work. National Standard 1 (Optimum Yield) requires managers to avoid overfishing. Technical guidance for National Standard 1 includes, for example, aims to achieve the “greatest benefits to the nation” and refers to myriad fishery benefits, including those that are difficult to quantify, such as enjoyment gained from recreational fishing, preservation of a way of life, and the cultural place of subsistence fishing. National Standard 1 also identifies several social factors relevant to an assessment of optimum yield including proportions of affected minority and low-income groups. NS1 objectives are stated simply, without any modification, whereas most of the other NSs have contingent elements.

National Standard 2 (Best Scientific Information Available) allows inclusion of “pertinent economic, social, community, and ecological information,” including evaluation of ethnographic and qualitative data, and local and Traditional Knowledge. Finally, National Standard 8 requires taking into account “the importance of fishery resources to fishing communities ... to (1) Provide for the sustained participation of such communities; and (2) To the extent practicable, minimize adverse economic impacts on such communities.”⁵ Stoll and Holliday (2014) note that direct allocations to communities were authorized under Section 303A “appear to have been driven by Congress’ interest in supporting small-scale and community-based operations.”

The committee notes that the assessment of social impacts, including equity concerns, is central to several executive orders, which are listed in Box 2-2, and required under the MSA as well as NEPA (Clay and Colburn, 2020). For example, Executive Order 12898 emphasizes that the NEPA review process can and should be used to promote environmental justice. Furthermore, two additional government guidance documents are relevant to the consideration of environmental justice: federal guidance from the White House Council on Environmental Quality on Indigenous Knowledge and the Department of Commerce Environmental Justice Strategy.

³The committee recognizes that revisions to the guidance documents for some national standards, including National Standard 4, are underway. The committee is aware of the Advance Notice of Proposed Rulemaking that was issued in May 2023 (88 F.R. 30934), but for the purposes of this report relied on the existing guidance.

⁴50 CFR § 600.325 (c)(3)(i)(B).

⁵50 CFR § 600.345(a).

Both the MSA and NEPA require meaningful participation in decision-making. For example, the MSA directs councils to “conduct public hearings, at appropriate times and in appropriate locations in the geographical area concerned, so as to allow all interested persons an opportunity to be heard in the development of fishery management plans and amendments to such plans, and with respect to the administration and implementation of the provisions of this Act.”⁶ The MSA also requires that, with limited exceptions, council meetings are open to the public for participation.⁷

The NMFS *EEJS* describes a wide variety of benefits that NMFS delivers, including permits and resource allocations, as well as other benefits, such as direct investments, data and decision-making tools, disaster assistance, and grant opportunities. The document also states NMFS’s intention to make these benefits accessible to *underserved communities* and to advance racial equity and provide economic opportunities to these communities. The NMFS *EEJS* identifies underserved communities as a central subject of equity concerns, describing them as sharing either a geographic location or “characteristics, history, or identity.” Executive Orders 12898 and 14008 reference similar and overlapping terms such as *minority and low-income communities and/or disadvantaged communities*. With respect to underserved communities, the NMFS *EEJS* states (NMFS, 2023b):

Underserved communities refer to communities that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. These include geographic communities as well as populations sharing a particular characteristic, history, or identity.... Specific to the fisheries context, underserved groups within fishing communities may include, for example, subsistence fishery participants and their dependents, fishing vessel crews, and fish processor and distribution workers. Finally, territorial and commonwealth communities in American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands may also be categorized as underserved. Underserved communities vary by region, and by the barriers they face. Furthermore, many of these community categories intersect. Hence identification of and meaningful involvement with underserved communities will be regionally specific and an ongoing process that will require long-term commitment.

In addition to geography, the definition provided above focuses on “shared characteristics” of individuals in various groups, including demographic characteristics such as ethnic and racial categories, religion, sexual orientation, gender, and disabilities. conditions (e.g., low income, high or persistent poverty) in which individuals live and characteristics (e.g., urban, rural) of their location. Although they are included in this definition of *underserved*, Tribal Nations and citizens bear unique historical and contemporary harms related to colonization; they also have a unique political status as sovereign nations.

The NOAA *EEJS* further notes that (1) underserved communities may include not only fishery participants, but also their dependents, crew, and processing and distribution workers (this is consistent with requirements in National Standard 8); (2) underserved community characteristics vary regionally and the categories intersect; and (3) the phrase “have been systematically denied” is utilized and consistent with phrasing in other policy instruments that recognize “being underserved” as a historical process, and cannot be understood solely as a present condition.

Additionally, the NMFS *EEJS* notes that several executive orders point to the importance of both recognitional and procedural equity. This includes the “meaningful engagement” of underserved communities. For example, the NMFS *EEJS* notes, Executive Order 14096 seeks to advance environmental justice by calling for “meaningful engagement and collaboration with underserved and overburdened communities to address the adverse [environmental] conditions they experience and ensure they do not face additional disproportionate burdens or underinvestment.” Likewise,

⁶16 U.S.C. § 1852(h)(3).

⁷16 U.S.C. § 1852(i)(2)(a).

Executive Orders 13985 and 14091 both define equity in terms that clearly have procedural elements (*italicized emphasis added*), stating that equity is:

who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequity.

The NMFS *EEJS* defines *recognitional justice* as “the acknowledgement of and respect for pre-existing governance arrangements as well as the distinct rights, worldviews, knowledge, needs, livelihoods, histories, and cultures of different groups in decisions” (NMFS, 2023b). However, the document does little to define which groups should be “acknowledged and respected” beyond those identified as members of “underserved communities.”

The one prominent exception is Tribal Nations and Indigenous Peoples—particularly, the importance of Traditional Knowledge and Indigenous Knowledge. For example, in 2022, the White House Office of Science and Technology Policy and Council on Environmental Quality issued its first-ever federal guidance on Indigenous Knowledge, recognizing it as distinct from local knowledge and encompassing more than Traditional Ecological Knowledge and noting that it is an “important body of knowledge that contributes to the scientific, technical, social, and economic advancements of the United States and to our collective understanding of the natural world” and relates this knowledge directly to federal research, policy, and decision-making.

Local knowledge and Traditional Knowledge are also included in National Standard 2, which requires that the “best scientific information available” (BSIA) be used in support of decision-making. Specifically, the Code of Federal Regulations guidelines state that “relevant local and Traditional Knowledge (e.g., fishermen’s empirical knowledge about the behavior and distribution of fish stocks) should be obtained, where appropriate, and considered when evaluating the BSIA.”⁸ Recent White House guidance cited above and work undertaken in the North Pacific is useful here to understanding important differences between local knowledge and Indigenous or Traditional Knowledge and how these knowledge systems can be meaningfully and appropriately included in fishery management and decision-making processes (NPFMC, 2023).

Tribal Nations and Indigenous Peoples

The importance of procedural equity vis-à-vis Indigenous Peoples is highlighted not only as members of underserved communities, but also as members of sovereign Tribal Nations with particular political status in the United States that have been greatly harmed by various historical and ongoing processes of assimilation and suppression. In addition to the NMFS *EEJS*, several recent executive orders, Presidential Memorandums, and related policy directives reaffirm the federal government’s trust responsibility to federally recognized Tribes, to address past harms, and make clear that the impacts of federal fisheries policy on Tribes requires additional and explicit consideration beyond NEPA social and environmental impact analyses and MSA requirements (see, e.g., example Executive Order 13175, Presidential Memorandum of November 5, 2009 [Tribal Consultation], Presidential Memorandum of January 26, 2021 [Tribal Consultation and Strengthening Nation-to-Nation Relationships]). This raises important issues related to recognitional equity, including the issue of Tribes that are not federally recognized but maintain deep ancestral ties to coastal lands and fishing livelihoods. The committee recognizes that disputes related to federal recognition are

⁸50 C.F.R. § 600.315(a)(6)(ii)(C).

beyond the purview of NMFS. Furthermore, Tribal citizens and Indigenous Peoples in the United States have been historically harmed and underserved as racial and ethnic groups (Carothers, 2011; Langdon, 2018). Recognizing that much work remains to be done to address past harms, some of which is beyond the role of NMFS, in the specific context of the committee's statement of task, it is clear that a key challenge in better accounting for and addressing the impacts and participation of Tribal Nations and Indigenous Peoples in federal fisheries is the lack of data and systematic data collection to identify, understand, and account for how Tribal Nations and Indigenous communities rely on, participate in, and are affected by federal fisheries decision-making.

EXAMPLES OF EQUITY CONSIDERATIONS IN FISHERIES

The global fisheries and marine policy literature provides many useful examples of how the equity dimensions, subjects, criteria, and contexts introduced above have been conceptualized and applied in fisheries management. Examples highlighted below from the United States and other countries evidence different ways equity has been defined and considered in fisheries. This brief summary lays the foundation for Chapters 3 and 4, which discuss relevant categories of information and data needs.

In many limited access fisheries, criteria for identifying who is eligible to receive a permit or quota in a fishery depends on the specific program objectives and definitions of equity. Catch history or landings thresholds (often based on a narrow set of qualifying years) are perhaps the most common criteria associated with initial allocations. Other examples include criteria for identifying and ranking hardship, designed to favor participation among those with limited economic alternatives (e.g., Alaska's Limited Entry System) and/or adjacency to the resource, intended to support local communities with high poverty rates (e.g., Western Alaska Community Development Quota Program; see also Foley et al., 2013 and Foley et al., 2015).

Provisions to existing programs in and beyond the United States have also developed criteria intended to address equity objectives in fisheries. These include age requirements (e.g., Norway's Recruitment Quota is available only to fishermen under the age of 35), as well as rural, small-scale, and Indigenous provisions intended to revitalize fleets, communities, and regions that have fared poorly under limited access management programs (Chambers, 2016; Cullenberg, 2016; Cullenberg et al., 2017; Eythórsson, 2016; Langdon, 2008; Stoll and Holliday, 2014).

Impacts documented among particular groups and communities have informed many of the federal fishery mandates and policy directives summarized above, which draw attention to particular equity "subjects," including crew and future generations; rural, local, small-scale fishermen; and/or low-income communities, shoreside labor associated with processing and distribution; and Tribal Nations and Indigenous Peoples. The emphasis on underserved communities adds additional complexity to the analysis of impacts.

Questions related to who is eligible to receive fishery benefits and the criteria selected to determine and evaluate what constitutes a fair distribution of fishery benefits is beyond the scope of this report. Asking and answering these questions will involve confronting multiple forms of power and the uneven power relations that can shape resource management and access. Power dynamics in fisheries and fishery management processes often result in negative impacts to less powerful segments of a fishery (Olson, 2011). This includes not only the ways in which procedural and recognitional (in)equities can contribute to enduring distributional effects that are difficult to mitigate once implemented (Carothers, 2010, 2011; Cullenberg et al., 2017; Krupa et al., 2018, 2020; Langdon, 2008; Pinkerton and Edwards, 2009), but also the ways in which distributional inequities can lead to procedural inequities and concentration of power and other forms of control (e.g., Chambers et al., 2017; Silver and Stoll, 2022).

FINDINGS AND RECOMMENDATION

The committee offers the following five findings and one recommendation derived directly from the material in this chapter.

FINDING 2-1: Equity is multidimensional and is more likely to be realized through an approach that accounts for each of the dimensions: distributional, procedural, recognitional, and contextual.

FINDING 2-2: Criteria or principles for assessing distributional equity vary, and there “is no rational way to prefer, a priori, one fairness criterion over another” (Pascual et al., 2010, p. 1239). Ideas of equity vary and are often culturally embedded. Attention to procedural, recognitional, and contextual equity can support the identification of criteria that may be acceptable to a broader range of stakeholders.

FINDING 2-3: Existing authority granted to NMFS by the MSA, the National Standards, NEPA, executive orders, and other instruments provides the agency with a clear mandate for a multidimensional and contextual approach to centering equity in its work.

FINDING 2-4: The distribution of benefits (including those derived from permits and quota) currently appears focused on particular individuals and groups, including sectoral allocations; historic participation; fishing communities; and in some cases, Indigenous organizations. The equity considerations centered in the NMFS’s EEJS and recent executive orders, including the focus on “underserved communities,” can both complement and challenge current approaches.

FINDING 2-5: The fishery and marine policy literature provides numerous examples of how dimensions of equity interrelate and can inform future approaches to defining and accounting for equity in fisheries.

RECOMMENDATION 2-1: The National Marine Fisheries Service should develop and implement a contextual, place-based, and participatory approach to identifying and integrating multi-dimensional equity considerations into decision-making processes in ways that balance previous and more recent mandates. Outcomes of these processes should include, among other things, clear identification of the criteria for, and appropriate subjects of, equity considerations.

3

Distributional Equity of Fishery Permit and Allocation Benefits

In this chapter, the committee addresses its statement of task (see Box 1-1 in Chapter 1) by focusing its interpretation of “primary benefits” on the allocation of permits and quotas and taking a limited view of the benefits that derive from those allocations. This focused lens considers *primary* from a “first in order” perspective and is aligned with the directive given to the committee by the National Marine Fisheries Service (NMFS). Chapter 4 discusses a broader suite of fishery benefits and beneficiaries, and Chapter 5, expands on distributional equity to explore procedural, recognition, and contextual dimensions of equity.

The first charge of the statement of task directs the committee to “determine the categories of information required to adequately assess where and to whom the primary benefits of commercial and for-hire fishery management accrue.” To address this element, the committee developed a stylized model fishery, in which comprehensive data on permit (or quota) holdings and transfers are augmented with information on characteristics of permit and quota holders for a developing fishery in which all permits (or quota) are held by individual owners. Using this stylized model fishery as an illustration, the committee highlights the opportunities and challenges in both measuring the distribution of ownership in fisheries across regions and assessing the distribution of the associated benefits; it also highlights how a focused reading of the statement of task yields a set of data and information that is necessary but insufficient for assessing equity in fisheries.

Second, the statement of task calls on the committee to “determine what information currently exists ... and what additional information, if any, NMFS would need to collect.” To that end, this chapter discusses available data and identifies currently unavailable but desirable data across the nation and in specific regions. Examples from the Northeast, the Gulf of Mexico, and the North Pacific serve as case studies; these demonstrate how contextual, statistical, and practical considerations affect an understanding of the current distribution of benefits across demographic categories at fishery, regional, and national levels.

Third, the statement of task directs the committee to “identify potential obstacles to collecting this additional data.” In responding to this component, this chapter describes obstacles to collecting the data and information identified in response to the second question. These include, for example, the difficulty of collecting data and information related to where and to whom benefits accrue, given

the complexities of fishery participation; lack of historical data; issues regarding the collection and use of personal identifying information and business identifying information through time; and lack of social science capacity and funding.

Finally, the statement of task calls on the committee to “identify methodologies the agency could use to assess the relative distribution of benefits from federal commercial and for-hire fishery management based on available information.” In response to this component, the committee discusses possible methodologies for developing the categories of information that are inputs into an assessment of distributional equity. Given the heterogeneity across the management regions in terms of the definition and use of permits and quota, data available, and how data are collected, the methodology discussion focuses on the regional level, again using examples from the North Pacific, Northeast, and Gulf of Mexico. This section describes how to utilize data that are currently available in the regions to develop categories of information—which could entail simply summarizing the age distribution of ownership or could entail the challenging measurement of monetary and nonmonetary benefits tied to permit and quota ownership. The latter is challenging both because of the sophisticated scientific tools needed for measurement but also because the scope and scale of benefits is a political decision with potential equity and fairness implications (see, e.g., discussion in Chapters 2, 4, and 5). Specific methods to use in assessment of distributional equity, including the definition of the counterfactual, may be explored in a subsequent report (see Chapter 1 regarding a “Phase 2” study).

A STYLIZED MODEL FISHERY

A hypothetical stylized model fishery is a starting point from which to develop insight into the data and information required to determine the categories of information needed to adequately assess the distribution of benefits associated with permits and quota. It is intended to have characteristics that are similar in structure to current NMFS data but augmented to include comprehensive information on the characteristics of permit and quota holders. Specifically, a case of a developing fishery in which datasets on permits, quota, and quota transfers can be linked to comprehensive demographic and geographic information on individual fishers. The next section describes these two components of the stylized model fishery.

In this example, NMFS begins the management of a developing fishery in federal waters for a productive species. The aggregate annual catches are insufficient to trigger regulatory limits. NMFS issues permits for individuals to participate in the fishery on an annual basis. Each permit holder is an owner-operator and uses a single vessel in the fishery. Permits are issued only to individuals—not to vessels, firms, banks, or communities. To obtain a permit, each individual is required to provide a suite of demographic information to the management agency. These data could include age, gender, race/ethnicity, tribal affiliation, household income range, alignment with specific communities, language spoken, education level, and more. A physical home address and address of the vessel, if different from the home address, is also required. Once a permit is held by an individual, it may be sold or leased to another individual. Transfers of permits and quotas and their transfer prices must be reported, and the new owner must provide identical categories of information to the original permit holder. The transfer market is active and efficient. Applicants must provide a list of other permits and quotas that they hold or lease. When the fishery is operational, each permit holder is required to submit daily reports of catch and discards. The permit holder has to provide information on the disposition of the landings geographically. A dealer reporting system allows for verification of permit holder reports. The fishery management system is maintained consistently over several years with complete compliance, thereby developing a rich database of information.

What would this model system provide with regard to the question of assessing the distribution of permits and quotas over time? Such an idealized dataset has many attractive features that would

provide valuable information when considering management changes and their distributional effects that typically remain largely invisible in the real world (Calhoun et al., 2016; Donkersloot, 2021; Gerrard and Kleiber, 2019; Kleiber et al., 2014; Meredith, 2018; Petterson, 1984). Because the fishery is new, such information will be available from the start of the program. Additionally, because reporting is mandatory at the permit application stage, analysts have data on permit applicants and holders, allowing comparison of the characteristics of successful and unsuccessful applicants. This capability is not common in fisheries generally. A complete dataset is available with respect to fishing activity. The data represent a census. The monetary price of the permit, as expressed through arms-length transactions, provides a measure of the economic benefits of participating in the fishery as a permit and/or quota holder.

The union of the lists of permit applicants and holders with the demographic database would enable one to address the basic questions of where and to whom the benefits of permit and quota holdings accrue. Many of the resulting data summaries on personal identifying information would not necessitate statistical estimation or consideration of the representativeness of the sample, given the census. The data could be categorized along a number of demographic axes, including age, gender, race/ethnicity, income level, tribal participation, and involvement in other fisheries. Assignments to these categories would be based on self-reported information and not inferred. Having demographic information on permit and quota holders would allow managers to ascertain the level of fishery engagement among various groups—for example, Indigenous or young people, or women. Analyses could explore how demographic variables may interrelate (see, e.g., Calhoun et al., 2016; Donkersloot, 2021; Gerrard and Kleiber, 2019; Kleiber et al., 2014; Meredith, 2018; Petterson, 1984). It would be straightforward to produce maps of the distribution of access rights (i.e., permits, quota), income/employment (permit/quota holders), sales of product, or sales of permits if such transfers were outcomes. Spatially resolved data could be aggregated to provide community-level insights. Additionally, analyses could leverage other data sources including the American Community Survey and the NMFS Social Vulnerability Index to provide further interpretation and context.

What dimensions of equity and categories of information remain unaccounted for in this model system? For one, it considers simply “first in order” benefits related to the issuance of permits and the allocation of quota in a single fishery. The measured benefits correspond only to monetary benefits and quantitative indicators of participation. Furthermore, nothing in the data described includes information on how to determine whether “first in order” benefits are the same as “high in importance” benefits. For example, no information is gathered on crew who may have been on board the permit holder’s vessel. No information is gathered on shoreside facilities, other than dealer reports to serve as landing verification. No information is gathered on downstream benefits related to industries that support fishing, or on the contribution of the income of the permit holders to the well-being and resilience of the community. (Chapters 4 and 5 address some of these concerns.) No information is collected on whether applicants participated in other fisheries, and whether or how participation in this new fishery affect participation and harvests in other fisheries. Finally, analyses simply described the distribution of benefits. There is no discussion of the appropriate criteria for measuring whether a distribution is equitable or whether such criteria are seen as fair among participating fishers. The criteria, for example, could include the appropriate counterfactual to use to measure whether distributional equity is improving over time, and the process for determining the appropriate counterfactual. The process for determining the counterfactual entails agreeing on the baseline or baselines from which to start measuring changes in the distribution of permit and quota owners and/or identification of an alternative management structure or program that observed distributional outcomes could be compared to. These aspects of assessing equity go beyond the study statement of task. Additionally, the stylized model fishery includes nothing to highlight the

important role of recognitional, procedural, or contextual equity in shaping distributional outcomes. Chapter 5, however, considers these broader equity considerations for fisheries.

MOVING BEYOND THE STYLIZED MODEL FISHERY

To illustrate that how demographic information in the stylized fishery could be used to address the focused lens of the statement of task (i.e., characterizing the distribution of benefits derived from holding permits and quotas), the committee made a number of simplifying assumptions on the nature of the fishery. Specifically, we assumed that (1) the permit owner is an individual who also owned the vessel, (2) the geographic information corresponds to the permit owner's community, (3) the permit market is efficient, (4) the permit and quota prices reflect monetary benefits, (5) monetary benefits are the only benefits derived from permit and quota holding, and (6) the fishery in question is commercial as opposed to a for-hire, charter fishery.

This section confronts each of these assumptions with the realities of U.S. federal fisheries. However, as discussed in Chapter 2 and illustrated in Chapter 4, this full suite of personal identifying information for quota holders is insufficient for addressing questions regarding distributional equity for the fishery overall. Moreover, many of the underlying assumptions in the model are not satisfied within the realities of U.S. federal fisheries. Thus, even measuring the current distribution of permits and quotas is challenging in reality.

Assumption 1: Permits are awarded to individuals active as on-board owner-operators. Awarding permits to an “on board” owner-operator guarantees the individual is actively engaged in the fishery. In federal fisheries, permits are not awarded consistently to individuals, and it is not immediately clear that the individual is the correct unit from which to measure distributional equity. Permits may be awarded to individuals, but an “on-board” requirement does not exist, and so the permit owner may be only passively involved in the fishery. Permits may also be owned by a limited liability corporation (LLC). In some cases, these are set up purely to protect a family's investments outside of the fishery. In other cases, the LLC are independent legal entities that are investing in fisheries in the same way they would invest in other financial devices. In some regions, permits are awarded to vessels, and the ownership of the vessel can be legally complex. The awarding of permits to vessels is often justified as an approach to prevent overcapacity in the fishery.

Assumption 2: Home and port address information on the permit holder is required for permitting. In federal fisheries, this complete information is not always available. In some cases, addresses provided on permit applications are a corporate office, which may not be an appropriate foundation from which to assess “where” benefits accrue. The uncertainty around where an entity operates reduces the ability to confidently link permit and landings databases to data sources with a fuller suite of social, economic, housing, and demographic information.

Assumption 3: The fishery is a new developing fishery, and the allocation process of the scarce permits is omitted. This assumption enabled the committee to remove the contextual underpinnings of the current set of permit and quota owners. The current set of owners of permits and quotas in any fishery, however, is the result of a long process of fishery management decisions, such as fishery closures; restrictions of specific gear types, which exclude some communities; and the implementation of rebuilding plans. For example, the initial allocation in a fishery with a limited access privilege program might be limited to fishers fishing a specific combination of gear, species, and area. Some participants could be left without an allocation, even if they have a historical record of fishing for that species (e.g., with different gear). Such was the case when the Gulf of Mexico snapper and grouper limited access privilege program was established; it required documented catches above a certain threshold for a period of time. These qualification criteria can exclude specific, historical segments of the fishery. The West Coast groundfish limited access privilege program covered the trawl fleet, even though fixed-gear fishermen were targeting the same stocks in the same areas.

