



Collaborating to Advance Research and Management

*Considerations and lessons learned from co-management
and cooperative research*

**Summary and discussion of themes from the 2014 West Coast Forum,
hosted by the Fisheries Leadership & Sustainability Forum**

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About the Fisheries Forum

The Fisheries Leadership & Sustainability Forum (“Fisheries Forum”) promotes professional development and continuing education by bringing together fishery managers and experts from a range of disciplines. The Fisheries Forum offers fishery managers opportunities to share experiences, build leadership skills, and enhance their understanding of fisheries law, policy, science, and economics. Topic based “forums” provide members and staff of the regional fishery management councils with access to peer networks, and an opportunity to learn from experience and share knowledge and insights across regions.

For more information and to view material from past forums, please visit the Fisheries Forum Information Network, <http://www.fisheriesforum.org>.

1. Introduction and Forum objectives

The 2014 West Coast Forum (“Forum”) explored the roles of co-management and cooperative research in advancing management objectives, and promoting innovation and efficiency through the sharing of responsibilities. Co-management and cooperative research are broadly used terms that lack a formal, consistent definition in U.S. federal fisheries. Different perspectives about the characteristics, benefits and limitations of these approaches make it challenging to engage in productive dialogue. The Forum approached this challenge as an opportunity, by embracing the ambiguity in these approaches and fostering an exploration of diverse ideas, examples, opinions and lessons learned. Co-management and cooperative research are independent approaches that can also be synergistically linked. The Forum provided the opportunity to discuss the merits of both approaches while also drawing connections and considering their respective benefits, limitations and challenges.

Forum participants included council members, executive directors and staff, state and federal agency representatives, fishery participants, academics and fishery management experts. The Forum agenda incorporated case study presentations and group discussions to explore a range of co-management and cooperative research arrangements and share lessons learned. Specifically, the Forum provided participants with an opportunity to:

- Enhance their understanding of co-management and cooperative research approaches;
- Explore examples of co-management and cooperative research in practice and draw lessons from those experiences;
- Consider the legal authorities, procedural mechanisms, analytical requirements, and tradeoffs associated with co-management arrangements;
- Discuss how cooperative research can be leveraged to support council decision-making;

- Examine the roles and responsibilities of councils, NOAA Fisheries and stakeholders in engaging in formal and informal partnerships; and
- Reflect on the role of leadership and relationship building in supporting innovative management and research arrangements.

The following report explores the concepts of co-management and cooperative research, the relationship between them, and opportunities and challenges related to their design and implementation. No definitive resource or guidance exists on the application of co-management and cooperative research in U.S. federal fisheries. This report is not intended to be a conclusive or a comprehensive guide to these approaches. Rather, it is intended as a compilation of information, experiences, lessons learned and considerations to inform future dialogue in the context of U.S. federal fisheries. The content of the report is drawn from presentations and discussions at the Forum, and insights gained through the Fisheries Forum's research on these topics. A full list of Forum resources, including the final agenda and vide of presentations are available on the Fisheries Forum Information Network, <http://www.fisheriesforum.org>.

2. Co-management and cooperative research in concept

2.1. Definition and relationship

There are many different opinions about what constitutes co-management and cooperative research, and individuals' understanding of these approaches is largely shaped by regional context and personal experience. Broadly speaking, co-management involves the sharing of responsibility and authority between managers and resource users. Cooperative research involves partnerships between scientists and fishery participants to conduct fisheries research. Both encompass a spectrum of approaches that vary in the extent and structure of collaboration, and the outcomes they aim to produce.

Co-management and cooperative research are distinct yet related arrangements. Both share the underlying premise of partnership and collaboration, rely on similar enabling conditions, and can have additional benefits to underlying relationships and associated processes. Cooperative research can help build the trust and capacity for co-management, just as co-management can help build the relationships and infrastructure for cooperative research. Each arrangement does not necessarily require or preclude the other; rather they are mutually beneficial arrangements that can both inform and facilitate cooperative approaches to science and management.

2.2. National policy context

The exploration of co-management and cooperative research at the Forum was timely relative to national discussions. There has been an increasing amount of discourse and stakeholder interest around these topics, particularly with respect to reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the implementation of electronic monitoring. In response, National Oceanic and Atmospheric Administration (NOAA) Fisheries Service convened a working group comprised of staff

from the agency's regional offices, science centers, program offices and headquarters. The goal of the working group is to develop a white paper that summarizes the critical success factors of co-management and cooperative research, document an inventory of examples, and identify best practices and challenges with the implementation of these approaches. This working group is also exploring the legal authorities around co-management and cooperative research across a number of relevant laws, including the MSA, Marine Mammal Protection Act (MMPA), Endangered Species Act (ESA) and National Environmental Policy Act (NEPA).

2.3. Similarities and ingredients for success

Co-management and cooperative research embody collaborative approaches to management and research. Through this collaboration they can change the fundamental relationship between managers, scientists and fishery participants, promote innovation and problem-solving, and lead to improved fishery outcomes. While these tools can achieve a number of desired outcomes, they are not guaranteed solutions. Co-management and cooperative research create a framework for shared responsibility and collaboration, and this framework is only as valuable as the commitment and capacity that are invested into its development and execution.

Co-management and cooperative research often evolve out of crisis. In all of the examples explored at the Forum, the development of partnerships and collaborations rose out of a need to address a difficult problem such as allocation conflicts, bycatch of constraining species, or habitat impacts from fishing gears. These challenges provided the impetus to re-examine manager-stakeholder relationships and the division of responsibilities in pursuit of a shared objective. Once established, co-management and cooperative research programs can provide multiple ongoing benefits to managers and resource users, and provide a platform for engaging and addressing problems proactively.

These two approaches share a number of fundamental requirements and ingredients for success:

1. Capacity needs: Engaging in co-management and cooperative research requires significant investments in capacity, and may not necessarily be more efficient, easier, or faster than traditional management and research arrangements. Up-front and sustained investments of time, funding and capacity are critical to producing the desired outcomes and capturing efficiencies over time.
2. Leadership: Strong leadership is essential to successful co-management and cooperative research programs. Leadership is required overcome the inertia of status quo relationships and empower the different parties involved to engage actively and productively. Once established, leadership is critical to maintaining co-management and cooperative research arrangements and facilitating their evolution over time.

3. Goals: Shared goals and objectives are critical for articulating the problem to be addressed and bringing focus to the partnership. Working toward a shared vision fosters dedication, commitment and trust, and vests each individual partner in a shared outcome.
4. Roles and responsibilities: It is important to clearly identify and communicate the roles and responsibilities of all parties involved. Well-defined terms of reference for partnerships can help establish expectations, provide accountability, and support an effective and efficient sharing of responsibility. While each party may play a different role or have a different set of responsibilities, it is important that all involved are equally invested.

3. Co-management in practice

3.1. Defining co-management

Co-management is a difficult concept to discuss let alone define. There are a number of different interpretations and working definitions of co-management, all of which are shaped by regional perspectives and personal experiences. For example, in the Pacific Northwest, co-management refers to a statutory relationship between NOAA Fisheries, state governments and treaty tribes to allocate and manage fishery resources in Washington and Oregon. In parts of Alaska and remote regions of the Western Pacific, co-management may be interpreted as arrangements that support the cultural values and natural resource tenure of indigenous communities. Along the east coast, co-management is often discussed in the context of management responsibilities shared and coordinated among three councils, an interstate commission and fifteen state governments. Depending on the scenario, co-management can be viewed as a legal relationship between governments and/or agencies, a procedural arrangement for sharing responsibility, and/or a philosophical principle applied to resource management.

Co-management is not a new concept. It has been discussed extensively in natural resource and fishery management literature, though largely in the context of international, small-scale fisheries (see text box, next page^{1, 2}). Broadly defined, co-management involves managers and resource users engaging in partnerships to share responsibility and authority for achieving management goals. There is a broad spectrum of approaches that have been termed co-management, from providing venues for stakeholder input and advice (i.e. the council process), to shared decision-making, to self-management and enforcement. While all engage stakeholders and managers, the degree of partnership and the division of responsibility and authority can vary significantly.