Being left out of the initial allocation, which often comes with a large economic gain, could lead to inequities among fishers many years after an initial allocation occurs (e.g., higher rates of exit). Simply measuring the demographic distribution of the current and future owners (by collecting these data on a regular basis) can lead to an inaccurate picture of the equity implications of federal fishery management decisions.

Assumption 4: Permit price reflects the economic benefit of ownership. In the stylized fishery, the committee did not consider the full suite of values and benefits associated with permit and quota ownership. The assumptions implied that permit prices reflect the economic returns from the fishery for the permit owner—whether that is true depends, for example, on the set of entitlements provided by the permit (e.g., tradable) and whether the permits are limited and observable. Even if it is possible to determine the economic value of holding an allocation, that does not necessarily equate to the economic benefits that accrue to the recipient of an allocation. For instance, quota or permit holders that purchased their allocation (e.g., entrants after an allocation is made) must also account for its monetary cost. In such cases, the benefits accruing to allocations are net of such costs and only exist if the quota/permit holder can generate a surplus over and above the cost of purchasing the allocation. Measuring such surplus requires not only knowledge of the purchase price of the allocation but also the operating costs of permit and quota holders, which are often unknown. Potential quota holders may also incur nonmonetary costs, such as the time costs associated with administrative forms that could be disproportionately born by individuals or groups, such as rural populations with poor Internet access, or those for whom English is not a first language.

Assumption 5: There are no non-monetary benefits associated with permit and quota holdings. At the level of the individual permit or quota owner, these benefits could include self-identity, mental and physical health, political empowerment, cultural knowledge and practices, job satisfaction, place attachments, food security, and individual well-being and quality of life (Breslow et al., 2017; Chan et al., 2012; Donatuto and Poe, 2015; García-Quijano et al., 2015; Gregory et al., 2023; Lyons et al., 2016; Norman et al., 2022; Picou, 2000; Pollnac and Poggie, 2006, 2008). Omitting these non-monetary benefits when characterizing benefits from permit ownership can result in an incomplete and potentially misleading interpretation of the distribution of the permit and quota owners.

Assumption 6: The stylized model fishery is commercial. However, federal fisheries include for-hire fisheries, which represent a different scenario from commercial fisheries, where permit owners are generally focused on providing desirable fishing experiences for customers or clients. Importantly, many for-hire fisheries remain open-access fisheries, which operate differently from the limited access, permit-based stylized fishery (Abbott and Willard, 2017; Abbott et al., 2018). In such fisheries, the need to control fishing mortality rates, as required by MSA, can lead to short seasons and/or reduced bag limits in individual fisheries. This means permit holders in the for-hire sector likely participate in multiple fisheries and the benefits become, accordingly, more dilute. Capturing only demographic information of permit owners in for-hire fisheries, as might have been the case if the stylized model used a for-hire fishery, would miss many of the elements discussed thus far. In addition, simple demographic information on permit holders would miss the diverse fishing motivations, avidity, and social and economic characteristics of the clients who fish on for-hire vessels (Arlinghaus and Mehner, 2005; Brinson and Wallmo, 2017).

The preceding discussion highlights some difficulties in determining who the primary beneficiaries are from permit and quota allocations in U.S. federal fisheries. The most immediate implication is that simply collecting a comprehensive database of permit and quota holders across all U.S. regions and fisheries is a necessary but not sufficient condition for determining the beneficiaries of allocations and the equity of those allocations in U.S. federal fisheries.

METHODOLOGY

This section provides a high-level overview of the permitting and quota allocation process in U.S. fisheries under the Magnuson-Stevens Act (MSA) and a review of data availability in three regions: the Northeast, Gulf of Mexico, and North Pacific. These regions were chosen because they illustrate a range of approaches to factors such as permitting, community characteristics, reliance on fisheries, and the importance of the for-hire sector. Data availability varies substantially by fishery, even within the same region, so this review focuses on data that are common across regions. The section then discusses methodological techniques and challenges for measuring monetary and nonmonetary benefits associated with permit and quota ownership.

Databases on Permit and Quota Ownership

Numerous data streams are available to NMFS to provide data relevant to assessing the distribution of benefits derived from permits and quota. However, these data streams are often incomplete, inconsistent, and incompatible. A recent review by NMFS staff found 565 different forms and surveys that collected information relevant to assessing distributional equity in the nation's fisheries. Approximately 200 of these forms were applications for mandatory permits for specific fisheries. In most U.S. federal fisheries, a permit is the minimum requirement to operate. However, there is considerable variability in the information collected on each permit application. Permits can be granted through a vessel license, a permit to an individual or corporate entity, a defined share (or quota) to a total allowable catch, or a combination of these.

Most permit applications require the name and mailing address of the permit holder. In cases where multiple people share ownership, the list of owners is often required, but their share in the ownership is not generally specified. Some limited, voluntary information may also be collected on the permit application. The extent of demographic information requested is limited over concerns that such information should not be seen as in any way qualifying criteria for permit applications. Other data that could inform an assessment of the distribution of benefits come from voluntary survey instruments that have been periodically deployed by NMFS. The voluntary nature of these surveys raises questions about the initial sample frame, as well as the level and representativeness of respondents. However, these surveys do collect a wide spectrum of demographic, economic, and geographic data that can inform assessment of distributional equity.

Based on presentations to the committee, development of a national database of permit holders that provides a consistent, complete sample frame seems unlikely in the near future. Such a data collection program would have to account for and be responsive to substantial contextual variation among regional approaches to fisheries. To understand the distribution of permits and quota, the committee adopted a regional approach. Three regions—the Northeast, Gulf of Mexico, and North Pacific—are chosen to illustrate this approach because they differ in their approach to permitting as a result of structural, contextual, and cultural differences. In selecting these regions, the committee seeks to identify challenges and opportunities for NMFS to assess distributional equity at the regional level. The committee developed a general process for data and information collection that forms the basis of our regional fishery data reviews. The seven steps in the process are:

1. Determine to whom **permits and quotas are issued** for each fishery managed within the region (e.g., individuals, vessels, corporate or community entities).
2. Determine **the rights associated with such allocations** for each fishery (e.g., defined right to total allowable catch, access-right only, rights of transfer/alienation).
3. Identify databases that **record the recipient of these allocations** and the “amount” of the allocation, if applicable (e.g., quota shares).

4. Determine **information associated with allocation recipients** (e.g., demographics or place of residence, which may inform questions of where the benefits accrue; see Table 3-1 for examples).
5. Identify other databases that contain information related to the monetary value and transfers of allocations (e.g., permit prices, quota prices), to the extent they are available.
6. Determine **records of landings** as a measure of the direct economic benefit of the allocation.

Beyond these initial steps, however, substantially greater heterogeneity is found in the existence of, structure of, and data and information contained in additional currently available data. Thus, the final step is:

7. Identify other databases and sources of information and whether they can be linked to permit and quota holders (e.g., surveys, ethnographic fieldwork). For example, the Bureau of Indian Affairs would be key to supporting NMFS in assessing Tribal citizen engagement in federal fisheries and change over time.

REGIONAL EXAMPLES

Northeast Fisheries

Fisheries in the Northeast have a venerable history (McFarland, 1911) that provides a context for the issuance of permits and quota. Today, the region falls under the jurisdiction of the Greater Atlantic Regional Fisheries Office (GARFO) of the National Oceanic and Atmospheric Administration (NOAA); GARFO serves both the New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC). The NMFS Northeast Fisheries Science Center (NEFSC) undertakes natural and social science research and surveys to support fisheries management.

Working with partners, GARFO currently oversees 42 fish stocks and 14 fishery management plans (Table 3-1). A federal vessel operator permit is a minimum requirement to participate in any of GARFO's commercial or for-hire fisheries. Application for a vessel operator permit requires the applicant to provide a physical mailing address. Other personal information, including eye color, hair color, height, and weight, together with a photo, are required. These are required for identification and compliance reasons and not for the collection of demographic information related to equity. Beyond this, specific annual permits are needed to operate in particular fisheries. Permits to participate in specific fisheries are assigned generally to fishing vessels. Applications for a permit require the vessel name, name of the owner or legally authorized agent, mailing address, home port, and principal fishing port. Detailed information on vessel size, construction, capacity, and power are also required. Additionally, the applicant identifies the open or limited access fisheries in which the vessel will operate. If the vessel is owned by an LLC or partnership, the applicant has to provide a list of all current owners or partners and their addresses. Details of the division of ownership is not required. No other data—including age, gender, ethnicity, and other demographic information—are required.

In general, permits may be transferred to a new owner on the sale of a vessel. However, vessels that sink, are destroyed, or are sold without the associated permit can be placed in a “confirmation of permit history” category, which preserves the landings and permit history of that vessel to be moved to a new vessel when the original is replaced. Vessel prices have escalated in recent years, driven largely by the value of the permit, which creates a barrier to entry. The price of vessels also creates a motivation for complex ownership structures, and the contribution of different owners

listed on the permit can be difficult to ascertain. There is no “onboard” requirement for the permit owner. This can uncouple ownership of permits from the communities in which shoreside capacity is based.

Table 3-1 summarizes the principal fisheries for the New England and Mid-Atlantic region, the required permits, and the rights associated with those permits, together with comments. Different permits provide different allocated catch limits within a fishery. The vast majority of fisheries in this region are associated with a limited access permit (Table 3-1). When and how these programs were implemented set the trajectory for the fishery and provides a context for understanding “to whom” benefits accrue. Many limited access permits for traditional fish species are bundled together (e.g., Northeast multispecies groundfish complex and the squid, mackerel and butterfish; Table 3-1). A key motivation for bundling of species into complexes appears to derive from efforts to manage over capacity following the expansion of management jurisdiction to 200 nm in the original Fishery Conservation and Management Act (1976). An important contextual detail is that fishers often qualified for multiple permits, and today they remain bundled together. Färe et al. (2017) report that steel-hulled vessels in the commercial fleet in the Northeast held an average of 4.1 permits per vessel. There are incidental take permits for nontargeted bycatch. Some of these incidental take permits are for small, open-access fisheries, mostly as a mechanism to reduce discarding levels. These are not intended to be economically viable by themselves. There are also four high-profile individual transferable quota fisheries: Atlantic scallop, ocean quahog, surfclam, and golden tilefish. Quotas are allocated annually in these fisheries. A “catch share” fishery exists within the Northeast Multispecies fishery. This portion of the multispecies fishery involves 17 groups of self-organized “sectors” whose permits have an associated annual catch entitlement (Clay et al., 2014). Finally, there are important for-hire sectors within the region for summer flounder, black sea bass, and other species that are managed cooperatively with coastal states.

The GARFO maintains a permit database for the region. Efforts are underway to improve the reliability and consistency of the data held. Hence, a cross tabulation of the permit holders and operator permits could provide a foundation for assessing the level of active versus passive investors in vessel permits.

The individual transferable quota fisheries provide public data that can be used to demonstrate the challenges that the pattern of bundled permits and assignment to vessels creates to assessing distribution of quota and permits in the Northeast. There were 63 allocations made to vessels in the surfclam fishery in 2022 in the Northeast. Data are available on these allocations on the GARFO website. GARFO has information on mailing address and ownership of vessels associated with each allocation. Seventeen of these allocations (about one-quarter) were made to vessels registered to six different financial institutions. Only one of those financial institutions appears to be based in a traditional fishing community. These financial institutions are permitted to hold quota as collateral on a loan.¹ Other vessels appear to be owned by food processing companies, suggesting that vertical integration of fisheries and derived products is not uncommon. The committee offers this example not to single out the surfclam fishery—indeed the patterns are similar in other limited access fisheries—but rather to demonstrate the challenges that the vesting of permits in vessels creates in terms of tracing where and to whom the benefits of permits and allocations accrue in the Northeast.

GARFO does collect data on transfers of rights associated with permits and quota. Data for fisheries with individual transferable quotas (Atlantic scallop, surfclam, ocean quahog, and golden tilefish) and for transfers between sectors in the Northeast multispecies complex are the most detailed (see Brinson and Thunberg, 2016).

Important voluntary surveys have been conducted in the region that provide key demographic, economic, and geographic data on aspects of the region’s fisheries. A portion of these data relate

¹50 C.F.R. § 648.74 (a)(1)(C).

TABLE 3-1 Principal Fisheries of the Northeast United States Overseen by the Greater Atlantic Regional Fisheries Office (GARFO) of the National Marine Fisheries Service (NMFS)

Fishery	Permits	Rights	Comments
Shellfish			
American Lobster	Vessel	<ul style="list-style-type: none"> Limited access Trap allocation CPH designation 	<ul style="list-style-type: none"> Area-specific trap allocations Transfers possible
Atlantic Sea Scallop	Vessel	<ul style="list-style-type: none"> Limited access Days at sea restriction 	<ul style="list-style-type: none"> 94.5% of ACL Full-time and part-time allocations Rotational access to areas VTR required
	Vessel	<ul style="list-style-type: none"> ITQ (est. 2010) 	<ul style="list-style-type: none"> 5% of ACL Quota can be leased or transferred VTR required
Atlantic Surfclam	Vessel	<ul style="list-style-type: none"> ITQ (est. 1988) 	<ul style="list-style-type: none"> Quota can be leased or transferred VTR required
Deepsea Red Crab	Vessel	<ul style="list-style-type: none"> Open access permit (500 lbs limit) Limited access (no limit) 	<ul style="list-style-type: none"> VTR required VTR required
Ocean Quahog	Vessel	<ul style="list-style-type: none"> ITQ (est. 1990) Except for mahogany quahog 	<ul style="list-style-type: none"> Quota can be leased or transferred VTR required
Finfish			
Northeast Multispecies (13 species complex including cod, haddock, halibut, yellowtail flounder)	Vessel	<ul style="list-style-type: none"> Limited access with six gear-based categories Days at sea restriction Sector program optional (catch shares, est. 2010) Open access (including for-hire) 	<ul style="list-style-type: none"> Catch entitlement can be transferred ACT monitoring for in-season closures VTR required VMS required
Squid, Mackerel, Butterfish	Vessel	<ul style="list-style-type: none"> Limited access with 3 tiers Species specific allocations Open access with low catch allocation 	<ul style="list-style-type: none"> ACT monitoring for in-season closures Slippage reporting required VMS required
Atlantic Herring	Vessel	<ul style="list-style-type: none"> Limited access Area specific management and possession limits 	<ul style="list-style-type: none"> Bycatch concerns for Atlantic mackerel, shads and river herrings Slippage reporting required
Atlantic Spiny Dogfish	Vessel	<ul style="list-style-type: none"> One trip per day 	<ul style="list-style-type: none"> ACT monitoring for in-season closure eVTR required
Black Sea Bass	Vessel	<ul style="list-style-type: none"> Open access commercial involving three gear types Open access for-hire fishery 	<ul style="list-style-type: none"> VTR required ACT monitoring for in-season closure eVTR required

continued

TABLE 3-1 Continued

Fishery	Permits	Rights	Comments
Bluefish	Vessel	<ul style="list-style-type: none"> Limited access commercial For hire 	<ul style="list-style-type: none"> Area (state) allocations ACT monitoring for in-season closure eVTR Possession limit eVTR requirement
Golden Tilefish	Vessel	<ul style="list-style-type: none"> IFQ (est. 2009) Incidental catch limits For-hire fisheries 	<ul style="list-style-type: none"> eVTR required eVTR required
Scup	Vessel	<ul style="list-style-type: none"> Limited entry involving seasonal restrictions 	<ul style="list-style-type: none"> VTR required

NOTES: Does not include species managed outside of the New England or Mid-Atlantic fishery management councils, such as those managed by NMFS Highly Migratory Species Branch. The table also does not include species whose management is chiefly under the Atlantic States Marine Fisheries Commission. Species are organized alphabetically within broad categories of shellfish and finfish. For each species, or species complex, the committee provided a summary of the permits, the rights associated with the permits, and any important factors related to the flow of benefits to permit and quota holders. ACL = Annual Catch Limit; ACT = Annual Catch Target; CPH = Confirmation of Permit History; eVTR = electronic Vessel Trip Report; IFQ = Individual Fishing Quota; ITQ = Individual Transferable Quota; VMS = Vessel Monitoring System; VTR = Vessel Trip Report.

directly to permit and quota holders. Voluntary surveys were conducted in 2011, 2012, and 2015 to estimate business costs. The original survey collected information on the primary landing and mooring ports, marital status, age, race, educational attainment, years in the fishery, and language at home, as well as a range of information on costs. However, NMFS staff indicated that there were negative reactions to the survey during pretesting in 2011, and many of the demographic data collection questions were removed. The constraints noted above have hampered efforts to undertake analyses of the socio-ecological fishery systems in the Northeast to assess where and to whom the benefits of fishery management actions accrue. The NOAA Voices Oral History Archive has also been used to provide data on where and to whom the benefits of fishery management action accrue.

As with other Councils and Regions, the NEFMC, the MAFMC, and GARFO are required by law to conduct impact assessments of their management actions, including the allocation of permits and quota. It has proven possible to integrate aspects of the permit database, with mandatory landings and dealer reports with social data streams for the region. Some of these data are available online.² Although dominated by economic data (e.g., revenue, average price, days at sea) these analyses have expanded to move beyond economic data to include social impacts (Clay and Colburn, 2020). The site provides a “fishing engagement index score” which is estimated for each port, for each fishery, and overall (Jepson and Colburn, 2013). These data are based on vessel trip reports that are synthesized and aggregated to provide data at the annual level. The fishing engagement index score is a linear combination of factors resulting from a principal components analyses of vessel trip report data from each port. Variables included in the analyses were the value of landings, the number of commercial fishing permits, the number of dealers with landings, and the total amount of landings. The indices were then categorized based on their standard deviation from the

²See <https://apps-nefsc.fisheries.noaa.gov/socialsci/pm/index.php>.

overall as High, Medium High, Medium, Medium Low, and Low. Communities with high engagement indices are considered more dependent on the commercial fishery or fisheries.

Gulf of Mexico Fisheries

The Gulf of Mexico provides another complex example of considering the distribution of commercial and for-hire fisheries benefits. NOAA's Southeast region includes three regional fishery management councils (Gulf of Mexico, Caribbean, and South Atlantic) spanning from North Carolina through Texas, as well as Puerto Rico and the U.S. Virgin Islands. The Southeast region involves more than 160 federally managed species and 17 fishery management plans including some of the largest recreational fisheries in the country. The Gulf of Mexico Fishery Management Council (GMFMC) has nine distinct fishery management plans: reef fish, shrimp, coastal migratory pelagics, red drum, spiny lobster, stone crab, coral, essential fish habitat, and aquaculture. Within the reef fish fishery, red snapper and grouper-tilefish are both managed under individual fishing quotas. In both the South Atlantic and Gulf of Mexico, commercial fisheries for shrimp and both commercial and for-hire fisheries for reef fish and coastal migratory pelagic species are managed under limited access privilege programs with vessel permits required for federal waters.

Within the Gulf of Mexico, many entities including the NOAA Southeast Fisheries Science Center (SEFSC), NOAA Southeast Regional Office (SERO), GMFMC, state resource management agencies, and academic institutions have conducted social science research characterizing the regions fisheries. The Gulf of Mexico is a particularly useful region for considering the unique context and challenges of characterizing for-hire fisheries. Federal reef fish and for-hire permits have been under a moratorium since 2004 (GMFMC). For-hire fisheries are characterized by two general types of vessel and business models: charter boats and headboats. Charter boats typically carry fewer passengers and charge a single fee for the vessel, whereas headboats usually carry more passengers and charge per person. Previous social science studies of for-hire fisheries in the Southeast provide some insights on demographics within the fisheries. One of the oldest studies, conducted in 1987–1988, measured several demographic characteristics of fishing captains, including age, gender, race, education, income, and marital status (Gill et al., 1993). A key finding of the survey was that the average charter boat operator was a 45-year old male, with more than 13 years of operating experience and 12 of those years with the same home port, indicating high place attachment.

However, socioeconomic data on for-hire fisheries was also at the center of a recent legal conflict leading to the court-ordered suspension of the Southeast For-Hire Integrated Electronic Reporting program in the Gulf of Mexico. This program required vessel owners or operators with federal charter/headboat permits for Reef Fish or Coastal Migratory Pelagic Species to notify NMFS before departing on any trip; submit electronic fishing reports with GPS position data for each fishing trip; and “other details of the trip,” including socioeconomic data. A major issue in the court ruling was whether or not data such as charter fee, fuel price and use, number of paying passengers, and number of crew for each trip constituted socio-economic data; the overturning court ruling deemed that the costs and benefits of collecting these data were not sufficiently assessed and could negatively impact small fishing businesses. The current state of the program also highlights the debate over the value of voluntary data, which NOAA currently discourages voluntary reporting noting limited utility and potential confidentiality limitations. The southeast has conducted extensive social and economic profiles of the regions fishing communities. For instance, a 2006 report prepared for NOAA described a comprehensive mixed-methods assessment of Alabama and Mississippi fishing communities that involved compiling permit, license, landings, and census information, as well as conducting key informant interviews and observational fieldwork to characterize local fleets and infrastructure (Pettersen, 2006). For each community, the report qualitatively described the fishing

environment, including primary fleets, species landed, shore-side infrastructure, and more. Census data were used to describe the demographics of each community and how they changed over a 10-year period between 1990 and 2000. These efforts and the report helped lay the groundwork for NOAA's Fishing Community Profiles and Community Snapshots. However, updates are needed to characterize the current state of each community given the vast amount of change that has happened within the region and fisheries.

More recently, social science research has been focused on the regions IFQ fisheries. In the most recent review titled "Red Snapper and Grouper-Tilefish Individual Fishing Quota Programs," (GMFMC, 2021), NOAA Social Indicators for Coastal Communities data were used to help characterize the social environment of fishing communities alongside individual fishing quota performance indicators (Table 3-2). The analyses were conducted by linking permit-level information to community-level indicators associated with the mailing address of each shareholder, which highlight some common challenges for assessing the distribution of permits or quota. For instance, individual fishing quota allocations linked to vessel accounts can be associated with individuals or businesses making it difficult to characterize the social implications for individual beneficiaries and communities. These analyses still helped characterize the current social environment of the fishery, with one key finding that 20.1–33.5% of shares were held by accounts that were not associated with fishing permits.

In summary, there is a long history of collecting social science data for characterizing the social and economic dimensions of Gulf of Mexico fisheries. There have also been efforts to integrate this information into management consideration, including detailed "Social Environment" or "Environmental Justice" sections within proposed management frameworks or reviews. While many social and economic analyses have focused on community-level and composite indicators, SERO has been collecting certain demographic data (race, ethnicity, sex) on commercial and for-hire vessel, dealer, and operator permit application forms since 2017.³ However, the Gulf of Mexico also illustrates many of the challenges for comprehensively assessing how the benefits of fisheries management are distributed. For instance, SERO was recently informed by OMB that they would no longer approve any mandatory data collection efforts for demographic or small business data (Travis, 2023).

TABLE 3-2 Individual Fishing Quota (IFQ) Performance Indicators

Performance Indicator	Definition	Timeframe
Engagement Index	Index consisting of pounds and value of IFQ species, number of permitted reef fish vessels, number of IFQ species dealers within a community	2012–2018
Regional Quotient (pounds and value)	Community landings of IFQ species divided by total landings of IFQ species in the region	2012–2018
Catch Share Program Local Quotient (pounds and value)	Community landings IFQ species divided by total landings (all species) in the community	2012–2018
Community Social Vulnerability Indicators (CSVIs)	Social Vulnerability Indicators: Poverty Index, Population Composition Index, Personal Disruption Index, Housing Characteristics Index, Labor Force Structure Index Gentrification Pressure Vulnerability Indicators: Housing Disruption Index, Retiree Migration Index, Urban Sprawl Index	2012–2016 American Community Survey 5-Year Estimate

SOURCE: Gulf of Mexico Fishery Management Council.

³Permits Applications and Forms in the Southeast | NOAA Fisheries, see <https://www.fisheries.noaa.gov/southeast/resources-fishing/permits-applications-and-forms-southeast#dealer-application>.

North Pacific Fisheries

The North Pacific region is generally considered “data rich” and comes close to the stylized model fishery described above. Information regarding allocations of permits and quotas is publicly available and, in many cases, extends back in time to the beginning of (and sometimes before) the initial allocations. However, the contextual underpinnings of the initial allocations and deficiencies in the information collected prevent a full accounting of the distribution of benefits derived from the allocation of permits and quotas in the North Pacific Region.

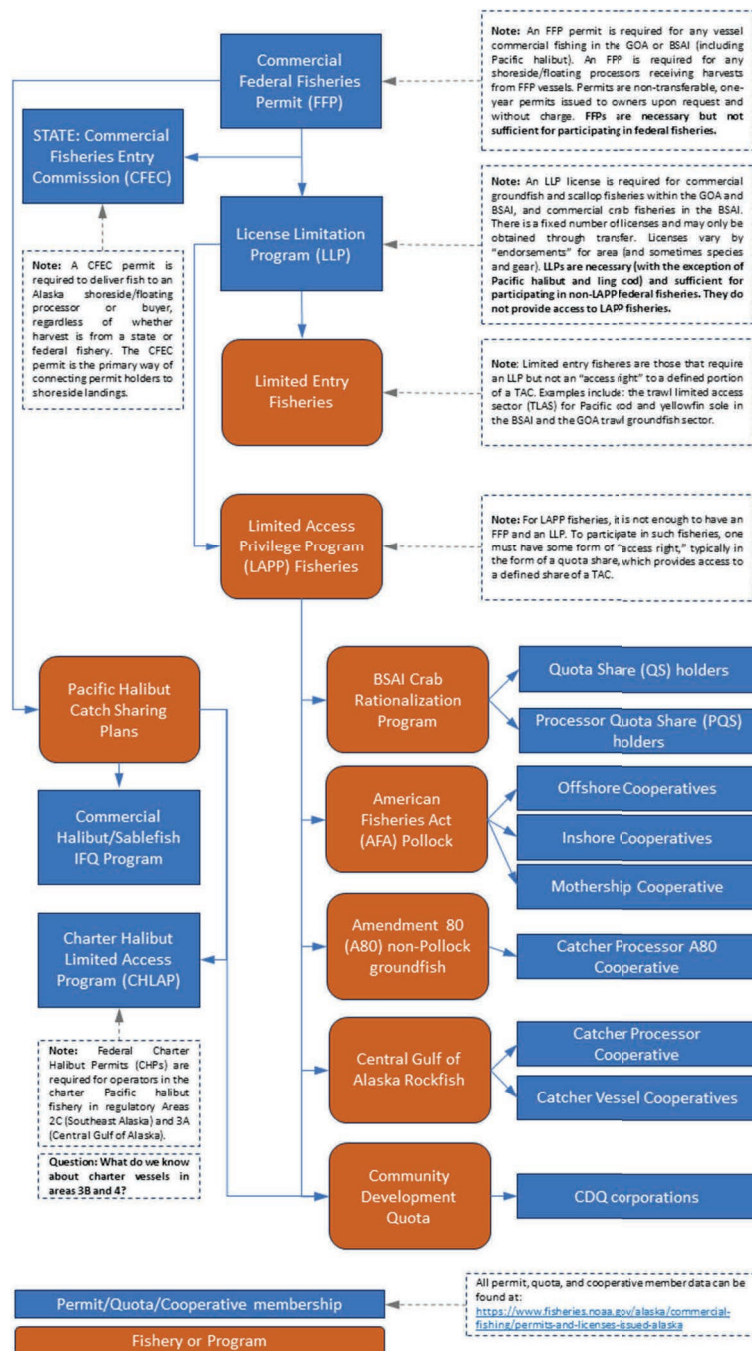
The North Pacific Fishery Management Council (NPFMC) is responsible for managing the fisheries in the Exclusive Economic Zone (EEZ) 3–200 miles off the coast of Alaska. Management of North Pacific fisheries is generally divided across four fishery management plans: Bering Sea and Aleutian Islands (BSAI) groundfish, Gulf of Alaska (GOA) groundfish, BSAI king and Tanner crab, and scallops. The management of such fisheries varies from harvester cooperatives to individual transferable quotas to limited and regulated open-access systems. Figure 3-1 lists the principal fisheries in the North Pacific region.

Commercial fishing vessels in the North Pacific must have a federal fisheries permit, which is nontransferable, 1 year in duration, and issued to vessel owners on request and without charge. Applications for a federal fisheries permit require the vessel’s name, Coast Guard number, State of Alaska registration number, and primary owner’s name and address. The permit is a necessary condition for fishing in federal waters but is insufficient on its own. Additional permissions (i.e., permits and/or quotas) must be obtained to participate in specific fisheries. Thus, a federal fisheries permit alone does not confer the right to access (or benefit from) a fishery in the North Pacific region.

In addition to a federal fisheries permit, a License Limitation Program (LLP) license is required (with some exceptions) onboard any vessel participating in commercial groundfish fisheries within the BSAI and GOA, crab fisheries in the BSAI, and scallop fisheries in the BSAI and GOA. In 1992, the NPFMC took action to limit participation in several commercial fisheries by adopting a moratorium on the entry of additional vessels. The moratorium on entry was eventually replaced by the LLP in 2000. While the moratorium placed a limit on the number of vessels that could participate, in practice, there were far more vessels than were necessary to efficiently harvest the total allowable catch for the target species. As such, vessels in the remaining fleet competed with each other to secure shares of the total allowable catch, both by racing for fish on the fishing grounds and by competing for apportionments of the total allowable catch within the council process itself. The result was an array of amendments to the fishery management plans that apportioned total allowable catch across gear, vessel sizes, and types.

LLP licenses are transferable and issued with endorsements, which provide permission to fish in particular areas or target particular species. For some limited-entry fisheries, an LLP license represents an access right as it permits the license owner to fish for an undefined share of the fishery’s total allowable catch. Examples include the trawl limited access sector for Pacific cod and yellowfin sole and the GOA groundfish trawl sector. For other fisheries, additional permissions are needed to participate. For example, in fisheries with limited access privilege programs, which provide members with a defined portion of a total allowable catch, participation requires an additional access right, usually in the form of a quota share. Examples include the BSAI Crab Rationalization fisheries, the American Fisheries Act pollock fishery, the Amendment 80 nonpollock groundfish fisheries, and the halibut/sablefish individual fishing quota fisheries.

The NPFMC also oversees the Charter Halibut Limited Access Program, a for-hire fishery for halibut in Southeast Alaska and the GOA. Starting in 2011, the program allocated a limited number of charter halibut permits, each of which are endorsed for a particular area and number of anglers. A permit confers the right to operate a for-hire halibut charter business within the endorsed area,

**FIGURE 3-1** North Pacific beneficiaries.

NOTE: BSAI = Bering Sea and Aleutian Islands; IFQ = individual fishing quota.

subject to annual harvest restrictions determined by the Halibut Catch Sharing Plan, which establishes harvest allocations between the charter and commercial halibut fisheries.

Unlike the stylized model fishery depicted previously, permits and quotas are allocated to a variety of entities, thereby complicating the assessment of where and to whom fishery benefits accrue. In many cases, permit and quota allocations can be held by either an individual owner or an LLC and may not be separable from a vessel. Furthermore, in addition to vessel owners, some programs also issue quotas to processors, captains, crew members, and communities. For example, the Crab Rationalization Program issues a small amount of quota share (3 percent) to captains and crew, in addition to processor shares, which requires harvesters to deliver a defined portion of their quota to shareholding processors (see, e.g., the economic report within the Crab Stock Assessment and Fishery Evaluation report in 2021 for a discussion of these challenges [Garber-Yonts and Lee, 2021]). In addition, the Community Development Quota (CDQ) Program allocates a portion (7.5–10 percent) of all BSAI quotas for groundfish, halibut, and crab fisheries to six CDQ entities representing 65 western Alaskan communities (see Box 3-1). Assessing where and to whom benefits accrue is further complicated in the for-hire charter halibut program, as the permit holder, vessel owner, guide, crew, and angler may all be different individuals.

NMFS maintains publicly available databases of all permit and quota allocations (see Table 3-3). Such databases generally include the name of the individual, company, or community entity to which the permit or quota is issued, the amount of quota issued (if applicable), the name or registration number of the vessel associated with the permit or quota (if applicable), and the address of the permit or quota owner. Aside from geographic residence, demographic data are often absent from these databases. Based on these databases alone, it is possible to determine the distribution of the number of permits and the size of quota allocations across communities (based on the registered address of the permit/quota/vessel owner) and how this distribution has changed over time.

Additionally, several confidential databases contain information regarding the monetary value of permits and quotas, although they are not comprehensive. For example, NMFS collects economic data reports (on a mandatory basis) for a subset of limited access privilege programs in the North Pacific. These reports contain detailed information on operating revenues and costs of the permit and quota holders. NMFS also maintains databases recording permanent transfers (and their values) of permits and quotas for several limited access privilege programs. The Alaska Department of Fish and Game

BOX 3-1 **Community Development Quota (CDQ) Program in Western Alaska**

The CDQ Program was created in 1992 to promote fishery related economic development and alleviate poverty in eligible western Alaska communities. The program intended to ensure that Indigenous communities in remote regions of western Alaska were able to benefit from the development and privatization of Bering Sea fisheries (Haapala, 2019). Initially, the program allocated 7.5 percent of the pollock resource to six CDQ entities representing 65 Bering Sea communities. (CDQ communities are in part defined geographically as located within 50 miles of the Bering Sea coast.) Today, CDQ entities are allocated a portion (7.5–10 percent) of all Bering Sea and Aleutian Islands quotas for groundfish, halibut, and crab fisheries. Generally, benefits to CDQ communities accrue in two ways: directly, through resident participation in CDQ fisheries, or indirectly, through investments made possible by the lease of CDQ allocations (Lyons et al., 2019). CDQ groups use earnings and royalties from their allocations to advance regional economic development through initiatives and investments in local industry, ownership of off-shore vessels, infrastructure, and education (NRC, 1999). CDQs typically offer a range of internship and employment opportunities, including employment aboard their Bering Sea offshore vessels, but the halibut allocation is the only CDQ allocation that is regularly harvested by rural residents of CDQ communities.

TABLE 3-3 Permits and Licenses Issued in Alaska by the National Marine Fisheries Service

Quota/Permit Holder Information Available					
Quota or Permit Program	Name	Considerations for Linking to the Benefiting Individuals	Community Data (Registered Address)	Cost and Earnings Data	Demographic Data
American Fisheries Act (AFA) pollock fishery	Yes	<ul style="list-style-type: none"> AFA permits were allocated to the vessels, so the permit holders are companies that own the vessels Harvested in cooperatives 	Yes	No <ul style="list-style-type: none"> Only gross revenue estimates from landings 	No
Crab Rationalization (CR) Program harvesters	Yes	<ul style="list-style-type: none"> Many nonindividual entities holding quotas, some individuals Alaska Fisheries Science Center (AFSC) has decomposed data on quota shareholdings Most of the quota share is leased and fished in cooperatives CR shareholders are all individuals 	Yes	Yes <ul style="list-style-type: none"> Economic data reports (EDRs) for those who own/lease vessel used to harvest CR crab 	No
CR Program processors (this program issues processing quota shares [PQS])	Yes	<ul style="list-style-type: none"> Primarily allocated to companies with complex affiliation structures There are PQS/individual processor quota holders that hold processing privileges that don't have ownership in a plant 	Yes	Yes <ul style="list-style-type: none"> EDRs for processing companies 	No
Amendment 80 (A80) (Bering Sea and Aleutian Islands nonpollock flatfish)	Yes	<ul style="list-style-type: none"> A80 quota share permits were issued to companies Quota is fished through one cooperative 	Yes	Yes <ul style="list-style-type: none"> EDRs for those who hold A80 quota permit or own/lease A80 vessel 	No
Halibut and sablefish individual fishing quota (IFQ) program	Yes	<ul style="list-style-type: none"> Mostly can be linked to individuals, with exceptions 	Yes	No <ul style="list-style-type: none"> Only gross revenue estimates from landings 	No
Community Development Quota (CDQ) Program	Yes, for CDQ and can buy into the CR and IFQ programs	<ul style="list-style-type: none"> Holdings by group Since they represent certain communities, can link to residents 	Yes	<ul style="list-style-type: none"> Only as CR Program quota shareholders 	Some - At the community level

Charter Halibut Permit (CHP) holders	Yes	<ul style="list-style-type: none"> • CHP holder is the business owner • CHP holder, guide, vessel owner, crew, angler, could all be different people 	Yes	Yes <ul style="list-style-type: none"> • For some years through AFSC surveys 	No
Gulf of Alaska (GOA) rockfish program	Yes	<ul style="list-style-type: none"> • Were initially issued to License Limitation Program (LLP) license holders (both individual and nonindividuals) • Fished in cooperatives 	Yes	Some <ul style="list-style-type: none"> • Through participation in the GOA trawl fisheries EDR (ended 2022) 	No
LLP license holders	Yes	<ul style="list-style-type: none"> • Held by both individuals and nonindividuals 	Yes	No <ul style="list-style-type: none"> • only gross revenue estimates from landings 	No
Federal fisheries/federal processing permit (issued freely and are not limited)	Yes	<ul style="list-style-type: none"> • Held by both individuals and nonindividuals 	Yes	No <ul style="list-style-type: none"> • Only gross revenue estimates from landings 	No
Pacific cod trawl cooperative program (new)	Yes	<ul style="list-style-type: none"> • Harvester-held quota (both individuals and companies) • Processor-held harvesting quota (companies) 	Yes	No <ul style="list-style-type: none"> • Only gross revenue estimates from landings 	No

NOTE: A80 = Amendment 80; AFA = American Fisheries Act; AFSC = Alaska Fisheries Science Center; CDQ = Community Development Quota; CHP = Charter Halibut Permit; CR = Crab Rationalization; EDRs = Economic Data Reports; GOA = Gulf of Alaska; IFQ = Individual Fishing Quota; LLP = License Limitation Program; PQS = Processing Quota Shares. SOURCE: Modified from Marrinan (2023).

also maintains a comprehensive record of all commercial fishery landings, which can be linked to the permit/quota holder and the processor/buyer receiving the delivery. Thus, it is possible to distinguish between the geographic location of where harvests are landed from the geographic residence of the permit/quota holder, which has been shown to be important for tracking the flow of downstream benefits from fisheries (Watson et al., 2021).

MEASUREMENT OF CATEGORIES OF DATA AND INFORMATION

The regional examples highlight the heterogeneity in data available on federal fisheries and the importance of understanding the contextual underpinnings of the data-generating processes. Conditional on that understanding and the data available, researchers summarizing the different categories of data and information will generally consider two types of variables as they analyze the to whom and to where benefits accrue.

First, there are those variables that are observed whose distributions could be simply plotted in any year and across time, such as number of permit and quota owners, landings, and age as derived from birth year. These variables could also be mapped to fishing communities and aggregated across the entire region as long as they can be supplemented with geographic information. This type of tracking is consistent with MSA requirements to report on the social and economic status of fisheries in Stock Assessment and Fishery Evaluation (SAFE) reports. In this section, we also explore the quantitative and qualitative data necessary to measure the monetary and non-monetary benefits associated with permit and quota ownership.

The second set of variables requires additional computation; these variables approximate unobserved information, such as personal identifying information that is not generally collected (e.g., gender, ethnicity, race) and monetary and nonmonetary values associated with ownership. For example, if gender information is not collected, quantitative methods using machine learning techniques are available for associating names listed on the permit and quota ownership information with gender. For instance, Szymkowiak (2020) analyzed name and birth year on Alaska permit holdings data using algorithms trained on social security and other datasets that provide names and gender information. Other machine learning algorithms could be used to estimate ethnicity and race associated with ownership of permits and quotas (see, e.g., Wong et al., 2020). These techniques are obviously inferior to explicit data collection and there are important limitations to their use (see, e.g., Lockhart et al., 2023), but the methods do provide estimates of categories of information to be summarized within a fishery across time and across fisheries over time. Szymkowiak (2020) combined these quantitative data measures with qualitative methods (e.g., focus groups) to develop a more in-depth and informed picture of women's participation in Alaska fisheries.

When measuring the monetary and nonmonetary benefits associated with an allocation, the nature of the rights associated with an allocation is critical. Conceptually, the most straightforward case for measuring the monetary value of an allocation is a single limited access fishery in which quota shareholders are allocated a right to a defined share of a total allowable catch. If quota shares are tradable and the market for quotas is well functioning, the quota prices reflect the (marginal) economic value of a quota allocation (see, e.g., Kroetz et al., 2015; Newell et al., 2007). In many respects, when these conditions apply, the quota price would be consistent with the first type of variables discussed above. If the quotas are not tradable and/or prices are not observable, however, then the net present value of the flow of fishing profits over the life of the allocated right would reflect the economic value of a quota allocation. Measuring fishing profits, however, is difficult given the paucity of cost data collected (Holland et al., 2015). Even in fisheries with a limited access privilege program, complications arise when the program covers multiple species that are jointly caught, as it becomes difficult to disentangle the value of any single fishery in the complex (Hatcher, 2022; Reimer et al., 2022).

In fisheries without a limited access privilege program, allocations do not confer the right to a defined portion of a total allowable catch. What is the (monetary) value associated with such an allocation? If permits are transferable (and limited) with a well-functioning market for the permits, then the permit price would reflect the (marginal) value of a permit allocation (Huppert et al., 1996). But what if permits are not transferable, not limited, or permit prices are not observed? What is the value associated with such an allocation, and how does one go about measuring it? There are no easy answers to these questions, and they are likely context dependent. Measurement of economic values in the fisheries will require additional data collection efforts on the costs of fishing.

The nature of rights associated with permit and quota ownership also impacts the non-monetary and sometimes non-quantifiable benefits associated with owning and participating in the fishery, such as identity, belonging, sense of place and place attachment, pride in work, continuation of subsistence practices, food sharing, status and social capital, and maintenance of social networks, among others (Donkersloot et al., 2020; Reedy and Maschner, 2014; Severence et al., 2013; Satterfield et al., 2013). A range of social science methodologies, and approaches utilizing quantitative and qualitative data and information has been developed to better measure specific non-monetary benefits. We return to the critical importance of multiple data types (and methods) in Chapter 5 both for fisheries management in general and an integrated approach to addressing equity in particular. Briefly, however, the committee highlights examples such as richly detailed ethnographic fieldwork, cultural content analysis, cultural model interviews, surveys, and focus groups as well as Indigenous methodologies that center relationality and reciprocity in research design and methods (Kovach, 2010). Moon et al. (2018) reviewed common social science research methodologies in conservation decision-making (see also Chan et al., 2012; Gregory et al., 2023). Recently, researchers have focused on developing indicators or metrics aiming to quantify (and rank or weight) difficult-to-measure, and sometimes nonquantifiable, social and cultural benefits and values (Breslow et al., 2017). Norman et al. (2022) provides an example of an approach that seeks to “groundtruth” secondary data—in this case, fishing community-level measures collected via summaries of Community Social Vulnerability Indicators (CSVIs), with primary individual-level collected survey data on fishers’ views on their livelihoods, social milieus, and community identities. Research also shows that it is possible to estimate quantitatively some of these nonmonetary (nonpecuniary) benefits, especially ones that are more uniform across permit and quota owners by decomposing permit prices into the component stemming from the economics of the fishery (e.g., prices, costs, stock sizes) and the component that is not described by the economics or the nonpecuniary benefits of owning and fishing a permit (Karpoff, 1985).

Regardless of which approach is pursued ultimately, methodological approaches have limitations and consequences, especially when it comes to attempting to develop policy-relevant “measures” of culture (Satterfield et al., 2013). Sterling et al. (2020) highlights important considerations in indicator development, such as scale- and place-based contexts, and identify well-known trade-offs and measurement challenges in local contexts (see also Breslow et al., 2017). The authors note that “trade-offs arise when there are differing values across levels. Many indicators are based on social norms that may not be applicable in all cultural contexts, and good intentions about navigating tensions between policy priorities, power structures, and principles of equity can actually lead to trade-offs within a system that result in social harm (Fisher and Fukuda-Parr, 2019; Kulonen et al., 2019).”

OBSTACLES IN DATA AND INFORMATION COLLECTION AND MEASUREMENT

In a world where fisheries in each region had similar characteristics and similar data collection and management protocols, the committee might recommend wholesale change to the collection of socio-economic data by the agency. A comprehensive statistical survey of all qualified permit holders might be the preferred path, especially as NMFS moves toward operational approaches regarding equity rather than simply a collection of ad hoc efforts under the research aspects of the organization. However, the committee also understands the context within which socioeconomic data collection currently occurs. These make a single survey ill-suited to the task at hand and likely impossible given the Paperwork Reduction Act (PRA) and Privacy Act requirements. The committee applauds the social scientists within NMFS for their efforts to stitch together databases from the diverse array of permit programs, permit qualifications, and voluntary data collection programs.

This chapter focuses its discussion of obstacles for data collection and measurement on permit and quota owners and measuring the distribution of ownership benefits. Not all federal commercial fisheries require permits, so permit allocation cannot be used as a single measure of benefit distribution. In other cases, permits can be owned by vessels, publicly traded corporations, banks, or LLCs. In these cases, collecting the relevant demographic information on the individuals fishing the permit might require additional data collection efforts, which would be subject to the PRA and budgetary issues. This complex pattern of permit ownership complicates analyses of where and to whom benefits accrue. Even in fisheries where the permits are allocated to individuals, there are prohibitions on the mandatory, or perception of mandatory, collection of demographic information (e.g., asking for the information on the same page as the information required for a permit). Demographic information can be collected during the permit application process if it is made clear to the applicant that the information is voluntary, and no demographic status can be used as a precondition for the issuing of permit. According to the information provided to the committee, mandatory data collection of this personal or business identifying information is only permissible under the PRA, Systems of Records Notice (SORN), and Privacy Act if it is explicitly part of NMFS's legislative mandate. Based on the current interpretation of rules on personal and business identifying information and the needs of NMFS to collect this information, a short-term solution could be to invest in partnerships with universities, think tanks, states, and nongovernment organizations to collect this information. In the long term, it will be important for NMFS invest in means of ensuring that the routine collection of this information is understood by all parties to be integral to meeting the National Standards of MSA in a similar spirit to that of biological data collection programs. These investments could be informed by looking at how other federal agencies, such as the U.S. Department of Agriculture (USDA), collect personal and business identifying information.