¹ United Nations Fishery and Aquaculture Department, FAO 2008-2015. Small-scale fisheries - Web Site. Co-management. FI Institutional Websites. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated. [Cited 13 June 2015]. <http://www.fao.org/fishery/topic/16625/en>

² International Development Research Centre 2006. Fishery Co-Management: A practical Handbook. R. S. Pomeroy and R. Ribera-Guieb

Fishery Co-Management: A Practical Handbook, Pomeroy and Rivera-Guieb:

“Cooperative management or co-management can be defined as a partnership arrangement in which the community of local resource users (fishers), government, other stakeholders (boat owners, fish traders, boat builders, business people, etc.) and external agents (non-governmental organizations (NGOs), academic and research institutions) share the responsibility and authority for the management of the fishery.”

Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department, Small-scale fisheries:

“A partnership arrangement between government and the local community of resource users, sometimes also connected with agents such as NGOs and research institutions, and other resource stakeholders, to share the responsibility and authority for management of a resource.”

Co-management is a departure from traditional management processes and relationships; it requires significant investment by all involved, and a dedication to engage over long timeframes. Coordinating efforts and expertise through co-management arrangements can foster the development of trust, strengthen partnerships, and also improve fishery outcomes. Engaging resource users in problem-solving can support innovation and promote the achievement of management and biological objectives while also promoting efficient and successful industries. Cohesion around shared goals can also lead to management measures that are broadly accepted and durable over time.

3.2. Origins of co-management in U.S. fisheries

While co-management has a long history in formal and informal resource management, co-management was first applied in the U.S. between federal and state governments and the Northwest Indian treaty tribes. In the mid-1800s, treaties were negotiated between the Washington Territorial Governor and twenty western Washington treaty tribes to settle land claim issues and establish resource rights. These treaties were ratified by the U.S. government and recognized in the U.S. Constitution, granting treaty tribes “the right of taking fish at the usual and accustomed grounds and stations.” Despite these treaties, tribal rights were not recognized or upheld. After over 100 years of legal cases, the Boldt Decision in 1974 (*U.S. v. Washington*) reaffirmed the tribal treaty rights and defined how those rights would be recognized. This decision established the tribes as co-owner and co-managers of fishery resources, and defined tribal entitlement as 50% of all harvestable fishery resources that reside in or pass through the tribe’s usual and accustomed areas.

Co-management, as outlined in the treaties and the Boldt Decision, is a point of law. This arrangement is executed in accordance with a set of management criteria and a shared framework for how the different parties involved meet resource conservation and sustainability goals, and ensure all parties are afforded the opportunity to harvest their share of the resources. Each individual tribe has the responsibility and authority to manage the resources within their respective waters. To exercise this authority and engage as co-managers, each of the 20 tribes had to develop their own management

programs and technical capacity to meet the specified requirements. The Northwest Indian Fisheries Commission (NWIFC), established in 1976, provided significant capacity to the tribes in establishing their programs and continues to support policy and technical aspects of the co-management arrangement.

The development and application of co-management in the Pacific Northwest was not an easy process. There was a significant amount of conflict and resistance, which required substantial leadership and commitment to arrive at a program that embodies the principles of co-management. Today, almost 40 years after the Boldt Decision, federal and state governments and the Northwest Indian treaty tribes engage in an effective co-management process, and tribes are actively involved in all aspects of research and management. The capacity and trust that have resulted from this process allow for improved cooperation and provides for new collaborative opportunities. The co-management arrangement still requires a considerable amount of effort, but produces mutually beneficial outcomes that would not otherwise be achieved.

The history and evolution of co-management in the Pacific Northwest demonstrates the importance of several factors and imparts lessons drawn from 40 years of experience.

1. Legal standing and authority: For sovereign governments to engage effectively in co-management, the legal standing and authority to manage resources in their own jurisdictions must be recognized and upheld by all parties. Where co-managers share equal sets of responsibilities, authority must extend to all relevant aspects of management, including data collection, analysis, and review to ensure all managers have equal influence and responsibility.
2. Joint framework: All parties need to be bound by a framework that allows for consistent and complementary management of shared resources. Jointly developed goals and objectives are necessary to focus management decisions and create buy-in among partners. The scientific inputs that inform management decisions also need to be grounded in established methods and standards to provide credible scientific advice and help focus discussions on critical policy decisions.
3. Capacity: Both technical and policy capacity are essential for co-management partners to engage in a meaningful way with state and/or federal counterparts. Involvement in the scientific and technical aspects of management makes the process more transparent and builds confidence in the overall management framework. Once established, the capacity that each co-manager brings to the process can improve efficiency and effectiveness, and support additional opportunities for collaboration. Support organizations, such as the NWIFC, can play a critical role in building and bridging capacity and supporting a successful and enduring process.

4. Leadership: The legal establishment of a co-management arrangement does not ensure that this process will be successful. Strong leadership is imperative to overcome hurdles and shepherd the long and difficult process of establishing and operationalizing partnerships. Successful co-management also requires significant commitment by all involved. Even once a process and framework are established, considerable and constant work is required to navigate challenges and maintain faith and commitment to the co-management process
5. Evolution over time: Even where co-management is a point of law, it is not static. Co-management arrangements take time to develop and need to evolve. The structures and processes in place need to be durable and adaptable to meet the needs of all partners and respond to changing priorities.
6. Traditional practices and culture: Co-management can provide management partners with the management authority to make independent decisions about how to utilize their respective resource apportionments. For the Northwest Indian treaty tribes, co-management reinforces cultural values through providing the ability to maintain traditional practices and customary resource uses.

3.3. Pathways for co-management

Within the U.S. fisheries management framework, a range of partnerships, mechanisms and tools can be leveraged to construct formal and informal co-management arrangements. The Forum explored case studies organized around three types of co-management arrangements:

1. Public-private partnerships: involving formal agreements between managers and resource users;
2. Private-private partnerships: involving private, non-regulatory agreements between parties; and
3. Community partnerships: involving partnerships between communities and government agencies.

3.3.1. Public-private partnerships

Public-private partnerships involve the use of formal regulations and contractual agreements between managers and resource users to support the achievement of management objectives. In place of certain specific management controls, regulations can outline incentive structures, performance standards and accountability requirements to frame the partnership and establish expectations. Private contractual agreements articulate how these standards and requirements will be achieved. Empowering fishery participants to determine the best approaches to achieve the regulatory requirements promotes innovation and supports the development of new solutions that meet resource conservation objectives while also promoting robust, profitable fisheries. Contractual agreements can be amended much faster than regulations, which allow the industry to be nimble and adaptive in responding to new challenges and evolving strategies.

There are a number of factors that influence the success for public-private partnerships in realizing these benefits, including the way in which these partnerships take shape (e.g., bottom up vs. top down), incentive structures, and the balance of flexibility and accountability. While these programs leverage additional expertise and capacity through collaboration, they may not be more efficient than traditional management. For example, they require significant investments in time and effort by all parties involved, and create additional administrative burdens on industry and managers.

Case studies at the Forum highlighted several important considerations related to the application and design of public-private co-management arrangements.

Defined goals, roles and responsibilities

In U.S. federal fisheries, public-private partnerships are a three-way co-management arrangement between NOAA Fisheries, the regional fishery management council, and the industry. However, the legal relationship of the contractual agreements is between the agency and industry. Defining specific goals for the co-management arrangement can help inform the appropriate division of responsibility, and provide a benchmark for evaluating the success of the program. It is important to identify which parties are engaged as co-managers, and outline specific roles and responsibilities for all parties involved. This can be informed by careful consideration of which aspects of management can be best performed by fishery participants, and which aspects need to remain under the authority of managers. Roles and responsibilities should be clearly articulated and communicated to maintain transparency within a public process. Once a co-management arrangement is in place, it is important to keep the council involved in the evolution and evaluation of the program to ensure it conforms to the intended goals and objectives of the relevant fishery management plan (FMP) and the larger management framework.

Existing relationships and cooperative structures within the fishing industry can help facilitate co-management. Industry-level organization increases the ability of industry to engage in the process and enter into formal agreements that are supported by all involved. In the absence of collaboration and organization, it can be difficult for managers to identify appropriate co-management partners and for the industry to communicate and represent their interests in an organized way. The extent to which industry works together also influences the outcomes and benefits that can be derived from co-management. Strong collaborations can help support innovation, and with the appropriate mechanisms in place, can allow the industry to collectively address challenges more swiftly and effectively than can be done through the regulatory process.