Voluntary data collection efforts can provide valuable information especially when response rates are high. With low response rates, the sample's representativeness of the larger set of permit owners becomes an important question. Without a full sampling frame, even assessing the adequacy of the sample can be difficult. If, for example, this process only yields responses from less experienced fishers or from fishers residing in only a few communities, then analysts will receive an incomplete and potentially misleading picture of the distribution of permit ownership. The representativeness issue is true at the fishery scale (e.g., only a subset of permit owners for species Y in region X respond), at the regional scale (e.g., aggregating fishery-level data to the region to develop regional summaries), and at the national scale (e.g., developing national-level demographic information or comparing regions). The issue is also important for comparing changes across time, as it is not clear whether and how the representativeness of the sample will change from year to year.

Data on distribution have many potential uses within fishery governance, from surveillance, to predictive modeling of new fishery management actions, to assessing current and past actions.

Along with the representativeness of the sample, the frequency and method of collecting this information are important considerations that need to follow directly from its primary uses. For example, using a new survey instrument to collect information on a cycle of every 5 years might be acceptable for general surveillance of changing personal identifying information, which could be used alone (as reported, e.g., in SAFE documents) or developed in community summaries. A 5-year survey may also be useful in identifying emerging trends and/or research and policy priorities. There is precedent for this type of information to be collected by the U.S. government. For example, the USDA Census of Agriculture collects myriad demographic and economic data on the nation's farmers, is mandatory, and provides important information that can inform the reauthorization of the Farm Bill, which occurs every 5 years. Yet, 5 years might not be sufficiently frequent for predictive modeling of a regulatory action or for assessing changes due to past fishery management actions. Utilizing permit applications, which are filled out each year, could provide higher-frequency data across more federal permitted fisheries than a new survey instrument—but with the caveats mentioned above. The combination of the diversity of needs across regions, the multitude of uses, and uncertainty on the means of and the frequency with which to collect the information are real challenges. At the same time, these conditions create a ripe environment for allowing experimentation that could lead to learning across the regions, but at the cost, at least in the short term, of developing a comprehensive national picture of ownership and participation of federally managed fisheries.

Another challenge with measurement of the distribution is matching the unit of analysis to the appropriate scale of the assessment of distributional equity. For example, permit and quota owners are by definition connected to a fishery, but the appropriate scale of assessment might be at the community level. The appropriate scale could be a region as entities often participate in multiple fisheries within a region, with changes in one fishery influencing outcomes in other fisheries (see, e.g., Kroetz et al., 2019).

With all the potential uses and challenges with collecting and measuring this information, the lack of a guidance document for the regional councils on how to interpret and utilize the information in the development of management plans can undermine support for these efforts and introduce friction that slows down adoption of best practices. A guidance document could include information on (1) how to present this information in SAFE reports; (2) how to utilize it in Fishery Management Plans or Fishery Ecosystem Plans beyond current efforts, which include reporting requirements related to the National Environmental Policy Act (NEPA) (e.g., social impact analysis and the impacts on small businesses); and (3) how to consider the equity implications of past management decisions when developing new management plans (see Chapter 5 for further discussion).

A significant obstacle in moving from acquiring and analyzing identifying information as a collection of ad hoc research outputs to implementing in operations is the lack of social science research expertise within the agency and the limited funding allocations. Simply stated, social science within the agency remains principally a small-scale research effort and not the operational system it needs to become if NMFS is to meet the commitments in the *Equity and Environmental Justice Strategy*. A number of NOAA Science Advisory Board reports have made similar arguments for increasing the human and financial capacity at NOAA to undertake social science (SAB SSRP, 2003; SSWG, 2009). For example, the 2003 report of the Social Science Review Panel of the NOAA Science Advisory Board concluded, “The capacity of National Oceanic and Atmospheric Administration (NOAA) to meet its mandates and mission is diminished by the underrepresentation and underutilization of social science” (SAB SSRP, 2003). While the motivations of those reports do not align precisely with measuring and assessing equity in fishery management, the arguments apply, maybe even more so, when considering NMFS's mandates to account for the diversity of values, benefits, and impacts linked to fishery management (as outlined in Chapter 2; see also, e.g., Clay and Colburn, 2020; Gilden, 2005; Gregory et al., 2023; NPFMC, 2023).

Key to developing plans for expanding capacity is a needs assessment within each fishery management region and at the NMFS national offices, as there are many approaches from focusing on hiring entry-level staff social scientists, to hiring from the Senior Scientist level all the way to entry-level. The committee is not prescribing a plan but notes the potential importance of senior leadership (e.g., Lead Social Scientist position akin to the Lead Economist position in NMFS) on these issues. Furthermore, the committee recognizes that social science expertise and leadership should not be conflated with the need for investing in other areas of leadership and capacity. For example, the committee recognizes the high value of positions such as a NMFS Senior Advisor on fisheries and tribal engagement. While not social science, such positions represent inclusion and perspectives that are critical to appropriately conceptualizing and assessing equity. Champions are necessary to improve the visibility and emphasize importance of equity considerations within NMFS, and potential funding allocations.

WHAT CAN NMFS DO NOW?

In this chapter, the committee used a stylized model fishery in which all necessary data were collected for assessing the distribution (where and to whom) of benefits of permit and quota allocation. The committee noted that few, if any, federal fisheries meet this standard. In the section on methodology, the committee examined substantial regional variations in the approach to allocating permits and quotas that will hinder any standardized assessment of distributional equity in the nation's fisheries. In combination, these observations indicate clearly that the data currently available are insufficient for conducting a comprehensive assessment of the distribution of benefits resulting from the issuance of permits and the allocation of quotas.

This is not to suggest, however, that until all such barriers and hurdles are overcome, no progress can be made in assessing the distribution of benefits arising from permits and quotas. Indeed, the committee heard from social scientists and senior agency staff who showcased the high-quality social science research being conducted within NMFS and with its partners. This section considers actions NMFS can take now and in the short term given its current capacity.

Continue to Expand on and Adapt Current Approaches

The committee appreciated the quality and range of analyses that have or are being undertaken by current NMFS and council staff. The nation's regional approach to fisheries management creates challenges for standardization, but also provides a testbed for different methodologies for advancing equity considerations in data and information development.

Expand and Advance Dashboards

NMFS scientists are already making an increasing amount of their data available publicly. The agency deserves congratulations on these efforts. More could be done with existing data that would provide a greater context for assessing the flow of where and to whom benefits of the issuance of permits and the allocations of quotas accrue. Other elements of current dashboards could be updated with existing data that would represent important first steps to assessing multiple dimensions of equity. For example, NMFS goes to great length to encourage public input. The committee is of the opinion that currently such attendance lists are used primarily to drive mailing lists. However, these data do provide information on participation. Generating simple metrics of the distribution of public input by role for each fishery would begin to formalize efforts to report representational equity. The committee recognizes that such simple metrics are vulnerable to letter writing campaigns and likely have attending biases, but the simple act of seeing members of your group rec-

ognized is powerful in and of itself. Such data may also provide NMFS and Councils indications of which approaches to gathering public input are effective for particular groups and for which groups particular approaches are ineffective. NMFS and Councils already recognize that not all public meetings are fully accessible to all groups because of travel costs or time. Similar efforts could formalize participation beyond attendance and could try to capture the source of questions and feedback.

Similarly, NMFS can start to characterize the distribution of the primary benefits of fishery management decisions through enhancements to dashboards. The committee presents data in this chapter on the pattern of ownership in the Surfclam fishery in mid-Atlantic region. Such data are easily communicated in dashboards, similar to ones in existence currently. For example, it would be possible for NMFS staff to amend the Surfclam dashboard with a simple graph that shows patterns of ownership of permits by ownership category, and or by geographic region. Similar graphs could be added to dashboards for other species. These simple figures serve two important purposes. First, they provide information on the dynamics in individual fisheries. Second, they telegraph NMFS interest in and intent to measure distributional equity in fisheries. The committee recognizes that confidentiality concerns may limit the extent to which these recommendations are feasible within all regions and nationally.

One specific example that may serve as an example of enhancements to current dashboards relates to newly required periodic reviews of LAPP programs. Reviews are triggered by either public interest-based, time-based, or indicator-based triggers. When triggered, this policy requires NMFS and Councils to consider the various ways different user groups receive a benefit from that allocation. It is intended that these analyses are summarized in dashboards that are readily accessible to the public.

NMFS is making progress on integrating socioeconomic data into analyses and assessments of the nation's fisheries as a means of informing an understanding of to whom and to where the benefits accrue. The CSVI Toolbox⁴ is a clear example of progress on the "to where" front. Some regions are beginning to apply these approaches.

As a clear example of NMFS's progress, the NEFSC's web application produces a dashboard of economic and social indicators.⁵ This site provides a number of economic and social metrics for the GARFO-managed fisheries, both separately and aggregated at the regional level. For each species, the site displays economic data including the number of vessels, the number of trips, and the number of days at sea, together with associated revenue. Data are derived from several sources, presumably. As permits are granted to vessels, which captures "to whom," the number of vessels displayed could be drawn from the permit holder database. The number of trips and days at sea are derived presumably from mandatory vessel trip reports. Similarly, revenues are likely derived from mandatory vessel trip reports and dealer reports.

The dashboard includes a community-based Fisheries Engagement Index Score (Jepson and Colburn, 2013); currently, this largely summarizes economic data. It would be useful to expand the dashboard to include graphics that characterize the distribution of permit ownership (individual, multiple, corporate, vessel owner, or crew), and the geographic distribution of permits based on the zip code of the mailing address and on the principal port reported for the vessel landings. Once permit holdings are identified by zip code, these data can probably be linked to social metrics beyond those currently provided (see Chapter 4 on expanding the scope of beneficiaries and benefits). The committee encourages NMFS to integrate indices from its CSVI Toolbox into such dashboards, as has been achieved in the NEFSC *State of the Ecosystem Report for 2022* (Figure 3-2; NEFSC, 2023).

⁴See <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-coastal-communities>.

⁵See <https://apps-nefsc.fisheries.noaa.gov/socialsci/pm/index.php/programs/ne>.

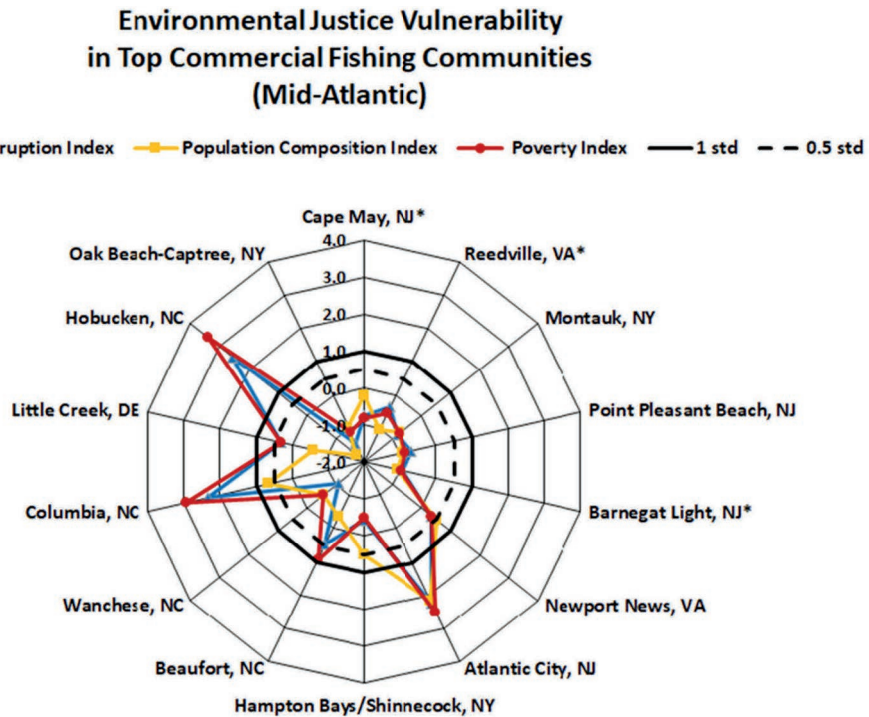


FIGURE 3-2 Environmental equity and justice indicators for fishing communities in the Mid-Atlantic, produced by the Community Social Vulnerability Indicators Toolbox of the National Marine Fisheries Service. SOURCE: NEFSC (2023).

If NMFS chooses to expand and improve its dashboards, an important component will be developing processes for supporting continual updates to the dashboards to ensure information is current. The processes likely require work on database structures, data access, and development of repeatable code. It would be advantageous if these enhancements can adopt an Open Science/Open Data approach (Fredston and Lowndes, 2023). Additionally, adequate staff time on the part of database and website managers as well as staff with the contextual knowledge to identify problems with outputs will be critical. Organizing and making this data publicly accessible provides an avenue for improved decision-making and transparency. First, timely availability of these summary statistics will support council staff. Specifically, having this information on hand reduces the burden of integrating it into any proposed rulemakings. A second potential use in the management process is that timely and accessible information provides the public with an opportunity to review the information. To the extent that there are public comments related to aspects of analyses of socioeconomic outcomes, the public would have access to a version of the raw data to support comments.

Expand and Enhance Collaborations

Partnerships in equity-related work in fisheries are both necessary and powerful. This section covers partnerships within the agency and with external bodies and organizations. Partnerships have the potential to improve levels of engagement among traditional fishing communities, underserved communities, and Tribal Nations and Indigenous communities. Partnerships may also assist NMFS in accessing categories of data that are currently difficult to collect under federal authorities.

Given the continual challenges to increasing full-time positions, short-term ways for current social scientists to expand their reach, productivity, stature, and profile within NMFS could include institutionalizing support for communities of practice. These could include partners outside NMFS (e.g., academics, nongovernmental organizations, local community leaders, tribal representatives) and be developed within each region to focus on regional context, and across regions to develop best practices and foster learning. For example, communities of practice have made progress in the field of stock assessment, including national workshops that engage directly with regional fishery management councils. The councils' science and statistical committees have convened nationally seven times since the first workshop in 2008. Most have focused on questions of stock assessment and stock status determination. The fourth workshop included a focus on social science, as a part of an overall focus on ecosystem-based approaches. However, discussions focused mostly on economic questions and not a broader perspective of social sciences (Seagraves and Collins, 2012). In a similar fashion, the social science communities of practice could formally work to address the obstacles to collecting distributional data, analyzing them, and synthesizing them for the regional councils. The committee heard testimony of noteworthy past and ongoing efforts, such as the social science workshop in 2014 hosted by the Western Pacific Regional Fishery Management Council, which provided an overview of the needs across the regions to consider equity through the NEPA social impact assessment reporting requirements. The committee sees the potential for current efforts along these lines to be used to develop a more robust national approach to operationalizing the development of communities of practice for the assessment of equity in fisheries management.

As a part of a community of practice, NMFS could consider further investments in the NMFS-Sea Grant Fellowship program, which currently supports graduate students training the areas of stock assessment, ecosystem dynamics and fisheries economics to include a fuller range of social sciences. The committee recognizes that the ecosystem dynamics area does call out social and human dimensions in describing areas of interest. However, expanding the program with additional resources to include parallel tracks in stock assessment and ecosystem dynamics, fishery economics, and fishery social sciences would have multiple benefits for NMFS. Students currently in this program contribute to communities of practice in each of the current disciplines by developing strong links between academic institutions and the agency. These Fellowships have been very successful in developing new methodologies, identifying and targeting potential future members of staff, and developing partnerships that often last long after the fellowship has ended. The committee would expect the expansion to include social sciences beyond economics relevant to NMFS's work would have similar benefits to a social science community of practice. Partnerships may be one way to overcome constraints in collecting demographic and socioeconomic data within the federal system. Partnerships with state agencies, for example, may provide access to lists of permit and quota holders and associated demographic data that may be used to develop insights not currently possible in the federal system. For example, Stoll et al. (2016) combined data on federal permit holders and those permitted by the Maine Department of Marine Resources to fish in state waters. These data were analyzed to quantify patterns of fishery specialization and diversification, and how coastal communities—as home communities of license holders—may be impacted by licensing changes intended to support fisher resilience. Stoll et al. (2016) were able to quantify how individuals' access to Maine fisheries has changed over a 25-year period, as a result of past policy interventions. Available data on individual license holders also allowed the authors to map changes in fishers' access portfolios in relation to fishing communities and to explore cumulative impacts of licensing changes on fisher access across fisheries. Similarly, Alaska's Commercial Fisheries Entry Commission (CFEC) annually collects and publishes data on permit holders in state-managed fisheries since implementing a limited-entry management system in 1974. The CFEC issues permits to individual permit holders as in the committee's stylized fishery. To track the geographic distribution of permit holdings by fishery, the CFEC created residency categories that designate communities

as rural or urban and local or nonlocal to a fishery. There is also a nonresident residency category. To understand the change in distribution of permit holdings in relation to these defined residency categories, CFEC tracks types of permit transfers (i.e., whether a permit was sold or gifted, whether a permit holder moved [e.g., from a rural local community to an urban nonlocal community], and permit cancellations). Other categories of information that are collected regularly at the fishery level and analyzed in relation to residency of permit holders include age of permit holder, rate of new entrants, and fishery earnings, among others.

CFEC data allow fishery managers and the public to understand who benefits from Alaska fisheries and how participation in Alaska fisheries changes over time. In 1984, CFEC published a report on Alaska Native participation in state-managed fisheries and how it had changed under limited entry (Kamali, 1984). This was possible at the time by linking CFEC data with the Bureau of Indian Affairs's Alaska Native Roll. Since then, the rural local residency category is often used as a proxy for understanding Alaska Native participation. CFEC data has also been essential in identifying participation and aging trends across and within fisheries, such as rural permit loss and the "graying of the fleet" (Donkersloot and Carothers, 2016). It has also been utilized in understanding the flow of benefits from Alaska fisheries both across and beyond Alaska (Watson et al., 2021), and if and how fishery regulation or management changes impact local Alaska communities that depend on fisheries (Donkersloot, 2021; Koslow, 1986; Meredith, 2018; Reedy-Maschner, 2007). CFEC data has also been drawn on to understand how permit ownership provides non-monetary benefits to both individuals and communities more broadly by supporting social and cultural roles, obligations, and practices, such as food sharing networks, and the maintenance of social and community ties (see, e.g., Holen, 2014; Reedy and Maschner, 2014; Severence et al., 2013).

FINDINGS AND RECOMMENDATIONS

FINDING 3-1: Comprehensive demographic data related to characteristics of permit and quota holders and their geographic locations are required if NMFS is to determine where and to whom the benefits of the issuance of permits and allocations of quotas accrue and to meet the intent of Congress expressed in the MSA for fair and equitable distribution of benefits, as well as to meet commitments made in recent executive orders.

FINDING 3-2: Permits and quotas are not required in some fisheries and regions. Where they are required, comprehensive demographic data are often not collected. In some fisheries and regions, complex administrative, statistical, and legal restrictions currently prevent NMFS from collecting comprehensive data.

FINDING 3-3: Determining the distributions of demographic data to inform analysis of to whom benefits accrue is difficult when permits and quotas can be issued to individuals, or linked to vessels, legal entities, and corporations, as well as community groups. Ownership characteristics and requirements vary within and across regions.

FINDING 3-4: Determining the distributions of demographic data to inform analysis of where benefits accrue is challenging, since addresses provided on permit and quota documentation could represent a corporate office rather than an address or addresses that best represent where benefits accrue (e.g., home and port address). Uncertainty around where an entity operates reduces the ability to confidently link permit and landings databases to other data sources, including a fuller suite of social, economic, housing, and demographic information.

FINDING 3-5: Because permits and quotas convey both monetary and nonmonetary benefits, measurement and assessment of to whom and where benefits accrue needs to include both.

FINDING 3-6: Many fishers, communities, and other entities participate in multiple fisheries necessitating measurement at scales above the fishery scale (e.g., the ecosystem scale) to develop a full picture of the equity in the distribution of benefits derived from permit and quota holding.

FINDING 3-7: Strong regional differences exist with respect to the history and current issuance of permits and allocations of quota. Since consideration of equity needs to be contextual and place-based, it is challenging to develop a single, uniform, national (one-size-fits-all) approach to assessing where and to whom the benefits of the issuance of fishery permits and allocation of quotas accrue.

FINDING 3-8: The collection, analysis, and interpretation of comprehensive demographic and social data requires a greater capacity within NMFS Social Science branches within NOAA headquarters, regional offices, science centers, and councils than exists currently.

FINDING 3-9: The lack of a guidance document(s) to inform and establish a definition of equity and how it needs to be measured, assessed, and utilized by NMFS, regional science centers, and council staff is an obstacle to increasing investment in social science capacity, which will be necessary to expand the agency's efforts in measuring equity.

FINDING 3-10: In spite of the challenges, NMFS scientists, in partnership with academics, council staff, and nongovernmental organizations, have made considerable advances in measuring and documenting analysis of to whom and where the benefits of permit and quota ownership accrue in particular case studies. Moving forward, the lessons learned from these regional case studies need to inform a national strategy for assessing the distribution of benefits and for increasing capacity for these efforts.

RECOMMENDATION 3-1: The National Marine Fisheries Service should take advantage of current opportunities both within the agency and in academia to expand work on equity by generating dashboards and data summaries that more fully express the distribution of permits and quota holdings in the nation's fisheries. Progress on these activities need not await more comprehensive discussion of equity or wider availability of data.

RECOMMENDATION 3-2: The National Marine Fisheries Service (NMFS) should develop a guidance document(s) to inform and establish principles that lead to definitions of equity (see, e.g., Recommendation 2-1), and processes for measuring and assessing equity over time by NMFS, regional science centers, and Council staff. This document(s) should parallel guidance documents related to the Magnuson-Stevens Act. For example, NMFS has issued technical guidance that provides national, operational definitions of abundance and exploitation thresholds. Accordingly, even though regional methods for evaluating these thresholds may differ, an integrated, national summary of the status of fish stocks is possible. The committee views the suggested equity guidance documents as working in a similar fashion.

RECOMMENDATION 3-3: The National Marine Fisheries Service (NMFS) should undertake a needs assessment in each region and at the national level that can provide guidance on different investment strategies for developing social science capacity and leadership within the agency. These investments could include staffing focused on early-career scientists or a mix of scientists at different career stages with diverse disciplinary expertise and skill sets, including in research design and qualitative and quantitative data collection and analysis. The committee recommends that increasing capacity needs to include, but not be limited to, the leadership level, such as a Senior Scientist for Social Sciences within the NMFS Directorate.

RECOMMENDATION 3-4: Much of the current measurement and assessment work on equity in fisheries is conducted within a research framework within NMFS, academia, and change to nongovernmental organizations. If NMFS is to meet the legislative mandate for equity within MSA and recent executive orders, work on equity must transition to operational data collection and assessment programs, supported and analyzed by the increased social science capacity as recommended in Recommendation 3-3.

4

Beneficiaries of Fishery Management Decisions

The previous chapter discussed the distribution of benefits of permit and quota holdings in commercial and for-hire fisheries, focusing most closely on the individuals who directly own or hold permits and quotas. Chapter 3 also explored the opportunities for and challenges to assessing the distribution of benefits in real-world fisheries for which data are less available.

Chapter 4 broadens the scope beyond permit and quota holders to consider the potential for benefits to flow to other groups. This more expansive view explores the current and potential flows of benefits. We define three common categories of beneficiaries. For each category, the chapter defines the beneficiaries, evaluates categories of benefits, assesses the data available, and reviews methods that may potentially expand the data available. First, the chapter considers traditional beneficiaries—those who do not hold permits or quotas but work on the water, namely crew and captains. Next, it considers shoreside businesses, and finally, it discusses how communities benefit from fishery management decisions.

The committee recognizes that this linear approach ignores contextual equity. It ignores the history of fisheries management. By focusing on these three well-defined, common groups of beneficiaries, this approach ignores others who might have once benefited or who could benefit in the future, or whom society might wish to see benefit were different fishery management decisions made. Therefore, the final section of this chapter introduces the notion of potential beneficiaries as an improved way of thinking about equity in fisheries management.

COMMON CATEGORIES OF BENEFICIARIES

Fisheries directly support livelihoods, cultures, and economies. Many different groups of people are involved in and benefit from targeting, harvesting or catching-and-releasing, processing, selling, and consuming fish. Fisheries represent complex, interconnected social-ecological systems and it is important to recognize that benefits accrue at many scales from individuals to societies (Figure 4-1; Pomeroy et al., 2018). For individuals, fishing can represent identities and contribute to life and occupational satisfaction (Pollnac and Poggie, 2008; Pollnac et al., 2001). Scaling up to communities, fishing shapes local cultures, traditions, and livelihoods. At broader society levels,

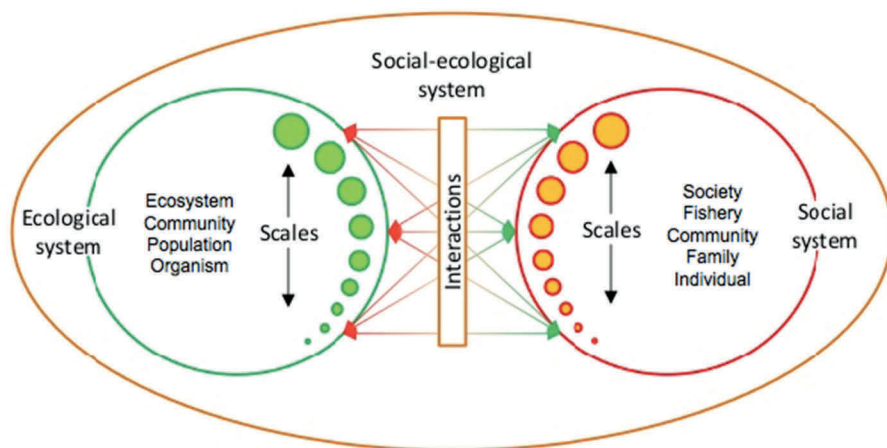


FIGURE 4-1 Fisheries social-ecological systems.

SOURCES: Pomeroy et al. (2018), adapted from Martin et al. (2015).

fisheries contribute to both regional and national economies and food security. Likewise, while many facets of society are interested in fisheries, the level of engagement or reliance is highly variability and underpins the importance of understanding how and to whom benefits are distributed.

Beneficiaries are individuals or groups of people who do or may benefit directly from using, enjoying, consuming, or interacting with the environment and natural resources (Landers et al., 2013; Sharpe et al., 2020). The concept and terminology of *beneficiaries* provide a link between the language in the Magnuson-Stevens Act (MSA)—which is focused on benefits to the nation and is reflected in the *Equity and Environmental Justice Strategy (EEJS)* of the National Marine Fisheries Service (NMFS)—and other equity-based work focused on “populations sharing a particular characteristic, history, or identity” or are a subject of equity along another dimension (NMFS, 2023b).

Those beneficiaries in the fishery social-ecological system not holding permits or quota may be grouped in many ways, most commonly by sector (recreational, commercial, charter, subsistence), target species, gear type, or geography. For example, the “for-hire sector” means those beneficiaries who take paying clients fishing for sport or pleasure. Fisheries beneficiaries are often grouped by fishing characteristics, including their participation in specific fisheries (e.g., groundfish, shrimp, scallop) by areas and/or gear types (e.g., pelagic longline, trawler). The MSA is comprehensive and holistic in its view of fisheries. Included explicitly in the legislation and in the National Standards (see Box 2-3 in Chapter 2) are shore-based industries and subsistence fisheries. Fishing communities are another important and explicitly recognized group. National Standard 8 focuses explicitly on place-based fishing communities. However, as discussed extensively in Chapter 3, the place-based approach to fishing communities is limited, including the potential need to specific historically marginalized or underserved groups.

The following sections consider three broad and often overlapping groups of beneficiaries in fisheries, beyond permit and quota holders, that receive benefits stemming directly from fishery management decisions.

Crew

Definition

Crew are essential fishery beneficiaries and highly impacted by management decisions. Crew typically include non-owner captains, deckhands, and mates. Crew may also include other specialized roles (e.g., engineers, cooks).

Benefits

Crew receive both monetary and nonmonetary benefits from participating in fisheries. In many fisheries, crew often operate under a lay system in which they are paid a portion or share of net revenues when catches are sold (Acheson, 1981). Historically, working on fishing boats as crew has also provided an entry point for new careers in fisheries. However, the increasing start-up costs and capital required for fishing have severely impaired this apprenticeship-type model and impede upward mobility in fisheries (Ringer et al., 2018; Szymkowiak et al., 2022; see also Pinkerton, 2013, regarding the lay-up system in fisheries in British Columbia, Canada).

A number of studies have focused on how crew are impacted when fisheries transition to catch shares due to well-documented consolidation trends along with distributional and intergenerational inequities, and the subsequent creation of high barriers to entry (Carothers et al., 2015; Knapp, 2006; Knapp and Lowe, 2007; Olson, 2011; Pinkerton, 2014). While much of this literature characterizes the negative impacts on crew, including livelihoods, opportunities, and status, there are counter-examples where crew jobs remained constant and some measures of remuneration increased (Abbott et al., 2010). Some crew positions may be paid salaries or wages, in part due to the longer fishing seasons (Olson, 2011). Crew shares are not always equal splits, as individuals with greater experience or specialized skills (e.g., mechanic) or those are captains typically receive higher earnings (Olson, 2011). Instead of shares of landed fish, crew on for-hire vessels often supplement their wages in tips or gratuities from customers. Therefore, crew of for-hire vessels are most heavily impacted by the number of days, trips, and customers.

Crew also receive important non-monetary benefits as participants in fisheries. Holland et al. (2020) demonstrate the importance of job satisfaction, social capital, and identity as drivers of participation in West Coast fisheries (Holland et al., 2020). These factors often lead to individuals choosing to participate in fisheries, despite the higher income volatility and risk inherent in going to sea compared with other jobs (Holland et al., 2020). In some fisheries, crew are often relatives or children of vessel owners and captains providing a pathway to multigenerational participation. In other cases, crew positions can provide broad access to entry-level careers in fisheries, which is exemplified by the relative high proportion of crew with a high school diploma or less formal education (Henry and Olson, 2014). Crew positions can also include opportunities for individuals with limited employment options due to immigration or visa status. However, several recent studies have highlighted the major challenges facing crew and the fisheries businesses that rely on them. Along the Northeast and Mid-Atlantic coasts, recent surveys have revealed an aging fleet of crew with very few new entrants (Cutler et al., 2022). Studies of Vietnamese fishing fleets in the south-east have described the challenges of language isolation, including those between fishing crew and fisheries management and observers (Schewe and Dutton, 2018).

Data and Methodology

Data on crew in federal fisheries come mainly from surveys of crew conducted in different regions. In 2012–2013, in the Northeast and Mid-Atlantic regions, the Northeast Fisheries Science Center (NEFSC) conducted a multiwave Socio-Economic Survey of Hired Captains and Crew

in New England and Mid-Atlantic Commercial Fisheries. In its first iteration, the survey sought a random sample of crew from ports from Maine to North Carolina. Participation in the surveys was voluntary. The survey interviewed 400 crew on the dock. Respondents provided data on basic demographic information, the principal fisheries in which the crew were engaged, and the principal ports at which catches were landed (Henry and Olson, 2014). The survey also collected data on well-being (including financial viability), social capital, and job satisfaction. This survey found that 60 percent of respondents had at least a high school diploma, and 85 percent identified as White. However, the number of self-identified ethnic groups reflected more diverse ethnic heritages (Henry and Olson, 2014). Crew member ages ranged from 16 to 75 years, with an average age that varied by fishery (Henry and Olson, 2014). The survey was repeated in 2018–2019, with a third wave ongoing in 2023. A further 377 crew members were interviewed in the 2018–2019 survey, responding to largely similar questions. In combination, these data begin to provide a time series of broad demographic patterns in crew and nonowner captains in the Northeast.

The State of Alaska offers one of the most comprehensive sources of which the committee is aware of information related to crew (see, e.g., Szymkowiak et al., 2022). Alaska requires a crew member license for any individual who directly or indirectly participates in a commercial fishing operation (e.g., engineers, cooks, vessel maintenance, gear work). The crew license, which can be purchased annually online and in person, collects information including full legal name, physical and mailing address, gender, date of birth, state residency (and length of residency), and state-issued driver's license number (if applicable). A Social Security number (or temporary Social Security number for non-U.S. citizens) is also required for crew over 16 years of age. The State of Alaska annually publishes license statistics, but these are limited to quantity sold and cost data on Alaska resident versus nonresident crew license purchases. The main database provides only a measure of an intent to fish; detailed information on actual crew participation and behavior is generally unavailable. The exception is the Economic Development Reports (EDR) fleets in federal fisheries, which require crew permit reporting. Although an advantage of this database is that the coverage is complete, the information collected does not include information on most of the characteristics identified within NMFS's *EEJS*.

Systematic knowledge of the monetary benefits of serving as crew in the harvesting sector is relatively limited. The Northeast survey discussed earlier asks questions about income levels by fishery, and data indicate substantial differences among fishery sectors in that region. By the end of 2023, NMFS will have data on trends in income in this region. In the North Pacific, the Crab EDR program is a mandatory data collection program. With the implementation of the Bering Sea and Aleutian Islands (BSAI) Crab Rationalization Program, collection increased in frequency and requires participants to submit yearly information related to revenues and costs, including data on crew employment and earnings. This is another highly comprehensive data collection effort related to crew, as it is a complete census of a fishery and has longitudinal for following outcomes over time. Academic and NMFS researchers were able to link these data to other data, including landings, and used it to show that both the share and real value of vessel proceeds accruing to captains, crew, and vessel owners declined under the catch share regime (Abbott et al., 2022). Importantly in terms of relevance for assessing management outcomes, the program was in place prior to the management change to facilitate a before-and-after comparison.

Data on the benefits and costs of fishery management decisions on crew are important. The crew survey conducted in the Northeast region is a high-quality example of one possible approach to collecting data to characterize how the flow of benefits to crew is affected by management decisions related to permits and quotas. The committee recognizes the benefits of expanding this survey to other regions and applauds the use of power analysis in the design of the second and third Northeast crew surveys. However, the relatively small sample size, of approximately 400 sampled out of approximately 21,000 potential crew (~2 percent) may be insufficient to allow reliable inferences

on only the coarsest of patterns. The committee was intrigued with the potential power of a crew registry, such as that operated in the State of Alaska, to serve as a sampling frame for improving the design of crew surveys, even with the noted weakness that the registry is only an indication of intention to crew. Longitudinal crew panels may be another way of providing important information on patterns of participation and benefits. Future studies of crew may also be informed by recent studies on the agricultural, landscaping, and other “day laborer” scenarios, where informal employment arrangements are commonplace and often involve immigrant (e.g., Galemba, 2021; Valdez et al., 2019).

The committee recognizes that there has been recent progress toward addressing unique data collection challenges for crew, including tailoring surveys and information programs toward specific fisheries contexts. For instance, the shrimp fishing fleet in Gulf of Mexico includes many Vietnamese and Hispanic/Latino fishermen, and the ongoing NOAA Crew Survey is being implemented in three languages (English, Spanish, Vietnamese). However, the committee also recognizes the remaining challenges inherent in collecting such data, including privacy concerns, respondents risking future employment by being seen providing information and concerns over how data may be shared across the federal government. There are several questions for NMFS to consider in deciding how to continue and or expand these efforts. What are the key questions to be addressed with the collected data? What spatial and temporal scale of data is required to address the key questions? For example, the 5-year frequency of the NEFSC crew survey is likely to be sufficient for identifying long-term trends. It may not however, be sufficiently resolved temporally to support the development of models of how fishery participants may respond to or have responded to management changes. If this is the goal, surveys conducted before and after significant changes in management would be desirable.

Processing and Distributing Sector

Definition

Shoreside facilities include processing and distributional networks that take landed fish to market. Fish processing involves transforming landed fish into seafood products that are ready for distribution or sale to consumers. This includes cleaning, gutting, filleting, portioning, cooking (e.g., smoking, steaming), and packaging. Fish processors are sometimes permit or quota recipients, particularly in vertically integrated fisheries, such as surfclam and squid in the Northeast. Distribution of fisheries products occurs through complex networks and supply chains that move fish from the point of capture or harvest to consumers. Distribution ranges from small, local delivery to air, train, and other high-tech pathways to global markets.

Benefits

Similar to fishing crew, individuals involved with shoreside facilities receive both monetary and nonmonetary benefits. Most fish processing jobs offer low pay, require long hours, and can be dangerous (Matheson et al., 2001; Bonlokke et al., 2019; Syron et al., 2019; Jiaranai et al., 2022). While jobs such as fish cutters and processors typically offer the lowest pay, some related occupations, such as safety and quality control inspectors, machine operators, and supervisors, offer higher wages. Fish processing jobs are highly dependent on the current status and management of supporting fisheries. For instance, when fish and shellfish landings declined along the Atlantic coast in the 1970s and 1980s, Maryland’s fish processing plants shed more than 1,000 jobs (Stull et al., 1995). Another important dimension of the processing sector is its interdependence with the harvesting sector and its susceptibility to change with management change. For an important example,

the location of processors can influence harvesting behavior through selection of delivery location (Birkenbach et al., 2022). On the other hand, the product and delivery timing can influence processor profitability. Examination of the West Coast Groundfish Trawl Catch Share Program by Guldin et al. (2018) suggests that changes, including consolidation of buyers and price, can occur post-catch share. Additionally, in fisheries that involve catcher-processor vessels, it is not uncommon for individuals to work as both crew and processors. It is worth noting that typical compensation systems tend to remain where crew are typically paid in shares and processing in wages (Olson, 2011). There are also important links between the processing sector and communities. Processing facilities and the people they employ are central to many fishing communities (Hall-Arber, 1996). Recognition of this linkage has led to calculation of a processing engagement indicator and a measure of the distribution of processed catch amongst Alaskan communities in the Annual Community Engagement and Participation Overview (ACEPO). In the southeast United States, fish processing plants have long relied on immigrant and temporary (i.e., H-2B visa) labor to fill the typically low paying processing jobs.

After processing, fish distributors provide the pathway for connecting wild-caught fish products to fish markets, restaurants, and international seafood brokers. Ethnographic research by anthropologists has long suggested that individuals working in distributing (e.g., lumpers) may be less socially or culturally tied to fishing, compared with harvest-related occupations (Hall-Arber, 1996). However, this is highly variable across fisheries and regions. In some fisheries, distribution occurs through standard temperature-controlled distribution pathways that involve sophisticated logistics. However, in other fisheries, distribution follows a “catch to table” model in which each step of the supply chain is conducted directly by the fishermen. Very little information is available on salaries or demographics to characterize fish distribution. Entry-level and typically lower-paying jobs include warehouse workers and local delivery drivers, whereas sales, supply chain managers, logistics coordinators, and food safety specialists typically earn more. It is important to note that many of these higher-paying jobs may be located at central distribution offices and not within fishing communities. Nonmonetary benefits of the processing and distribution sector relate most to providing seafood that supports consumer welfare (Costello et al., 2020). Fishery management decisions, including issuance of permit and the allocation of quota directly affect this non-monetary good (Costello et al., 2020).

Data and Methods

Very few studies have focused on the social, economic, or demographic dimensions of fish processing and distribution. The studies that exist are generally ethnographic studies. The National Oceanic and Atmospheric Administration’s (NOAA’s) technical reports are available for some regions, although most are quite outdated. For instance, Bayou la Batre, Alabama, is among the more extensively profiled fishing communities where processing and distributing has been described in peer-reviewed literature and NOAA reports. One study reported approximately 24 processing plants, each employing an average of 30 workers, in a town of slightly more than 2,000 people—illustrating the importance of fisheries to the community (Pettersen et al., 2006). This study also described the demographics of Bayou la Batre from the 1990 and 2000 censuses, including high racial and ethnic diversity, with a population that is 33 percent Asian and 20 percent Black or African American. Bayou la Batre also represents a fishing community with higher-than-average levels of language isolation; 16 percent of residents speak English less than very well. Collectively, these characteristics illustrate the importance of understanding local context for assessing and measuring equity in small, diverse fishing communities.

Previous NOAA Social Science reports have described several practical and logistical challenges for characterizing seafood processors and other shore-side businesses including the “Rule

of Three,” which requires a sample size of at least three per community to promote confidentiality (Pettersen et al., 2006). Many fishing communities may have one or two processing plants that are critical to individuals and communities, yet reporting landings, employment, and other statistics is typically not permissible. For instance, if less than three dealers purchased or sold a fish species during a given year, the data associated with those landings typically would be confidential. While confidential data may be accessible to researchers through non-disclosure agreements, they are not generally available for public dashboards or discussions.

Communities

Definition

The importance of communities as entities impacted by fisheries management and policy is identified explicitly in National Standard 8 of the MSA. This standard requires consideration of “sustained community participation” and “minimization of adverse economic impacts on fishing communities.” In defining fishing communities, National Standard 8 guidelines make a shared geographic location an explicit criterion and also provide a list of community members that extends beyond license holders and vessels owners. The term *fishing community* means a community that 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, as well as fish processors that are based in such communities. While there are many different definitions or ways of characterizing fishing communities, a unifying theme is the connectedness of fishing to many other aspects of the economy and culture leading to entities such as maritime museums, seafood markets, and service-related businesses tailored specifically to the needs of fisheries and other maritime businesses.

As noted in Chapter 2 there is a potential that a focus on current participants and fishing communities (see National Standards 4 and 8) could inhibit equity and environmental justice considerations when past decisions (including, presumably, allocations and licensing) serve to disadvantage underserved communities. On the other hand, National Standard 8 guidelines also state:

This standard does not constitute a basis for allocating resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community.¹

Benefits

Communities obtain monetary and nonmonetary benefits that result from management decisions related to permit and quotas allocation. NMFS does not track well the flow of product once it leaves the dock, and thus connecting the economic benefits of permits and quotas to community benefits is a nontrivial problem. In addition to these monetary benefits, there are diverse nonmonetary benefits of permit and quota holdings in relation to fishing communities. Fishing communities are diverse, spanning from small artisanal communities in the Western Pacific to large industrial ports in the Northeast, and cultural identities are important across this spatial spectrum. The committee heard that in some communities, particularly in the Western Pacific, fishers achieve considerable standing and respect in the community by gifting fish either for others in the community as food security or for important community celebrations.

In some regions, communities can receive direct benefits from holding permits and/or quotas. Prominent examples of community-held quotas in Alaska include the Community Development

¹CFR § 600.345 (b)(2).

Quota (CDQ) Program in Western Alaska, discussed in Chapter 3, and the Community Quota Entity (CQE) Program. The CQE Program was implemented in 2005 to allow eligible communities in coastal Alaska to create entities authorized to purchase and hold halibut and sablefish quota shares. Direct allocations to fishing communities were also authorized in the 2007 MSA reauthorization, which includes language authorizing mechanisms for distributing fishing privileges to communities (see Sections 303A(c)(3) and (4) of the MSA, authorizing fishing community and regional fishery association entities). Beyond permit and quota holders, NMFS has a specific interest in (and obligation to consider) the effects of management actions on fishing communities more broadly.

Data and Methods

Considerable amounts of data are available related to monetary values that accrue in specific fishing communities (NMFS, 2023b). These estimates are based on the value of fish and shellfish landed in individual ports.

Earlier chapters highlight some of the substantial work that has been done to develop indicators of coastal community social vulnerability to better account for the community impacts of fishery management and policy (e.g., Colburn et al., 2016; Jepson and Colburn, 2013). These multivariate analyses integrate and synthesize data collected on thousands of communities from many coastal states. Fisheries data come from port-specific information, including number of permits and volume and sector distribution of landings, derived from vessel trip reports and port agents. These are combined with community-based data that rely heavily on data from the U.S. Census Bureau's American Community Survey. Additional community-level data on nonfederal sources were also included. A factor analysis was then used to derive indices related to measures of community reliance (i.e., dependence) on fishing (e.g., Colburn et al., 2016). NOAA's Social Indicators website describes the indices as useful for both National Environmental Policy Act (NEPA) and MSA assessments, as well as the environmental justice concerns of Executive Order 12898 (NMFS, 2021). NOAA defines four key fisheries indicators (NMFS, 2021):

- **Commercial fishing engagement** measures the presence of commercial fishing through fishing activity as shown through permits, fish dealers, and vessel landings. A high rank indicates more engagement.
- **Commercial fishing reliance** measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance.
- **Recreational fishing engagement** measures the presence of recreational fishing through fishing activity estimates. A high rank indicates more engagement.
- **Recreational fishing reliance** measures the presence of recreational fishing in relation to the population size of a community. A high rank indicates increased reliance.”

Beyond the fisheries focused indicators, NOAA's Social Indicators include national-level indicators of social vulnerability. For instance, Personal Disruption is an index that reflects “the kinds of changes and circumstances that might affect a person's ability to find work, propensity to be affected by crime, exposure to poverty, or personal circumstances affecting family life or educational level.” Population Composition is an index that “corresponds to the demographic makeup of a community including race, marital status, age, and ability to speak English”. These indicators have been used in environmental justice analyses and generally illustrate that fishing communities typically exhibit higher levels of poverty, vulnerable populations, and personal disruption (see Figure 3-2 in Chapter 3). While there are many potential management scenarios where such data could be useful, their direct consideration or influence on management decisions remains unclear.

Indicators of coastal community engagement have also been adapted for use in different regions. For example, the ACEPO presents “social and economic information for those communities substantially engaged in the commercial Fishery Management Plan (FMP) groundfish and crab fisheries in Alaska.”² ACEPO reports are meant to support data needs related to National Standard 8 and respond to the North Pacific Fishery Management Council management objectives. The report is based on a mixed-method approach. The ACEPO includes an analysis of time-series data on landings to characterize community engagement and the concentration of catch in terms of harvesting and processing. It also contains qualitative deep dives into heavily engaged communities. Additionally, the ACEPO offers some information on the broader community context in which these fisheries exist. Specifically, it contains analysis of school enrollment and estimates of taxes collected. Although these community summaries provide some information beyond quota and permit holders, expanding updating these efforts could improve the responsiveness of these tools to support equity in fisheries management. First, this information needs to be available and current at the time of management decisions. Additionally, rather than characterizing a snapshot in time or a recent time series, which is typical, a richer understanding of equity requires presenting this information since fishery inception. Similar to the Southeast region, the North Pacific is moving in the direction of using webtools with its Human Dimensions Data Explorer,³ which could facilitate these types of extensions.