Flexibility and accountability

Co-management arrangements can provide resource users with incentives and additional flexibility, in exchange for increased responsibility and accountability. Performance standards can replace more prescriptive management controls (e.g., trip limits and time/area closures), allowing the industry to achieve established metrics in a way best suited for their operations. When designing these programs, it is important to find a balance between flexibility and accountability, and identify which provisions should be established through the regulatory process, and which should be included in contractual

agreements. Regulations and contractual agreements need to establish appropriate sideboards and requirements, and provide sufficient detail to ensure compliance. However, including too many details in regulations can constrain the effectiveness and evolution of a program, and hinder the innovation it is designed to promote.

In exchange for increased flexibility and control over certain aspects of management, industry co-managers take on additional responsibilities, such as data collection, monitoring, and reporting requirements. This arrangement enables managers to delegate management responsibilities, while ensuring that resource users are accountable and comply with relevant laws. These additional accountability requirements can support improved data timeliness and accuracy, and the additional information collected by industry can be leveraged internally to improve operations. While data collection and monitoring capacity can be built to facilitate public-private partnerships, the extent to which these tools are already in place (e.g., at sea observers, dockside monitoring, etc.) can provide more options for delegating responsibility during the initial program development.

Program development and evolution

Public-private co-management partnerships represent a fundamental departure from traditional management arrangements. Partnerships are dynamic, and all aspects of a co-management program, from roles and responsibilities to specific administrative, data collection and reporting requirements, will evolve with time and experience. In order to realize the benefits that co-management arrangements can produce, programs need to be constructed a way that allows them to leverage the experience, relationships, and capacity that are built over time. During the development of a program, it can be helpful to begin by gradually shifting responsibilities as partners learn, adapt and build capacity.

Program evaluation is a fundamental step in the evolution of public-private partnerships. Establishing clearly defined goals at the outset can provide a benchmark for assessing if the co-management arrangement is meeting its specific objectives. Performance standards can also be useful in evaluating the program; however, compliance with specific standards and requirements does not necessarily indicate the program is achieving the broader objectives of the management plan. Data confidentiality issues can significantly hinder the evaluation process, and make it difficult for all co-managers to have access to the same information. Voluntary or anonymous industry reporting and continual dialogue between the agency, council and industry can help to overcome this challenge.

Enforcement and public process considerations

Public-private partnerships can shift some compliance responsibilities to the industry, and introduce unique challenges related to transparency. Under a co-management arrangement, regulations generally establish performance standards, while the mechanisms for achieving these standards are contained in private contracts. The industry becomes responsible for the enforcement of provisions included in the private contracts, while the agency enforces the broader provisions outlined in regulations. While this additional enforcement capacity is helpful, the variety of approaches that can be

authorized in private contracts make it challenging for federal enforcement officials to identify violations.

Fisheries are public resources and federal law mandates that these resources be managed through a public and transparent process. The private nature of contracts, and issues with disclosing confidential data to the public can challenge the transparency of public-private partnerships. Private contracts can also introduce analytical challenges when establishing these programs through the federal regulatory process, including meeting NEPA requirements. For example, it can be difficult to analyze the potential impacts of the “ends” that are specified in regulation while the “means” through which they are achieved are specified in private contracts.

3.3.2. Private-private partnerships

Private-private partnerships involve private arrangements established outside the management framework that promote efficiency, innovation and problem-solving among resource users. While these partnerships are not regulatory, they can support the achievement of management objectives and address dynamic problems that are difficult to solve with traditional management measures. Industry and stakeholder collaboration supports outcomes that work within the context of the fishery and are supported by those involved. A number of partners can be involved in these collaborations, including individual fishery participants, industry organizations, academic institutions, and non-governmental organizations. These programs may also intersect with state and federal management, and benefit from the support of these bodies. Private-private partnerships can be voluntary or obligatory, and may involve informal or formal partnership agreements. While these partnerships are not constrained by the same administrative burden as regulatory pathways, they are resource intensive. Significant funding, time and leadership are necessary to support successful programs. Similar to public-private partnerships, the success of private-private partnerships involves the balancing of incentives, flexibility and accountability.

The case studies explored at the Forum illuminated several lessons learned and key factors that support the development of successful private-private partnerships.

Collaboration and leadership

For private-private partnerships to thrive, they must reflect a true, collaborative partnership. It is important to have buy-in and investment by all partners, and strong, enduring leadership to ensure communication and cooperation remain central to the program. Where private entities, such as academic institutions or industry organizations play an orchestrating role, it is important to build leadership within the industry, engage all parties, and establish a collective vision for the program. Private-private partnerships often arise out of a crisis, and are initially designed to address a specific problem. Once these partnerships are in place, they can become platforms to proactively address future needs and challenges. Successful partnerships need to be dynamic in response to changing conditions, and nimble enough to evolve over time.

While the nature of private-private partnerships involve collaborations among stakeholders, agencies and councils can play supporting roles. Managers can facilitate the development of these partnerships by establishing benchmarks and standards that demonstrate compliance or success, identifying major components to be incorporated into the program, and making any enabling changes to regulations. Managers can also support private-private partnerships through providing guidance, expertise and access to data.

Structure and regulatory implications

Private-private partnerships need to be context-specific, and designed in light of the specific characteristics of the fishery and the needs of the parties involved. Partnerships can be informal or formal, and structured as voluntary or binding programs. Informal programs can be more adaptable, but may lack a formalized framework that supports long-term partnerships. Voluntary programs can be beneficial where there are varying participation levels, though lack of participation and accountability may limit what goals can be achieved. Private-private partnerships can be formalized through private contracts that provide a legal structure and basis to the partnership; partners are thereby obligated to comply with the provisions of the agreement, which can be enforced by civil courts.

While these partnerships are not regulatory, they may intersect with regulatory processes in a number of ways. First, private-private partnerships may require regulatory changes to support their development or authorize the structure and/or tools used. These programs may also draw on regulatory ideas or frameworks to be implemented privately. Second, changes to regulations may inform the design of these partnerships, and prompt the programs to evolve in response. Finally, private-private partnerships can inform future management decisions, or become informally or formally incorporated into regulations. For example, the success of a private-private partnership may prompt the council and agency to not implement regulatory measures. Outcomes from partnership programs may also inform the council in exploring ways to incorporate the program aspects into regulations.

Accountability, enforcement and data sharing

Private-private partnerships can enhance accountability and compliance at the individual and industry level. In fisheries where the management structure does not provide the tools or capacity for individual accountability, private-private partnerships can facilitate and incentivize accountability. Collaborations among individuals within a fishery can support efficient operations within fleet-wide constraints, such as improving utilization of target quota under constraining sector bycatch caps. Private-private partnerships also provide a vehicle for incorporating individual accountability, where individual members are accountable to the rules and limits outlined in the private agreement. These partnerships can also create private enforcement capacity, and reduce the burden on federal enforcement officials through self-regulation.

Private-private partnerships often rely on internal data sharing to support real-time management, accountability and compliance, and the industry may view this information as proprietary. For example, internal data sharing can enable the industry to develop responsive solutions to dynamic problems, such as bycatch. Hesitancy to share this

information can hinder the accuracy and completeness of data streams used to make projections, and limit the effectiveness of the program. Given the private nature of these programs there is no requirement to share internal data with managers. While this maintains confidentiality, it can also constrain the extent to which the program can be leveraged or integrated within the broader management framework. Over time, the relationships built among fishermen and with managers can help establish trust and comfort with data sharing.

3.3.3. Community partnerships

Community co-management involves partnerships between communities and government agencies to create and sustain systems for local marine resource management. This form of co-management can be an effective tool when centralized management is ineffective, and where there is strong social organization and leadership within a community. In order to define and devolve responsibilities through a community co-management arrangement, there must be well-defined boundaries on the resource and a discrete set of resource users.

Empowering local communities to manage their fishery resources can lead to more sustainable resource management and improved livelihoods. Aligning management with cultural values and reinforcing customary resource rights increases the extent to which communities are vested in management strategies and outcomes. Community co-management can build on existing social and cultural structures and allow for small-scale management decisions that address specific needs, such as prioritizing harvest for cultural activities. While this form of co-management can benefit both fishery resources and the communities that depend upon them, it is not appropriate for all communities and requires significant and sustained capacity and leadership to be successful.

Several considerations and lessons can be drawn from the community co-management case study examples discussed at the Forum.

Roles, responsibilities and community investment

Strong leadership from both the community and resource agency is imperative for successful co-management arrangements. The division of responsibilities between these two parties needs to ensure that communities have the knowledge, capacity and authority to be successful in managing and monitoring the resources and enforcing regulations. It is also important to determine where and when the transfer of responsibility takes place, and the agency's role in long-term community co-management.

Successful community co-management requires the existence of strong social organization within the community and the willingness and capacity to take on new responsibilities. Shared goals for resource use and management, existing structures for decision making, and strong, recognized leadership within a community provide a solid platform for co-management, and support buy-in and compliance with decisions made by community leaders. Communities must be highly invested in the process, and possess the capacity to take on the responsibility of managing their fisheries resources and work with the government partners to ensure that all requirements are met. Shifting priorities and

interests of community members, and lack of communication between community leadership and community members can challenge success of community co-management programs.

Context and traditional practices

Community co-management programs need to be developed in light of the specific context of each partnering community. The biology and ecology of the fishery, gear types used, purpose of harvest (e.g., subsistence, personal use, commercial sale), and the social structure and cultural heritage of the community all need to be considered. Management measures should be carefully designed to reflect each community's unique composition and practices, and be adaptable to community and resource changes over time.

Community co-management can leverage traditional management practices, which empowers communities to strengthen cultural ties and provides a renewed recognition of traditional knowledge and customary resource rights. While management measures that align with a community's culture and customs can yield increased compliance and desired outcomes, traditional practices must be viable under current legal frameworks. For example, many communities have historically excluded outsiders from access to the resource, a practice that is no longer legally allowed. Changes in resource use, such as shifts from subsistence to commercial fishing, and private property rights along coastlines and watersheds, may also undermine the ability of traditional tools to produce desired outcomes.

3.4. Lessons learned and reflections

Co-management represents a broad spectrum of approaches that involve sharing responsibility and authority between managers and resource users. In addition to the three types of co-management arrangements discussed in Section 3.3, there are a number of less formal pathways for integrating co-management principles into traditional management structures. Regardless of the parties who are involved or the way in which the partnership is structured, there are several common insights and lessons that can inform the consideration, development and implementation of co-management arrangements.

3.4.1. Attributes of successful co-management

While each co-management arrangement is unique, experiences shared at the Forum highlight several common attributes that have contributed to successful partnerships across a broad range of co-management scenarios. The group also identified a number of design considerations and resource requirements that should be considered up front when evaluating if co-management is an appropriate fit for a fishery.

Human capital and a foundation of partnership

In an ideal co-management scenario, partners are unified by working toward a shared set of goals and objectives in support of a well-defined vision. This cohesion fosters dedication, commitment and shared responsibility for outcomes. The cooperation and collaboration required to be successful are not elements that can be forced or mandated.

All parties must be willing to actively engage and commit to a long-term partnership. The relationships and communication channels that are established through co-management can have long-term benefits by increasing engagement, transparency, and trust in the process. While often established to address a specific problem, co-management arrangements can transcend the initial crisis and evolve into more proactive partnerships.

While it is essential to establish clear roles and responsibilities between co-managers, the sharing of responsibility and authority does not have to be equal. Rather, roles and responsibilities can be established to draw on each party's strengths and leverage synergies in pursuit of the shared goals. The legal framework for federal fisheries management also informs this division, as there are certain responsibilities that cannot be delegated, and need to remain with NOAA Fisheries.

Planning for and committing to an ongoing process

Co-management represents a management process, a relationship, and a set of outcomes that result. All three aspects must reflect an underlying premise of partnership. Co-management arrangements should not be entered into lightly. Significant investments of time, effort and resources are essential to establishing and sustaining these partnerships. It's important to assess barriers, identify capacity needs, and ensure the resources are in place to sustain a long-term commitment.

Co-management arrangements are not static, but evolve over time with experience and increased capacity. Partnerships must be designed to be flexible and adaptable to respond to changing circumstances, and to allow for the gradual shifting of new responsibilities over time. Establishing performance standards or criteria for measuring performance can help inform the appropriate balance of flexibility, and shape the evolution of the co-management partnership. Evaluation of the program is also essential to ensuring legal and conservation requirements are met, and building mutual respect between partners.

Strong and enduring leadership

Co-management requires strong and enduring leadership to be successful. The sharing of responsibility and authority often requires cultural and institutional changes to accommodate and facilitate these partnerships. Leadership within management bodies must be willing to move away from traditional command and control regulatory structures, fundamentally reconsider roles and responsibilities, and empower resource users to engage as co-managers. Champions among all parties engaged in the partnership are essential to identifying and overcoming barriers, and ensuring that the resources and commitment remains in place to support a long-term and evolving partnership.

Public process and context considerations

Fisheries in the U.S. are a public resource. There are other parties not directly included in co-management partnerships, such as processors, distributors, communities and non-governmental organizations, who have a stake in the management process and the outcomes it produces. These groups can bring valuable perspectives to the process; however, the costs and benefits of management decisions are often different between fishermen and other stakeholders. Determining the stake that each party has in the co-

management arrangement can help inform the extent to which each stakeholder group should be involved and their respective roles in co-management. Co-management partnerships by their very nature require fishery participants to contribute their time and capacity, but fishery participants have different abilities to contribute and engage. When developing co-management partnerships, it is important not to disenfranchise minorities, small players, or those who cannot afford to be at the table.

Co-management programs need to be tailored to the specific context of the fishery and the needs of the different parties involved. There are a range of tools that can be leveraged in these partnerships to balance flexibility and accountability, and these tools should be carefully selected to facilitate success. Co-management is not appropriate for every fishery. Many fisheries lack the resources, capacity, internal relationships, willingness and organization that allow for cooperation and sharing of responsibility. Identifying the relationships that are ripe for co-management and evaluating where the benefits outweigh the costs can help identify the fisheries with the most potential for co-management.

3.4.2. Building capacity

Co-management represents a long-term vision and a long-term process. Building the relationships and capacity to support co-management requires an investment of time and effort from each co-management partner. While the role of co-management in U.S. federal fisheries is still taking shape, there are several opportunities for councils to invest now to support future co-management opportunities in their regions.

1. Foster leadership: Strong leadership is critical to the success of co-management. For co-management arrangements to endure and evolve over time, it's imperative to build successive generations of leadership who can shepherd the partnership after founding leaders retire. Councils can play an important role in fostering the development of leaders both in the fishery and management community.
2. Take the first step: Co-management is neither a short-term strategy nor an all-or-nothing approach. Strengthening relationships with resource users and stakeholders can build a foundation for future partnerships. Councils can also take small steps to support a gradual sharing of responsibilities, for example, by identifying areas where industry can be more engaged or take on more responsibility.
3. Invest in capacity: A significant amount of capacity is needed to support co-management. Managers need to develop capacity to manage within a new framework, and fishery participants need to develop capacity to fulfill a new set of responsibilities under co-management. Councils can cultivate capacity by providing the information, tools, and resources for stakeholders to communicate their interests and engage collaboratively in the management process.

4. Engage other partners: Engaging a wide range of partners can also help build capacity to support co-management. State resource departments, academic institutions, industry organizations and non-governmental organizations can contribute additional resources and capacity to the partnership. For example, these additional partners can play important facilitation roles and help tap into existing infrastructure, data streams and expertise.

4. Cooperative research in practice

4.1. Defining cooperative research

Cooperative research refers to a broad spectrum of activities with different levels of partnership between scientists and fishery participants. These activities can range from catch accounting, to using fishing vessels as research platforms, to fully integrated studies conducted jointly by researchers and fishermen. The goal of cooperative research is to leverage the resources and expertise of scientists, fishermen and partners in pursuit of information on a shared research question. While there can be value in all cooperative research arrangements, cooperative research that engages all parties in all stages of the research, including proposal development, study design, data collection, data analysis and communicating results can yield the most significant benefits.

A number of partners can be engaged in cooperative research, including fishermen, NOAA Fisheries, councils, state agencies, universities, non-governmental organizations, private institutions, research firms, and management partners such as interstate commissions. Each partner's role and the extent of their involvement depends on the objectives and needs of a project, and the types of resources or expertise that are necessary to achieve the project's goals. Partners can bring different expertise and capacity to the collaboration, such as knowledge of the fishery, data collection or assessment methods, or resources in the form of vessel time, equipment, staff time or direct monetary support. Cooperative research projects that involve management and data collection partners, such as state natural resource agencies, can utilize existing infrastructure and data collection programs and also add legitimacy to research methods and findings.