The committee appreciates the extensive analyses that the Agency has conducted to explore patterns of community dependence and resilience. The committee recognized specific limitations arise from grounding the Community Social Vulnerability Index (CSVI) and similar analyses in U.S. Census data. First is the issue of temporal granularity, as Census data are collected at 10-year intervals, which may or may not match important time scales for changes in fishing communities. This same issue would apply for any episodic data collection structure with a period that does not match well with the dynamics of social-ecological systems or the impacts of decision-making. Second, the data are aggregated and presented at the community level, reflecting an issue of spatial granularity. Census tract-level data can (arguably) be aggregated to identify, for example, levels of poverty, population composition, and personal disruption (the three indicators that comprise the environmental justice component in the CSVI toolkit) at the community level. However, it is not clear whether and how Census data can be disaggregated to assess differences (e.g., in the presence of underserved community members) within geographic communities (or within tracts, if those were made available). Third, the CSVI was not designed to assess the flow of benefits from fisheries, but rather to describe the composition of communities across various indicators. Thus, while the CSVI might indicate the sustained participation or vulnerability of a (geographic) fishing community over longer time scales, it is less able to describe the underserved communities within those fishing communities, or the fishing-related benefits they do or do not enjoy. Seeking alternative sources of community-specific information seems to be an important way of improving these indices to make them more responsive to potential patterns of change in fishing communities.

As NMFS seeks to expand its commitment to equity, one of its central challenges is the need to increase its capacity to design, conduct, and analyze structured or semistructured interview surveys to gain insights into important aspects of community identity, intergroup dynamics, and values. These surveys are complex instruments that vary in the amount of information that interviewees can introduce outside of the survey questions. In structured interviews, only information directly relevant to the questions is included, whereas in semistructured interviews, the interviewee can introduce other topics. These surveys have been used widely in social science research related to

²See <https://www.fisheries.noaa.gov/alaska/socioeconomics/human-dimensions-fishing#community-information-for-annual-tac-determination:-acepo-and-social-indicators-for-coastal-communities>.

³See <https://reports.psmfc.org/akfin/f?p=501:2000:12011482822315>.

fisheries to capture and quantify fisher's knowledge (e.g., Neis et al., 1999). Damiano et al. (2022) provides a recent example of the application of semistructured interviews in the for-hire fishery section in the South Atlantic region. Success in structured interviews requires development of trust between the interviewers and interviewees. This can often require a pattern of consistent engagement prior to the deployment of any survey instrument. Structured interview surveys also require considerable postsurvey analysis and synthesis to code the individual responses. This expertise can be developed either through increasing capacity within the agency (see Recommendation 3-3) or through partnerships with practitioners.

POTENTIAL BENEFICIARIES

The preceding sections consider common categories of beneficiaries, following a linear chain from seafood harvest to sale. This chain provides numerous monetary and nonmonetary benefits, although the specific benefits may vary along the chain. However, in considering the complete framework for equity described in Chapter 2, this simple linear chain of beneficiaries is clearly embedded within a contextual framework. Those who benefit today are but a portion of those who may have benefited from fisheries in the past, or who could benefit today, or even who society would wish to see benefit in the future from fish stocks as public trust resources. Thus, this section turns to *potential beneficiaries*—individuals, entities, or communities (geographic or sharing another common dimension) that have the potential to benefit from fisheries if the fisheries were managed differently.

Potential beneficiaries are not stakeholders. There are important differences between stakeholders and potential beneficiaries. *Stakeholder* is a general term for interested or affected individuals and groups. In fisheries, this may include group designations, such as recreational fisher, commercial fisher, environmental group, or fishery manager. In contrast, potential beneficiaries are groups of people who currently do or could receive benefits from fisheries management. While both stakeholder and potential beneficiary classifications provide a lens for considering how fisheries management affects people, the most important difference is how using the two terms may influence whether or not certain groups are considered. Crosman et al. (2022) state, “Equity comparisons framed around stakeholders are common, [but] can be problematic.... The term ‘stakeholders’ obscures differences in the basis and nature of claims between different groups. Specifically, the term diminishes customary, traditional, or treaty rights holders’ claims to a ‘stake’ rather than a sovereign right.” The term *stakeholder* has been increasingly criticized both for its impacts on Tribal citizens and Indigenous Peoples and for reinforcing hierarchal structures of management (Reed and Rudman, 2023). Connecting this back to the discussion in Chapter 2 on equity subjects, potential beneficiaries who lose access to or who are currently excluded from benefits of federal fisheries might then be considered subjects of inequities (e.g., federally recognized versus non-federally recognized tribes).

Although there are existing frameworks for characterizing potential beneficiaries in environmental management, there is no one-size-fits-all approach. Much more information is available to characterize stakeholders than beneficiaries. Importantly, this literature has a long history of emphasis on assessing equity among stakeholders, which makes transitioning toward information that characterizes potential beneficiaries straightforward. One of the earliest papers on stakeholder engagement described a “ladder of engagement” where each rung corresponds to an individual's or groups' potential power or influence (Arnstein, 1969). Mikalsen and Jentoft (2001) focus directly on fisheries, presenting both a potential framework and a Norwegian case study. Their work was originally framed with respect to stakeholders, and asked two key questions: (1) Who has a legitimate claim on the attention of managers? This question is largely framed to identify potential

beneficiaries. (2) Who is actually considered a beneficiary by managers? This question focuses on salience and recognition. Mikalsen and Jentoft's framework identifies three criteria related to potential beneficiaries: urgency, power, and legitimacy. More recently, a paper by authors from the Environmental Protection Agency (EPA) proposed a stakeholder prioritization framework (Sharpe et al., 2020), which was integrated in an EPA scoping tool for decision-making (Sharpe et al., 2021). The committee uses this framework to illustrate ten potential criteria, which are listed and defined in Table 4-1, with a key message being that a systematic approach to prioritize potential beneficiaries and their input is widely needed in fisheries decision-making. Notably, equity and environmental justice considerations are centrally positioned in the framework through three criteria. "Rights" accounts for individuals and groups who hold legal or other rights that might impact or be impacted by the decision. Fairness indicates whether or not excluding a group would lead to a perception of unfair decision-making. Lastly, and highly relevant for this report, Underrepresented / Underserved populations denotes whether or not a group includes such populations.

As described throughout this report, underrepresented or underserved populations can be characterized in many ways. For societal and federal workforce considerations, Executive Order 13985 directly provides many specific categories:

TABLE 4-1 An Example Scheme for Categorizing Potential Beneficiaries

Stakeholder prioritization criteria	Definition
Level of interest	The amount of interest a stakeholder group has in the decision-making process or the decision outcome
Level of influence	The amount of influence a stakeholder group has over the decision-making process
Magnitude of impact	The degree of potential impact to the stakeholder group as a result of the decision
Probability of impact	The likelihood of potential impact to the stakeholder group as a result of the decision
Urgency/temporal immediacy	The degree to which a stakeholder group would like to see a decision made or an action taken
Proximity	How frequently a stakeholder group comes into contact with the environment for which a decision is being made
Economic interest	Whether a stakeholder group's livelihoods or assets could be impacted by the decision outcome
Rights	Whether a stakeholder group has legal, property, consumer, or user rights associated with the decision-making process, the decision outcome, or the environment for which the decision is being made
Fairness	Whether the exclusion of a stakeholder group from the decision-making process would lead to the process being viewed as unfair by the community
Underrepresented/underserved populations	Whether a stakeholder group includes any underrepresented or underserved populations

SOURCES: Sharpe et al. (2020, 2021).

In the context of the Federal workforce, this term includes individuals who belong to communities of color, such as Black and African American, Hispanic and Latino, Native American, Alaska Native and Indigenous, Asian American, Native Hawaiian and Pacific Islander, Middle Eastern, and North African persons. It also includes individuals who belong to communities that face discrimination based on sex, sexual orientation, and gender identity (including lesbian, gay, bisexual, transgender, queer, gender non-conforming, and non-binary (LGBTQ+) persons); persons who face discrimination based on pregnancy or pregnancy-related conditions; parents; and caregivers. It also includes individuals who belong to communities that face discrimination based on their religion or disability; first-generation professionals or first-generation college students; individuals with limited English proficiency; immigrants; individuals who belong to communities that may face employment barriers based on older age or former incarceration; persons who live in rural areas; veterans and military spouses; and persons otherwise adversely affected by persistent poverty, discrimination, or inequality. Individuals may belong to more than one underserved community and face intersecting barriers.

Additionally, other categories are necessary for assessing equity in the distribution of fisheries benefits. These include geographic communities that are dependent or highly engaged in fisheries. NOAA's social indicator database uses census information coupled with publicly available aggregated permit and landings data to develop indicators of community engagement and reliance (Jepson and Colburn, 2013). This effort uses publicly available information on income and poverty levels at the community level. One potential shortcoming, however, is that the census data are at the community level and may not reflect the economic status of those engaged in or relying on fisheries, directly or indirectly. Data on intergenerational participation or family reliance on fisheries are important categories for individual and community assessments, including the full fisheries workforce and supply chain from captains and crew to processors and distributors.

The committee recognize two groups of potential beneficiaries of particular note: underserved communities as defined by NMFS and citizens of Tribal Nations or Indigenous Peoples.

Underserved Communities

NMFS's *EEJS* identifies 'underserved communities' as a central subject of equity concerns and defines those communities as sharing either a geographic location or "shared characteristics, history, or identity" (NMFS, 2023b). The *EEJS* notes (1) underserved communities may include not only fishery participants, but also their dependents, crew, and processing and distribution workers (this is consistent with what is required under National Standard 8); (2) underserved community characteristics vary regionally, and the categories intersect; and (3) the phrase "have been systematically denied" is utilized and consistent with phrasing in other policy instruments that recognize "being underserved" as an historical process, rather than something that can be understood as a present condition (NMFS, 2023b).

Tribal Nations and Indigenous Communities

Citizens of Tribal Nations and Indigenous Peoples in the United States have been historically underserved as both citizens of sovereign nations and racial and ethnic groups and marginalized under past and current fishery management regimes (Carothers, 2011; Langdon, 2008). For example, a recent National Academies report (NASEM, 2021) on limited access privilege programs notes "the tendency for ITQs [individual transferable quotas] to exclude Indigenous peoples or those who are otherwise marginalized politically and economically due to structural factors, such as racism (Young et al., 2018)."

As part of the federal government's effort to better serve and account for impacts to Tribes and Indigenous Peoples, there has been a growing interest in improving the federal trust responsibility,

Tribal Consultation processes, and recognizing and including Indigenous and Traditional Knowledge in federal decision-making, research, and policies (see Chapter 2). Despite this progress, a key challenge in accounting for the impacts and participation of Indigenous Peoples in federal fisheries (not just treaty fisheries) is lack of data and difficulty in systematic data collection to identify different social and demographic groups that rely on, participate in, and are affected by federal fisheries. Executive Order 13985, on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, signed in January 2021, aims to better meet the needs of Indigenous peoples and other people of color who are disproportionately and adversely affected by persistent poverty and inequality (White House, 2021a). Tribal citizens and Indigenous peoples are also uniquely and disproportionately affected by climate change (see Executive Order 14008 [White House, 2021b]; Reidmiller et al., 2017). Progress is also being made to better account for underserved communities, including tribal communities, in federal decision-making. As one example, NOAA's Climate and Economic Justice Screening Tool includes an interactive mapping tool that identifies underserved communities using eight categories of indicators (e.g., climate change, energy, health, housing, workforce development).⁴

Many examples in the social science literature can help inform NMFS's approach to better accounting for the ways in which Indigenous and underserved communities may be included in assessments of benefits or impacts of fishery management decisions. For example, Carothers et al. (2010) analyzed data regularly collected by NMFS on halibut individual fishing quota transactions and participants in the North Pacific region to investigate the relationship between halibut quota share transfers and residency in small, rural coastal communities (characterized by populations of less than 1,500). The authors were able to assess the net flow of quota share into and from these communities from available data on quota sales transactions. In addition to residency in small, remote fishing communities, the authors also analyzed age as a variable of interest. The suite of available data drawn on in their analysis, including age and residency of individuals and quota market transactions, revealed that size of community and Alaska Native cultural affiliation are important factors in understanding quota share market behavior. In another example, Carothers (2013) assessed the relative importance of community of residence, cultural affiliation, and demographic variables (i.e., age, gender, ethnicity income and education levels, and fishing participation) in affecting market participation and whether an individual buys or sells quota. These studies are valuable in identifying and understanding potential community-level impacts (be they place-based communities or underserved communities) through analysis of available data collected at the individual level.

FINDINGS AND RECOMMENDATIONS

FINDING 4-1: The beneficiaries of commercial and for-hire fishery management go beyond current permit and quota holders to include others engaged directly in the fishery (e.g., non-permit-holding vessel captains and crew), shoreside facilities involved in processing fishery products, the network that distributes fishery product, local and regional businesses that rely directly and indirectly on fishery activity, and local fishing communities.

FINDING 4-2: While challenging to measure, many of these potential beneficiaries receive both monetary and nonmonetary benefits from participating in fisheries. Nonmonetary benefits include, among other things, meeting social and cultural obligations, prestige, food security and sovereignty, life and occupational satisfaction, and spiritual practices and sites.

⁴See <https://coast.noaa.gov/digitalcoast/tools/cejst.html>.

FINDING 4-3: Crew are important potential beneficiaries of fishery management decisions. The committee applauds NMFS's efforts in surveying this important group. Current challenges in obtaining data on crew include the lack of a sampling frame, which could be provided by a crew registry; infrequent and incomplete surveys of crew at the national level; and the often transitory and vagile nature of employment on fishing vessels. Information on crew at the individual, fishery, regional, and national levels would reflect the distribution of benefits of the issuance of permits and allocation of quota more fully and provide a foundation that would help understand linkages between crew, fisheries, and communities that would aid in the development of criteria for and measures of equity in fisheries.

FINDING 4-4: Shoreside facilities, distribution networks, fishery-dependent industries, and fishing communities are important potential beneficiaries of fishery management decisions. However, data on these important potential beneficiaries are sparse and inconsistently available. Improving the reliability and availability of such data is essential if the full flow of benefits that accrue from permit and quota allocation is to be understood.

FINDING 4-5: NOAA's Social Indicators for Coastal Communities and Fishing Community Profiles provide useful indices related to the social characteristics of fishing communities. However, these data are often outdated, fragmentary at the national level, and not collected at a frequency to reveal changes in the full flow of fishery benefits to the nation.

RECOMMENDATION 4-1: The National Marine Fisheries Service should commit to regular collection, analyses, and interpretation of social and economic data to characterize the full flow of benefits and beneficiaries from the nation's fisheries. The committee recommends collecting and, within the extent of the law, disseminating publicly this information at more regular intervals to adequately assess the impacts of management decisions and changes in fisheries.

RECOMMENDATION 4-2: The National Marine Fisheries Service should continue developing community-level indicators of fishing engagement, dependence, and reliance. However, the committee also recommends further developing products that are not geographically constrained or limited by the spatial resolution of census data, which may not always align with the more holistic definition of equity.

5

Next Steps and Current Efforts for Assessing Equity

A core tenet of the equity literature is that distributional equity is only one dimension of equity (see Chapter 2). Distributional equity is inseparable from procedural and recognition equity, and all of which are embedded in context (see Figure 2-1 in Chapter 2). The multiple dimensions of equity are interlinked and inextricable. If equity is a goal for fisheries management, a more comprehensive approach is required.

In listening to experts' presentations, and after reviewing the National Marine Fisheries Service's (NMFS's) management documents, the committee determined that NMFS has yet to adopt a comprehensive approach to integrating equity in management. As reflected in the statement of task, much of the current interest and work focuses on the distributional nature of economic benefits. The committee heard of very few examples—and none that were fully operational at the regional scale—of participatory approaches to enhance procedural or recognition equity that had succeeded in incorporating the perspectives of traditionally underserved communities, or that could demonstrate more equitable processes as well as outcomes stemming from management decisions. Under a more complete framing of equity, categories of data and information and methodologies for collection are developed within broader processes that engage the diverse and sometimes conflicting knowledges and values associated with fisheries, as well as perceptions of what is considered equitable distribution (criteria) and how it can be measured. Processes themselves need to be sensitive and responsive to equity concerns associated with public participation and engagement, both generally and for disadvantaged groups. While such processes may not result in a universally shared understanding of what constitutes an equitable distribution of benefits and costs, they can increase understanding of and tolerance for outcomes.

In this chapter, the committee explores the challenges associated with a more complete approach to equity. These challenges relate to both structure and methodology. Subsequently, the chapter outlines elements of several programs and efforts, both within and outside NMFS, that could inform (but would not by themselves constitute) a holistic approach to equity considerations.

CHALLENGES TO DEVELOPING A COMPREHENSIVE APPROACH TO EQUITY

The committee recognizes that operationalizing a comprehensive approach to equity will be challenging. These challenges, combined with the recommendations in Chapter 4 calling for an expanded definition of beneficiaries and benefits, may make a more comprehensive approach to equity seem daunting. However, many staff at NMFS are already aware of the need for and are taking steps toward this approach. Whether describing the importance of nonmonetary benefits, such as fish for food or culture, or identifying important beneficiaries along supply chains, or pointing to the inadequacy of formal public consultations as a means to ensure procedural equity, evidence presented to the committee frequently emphasized both the need for and the challenges associated with expanding efforts to support and measure equity in fisheries management.

A prominent example of ongoing work supporting a more complete approach to equity is the NMFS *Equity and Environmental Justice Strategy (EEJS)*, which acknowledges that underserved communities experience several barriers to receiving “fair treatment and meaningful involvement in NOAA Fisheries” (NMFS, 2023b). These barriers relate to aspects of NMFS’s structure and operations, as well as those associated with underserved communities. Both sources of structural challenge have contextual foundations. In acknowledging these barriers, the committee notes that NMFS has already conducted substantive work considering the inseparable multi-dimensional nature of equity, and how challenging the task of addressing equity in that way will be.

The first barrier outlined in the *EEJS* is unawareness of underserved communities. NMFS acknowledges that it has yet to fully identify underserved communities, noting that “without recognition of underserved communities, their needs cannot be documented or addressed” (NMFS, 2023).

Underserved communities face structural barriers (e.g., laws, regulations, policies, inadequate political representation, territorial residence); the “criteria for allocation of resources may be based on historical ownership or access, creating services for the largest number of people, or generating the greatest net benefits, which may exclude underserved communities” (NMFS, 2023b). In many places, permit and quota allocation decisions by NMFS have long histories, with some quota allocation programs in place for nearly 40 years. Although some of these legacy programs were designed with equity goals in mind (e.g., to retain capacity in the small boat sector or guard against consolidation), monitoring regimes were not structured in ways that allowed for goal assessment. Past management practices and outcomes are part of the context in which any new efforts to support and assess multidimensional equity will be embedded. The history of permit and quota allocation management will shape how current and potential beneficiaries perceive new management efforts both generally and in specific places (e.g., lack of trust may be associated with a specific fishery but also a problem more generally).

The second barrier relates to contextual equity. The long history of some allocation programs will pose challenges for identifying those excluded from participation and benefits in the past. Such excluded potential beneficiaries have been subjects of inequity. Data and information on who was originally excluded from receiving an allocation may be difficult to obtain. How will NMFS account for fishers who have lost access in past allocations or who have been unable to gain access to specific fisheries? This is the problem of “who is in the room.” Individuals and groups that already hold permits and quotas have vested interests and are empowered in current management systems; they are already in the room and may resist management efforts seeking to recognize claims by and meaningfully engage with those who are not. New allocations or reallocations to address equity concerns will need to recognize and contend with the resulting power dynamics.

Third, the *EEJS* identifies barriers to engagement and accessing services, which appears to relate to procedural justice issues, highlighting the cost, language, geographic, and cultural barriers.

ers to meaningful participation. Relatedly, different beliefs about what equity means can exist. For example, Indigenous knowledge and governance systems vis-à-vis natural resource usage can “be at odds with Western management strategies” (NMFS, 2023b).

The fourth barrier addresses the highly hierarchical and complex nature of fisheries management. Addressing this structure can be a daunting goal. Commonly, place-based, context specific, often qualitative or traditional and Indigenous Knowledge that might best inform implementation and assessment of multidimensional equity in fisheries management—particularly recognitional and procedural dimensions—fits uneasily in management regimes that prioritize generalizable, quantifiable data and analyses as critical (and exclusive) inputs to science-based decision-making. As an example, several staff noted both the value of the Voices from the Fisheries Oral History Project, and the challenges with communicating this value to decision-makers. The data fit uneasily, both because they might not be perceived as legitimate and/or they are incommensurable with other data streams. This can create a vicious cycle—if certain types of data are not used in management, then they are not prioritized for regular collection. If they are not collected regularly, then they are seen as less useful to management, and not used. These data issues are related to the capacity issue described below.

The fifth barrier acknowledges that equity is impacted by processes beyond permit and quota allocation. The committee recognizes that the management and allocation of permits and quotas is only one element of fisheries management. Other fisheries and marine management actions undertaken by NMFS, the National Oceanic and Atmospheric Administration (NOAA), and other agencies can be equally impactful on fishers and fishing communities from an equity perspective. Examples of such actions include area closures for biodiversity conservation, offshore wind energy development, endangered species protection, aquaculture leasing and other spatial allocations. The extent to which these other actions are important in particular places will shape the relative importance of distribution in considerations of the assessment of equity. For instance, in the Western Pacific region, loss of access to marine space through the continued expansion of large-scale conservation areas that prohibit commercial fishing may be more of a pressing equity concern for fishers than permits and licensing. Those concerns cannot be addressed by NMFS alone but will require interagency collaboration; many large-scale conservation areas have been established via Presidential Proclamation.

The final barrier, that of capacity, integrates many of the concerns expressed in the preceding five barriers. In gathering evidence to develop its report, the committee heard repeatedly about a lack of expertise and staff capacity to do this work. Despite innovative efforts by staff in the agency, fishery management councils, and regional science centers that could inform multidimensional assessments of equity (including procedural and recognitional equity), the capacity to do the challenging work needed is limited, and existing staff are overburdened. Relatively few social scientists hold staff positions, and a majority of these are trained in economics (Abbott-Jamieson and Clay, 2010). As addressed in Recommendation 3-3, the need to build social science capacity, both human and financial, has been identified in a number of NOAA Science Advisory Board reports (SAB SSRP, 2003; SSWG, 2009; see also Kast et al., forthcoming). The problem of capacity limitations plays out in two ways. First, capacity shortfalls limit the social science work that can be done, including potential work on a comprehensive approach to equity. Importantly, capacity is needed to fully integrate social science as a necessary component of the management process, rather than have these efforts be tied to specific individuals or projects. Specifically relevant to this chapter and this approach to equity, the committee notes that diverse capacity growth is required at the leadership level of NMFS in order to advance equity beyond specific regional analyses or actions, and to lead development of a more inclusive and complete approach. Second, underrepresentation of social science within the agency makes it difficult to communicate the value and importance of the work and mobilize that work to inform management decisions. Lack of capacity is not only

a practical constraint, but also an epistemological one, reinforcing a culture within NMFS that values particular kinds of science, data, and evidence. This same culture will likely shape how recognitional equity, which includes recognition of diverse ways of knowing (e.g., Traditional Knowledge) and worldviews, is conceptualized and operationalized. The lack of capacity to do the work required, combined with a culture that undervalues that work, is part of the context that will shape all of NMFS's equity work. Similarly, the EEJS turns the lens inward by describing gaps in representation, noting the lack of diversity within NMFS, including the councils, which may lead to "lack of awareness ... and crucial gaps in expertise" (NOAA, 2023b). For example, Council staff and bodies in the North Pacific recently participated in a cultural awareness training hosted by the First Alaskans Institute. The training covered topics related to Alaska Native Tribes, their governance, history, and cultures with the goal of enhancing knowledge, understanding, trust and equitable relationships with Alaska Native communities.