Cooperative research can be leveraged to meet a wide range of information needs and support advancements in fishing practices and management. Research can be used to generate stock assessment inputs, including catch and discard accounting, information about life history characteristics, and other biological and ecological data. Scientists and fishermen can work together to improve gear efficiency or sensitivity, such as gear modifications to improve selectivity or reduce habitat impacts. Cooperative research can also be used to answer specific management questions that can aide in developing or amending regulations. Engaging managers in the design of cooperative research projects can improve the utility of resulting data and support managers in identifying the best solutions to overcome management challenges.

In addition to these information outputs, cooperative research can generate a number of ancillary benefits.

1. Building trust and relationships: Cooperative research can build and strengthen relationships between fishermen, scientists and managers. The collaborative approach provides all parties with greater confidence in the data, which in turn promotes buy-in to the management decisions. Cooperative research is also a pathway for bringing fishermen into the management process; through engagement in science, fishermen develop a better understanding of data collection methods and scientific inputs, and become more engaged in the management process and vested in the outcomes.
2. Leveraging resources: The process and partnerships involved in cooperative research can bring additional resources to data collection and scientific research efforts, which is particularly important given stable or declining budgets for research and management. These resources include manpower, infrastructure such as vessels and gear, and funding in the form of time, vessel use and direct monetary contributions. Cooperative research can also amplify the utility of these resources through addressing multiple questions or collecting multiple data inputs from the same platform. For example, studies can be designed that support scientific data collection while also helping industry explore ways to improve their business.
3. Integrating a range of expertise: Fishermen, scientists, and managers all have different perspectives and bring different experience and knowledge of the fishery and resource. Combining these different perspectives can improve the design and execution of research methods, and provide a larger, more robust view of the system, research questions and the problem being addressed.

4.2. Identifying cooperative research opportunities

4.2.1. Building capacity

There are a number of actions that councils, NOAA Fisheries, scientists and research partners can take to build capacity for cooperative research in their regions, and facilitate outcomes that advance management.

1. Identify and communicate research priorities: The processes that councils use to establish and revisit research priorities provide an opportunity to engage scientists, management partners and stakeholders in identifying data needs, priorities, and opportunities for collaboration. Managers can use research priorities as a vehicle for communicating research questions and the specific data inputs that are needed to support future decisions, and consider how cooperative research can support those priorities.

2. Align resources and data needs: Cooperative research projects are most common in high value and/or well-organized fisheries. While these fisheries have fewer barriers to participation in cooperative research, they may not necessarily have the most pressing research needs. Strategic funding and investment in building the capacity for cooperative research within specific fisheries could help to engage new fishermen in bridging critical science and data collection gaps.
3. Expand the council's role: In addition to setting research priorities, councils could play additional intermediary roles in facilitating and coordinating cooperative research. Councils could assist fishermen in navigating the research process, submitting proposals and identifying scientific partners. Existing council communication channels could also be leveraged to advertise cooperative research opportunities and solicit proposals. Working with NOAA Fisheries and other partners to establish consistent funding streams could build additional capacity at the regional level and support long-term cooperative research partnerships.
4. Coordinate with scientists: Coordination and cooperation between NOAA Fisheries science centers, Scientific and Statistical Committees (SSCs) and fishermen early in the development of cooperative research projects can increase the likelihood of outputs being incorporated into management. Scientific review of methods and protocols can ensure that projects are developed and executed in a manner that will support peer review, and support the timely incorporation of information into stock assessments and other management inputs.

4.2.2. Limitations and challenges

While the benefits achieved through cooperative research can be significant, these collaborations come with their share of challenges. Discussions at the Forum identified a number of factors and limitations that are valuable to consider when evaluating the ability of cooperative research to produce the desired outcomes.

1. Capacity and shrinking budgets: While cooperative research can bring additional capacity and funding to science and data collection, it is not necessarily a net gain in terms of time and resources. Cooperative research requires a significant investment of effort and time, and long-term dedication from all parties involved to ensure that direct and ancillary benefits are realized. The need to fund core research and surveys with decreasing federal budgets can limit the ability of researchers to engage in new or innovative projects. Limited staff time at NOAA Fisheries science centers and regional offices can also delay the analysis and dissemination of results from cooperative research studies.
2. Fishermen interest and involvement: The extent to which fishermen are interested and able to engage in cooperative research varies across fisheries and regions. Relationships between fishermen and scientists are often the vehicle that initiates these projects, and it can be difficult to establish cooperative research arrangements where these relationships do not yet exist. The extent to which

fishermen are actively involved in developing the different aspects of cooperative research influences the outcomes and benefits that are derived. Projects that engage fishermen only in the use of vessels, or where the study is designed solely by scientists or academic institutions can result in only peripheral industry involvement. While these arrangements may still leverage additional capacity, the benefits of trust, relationship building, and incorporating additional knowledge and expertise that can come from a partnership are not realized.

3. Incorporating results: Ideally, information gleaned through cooperative research is incorporated quickly and effectively into the management process. However, delays in analysis and peer review can challenge the timeliness and ultimate utility of cooperative research outputs. Fishermen often feel disenfranchised when results from cooperative research are rejected by scientific review bodies, or not incorporated in a timely manner that allows them to inform management decisions.
4. Misaligned expectations: Cooperative research can make significant contributions to the management of fishery resources, but it is important to establish and communicate reasonable expectations for how the information will be used, and what decisions it can support. While it can be challenging to focus on the cooperative research process rather than specific outcomes, a longer-term perspective can strengthen partnerships and lead to increased utilization of cooperative research information over time.

4.3. Funding cooperative research

NOAA Fisheries Cooperative Research Working Group

In 2001, NOAA Fisheries leadership established the Cooperative Research Working Group (CRWG) to meet the requirement for a cooperative research program under section 318 of the MSA. The 14-member CRWG provides national coordination and oversight, allocates and awards funding, coordinates policy development, enhances communication and conducts outreach activities. The working group administers a budget of over \$10 million per year, including a competitive award process and an obligatory allocation of approximately \$700,000 to each regional science center. The regional allocation of funding allows each region to administer their apportionment according to their own priorities. These priorities are intended to address stakeholder needs and requests, research and management priorities, and alignment with science center strategic plans and national priorities identified in the MSA (see text box, next page).

National Cooperative Research Program Priorities

Priorities for the cooperative research program are outlined in Section 318 of the Magnuson-Stevens Act, and include:

- (1) Projects to collect data to improve, supplement, or enhance stock assessments, including the use of fishing vessels or acoustic or other marine technology.
- (2) Projects to assess the amount and type of bycatch or post-release mortality occurring in a fishery.
- (3) Conservation engineering projects designed to reduce bycatch, including avoidance of post-release mortality, reduction of bycatch in high seas fisheries, and transfer of fishing technologies to other nations.
- (4) Projects for the identification of habitat areas of particular concern and for habitat conservation.
- (5) Projects designed to collect and compile economic and social data.

Research set-asides

Some councils utilize research set-asides (RSAs), which allocate a portion of a fishery's allowable catch to support cooperative research. RSAs can be allocated on an ad-hoc basis, or through a continual, targeted program. While more time consuming, established programs that engage the council and their associated advisory bodies in the RSA process facilitate the incorporation of funded research into the management process. For example, in several of their fisheries, the Pacific Fishery Management Council can choose to set aside a portion of the allowable harvest to support cooperative research conducted under exempted fishing permits (EFPs) during the annual catch limit (ACL) specifications processes for their respective fisheries. The New England Fishery Management Council administers two programmatic RSAs for scallops and herring. The RSA programs are guided by annual priorities, which are set collaboratively by scientists, managers and industry. Each year, a set amount or percentage of the allowable biological catch (ABC) is set aside to fund research. Researchers and their industry partners submit proposals, which undergo science and management review, including by the relevant plan team and research steering committee, prior to the full council vote. Selected proposals are allocated an amount of quota, the sale of which funds the research. One of the challenges with this approach is that the amount of funding translated by the RSA allocation depends on the market value for the fish; for example, in the herring RSA program, the low in-season value of the RSA allocation has resulted in limited funding.

Other federal funding opportunities

In addition to the funds administered by the NOAA Fisheries Cooperative Research Program through the regional science centers, federal funding for cooperative research is available through other federally administered programs, including:

- The Saltonstall-Kennedy Program (S-K) is a competitive grant program, that funds research and development projects that address a wide range of research needs to benefit participants in US fisheries, including harvesting, processing, marketing and associated infrastructure.

- The Bycatch Reduction Engineering Program (BREP) supports cooperative research between non-federal researchers and U.S. fishermen to develop technological devices and other conservation engineering changes designed to minimize bycatch, seabird interactions, bycatch mortality and post-release mortality in federally managed fisheries.

5. Innovation through exempted fishing permits

5.1. Definition and legal context

Exempted fishing permits (EFPs) are federal permits that authorize vessels to engage in fishing activity that would otherwise be prohibited under regulations and management plans (see text box). EFPs essentially grant exemptions from specific regulations to support a number of activities that may facilitate co-management and cooperative research. Activities conducted under the exemptions must remain consistent with the MSA and the goals of the respective management plan. NOAA Fisheries Regional Administrators or Directors have the authority for reviewing, approving and issuing EFPs, in accordance with the application process and criteria outlined in 50 CFR 600.745 Chapter VI Part 600 Subpart H. The process includes published notice in the Federal Register, notice to councils and other relevant management bodies, such as the U. S. Coast Guard, and affected state resource agencies. Analysis and additional consultations are also completed under relevant laws such as NEPA, ESA and MMPA. The agency is required to provide councils with a copy of relevant EFP applications and consult with the council as necessary. Councils can accept public testimony and discuss the permit applications at council meetings and provide comments and recommendations to the agency.

Code of Federal Regulations Title 50
Wildlife and Fisheries Chapter VI, Fishery Conservation and Management
National Oceanic and Atmospheric Administration, Department of Commerce
Part 600. Magnuson-Stevens Act Provisions
Subpart H. General Provisions for Domestic Fisheries

§600.745 Scientific research activity, exempted fishing, and exempted educational activity.

(b) *Exempted fishing*—(1) *General*. A NMFS Regional Administrator or Director may authorize, for limited testing, public display, data collection, exploratory fishing, compensation fishing, conservation engineering, health and safety surveys, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited. Exempted fishing may not be conducted unless authorized by an EFP issued by a Regional Administrator or Director in accordance with the criteria and procedures specified in this section. ... An EFP exempts a vessel only from those regulations specified in the EFP. All other applicable regulations remain in effect.

Within this national framework, the process for considering and approving EFPs is conducted regionally. The extent to which councils provide input in the permitting process varies by region and also with respect to the exemptions being requested in particular EFPs. Some councils have established specific processes to support their review of EFPs. For example, the New England Fishery Management Council uses a series of reviews to ensure that proposals will produce relevant information. A Research Steering Committee, comprised of council members, NOAA Fisheries science center and state resource department staff, and others performs the first review. The applicable FMP committee and then the full council review EFP applications, and provide comments. The Pacific Fishery Management Council also has a formalized process to coordinate solicitation, review and timing of EFP proposals, outlined in council operating procedures. This standardized approach allows the Council to prioritize EFP proposals based upon specific criteria and needs, leverage guidance from advisory bodies, and link the consideration of EFPs to their biennial specifications process. While the final decision for granting or denying EFPs rests with the NOAA Fisheries Regional Administrator, integrating EFP consideration within the council process can help link EFPs to specific management questions, and ensure the information can be used in decision-making.

5.2. Applications of EFPs

EFPs provide a platform for experimentation and learning. The knowledge gained from EFPs can support science and management efforts and provide valuable insights in how best to achieve fishery outcomes. They provide an avenue for innovation and allow fishermen to find practical solutions to problems and present managers with solutions. EFPs have been used to facilitate a number of explorations such as reducing bycatch and habitat impacts, testing gear modifications and improving data collection. EFPs can also support innovation and allow for the consideration and refinement of new management measures prior to the cumbersome regulatory process.

Co-management and cooperative research can also be facilitated through the use of EFPs. In the process of considering or developing co-management as a management approach, EFPs can provide an opportunity to test drive new management arrangement and provide information to evaluate their effectiveness and feasibility. Additionally, EFPs can inform how regulations should be written to implement new or innovative programs before committing specific requirements to regulations. EFPs also provide a good opportunity for collaborative problem-solving and cooperative research. Through the exemptions provided by EFPs, fishermen and scientists can collect important scientific information that would otherwise not be allowed. This has been particularly valuable where prohibitions on fishing have halted data streams.

5.3. Lessons learned

Experiences shared at the Forum highlighted a number of lessons learned and considerations that inform how and when EFPs might be an appropriate tool for supporting research and management.

1. Limited duration: EFPs are designed to provide short-term exemptions to specific regulations. When used consistently over several years, EFPs can become the de facto way of managing a fishery, which may not be consistent with the intent of EFP provision, or the terms outlined in the application and subsequent permit.
2. Timing of review: While the detailed processes used by some councils to solicit and consider EFPs can help promote management relevance, they can be time intensive. Conducting review by multiple council bodies and aligning with other council decisions such as ACL specification may extend the timeframe for EFPs months to years. This may deter some applicants from requesting EFPs and may reduce the relevance of the resulting information given time between the request and when data will be available.
3. EFPs can adapt: EFPs can enable managers to respond quickly to new information and changing conditions. They can provide a flexible tool for incorporating experience, and responding to new questions that need to be addressed.
4. Regulatory process alignment: Coordinating EFPs with the regulatory process can help derive additional benefits, and provide an avenue to integrate insight and experience. While this integration is optimal, it can be difficult to align these processes so that draft regulations inform the questions that need to be answered in EFPs and EFPs inform decisions on the regulations. This can add additional time to an already lengthy process.

6. Presentation summaries

The Forum agenda was structured around several discrete yet related topics, and relied heavily on the experience and insights presented by case study speakers. The following summaries outline some of the main points and themes from Forum presentations; video recordings and PDF versions are available on the [Fisheries Forum Information Network](#).

Introductory presentations

NOAA Fisheries working group and legal perspectives

Ms. Heather Sagar, Senior Policy Advisor, Office of Policy, NOAA Fisheries

Ms. Sagar described the goals of the NOAA Fisheries working group on co-management and cooperative research, shared insights on the concepts of co-management and cooperative research, and discussed relevant legal authorities. At the request of the

NOAA Leadership Council, an internal working group was formed to explore co-management and cooperative research. The working group is comprised of NOAA Fisheries staff from the regional offices, science centers, program offices and headquarters. The goal of the working group is to develop a white paper that summarizes the critical success factors of co-management and cooperative research for U.S. federal fisheries, document an inventory of examples, and identify best practices and challenges with the implementation of these approaches. The working group intends to develop a short summary of best practices, which once completed will be distributed publically.

As the working group began discussing these topics, they uncovered a number of different definitions for co-management and cooperative research, and acknowledged the challenging nature of these concepts and the nuances in how these approaches are applied. In translating these concepts into the context of U.S. fisheries, the working group identified a spectrum of co-management examples, such as the regional fishery management council process, management with states and federally recognized tribes and take reduction teams. To exemplify the frameworks that apply across this spectrum, Ms. Sagar provided an overview of the legal authorities relevant to co-management and cooperative research in the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Marine Mammal Protection Act (MMPA), and the Endangered Species Act (ESA).

Origins of co-management: Northwest Indian treaty tribes

Mr. Craig Bowhay, Fisheries Policy Analyst, Northwest Indian Fisheries Commission

Mr. Bowhay shared his experience with co-management among state and federal governments and the Northwest Indian treaty tribes. In the mid-1800s, treaties were established recognizing the rights of 20 treaty tribes in Western Washington to take fish at “usual and accustomed grounds and stations.” Despite these treaties, tribal rights were not recognized or upheld. After years of legal cases, the Boldt Decision in 1974 (*U.S. v. Washington*) reaffirmed the tribal treaty rights and defined how those rights would be recognized. This decision established the tribes as co-owners and co-managers of fishery resources, and defined tribal entitlement as 50% of all fishery resources that reside in or pass through the tribes’ usual and accustomed areas. Co-management, as outlined in the treaties and the Boldt Decision, is a point of law executed in accordance with a set of management criteria and a shared framework for how the different parties involved meet resource conservation and sustainability goals, and ensures all parties are afforded the opportunity to harvest their share of the resources.

The Boldt Decision gave each individual tribe the legal standing and authority to manage their resource allocation within their respective waters. To exercise this authority and engage as co-managers, each of the 20 tribes had to develop their own management programs and technical capacity to meet the specified requirements. To support the development of these capacities, the Northwest Indian Fisheries Commission (NWIFC) was established in 1976. As the tribes established individual management programs, NWIFC shifted from assisting with management plans to providing technical and policy support and leading habitat conservation and restoration efforts. Today, tribes are

involved in all aspects of research and management in their tribal jurisdictions, and the policy and technical capacity they bring has increased partnerships and collaborative research with their federal and state management partners.