The six barriers that the committee identifies are significant obstacles to enacting a comprehensive approach to equity. The committee acknowledges examples exist where participatory and inclusive processes have been used in framing fishery management decisions. The first example involves King Mackerel (*Scomberomorus cavalla*) fisheries in the Southeast United States. Miller et al. (2010) developed a participatory modeling approach which started by carefully evaluating constituencies that had a role in the fishery, including commercial and recreational fishers, tournament organizers, shoreside businesses, managers, and nongovernmental organizations. Equal numbers of representatives participated in all meetings. The policy outcome was reached by a consensus process determined by the participants to reflect their values. Another example involves dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*) fisheries in the U.S. South Atlantic. These fisheries are characterized as having limited biological data and an array of different fisheries seeking to catch them. A participatory modeling approach was used to understand the physical, biological, social, economic, and institutional aspects of the fisheries in the Southeast United States. (McPherson et al., 2022). The approach which focused on recognition, participation, and distribution of catch represents a process which aims to produce more equitable allocations than would occur otherwise. A final example, also from the Southeast United States involves integrating Local Ecological Knowledge from fishers into effort to understand patterns of red tides along the Florida Gulf Coasts (Blake et al., 2022). Here a participatory workshop inherently recognized the value of fisher's Traditional Ecological Knowledge in deepening knowledge on the temporal and spatial extents of red tides, and their impacts on human and marine ecosystems. Both cases led to management action. Although these examples led to more equitable outcomes by promoting recognitional and procedural elements of equity, the committee cautions against the conclusion that all NMFS and councils need to do is to hold participatory workshops. Wholesale changes in the approaches and procedures used in coming to management decisions, including thinking about how to encourage and support broad participation, are likely needed if NMFS is to achieve its equity goals. However, the committee recognizes the importance of increased participation involving an increased range of actors will be important in the new approaches that will be developed.

MEASURING WHAT IS VALUED OR VALUING WHAT IS MEASURED

Given the emphasis on methodological approaches in the statement of task, the committee notes the challenges associated with data and information and the assessment of equity concerns. For example, contemporary governance often emphasizes management goals and targets and identifying measurable indicators that can be monitored to assess progress (Campbell et al., 2014; Cooper, 2015). The emphasis is on outcomes or results, rather than administrative processes of policy delivery, and metrological practices to support outcome-based management—for example, setting and measuring standards, targets, criteria, baselines, benchmarks, and thresholds—are seen

as key to good governance, allowing for monitoring, transparency, reporting, and evaluation (Pierre and Peters, 2005).

Shifts in the role and operation of the public sector in the United States and other countries (e.g., new public management [Hughes, 1998] or “governing by goals” [Biermann et al., 2017]) began in earnest in the 1980s as a response to concerns about regulatory overload and failure, and a more general interest in promoting the so-called 3 Es: economy, efficiency, and effectiveness (Hughes, 2003). The history of public-sector management is clearly beyond the scope of this report, but the point is that this way of governing (by goals), for economy, efficiency, and effectiveness (and not equity) reflects social and political decisions; it is not the only way of governing, nor is it inevitable. This also helps to explain why equity of outcomes from past management is difficult to assess; until recently, equity was not a named priority on par with, for instance, efficiency.

Debating the merits of different modes of governance is beyond the scope of this report, but the committee highlights that a governing logic that emphasizes the measurement of indicators to assess progress has important implications for integrating equity into fisheries management. First, this logic emphasizes that which is more easily measured in standardized, quantified, and comparable ways. Second, it reinforces the importance of the things it purports to measure. Measurement practices “do not just reflect reality as it is. They create new realities (calculable objects)” (Barry and Slater, 2002), by defining what is (and is not) worth measuring. If governance progress is evaluated by the achievement of measurable goals, then governance action will be directed toward identified goals and preferentially toward those that are more easily measured. Jacob (2017) diagnoses the relationship between the quality of a goal’s performance measurement system—the existence of indicators, easily measured, using available high-quality data—and performance success.

Multidimensional equity, embedded in context and with key terms subject to interpretation, fits uneasily within a governing logic of standardized, quantified, comparable, and easy-to-measure indicators. Efforts to “make equity fit” by adopting universal definitions and measures risk perpetuating inequities, by imposing top-down conceptualizations “of what constitutes fairness and justice and how these should be measured” (Alexander et al., 2021). This leaves proponents of equity facing a conundrum. On one hand, if equity is integrated into a measurement regime in ways that are comparatively complex, it may not be prioritized for policy implementation. Policy implementers will be attracted to pursuing goals for which success can be shown (i.e., measured) more easily (Taylor, 2009). On the other hand, if measures of equity are oversimplified such that they work well within a measurement regime, the meaning of the measures may be questionable. But if left out altogether, equity is unlikely to be consistently or meaningfully prioritized. Box 5-1 describes efforts in the United Nations Convention on Biological Diversity to expand its measurement regime for protected areas to include assessments of equity, and the challenges of doing so. We also offer later in this chapter the outcome of this effort, The International Institute on Environment and Development’s Site-Level Assessment of Governance and Equity (SAGE; IIED, 2023), as an example of a tool designed specifically to assess equity.

A NOTE ON EPISTEMOLOGY

In this section, the committee highlights the utility of expanding the historical epistemological foundations of fisheries management to more fully address equity concerns. By “epistemological foundations” we mean the ontological assumptions, methods, data types, and analytical practices that are perceived to be valid for establishing “truth” (in this case with respect to fisheries management). This is important to consider given that NMFS is dominated by natural scientists and the relatively small number of social scientists is itself dominated by economists (Chan et al., 2022). This makeup reflects the history of fisheries science and, as a result, quantitative data and associated methods have become most “legible” (Scott, 1998) to managers and are tightly woven into

BOX 5-1 Lessons from Integrating Equity into Marine Conservation

Marine protected areas (MPAs) have increased in number, distribution, and average size at a rapid pace (Secretariat of the CBD, 2020). This has been driven at least in part by the adoption of global targets for MPAs beginning in the early 2000s in the United Nations Convention on Biological Diversity (CBD), adopted in 1992. The CBD negotiated three protected areas targets, in 2002, 2010, and 2022. While the first two targets identified an area coverage target of 10 percent of oceans under protection, the most recent aims for 30 percent coverage of both oceans and land by 2030. The increase reflects the “success” of expanded MPA coverage to date (Campbell et al., 2022).

Beginning in 2010, the CBD target included that MPAs be both effectively and equitably managed, but progress on equity is assessed as “unknown,” in part because “no comprehensive global indicators are available to assess the proportion of protected areas that are equitably managed” (Secretariat of the CBD, 2020). In contrast, protected area coverage is relatively easily measured as the number, size, and location of the world’s protected areas are cataloged in existing authoritative databases (Campbell et al., 2014). As measurement reveals progress, measurability both facilitates success and encourages action (Campbell and Gray, 2019).

While challenging, some authors (Schreckenberg et al., 2016; Zafra-Calvo et al., 2017) have identified criteria against which progress toward equity can be assessed, and the 2022 iteration of the CBD’s MPA target refers to equity. However, the associated monitoring framework identifies area coverage as the headline indicator (required reporting). The equity indicator is a component indicator (optional reporting), measured as the number of protected areas that have been assessed using the Site-Level Assessment of Governance and Equity (SAGE) methodology. SAGE includes 53 assessment questions in 10 categories (IIED, 2023) across multiple dimensions of equity, but the CBD indicator is binary—protected areas assessed with SAGE or not—regardless of the results of the SAGE assessment.

the fabric of fisheries management decision-making. This emphasis, however, has both strengths and weaknesses for fisheries management generally, and for efforts to address equity specifically.

The committee’s Statement of Task used the terms “data” and “information.” While the terms are used somewhat interchangeably, we refer to data here as numbers or text in their raw forms. These data are produced through a range of methods, from trawl surveys to logbooks to interviews and document reviews. A range of analytical processes make meaning from that raw data, turning it into “information” that could be used in management. For example, in the case of assessing the condition of a fish stock, we might depend (at least in part) on trawl survey data that is entered into a stock assessment model to provide information in a SAFE (Stock Assessment and Fishery Evaluation) report that managers or Council members might act on.

Quantitative data are well-positioned to address “what” and “how many” types of questions, including those related to equity. By definition, quantitative data are those that can be expressed numerically, and they tend to focus on the measurement of variables and/or the identification of patterns within and between those variables, often through statistical analyses. This type of data is well-suited for examining large populations, predicting outcomes, enabling direct comparisons, and for conducting experiments where precise measurements are essential. Quantitative data are often produced and utilized through quantitatively oriented methods and analytical/interpretative processes such as biological surveys, stock assessments and bio-economic modeling (and, on the social science “side,” surveys).

There are, however, limitations to what quantitative data/methods can or should address. First, while the expression of information in a numerical form can produce gains in precision, that expression can compromise adequate attention to complexity, context, assumptions, or other

concerns. Second, some phenomena do not lend themselves to quantification. This includes not only “how and why” and process-oriented questions (see below) but also outcomes from environmental interactions (including in fisheries) where quantification can be challenging. The 2022 report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) provides a rich description of some of these challenges, as well as a range of methods (both qualitatively and quantitatively oriented) to address them. Third, while quantitative data are often described as “objective,” the objectivity of quantitative data has been a point of critique. The assertion of objectivity has led to concerns that inescapable underlying subjectivities, assumptions, and biases can be masked by presenting numerical information as objective truth.

Qualitative data, on the other hand, often seek to answer “why” and “how” questions as well as to characterize factors that are not easily quantifiable. This includes expressing underlying meanings and motivations and exploring, among other things, social phenomena, processes, human behavior, and complex interactions (such as those within a fisheries social-ecological system). Qualitative approaches can provide the “rich detail” that can usefully describe aspects of context (historical, political, socio-economic, biophysical, etc.) that can be critical in situating and interpreting all data. Qualitative data are essential for the multi-dimensional conceptualization of equity described here. Qualitative data tend to be produced through a range of methods, such as interviews, ethnographies, focus groups, workshops, and other approaches. Though currently less systematically used in federal fisheries management decision-making, these methods can be extraordinarily useful. The utility of ethnographic approaches in informing government agency actions (including NMFS), for example, has been explicitly recognized by the Government Accountability Office.¹

Qualitative data/methods, of course, also have limitations. There are perceptions that qualitative data/methods are subjective, highly contextualized, difficult to replicate and non-generalizable (in the sense often meant in the natural sciences). The committee acknowledges these debates, but notes that applying evaluation criteria developed for quantitative studies to qualitative ones is often inappropriate (Given, 2008a,b). For example, Yin (2014) argues for the generalizability through theoretical interrogation, where qualitative studies, when linked to theory, provide insights and understanding beyond the specifics of the case at hand.

The committee further notes that mixed methods approaches that use methodological sequencing and or triangulation to combine the strengths and weaknesses of different data types (and associated methods) could be useful in addressing management (including equity) concerns (Murray et al., 2016). For example, some distributional outcomes might lend themselves to quantified assessments, while others may not. Likewise, assessments of procedural elements such as the frequency of public input meetings or the number attendees might lend themselves to quantification, but the quality of the overall process or the power dynamics within and across the stages of that process, might resist quantification. Coupling quantitative information with qualitative data might therefore facilitate assessment of whether the procedure was equitable.

Finally, the committee notes that because the quantitative/qualitative distinctions described above are rooted in western scientific knowledge systems, they share both underlying ontological and epistemological assumptions that are not shared in all places and by all groups involved in, or affected by, fisheries management decisions. This can and does include equity concerns. As described in Chapters 2 and 4 there has been an increasing attention to Indigenous Knowledge at the U.S. federal level, including within NOAA. The committee sees this as a much needed expansion of what counts as “valid” when making fisheries management decisions, particularly in Indigenous contexts, including those related to equity.

¹See <https://www.gao.gov/products/gao-03-455>.

MOVING FORWARD: RECENT ADVANCES IN IMPROVING EQUITY IN MANAGEMENT

Although progress on equity in fisheries will not be simple or quick, recent work suggests potential paths forward. A comprehensive approach to equity that includes considerations of the criteria for subjects of equity, along with distributional, recognitional, procedural, and contextual dimensions, will be difficult to measure in ways that resonate easily with standardized data collection and management procedures (e.g., collected on fisheries permit applications). For example, focusing on dimensions of equity that are easier to measure (e.g., the distribution of a monetary benefit), with both the benefit and criteria for assessing distributional equity defined by management agencies alone, is an incomplete approach to equity. It ignores nonmonetary benefits, and it ignores procedural and recognitional questions regarding potential beneficiaries who have been subjects of inequity.

However, while measuring procedural and recognitional equity is challenging and fraught, many organizations are working to increase equity of management (see example in Box 5-1). Guides for doing so are emerging (IIED, 2023; Schreckenberg et al., 2016; Zafra-Calvo et al., 2017), and these provide examples that might be modified and enhanced to support the diagnosis and implementation of multidimensional equity in fisheries management. The committee reiterates Recommendation 3-2: work on a NMFS technical guidance document is critical. This section provides an overview of key NMFS efforts, followed by examples of work in other fields that could be useful to inform NMFS's work on equity. This is not intended to be an extensive review but to illustrate the diversity of resources that might prove helpful.

The NMFS Equity and Environmental Justice Strategy Document

The NMFS *EEJS* document lays out a series of goals, core areas, and objectives. These elements touch on aspects of both procedural and recognitional justice; in sum, NMFS acknowledges the importance of process and participation in understanding and more equitably shaping the distribution of impacts. The remainder of the document essentially represents an aspirational framework and includes a series of tables that break down the core areas into a series of necessary actions, metrics, and necessary resources. Critically, the document notes that “each geographic region (e.g., Southeast, Pacific Islands) and national program (e.g., Office of Protected Resources, Office of Habitat Conservation) will create an EEJ implementation plan that is consistent with applicable law, specific and responsive to the needs of underserved communities, and allows for their input” (NMFS, 2023b). Given the importance of a contextually-based and multi-dimensional nature of equity, this devolved strategy will be more effective than a centralized process. However, the committee also notes that, given the wide diversity of communities and fisheries, developing effective implementation plans will likely demand different processes, data collection efforts, and modes of recognition and participation both within and across regions. The place-based approach expressed in the *EEJS* reinforces capacity concerns that the committee has expressed. For example, development of these plans needs to include traditionally underrepresented groups in the management process. Reaching these individuals may require innovative approaches, continuous engagement with communities, and financial support to implement these approaches.

NMFS Guidelines for the Assessment of Social Impact of Fisheries Management Actions

Social impact assessments, which have long been part of NOAA's decision-making, are required for NMFS management actions under both the National Environmental Policy Act (NEPA)

and the Magnuson-Steven Act (MSA). Guidance related to these assessments has often noted the importance of addressing equity and environmental justice concerns, although this has not been the focus. For example, in a paper that followed from a workshop convened by NMFS in 2004, Pollnac et al. (2006) noted that social impact assessments need to occur at scales from the individual to firms, families, and communities; that they need to be comprehensive in nature (they suggest that well-being should be the “dependent variable”) and that:

special attention should be given to social groups that may gain or lose from the management choices made. These populations may not always be readily visible at public hearings or on newspaper opened pages. Scoping, therefore, requires an assessment of each part of the sociocultural system that is likely to be affected, with specific attention to any marginalized populations because environmental justice issues may also be involved.

In 2007, NOAA released revised guidelines for social impact assessments in fisheries (NMFS, 2007). This document affirms the mandate for assessing social impacts of fisheries management decision-making, suggests an assessment process that involves an initial scoping phase guided by a professional social scientist (anthropologist[s] or sociologist[s]), and points to the central importance of both fishing communities and the “minority populations and low-income populations” described in Executive Order 12898 (White House, 1994). Because the assessments are intended to predict the social impacts of a range of alternative management scenarios (including the status quo), the document distinguishes a social impact assessment from (1) economic or ecological impact assessments, (2) overviews (such as those included in Stock Assessment and Fishery Evaluation [SAFE] reports), or (3) affected human environment components of environmental impact statements. The document also lays out a range of (and advice on implementing) possible qualitative and quantitative methodological techniques, including literature reviews, secondary data analyses, surveys, focus groups, and interviews.

Most recently, a 2020 technical report provides a step-by-step handbook for planning and conducting social impact assessments. The document builds on the 2007 guidance document and includes a wide range of social impacts that could be precipitated by various management actions. The diverse nature of these impacts points to the diverse nature of the benefits derived from fisheries outlined in Chapter 4.

Guidance for Implementing the California’s Marine Life Management Act

Socioeconomic Guidance for Implementing the California Marine Life Management Act (Pomeroy et al., 2018) emerged from efforts by the State of California to implement the 1998 Marine Life Management Act (MLMA). The MLMA included a variety of socioeconomic goals and objectives, including fairness, for management of the state’s fisheries. In the 2001 MLMA Master Plan, socioeconomic information was included as “essential fishery information,” and the guidance document was published to support managers’ abilities to “effectively integrate socioeconomic information, evaluate management options, anticipate responses, achieve desired outcomes, and avoid unintended consequences” (Pomeroy et al., 2018). The guidance document identifies categories of information on human dimensions of fisheries required to meet MLMA goals and objectives, including information on demographics, operations, and employment, as well as values, preferences, needs, attitudes, opinions, beliefs, and relationships and networks (Table 5-1; see Pomeroy et al., 2018, for a full listing).

Although the document is not specific to equity, many of the categories of data and information are relevant. For example, understanding attitudes, beliefs, and opinions can be “useful for developing and evaluating allocation measures that are perceived to be fair, for gauging support or

TABLE 5-1 Examples of Questions About the Fisheries Human System Relevant to MLMA Socioeconomic Objectives

Socioeconomic Objectives
<i>Sustainable use</i>
How do people use the state's fishery resources?
What social, cultural, and economic benefits do fishery participants derive from fishing?
What is necessary (and sufficient) to sustain resource use?
Is the fishery's human system sustainable, i.e., viable ecologically and socioeconomically?
How does fishery management affect the viability of the fishery's human system?
<i>Long-term well-being of fishing-dependent people observed</i>
How are people dependent on fishing for food, livelihood, or recreation?
How does fishing contribute to the well-being of fishing-dependent people, communities and economies?
What conditions/factors affect people's fishing for food, livelihood or recreation?
How do changes in management, individually and cumulatively, affect their long-term well-being?
<i>Adverse impacts on small-scale fisheries, coastal communities and local economies minimized</i>
What are the impacts of management on the function and well-being of small-scale fisheries, communities and economies?
What are the <i>cumulative</i> impacts of management (and other factors) on their function and well-being?
<i>Catches allocated fairly</i>
What are the criteria for allocating resources among fishery participants (e.g., equal shares, need, fishing history)?
How is fairness defined and perceived by fishery participants?
Do allocation options meet criteria for fairness?
What are the social and economic impacts and implications of allocation options for the fishery's human system?
How do human system responses, in turn, affect achievement of MLMA objectives?
<i>Prevent/reduce excess effort</i>
What constitutes excess effort in the fishery?
What factors contribute to excess effort in the fishery?
How does excess effort affect the fishery's human (as well as ecological) system?
What are the impacts and implications of measures to reduce excess effort for the fishery's human system?
How do human system responses, in turn, affect achievement of MLMA objectives?

NOTES: Original table continues with questions on management system and ecological objectives. MLMA = Marine Life Management Act.

SOURCE: Pomeroy et al. (2018).

opposition for management measures, and for identifying misinformation and misunderstandings related to fisheries and their management” (Pomeroy et al., 2018). It addresses fair allocation of catch directly, mostly as a distributional concern, but with some implicit reference to other dimensions. For example, the question of what criteria are used for allocating catch is accompanied by a question of how fishery participants themselves define fairness (recognition equity; see Table 5-3 in this report). Pomeroy et al. (2018) also emphasizes the need for conflict resolution procedures, often included in guidance for procedural equity.

Pomeroy et al. (2018) describes an iterative process of social analyses (informed by NMFS, 2007; reviewed above), which involves building a social baseline, scoping, selecting relevant social

variables for investigation, and synthesizing and analyzing data to address management questions. It reviews and provides guidance on data collection methods relevant for human dimensions research, including literature reviews, archival resource, observation, interviews, focus groups, and surveys, and illustrates how the process and methods were used to inform decision-making in several case study fisheries.

Site-Level Assessment of Governance and Equity

The International Institute for Environment and Development issued a manual for facilitators on site-level assessment of government and equity (SAGE) (IIED, 2023). This document is the result of over a decade of work to support the Convention on Biological Diversity in its efforts to integrate equity into its protected areas target (see Box 5-1). SAGE “is a tool for site-level actors to themselves assess the governance and equity of a PCA [protected and conserved area] and associated conservation interventions, and themselves plan, implement and monitor actions to improve governance” (IIED, 2023). It is a methodology intended to support SAGE facilitators in implementing the methodology.

Although developed in the specific context of protected areas (and mostly for use in developing countries), SAGE is included here because, importantly, it is targeted directly at assessing equity. Recognitional, procedural, and distributional equity are evaluated using a questionnaire. For each equity dimension, SAGE identifies multiple principles (Table 5-2), and each principle has multiple associated themes (IIED, 2023). Themes have associated questions, evaluated on a multiple-choice performance assessment scale. Table 5-3 provides an illustration of the application of the methodology to the second principle in recognitional equity: “Respect for all relevant actors.” Although SAGE does not address contextual equity within the questionnaire, it recognizes context both generally—for example, protected areas’ impact on local people and their use of common pool resources—and specifically in the preparation phase, which includes an actor analysis, site profile and consent, and assessment of six feasibility conditions (including, e.g., whether or not there are high levels of resentment between local communities and park managers). The purpose of SAGE is to assess equity, and its design also reflects attention to equity—for example, engaging a broad scope of actors and seeking informed consent for the assessment to proceed during the preparation phase.

TABLE 5-2 Principles of Equitable Governance

Equity: recognition	1. Respect for resource rights and human rights of community members
	2. Respect for all relevant actors and their knowledge, values and institutions
Equity: procedure	3. Effective participation of all relevant actors in decision making
	4. Transparency, information sharing and accountability for actions and inactions
	5. Access to justice including effective dispute resolution processes
	6. Fair and effective law enforcement
Equity: distribution	7. Effective mitigation of negative impacts on community members
	8. Equitable sharing of benefits among relevant actors

SOURCE: IIED, 2023.

TABLE 5-3 An Illustration of the SAGE Assessment Methodology

SAGE Category	SAGE Assessment Logic Flow
Dimension	Recognition
Principle	Respect for all relevant actors and their knowledge, values and institutions (one of two principles for this dimension)
Theme	One actor's opinion of another (one of five themes for this principle)
Question	How do people who work for the PCA regard community members and their interests in the PCA? (each theme has one question)
Response scale	A Most people who work for the PCA do not regard community members as legitimate actors B Most people who work for the PCA regard community members as legitimate actors but do not listen to them C Most people who work for the PCA regard community members as legitimate actors and usually listen to them D Most people who work for the PCA regard community members as legitimate actors and listen to them with great respect E Don't know (each question has a tailored 4-point response scale)

SOURCE: Based on IIED (2023).