Mr. Bowhay shared an example of how co-management has been operationalized for salmon management under the North of Falcon process. This process was established to address conservation and allocation issues, accommodate representation from each of the tribes and state governments involved in managing the resource, and align with the Pacific Fishery Management Council's management in federal waters. The North of Falcon process is a multi-phased and highly consultative process that allows participants to collectively evaluate resource and management options and build consensus on final management decisions. The success of the process requires commitment and trust among all parties, significant and focused effort to support a democratic process, joint planning and regular consultations, and a reliance on jointly developed goals and objectives to help focus difficult discussions.

Reflecting on his experience, Mr. Bowhay shared several lessons learned from co-management in the Pacific Northwest. Effective co-management requires all parties to share both responsibility and accountability and display a strong commitment to the process. Jointly developed goals, objectives and scientific standards create buy-in, and help to focus the co-management process on the policy issues at hand. Significant technical and policy capacity is needed to engage in co-management in a meaningful way; however, once established, this capacity can be leveraged and coordinated across partners. Co-management is not a static arrangement; the process and structure need to be flexible and allow for adaptation over time. Strong and enduring leadership is critical to support a cooperative approach and foster the evolution of the partnership.

Public-private partnerships in co-management

Salmon bycatch in the North Pacific pollock fishery

Ms. Sally Bibb, Deputy Assistant Regional Administrator, Alaska Regional Office, NOAA Fisheries

Ms. Bibb shared her experience managing salmon bycatch in the North Pacific through co-management arrangements. The North Pacific Fishery Management Council and NOAA Fisheries have been working to manage bycatch of Chinook and chum salmon in the pollock fishery since the 1990s. The initial use of time-area closures to reduce bycatch were ineffective given their static nature relative to the variable dynamics of salmon bycatch trends and the regulatory lag of incorporating new information and amending the closures. In the mid-2000s, the pollock industry initiated a voluntary "rolling hotspot" program where they identified and removed themselves from areas with high bycatch. The industry leveraged the private contracts they developed under the American Fisheries Act as a vehicle to take a larger role in management and implement the voluntary program. In response to the program's success, the Council exempted vessels participating in the voluntary program from the time-area closures through codifying the nature of the private contractual agreements. The fishery operated under

exempted fishing permits (EFPs) while the industry decided what critical details to include in the cooperative contracts, and the agency determined what requirements must be reflected in formal regulations.

In response to a subsequent rise in Chinook salmon bycatch, the Council adopted a bycatch cap, which included an incentive plan agreement (IPA). In exchange for entering into a contractual agreement to reduce bycatch in all situations of salmon and pollock abundance, participating vessels were given a higher bycatch cap. Learning from their experience with the voluntary hotspot program, the Council and agency included more general contract requirements to provide more flexibility and support the evolution of the program. The interplay between the measures to address Chinook bycatch (described above) and the regulations for chum salmon bycatch have prompted the Council to revisit the level of detail required for chum salmon under the voluntary rolling hot spot program. Ms. Bibb emphasized that these co-management arrangements have evolved over time; the programs' successes in achieving bycatch reduction goals resulted from continual evaluation and refinement, and the long-term commitment of all parties involved. Reflecting on the North Pacific's experience with co-management, Ms. Bibb noted the importance of well-defined and specific goals, clearly articulated roles and responsibilities for all parties involved, and flexibility to amend and gradually shift responsibilities as the program evolves.

Sector management in the New England groundfish fishery

Mr. Tom Nies, Executive Director, New England Fishery Management Council

Mr. Nies shared his experience with managing New England's groundfish fishery, and reflected on the co-management aspects of the sector program. In the early 2000s, the New England Fishery Management Council authorized fishery participants to form voluntary sectors as an alternative to some of the traditional and increasingly complex effort controls in place for the fishery. Sectors are essentially voluntary cooperatives, which are given significant control in determining how to allocate and fish their quota. In exchange for this flexibility, sectors are required to develop sector operations plans and comply with a suite of monitoring and reporting requirements. Initially, only two sectors took advantage of this provision. Faced with additional cuts in quota and the need to address bycatch issues, the industry expressed an increased interest in sectors. Based on the experiences of the first two sectors, the Council refined and expanded the guidance and requirements for sectors in 2010. The vast majority of the fishery now operates under sector management, and catch accounting in the fishery has significantly improved as a result of the accountability and reporting requirements.

The operations plans developed by each sector have proven to be a more nimble vehicle for adapting and responding to new challenges compared to the existing regulatory process. The organization of the fishery into cooperatives has also provided a platform for the industry to collectively address problems that arise. Despite these advantages, the sector program was not purposefully architected as a co-management program, and therefore has not realized many of the potential benefits. Roles and responsibilities between the Council, agency and industry were not well-defined, and communication

between the groups involved has been complicated and sometimes challenging. The effectiveness of the sector program has also been difficult to evaluate. The lack of clear, established goals and metrics for evaluating the program make it difficult to determine if sectors are meeting the broader management goals of the fishery. Data confidentiality issues and enforcement challenges have further complicated evaluation and purposeful refinement of the program.

Private-private partnerships in co-management

Bycatch risk pools in Pacific groundfish fisheries

Mr. Bob Dooley, Trawl Fisherman, Half Moon Bay, CA

Mr. Dooley shared his experience with cooperatives and risk pools in the Pacific whiting fishery. The idea to take an industry-led cooperative approach was driven by the challenge of constraining bycatch species that limit the sector's ability to harvest their full whiting quota each season. As the Pacific Fishery Management Council began developing the groundfish trawl rationalization program, the mothership sector requested, and the Council approved, a cooperative structure to address bycatch. In 2010, two industry groups formed a small team of committed leaders who worked swiftly to develop the legal and operational aspects of the program, and to ensure the entire sector was on board with the approach. The resulting plan involved several complex components to ensure accountability, transparency and flexibility.

The formation of a single cooperative entity allows industry members to enter into contractual agreements and incorporate collective and individual accountability through civil enforcement and penalty provisions. The cooperative agreements are updated every year and include the use of bycatch avoidance measures such as hot spot notifications, reporting and monitoring requirements, and four collective risk pools with respective allocations of bycatch and a suite of corresponding accountability measures. The program has been highly effective at reducing bycatch and improving utilization of target quota. Reflecting on the development of the program, Mr. Dooley noted that the Council's up-front articulation of the critical components that needed to be addressed in the cooperative agreements (e.g., bycatch reduction, annual reports, joint liability, etc.), and the back-and-forth dialogue between the Council, agency and industry were integral in helping the industry develop an effective program.

Following the implementation of the mothership whiting risk pool, the shoreside whiting fishery, which operates under an individual transferable quota (ITQ) program, followed suit and developed a risk pool for their sector of the fishery. While the process for developing the risk pool was similar, the goals were distinctive. Participants in the shoreside whiting fishery are allocated ITQs for target and bycatch stocks, which can be traded among ITQ holders. The small allocations of individual bycatch quota and the dynamics of bycatch ITQ markets proved constraining for individual fishermen. As a result, some sector members developed an insurance-based risk pool, whereby members could pool their quota to cover overages granted they abide by bycatch avoidance requirements. Both the shoreside and mothership whiting risk pools exemplify how

industry can develop and fund programs that help the Council and agency achieve their established goals through innovation rather than overly prescriptive regulations.

Bycatch avoidance networks in Mid-Atlantic and New England fisheries

Dr. Cate O’Keefe, Research Associate, University of Massachusetts - Dartmouth, School for Marine Science and Technology (SMAST)

Dr. O’Keefe discussed the evolution and use of bycatch avoidance networks in the Northeast and shared her experience with co-management programs. Yellowtail flounder are caught incidentally in the sea scallop fishery; bycatch caps have historically limited prosecution and occasionally resulted in closure of the fishery. Scallops are a high value fishery and the economic loss created by these closures provided a strong incentive to address bycatch issues. In 2010, SMAST formed a partnership with the scallop industry to develop a real-time communication system to provide timely, useful information to avoid yellowtail flounder. Participating fishermen report target catch and bycatch every 24 hours, and SMAST researchers compile that information and distribute advisories that highlight areas of high, medium and low bycatch rates. The near real-time nature of the program has allowed individual vessels and the fleet as a whole to change their behavior, and has significantly improved utilization of the scallop quota. Since its inception, the network has expanded in both participation and scope; about 70% of the industry now participates in the program, and the geographic scale has expanded across Georges Bank and into southern New England. While the network was initially developed in response to a crisis, it now incorporates a new bycatch species in an effort to proactively address emerging challenges. The program is funded by a combination of the scallop research set-aside administered by the New England Fishery Management Council (NEFMC) and by industry donations.