The Protocol for Identifying, Analyzing, and Incorporating Local Knowledge, Traditional Knowledge, and Subsistence Information into the North Pacific Fishery Management Council's Decision-Making Process

The *Protocol for Identifying, Analyzing, and Incorporating Local Knowledge, Traditional Knowledge, and Subsistence Information* (hereafter, the LKTKS protocol) arose out of a multi-year process of the North Pacific Fishery Management Council (NPFMC) to develop the Bering Sea Fishery Ecosystem Plan (BSFEP). As a result of increased awareness of the value and importance of accounting for diverse knowledge systems in fishery decision-making, “the Council initiated Action Module 2 of the BSFEP in December 2018, and appointed the LKTKS Taskforce in October 2019 to complete the Action Module's work” (NPFMC, 2023). In February 2020, two goals for the LKTKS Taskforce were adopted:

1. To create processes and protocols through which the Council can identify, analyze, and incorporate Local Knowledge (LK) and Traditional Knowledge (TK), and the social science of LK and TK, into the council's decision-making process to support the use of best scientific information available in ecosystem-based fisheries management (EBFM).
2. To create a protocol and develop recommendations through which the Council can define and incorporate subsistence information into analyses and decision-making.

The LKTKS protocol cites “the urgent need for multiple ways of knowing and understanding the marine environment” in the context of rapid and dramatic change in the Bering Sea ecosystem as motivating its work, along with National Standard 2; the “best scientific information includes western science and the relevant Local Knowledge (LK) and Traditional Knowledge (TK).... These knowledge systems are not ‘anecdotal’ information but are rather complex systems of dynamic and living knowledge” (NPFMC, 2023). As reflected in the goals set for the LKTKS Taskforce, the protocol is directed at supporting the incorporation of local and Traditional Knowledge into the council's decision-making process, systematically, appropriately, and ethically. This includes being

aware of and responsive to data sovereignty and related issues including who has permission to share knowledge and what happens to that knowledge once it is shared in the public process. To this end, the LKTKS Taskforce identified eight guidelines that can support the integration of local and Traditional Knowledge into council decision-making (Box 5-2).

All of these guidelines, if followed, would advance procedural and recognitional equity, even if they are not labeled as such. For example, the LKTKS protocol speaks directly to the issue of interest in procedural equity, pointing to the time and resources required for local and Traditional Knowledge holders to participate in council decision-making processes, the need to support sharing of local and Traditional Knowledge in ways that are meaningful to the knowledge holders, and the burnout associated with multiple demands on their knowledge, especially when there is little evidence that it impacts management processes (NPFMC, 2023). The Taskforce (NPFMC, 2023):

encourage[s] the Council to consider ways to create equity in its decision-making process in terms broader than the costs and benefits related to management actions (Anderson et al., 2019; Carothers[,] 2011). Expanding conceptualizations of equity in the Council's decision-making process could include elements related to the ability of different identities and values to be represented and meaningfully engage the Council's decision-making process (Allison et al., 2012; Cheung et al., 2012; Carothers et al., 2021; Ellam Yua et al., 2022; Donkersloot et al., 2021; McDermott et al., 2013; Schreckenberget al., 2016).

LEARNING FROM RECENT WORK TO IMPROVE NMFS' INTEGRATION OF EQUITY IN MANAGEMENT

Recent work on equity supports NMFS in developing a holistic strategy for incorporating equity into management, tailored within regions. Arguably, the devolvement of management processes and decisions to the regional level positions NMFS ahead of other organizations that lack power at smaller scales.

Developing a strategy for equity in management best begins with a diagnosis of current decision-making processes, in terms of both fisheries governance and NMFS's operations. It would be useful to assess (diagnose) who is represented and what views are represented (recognitional equity)

BOX 5-2

Guidelines Produced by the North Pacific Fishery Management Council's Local Knowledge, Traditional Knowledge, and Subsistence Taskforce

Guidelines:

1. Demonstrate respect for LK and TK systems
2. Understand the use and appropriate concepts for LK, TK, and subsistence
3. Appropriately and accurately identify LK and TK, LK and TK holders, the social science of LK and TK, and subsistence information.
4. Engage in early and frequent communication with relevant entities
5. Adhere to local and cultural protocols that entities have established for sharing and communicating LK, TK, or subsistence information
6. Acknowledge and account for differences in capacity among relevant entities
7. Build appropriate capacity for working with LK and TK systems and subsistence information
8. Understand how to navigate multiple knowledge systems

SOURCE: NPFMC (2023).

in decision-making processes related to benefits, and how those processes are structured (procedural equity). A council and its related advisory bodies and decision-making structures could serve as a helpful case study. The committee expects such a study would be both tractable and informative. Similarly, it could be useful to assess to what degree participatory (public and otherwise) processes consider and integrate questions of both recognitional and procedural equity, although this would expand the scope of an initial case study substantially.

Such a review will likely identify a lack of representation and inadequate processes, suggesting a need for progress in procedural and recognitional equity. As discussed previously, capacity constrains NMFS's engagement in supporting equity. Also, the LKTKS protocol and other documents point out barriers to groups participating in more holistic processes, ranging from costs to histories and cultures of distrust (NPFMC, 2023). The latter issue indicates that NMFS staff need to (1) articulate clear plans early on to assure participants that their voices will be considered and (2) adapt new forms of outreach that acknowledge these past experiences. The issue of prohibitive time and monetary costs supports the committee's recommendations on capacity and resources. This could include NMFS supporting staff to work with and in communities (e.g., Pomeroy et al., 2018) or funding for a more diverse range of participants to travel and engage in management processes. An example is the rotating of location of the NPFMC's June meetings through smaller geographic communities.

Technological advances may also provide new opportunities. For example, although the COVID-19 pandemic created short-run challenges for fisheries and fisheries management, it brought about a shift to remote council meetings, which have continued to be livestreamed in some cases. Continuing with or adding remote participation options has the potential to reduce costs of participation and therefore make participation easier. However, unreliable and/or nonexistent Internet access, lack of facilities with technology, lack of proficiency with English, and other factors could continue to serve as barriers to inclusion in formal processes.

While a shift toward a truly holistic approach to equity will take time and resources, shorter-term and lower-cost changes may help begin to "move the needle." NMFS can help to indicate its commitment to improving equity by identifying points in the management process that are inconsistent with policy and could be rethought and modified within a more comprehensive approach to equity. For example, this report highlights SAFE reports for tracking of fishery outcomes and social impact assessments for proposed rulemakings as potential on-ramps to improving equity in fisheries. The committee also suggests that NMFS consider its own structures, composition, collaborative opportunities, and approaches to improve the capacity of NMFS staff at all points in the management process.

FINDINGS AND RECOMMENDATIONS

FINDING 5-1: The committee applauds NMFS for signaling a willingness to move toward a more comprehensive definition and assessment of equity that is critical to meeting its legislative mandate and stewardship responsibilities.

FINDING 5-2: The interdependent, multidimensional nature of equity in fisheries makes questions of recognition, procedure, subjects, and criteria inseparable from distributional concerns. Few, if any, current approaches within NMFS for assessing and implementing equity of fisheries management decisions are consistent with a holistic approach.

FINDING 5-3: A range of challenges is associated with moving toward comprehensively addressing and integrating equity concerns into fishery management decision-making processes and their realized outcomes. These challenges include those related to diversity and capacity

within NMFS and other management bodies, as well as those that are features of the communities (fishing, underserved, Indigenous) whom NMFS impacts, those that are part of the larger social-ecological context, and those that stem from the unavoidably complicated nature of assessing equity itself.

FINDING 5-4: Existing initiatives within NMFS and other U.S. and international agencies could help inform NMFS on future efforts to implement a holistic approach to equity. These may include trainings and/or dialogues for NMFS, Council, and/or science center staff to improve awareness and understanding of equity considerations in fishery science and policy (e.g., Alaska Native Governance & Protocols training provided by First Alaskans Institute).

FINDING 5-5: NMFS has signaled an intent to develop implementation plans, based on its EEJS, at the regional level. Given the variety of fisheries within each region, this may also demand fishery-by-fishery considerations that will in turn demand significant resources and guidance to move forward.

RECOMMENDATION 5-1: The National Marine Fisheries Service should continue its work on equity in the nation's fisheries, and it should move beyond a focus on distributional outcomes associated with permit and quota holdings to a more multidimensional assessment of equity. This will require addressing a range of complex challenges that can be informed by existing programs, projects, and frameworks, but will not likely be achieved by minor adjustments to existing efforts. Addressing these challenges will, among other things, demand a contextually based, multidimensional approach and a considerable expansion of the social science capacity within the agency as well as the development of partnerships across a range of governmental and non-governmental sectors.

RECOMMENDATION 5-2: Qualitative data/methods and mixed method approaches to assessing procedural, recognitional, and contextual equity should be elevated in fisheries management decision-making.

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Appendix A

Public Meeting Agendas

Assessing Equity in the Distribution of Fisheries Management Benefits: Data and Information Availability

Committee Meeting
March 30, 2023
Virtual Meeting

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| 1:00 PM | Welcome and Introductions
Tom Miller , <i>Committee Chair</i> |
| 1:15 PM | Study Orientation
Stacey Karras , <i>Study Director</i> |
| 1:45 PM | Briefing from Study Sponsor
Lindsay Fullenkamp , <i>Acting Branch Chief, Office of Sustainable Fisheries,
National Oceanic and Atmospheric Administration (NOAA) Fisheries</i> |
| 2:15 PM | Discussion of Committee Task and Committee Q&A |
| 3:15 PM | Adjourn Open Session |

April 11, 2023
Virtual Meeting

OPEN SESSION

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| 1:00 PM | Welcome and Introductions
Tom Miller , <i>Committee Chair</i> |
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ASSESSING EQUITY IN THE DISTRIBUTION OF FISHERIES MANAGEMENT BENEFITS

- 1:15 PM Presentation by NOAA Fisheries and Q&A
Benjamin Fissel and Lisa Colburn, *NOAA Fisheries*
Lindsay Fullenkamp, *Office of Sustainable Fisheries, NOAA*
- 2:45 PM Break
- 3:00 PM Briefing of *The Use of Limited Access Privilege Programs in Mix-Use Fisheries*
Report and Q&A
Bonnie McCay, *Committee Chair*
- 4:00 PM Adjourn
**Assessing Equity in the Distribution of Fisheries Management Benefits:
Data and Information Availability**

May 15, 2023
Virtual Meeting

- 1:00 PM Welcome and Introductions
Tom Miller, *Committee Chair*
- 1:15 PM Presentation by NOAA's Greater Atlantic Regional Fisheries Office
Michael Pentony, *Regional Administrator*
- 1:45 PM Presentation by NOAA's West Coast Regional Fisheries Office and Q&A
Frank Lockhart, *Branch Chief*
- 2:15 PM Break
- 2:30 PM Presentation by NOAA's Alaska Regional Fisheries Office and Q&A
Gretchen Harrington, *Assistant Regional Administrator for Sustainable Fisheries*
- 3:00 PM Presentation by NOAA's Southeast Regional Fisheries Office and Q&A
Andy Strelcheck, *Regional Administrator*
- 3:30 PM Presentation by NOAA's Pacific Islands Regional Fisheries Office
Sarah Malloy, *Regional Administrator (Acting)*
- 4:00 PM Q&A Discussion with Regional Administrators
Moderator: **Tom Miller**, *Chair*
- 4:30 PM Adjourn

July 17–18, 2023
Hybrid Meeting

July 17, 2023

10:00 AM	Welcome and Introductions Tom Miller , Committee Chair
10:15 AM	Presentation by NOAA's Southeast Regional Fisheries Office Michael Travis , Branch Chief
10:45 AM	Presentation by NOAA's Northeast Fisheries Science Center Min-Yang Lee , Economist
11:15 AM	NOAA's Northeast and Southeast Fisheries Science Center Q&A Panel Moderator: Tom Miller , Committee Chair
12:00 PM	Lunch Break
1:00 PM	Welcome Back Tom Miller , Committee Chair
1:05 PM	Presentation by NOAA's Southwest Fisheries Science Center Dale Squires , Program Lead, Economics and Social Science
1:35 PM	Presentation by NOAA's Northwest Fisheries Science Center Leif Anderson , Economic and Social Science Research Program Manager
2:05 PM	Presentation by NOAA's Pacific Islands Fisheries Science Center Justin Hospital , Supervisory Economist
2:35 PM	Presentation by NOAA's Alaska Fisheries Science Center Brian Garber-Yonts , Research Economist Marysia Szymkowiak , Research Social Scientist
3:05 PM	NOAA's Fisheries Science Center Q&A Panel Moderator: Tom Miller , Committee Chair
3:45 PM	Additional Thoughts, Next Steps, and Closing Remarks Tom Miller , Committee Chair Stacey Karras , Committee Staff
4:00 PM	Adjourn

July 18, 2023

- 9:00 AM Welcome and Introductions
Tom Miller, Committee Chair
- 9:15 AM Presentation by Jennifer Silver and Q&A
Jenifer Silver, University of Guelph
- 9:45 AM Adjourn

August 14–16, 2023
Virtual Meeting

August 14, 2023

- 12:30 PM Welcome and Introductions
- 12:45 PM Fishery Management Council Presentations
New England: **Rachel Feeney and Naresh Pradhan**, NEFMC
Mid-Atlantic: **José L. Montañez**, MAFMC
South Atlantic: **Christina Wiegand**, SAFMC
- 1:45 PM Q&A
- 2:15 PM Break
- 2:30 PM Fishery Management Council Presentations (Continued)
North Pacific: **Sarah Marrinan and Kate Haapala**, NPFMC
Western Pacific: **Kitty Simonds and Zach Yamada**, WPFMC
- 3:30 PM Q&A / Break
- 4:00 PM Q&A Regarding Paperwork Reduction Act, Privacy Act, and Office of
Management and Budget
Adrienne Thomas, NOAA
- 4:30 PM Adjourn Open Session

August 16, 2023

- 11:00 AM Welcome
Tom Miller, *Committee Chair*
- 11:15 AM Insights from Work on Methods, Data to Inform Management, and the Local
Catch Movement
Josh Stoll, University of Maine
- 12:00 PM Lunch Break

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| 12:30 PM | Welcome Back
Tom Miller , <i>Committee Chair</i> |
| 12:45 PM | Insights from Work on Human Dimensions of Fisheries, Fishing Communities, and the <i>Socioeconomic Guidance for Implementing the California Marine Life Management Act</i>
Carrie Pomeroy , University of California, Santa Cruz |
| 1:15 PM | Insights from Work with Traditional Knowledge Systems, Dimensions of Equity, and Fisheries Management
Courtney Carothers , University of Alaska Fairbanks |
| 1:45 PM | Insights from Work with Fisheries Crew and Communities, including the <i>Annual Community Engagement and Participation Overview (ACEPO)</i>
Marysia Szymkowiak and Sarah Wise , Alaska Fisheries Science Center |
| 2:15 PM | Closing Remarks |
| 2:30 PM | Adjourn |

Appendix B

Committee Biographies

Thomas J. Miller, *Chair*, is a professor of fisheries science at the University of Maryland Center for Environmental Science's (UMCES's) founding campus, the Chesapeake Biological Laboratory in Solomons, Maryland. He has been a leader in the development of approaches to manage several Chesapeake Bay species, including crabs and menhaden, combining laboratory, field, and modeling approaches to address questions of interest to society. Most recently, his research has focused on both the effects of ocean acidification on blue crab, recruitment issues in menhaden and striped bass, and stakeholder involvement in recreational fisheries. He has been the recipient of the President's Award for the Application of Science at UMCES and received the 2015 University System of Maryland Regents' Faculty Award for Public Service. Miller received a B.Sc. from the University of York in England and a master's degree in ecology and Ph.D. in zoology from North Carolina State University. He was a post-doctoral fellow at McGill University in Montreal, Quebec, Canada. Miller is currently a member of the National Academies of Sciences, Engineering, and Medicine's Ocean Studies Board and the U.S. Committee for the Decade of Ocean Science for Sustainable Development. Miller serves as a member of the Mid-Atlantic Fishery Management Council's Science and Statistical Committee. Miller also serves as a scientific advisor to the Potomac River Fisheries Commission.

Lisa M. Campbell is the Rachel Carson Distinguished Professor of Marine Affairs and Policy in the Nicholas School of Environment, Duke University, and based at the Duke University Marine Lab. Campbell studies oceans governance in relation to diverse issues, such as the blue economy, protected species, fisheries, marine spatial planning, marine protected areas, and tourism. She draws on theory from political ecology, political economy, and science and technology studies to examine how science and other values as well as state and non-state actors inform governance processes and outcomes across geographic and socio-political scales. Campbell received a Ph.D. in geography from the University of Cambridge in the United Kingdom. Campbell is currently a member of the National Academies of Sciences, Engineering, and Medicine's Ocean Studies Board and the U.S. Committee for the Decade of Ocean Science for Sustainable Development.

Rachel Donkersloot manages a social science research and consulting firm in Aniak, Alaska, and works in close partnership with university faculty and students, fishing communities, non-profit organizations, Indigenous Tribes, and other organizations across Alaska. Donkersloot's research concentrates on community sustainability, equity, well-being, and marine resource governance in the context of rural and Indigenous fishing communities in the North Pacific. Her work on the "graying of the fleet" in Alaska fisheries received the National Sea Grant Association Research to Application Award in 2018. She has been invited to present her research to the Alaska State Legislature, North Pacific Fishery Management Council, and the House of Commons Standing Committee on Fisheries and Oceans. Donkersloot currently serves on the North Pacific Fishery Management Council's Local Knowledge, Traditional Knowledge, and Subsistence Taskforce. Donkersloot received a Ph.D. in socio-cultural anthropology from the University of British Columbia in Vancouver, Canada.

Kailin Kroetz is currently an assistant professor in the School of Sustainability at Arizona State University. Her research focuses on management and policy decision-making related to natural resource use and includes work to understand trade-offs arising from multiple objectives and to explore the implications of connectivity within socio-environmental systems. She is currently a university fellow at Resources for the Future. Kroetz received a B.A. in mathematics and environmental studies from Dartmouth College and a Ph.D. in agricultural and resource economics from the University of California, Davis. Kroetz serves as a member of the Scientific and Statistical Committee of the North Pacific Fishery Management Council.

Grant Murray is an associate professor of marine policy at the Duke University Marine Laboratory. Previously, he was a faculty member and director of the Institute for Coastal Research at Vancouver Island University in British Columbia, Canada. He is an interdisciplinary marine social scientist with more than 25 years of experience working on values, equity, well-being, and social impacts in small-scale fisheries, aquaculture, and marine protected areas. Murray has worked with Indigenous and local communities in Canada; with resource-dependent communities in Tanzania, Mexico, and Ghana; and with fishing communities in the United States. He has previously held a Canada Research Chair, a Fulbright Fellowship, and is a member of the International Union for Conservation of Nature World Commission on Protected Areas. Murray received a B.Sc. in english, environmental studies, and biology from Tufts University, a master's degree in environmental management from Duke University, and a Ph.D. in natural resources and environment from the University of Michigan, Ann Arbor. He held post-doctoral positions at Memorial University of Newfoundland and Rutgers, the State University of New Jersey.

Matthew Reimer is an associate professor in the Department of Agricultural and Resource Economics at the University of California, Davis, and was previously an associate professor of economics at the University of Alaska Anchorage. His research focuses on designing and evaluating public policies, emphasizing policies for managing marine resources. He has published on the contribution of commercial fisheries to local economies, the potential for cross-fishery spillovers from fishery policies, the evaluation of marine reserves, and the impacts of rights-based management policies. His current work includes projects related to climate-resilient fisheries and the distributional impacts of fisheries policies. Reimer received a B.A. with honors in economics from the University of Calgary and a Ph.D. in agricultural and resource economics from the University of California, Davis. Reimer currently serves as a member of the Science and Statistical Committee (SSC) for the Pacific Fisheries Management Council and has previously served on the SSC for the North Pacific Fisheries Management Council.

James N. Sanchirico is a professor of natural resource economics and policy in the Department of Environmental Science and Policy at the University of California, Davis (UC Davis). His main research interests are the economic analysis of policy design, implementation, and evaluation for marine and terrestrial species conservation, and the development of economic-ecological models for forecasting the effects of resource management policies. He received the Rosenstiel Award for Oceanographic Sciences in 2012 and the UC Davis Distinguished Scholarly Public Service Award in 2014. He is currently co-editor at the *Journal of the Association of Environmental and Resource Economists*, and principal investigator on the National Science Foundation–funded Sustainable Oceans National Research Training program at UC Davis. Past professional service includes the Lenfest Fishery Ecosystem Task Force, and 6 years on the National Oceanic and Atmospheric Administration’s Science Advisory Board. Sanchirico received a B.A. in economics and mathematics from Boston University and a Ph.D. in agricultural and resource economics from UC Davis. Sanchirico is currently a member of the National Academies of Sciences, Engineering, and Medicine’s Ocean Studies Board and the U.S. National Committee for the Decade of Ocean Science for Sustainable Development and was a member of the Committee on Evaluating Effectiveness of Stock Rebuilding Plans of the 2007 Fishery Conservation and Management Reauthorization Act.

Steven B. Scyphers is an associate professor in the School of Marine and Environmental Sciences and the Department of Sociology, Anthropology, and Social Work at the University of South Alabama. He is also a Senior Marine Scientist II at the Dauphin Island Sea Lab. Prior to his current position, Scyphers was a tenured associate professor at Northeastern University in the Department of Marine and Environmental Sciences and Core Faculty in the Social Science Environmental Health Research Institute. His lab’s research integrates ecology and sociology to understand and overcome major challenges facing coastal communities, including sustainable fisheries, coastal development, ecosystem restoration, and climate adaptation. Scyphers received a B.S. in marine biology from Auburn University and a Ph.D. in marine sciences from the University of South Alabama and the Dauphin Island Sea Lab. Scyphers previously served on the National Academies of Sciences, Engineering, and Medicine’s Committee on Data and Management Strategies for Recreational Fisheries with Annual Catch Limits and is currently serving on the Standing Committee on Offshore Wind Energy and Fisheries. Scyphers serves as a member of the Scientific and Statistical Committee and Ecosystem Technical Committee of the Gulf of Mexico Fishery Management Council.

Rashid Sumaila is a University Killam Professor and Canada Research Chair in Interdisciplinary Ocean and Fisheries Economics at the Institute for the Oceans and Fisheries and the School of Public Policy and Global Affairs, University of British Columbia. He specializes in bioeconomics, marine ecosystem valuation, and the analysis of global issues such as fisheries subsidies, illegal fishing, climate change, and oil spills. Sumaila is the co-recipient of the 2023 Tyler Prize for Environmental Achievement, a recipient of the 2022 Royal Society of Canada Miroslaw Romanowski Medal for Scientific Work Relating to Environmental Problems, the 2021 Social Sciences and Humanities Research Council Impact Award, and the 2017 Volvo Environment Prize. He was inducted into the Fellowship of the Royal Society of Canada in 2019, and was named a 2022 American Association for the Advancement of Science Fellow. Sumaila received a B.Sc. in quantity surveying from the Ahmadu Bello University and a Ph.D. in economics from the University of Bergen. Sumaila previously served on the National Academies of Sciences, Engineering, and Medicine’s Committee on the United States Contributions to Global Ocean Plastic Waste.