To address bycatch of depleted river herring stocks in the Atlantic herring and Atlantic mackerel mid-water trawl fishery, a similar partnership was developed. Voluntary vessel reports and state port sampling data allow SMAST to develop real-time bycatch avoidance grids, which the fleet has used to avoid high bycatch areas. The mid-water trawl program has evolved over time through improving the timeliness and resolution of data and leveraging technological tools to improve data submission. In addition to funding from the NEFMC research set-aside for herring, the program is also supported through two external grants provided by non-profit organizations.

While the scallop and herring programs are conceptually very similar, they are applied very differently to address the specific nature of the target and bycatch stocks and the distribution and dynamics of the fleets. Both programs have been effective in reducing bycatch through changing behavior and leveraging low cost, real-time data collected by the industry. Communication and trust have allowed these projects to expand and evolve over time.

Community co-management

American Samoa's Community-Based Fisheries Management Program (CFMP)

Dr. Domingo Ochavillo, Chief Fisheries Biologist, American Samoa Department of Marine and Wildlife Resources

Dr. Ochavillo discussed the Community Based Fishery Management Program (CFMP) in American Samoa, administered through the Department of Marine and Wildlife Resources (DMWR). Established in 2001, the CFMP leverages a bottom-up approach to management through engaging local villages in managing their resources. Participating villages sign cooperative agreements with DMWR that outline their role and responsibilities in the CFMP program. Working with DMWR, the villages develop fishery management plans that identify management measures (e.g., marine protected areas, catch limits, fishing seasons, etc.) they think are appropriate for their village and resources. The program provides a legislative pathway for the resulting village by-laws, and deputizes village representatives to enforce these laws. DMWR provides continuing support to participating villages through technical expertise and outreach and education, including training on law enforcement and coral reef monitoring.

There are currently 11 villages participating in the program. The CFMP has been successful at enhancing community participation and co-management through recognizing and leveraging traditional knowledge and customary laws. Looking forward, DMWR plans to improve the program's use of marine protected areas by helping villages better articulate their objectives, identify and recognize villages and leaders who have been successful, and formally evaluate the effectiveness of marine protected areas (MPAs) as a management tool. Improvements in education and outreach can also help village members understand decisions and management measures, address enforcement challenges, and enhance capacity for villages to lead monitoring efforts.

Lessons learned from community co-management in the Western Pacific

Dr. Arielle Levine, Assistant Professor, Department of Geography, San Diego State University

Dr. Arielle Levine provided insights into the factors that contribute to community co-management success, and highlighted lessons learned from two examples in the Western Pacific. Community fisheries co-management involves a partnership between communities and government agencies in creating and sustaining systems for local marine resource management. While this form of co-management can lead to sustainable resource management outcomes and improve livelihoods of local communities, community co-management faces a number of political, social, economic, ecological and logistical challenges. Drawing on peer reviewed literature, Dr. Levine shared a number of attributes, design principles and contextual factors that contribute to the success of these programs. One of the studies referenced was a meta-analysis of fisheries co-management regimes, which found that strong leadership has the biggest influence on success of co-management arrangements.

Dr. Levine described two programs, the Community-based Subsistence Fisheries Area (CBSFA) legislation in Hawaii, and the Community-based Fishery Management Program (CFMP) in American Samoa. While both programs aim to improve resource management by strengthening community involvement through leveraging traditional management and co-management with local governments, the two programs have resulted in quite different outcomes. Dr. Levine highlighted several factors that explain why the CFMP program has been successful while the CBSFA program has not yet realized its potential. Both programs look to empower native/local communities to manage their resources. However, the community cohesion, structure, and social institutions necessary to support co-management at this level have remained largely intact in American Samoa, while traditional communities have been disrupted in Hawaii as a result of the state's ethnic and cultural diversity and integration into the global economy. Similarly, both programs aim to strengthen traditional natural resource management, though traditional practices and resource access rights are more difficult to integrate into Hawaii's current legal framework, economy and resource demands. In addition to the structure and dynamics of the communities involved, the level of support, investment and capacity of local governments and agencies also vary. The Department of Marine and Wildlife Resources (DMWR) in American Samoa has provided significant technical, logistical and policy support, and dedicated time and resources to support the continuing implementation of the program. DMWR has also adapted their program and supporting institutional frameworks to meet the needs of the villages as they arise. These factors, among others, have influenced the outcomes of these two programs and are important considerations for constructing successful community co-management arrangements.

Innovation and proof of concept through exempted fishing permits

Electronic monitoring in the Pacific groundfish ITQ fishery

Ms. Dorothy Lowman, Chair, Pacific Fishery Management Council

Ms. Lowman discussed the Pacific Fishery Management Council's exempted fishing permit (EFP) process, and how EFPs are being used to explore electronic monitoring (EM) in the groundfish fishery. The Council views EFPs as a tool to inform management decisions, and employs a formal process to coordinate the solicitation, review and timing of EFP proposals. This standardized approach allows the Council to prioritize EFP proposals based upon specific criteria and needs, leverage guidance from advisory bodies, and link the consideration of EFPs to their biennial specifications process. Through this process, the Council vets and recommends proposals to NOAA Fisheries; while the agency officially reviews and approves EFPs, they give weight to the Council's recommendation.

The Council has a history of using EFPs to address monitoring concerns in the groundfish fishery. EFPs were used in the Pacific whiting fishery to allow the industry to land unsorted catch, and then to explore the feasibility of EM to monitor full retention requirements. Through conducting these EFPs within the Council's formalized process, valuable insights were gained that allowed for the EM EFPs to evolve over time and adapt in response to what was learned. While EM has not been implemented in the

Pacific whiting fishery, the Council is now considering regulations to allow EM for all groundfish sectors to alleviate some of the costs and operational constraints associated with providing full observer coverage of the fleet. Through the regulatory process, the Council identified a number of questions and issues with EM implementation, and considered out-of-cycle EFP proposals to help resolve some feasibility and operational considerations. The benefits and limitations with leveraging these EFPs to inform the design of the groundfish EM program has prompted the Council to consider the relationship between the EFPs and the regulatory process. For example, what regulatory decisions could be made now to inform the design of EFPs, and what decisions should be made in light of information gained from the EFPs. The long time horizon of developing, implementing and amending regulations, also raises questions about how best to align the timing of EFPs with the regulatory process. Despite the challenges in leveraging EFPs within this process, the Council's experience highlights the opportunity EFPs provide for collaborative research and problem-solving.

Reducing habitat impacts in the North Pacific flatfish fishery

Mr. John Gauvin, Fisheries Research Projects Director, Alaska Seafood Cooperative

Mr. Gauvin shared his experience conducting a series of cooperative research projects with the Bearing Sea flatfish fishery. In 2005, as the North Pacific Fishery Management Council was considering ways to address habitat impacts from the flatfish fishery, the industry asked the Council to consider gear modifications in the form of elevated sweep cables as an alternative to traditional closed areas. In order to support the Council in considering this alternative, the industry engaged in a number of projects to address a) the impacts of the new gear on target catch rates, b) its effectiveness at reducing habitat impacts, c) whether the modifications were practicable and d) how they could be enforced. Facilitated through an EFP, the Alaska Seafood Cooperative (AKSC) tested conventional and modified sweeps in tandem, demonstrating no significant reduction in flatfish catches. Next, the flatfish fishery partnered with the Alaska Fisheries Science Center to explore reductions in habitat impacts from the modified sweeps. Authorized through a scientific research permit (SRP), the research was conducted in close collaboration with industry to ensure study tows were representative of actual fishing activities. Additional industry research helped refine bobbin size and spacing to achieve desired clearance above the seafloor. Finally, a letter of authorization (LOA) was issued to allow AKSC to demonstrate use of the new gear out of season to enforcement officials and regulators.

The results from the cooperative research allowed the Council to evaluate the effectiveness of the gear modifications in meeting their habitat objectives, and the sweep modifications were adopted in regulations as a result. The use of EFPs, SRPs and LOAs allowed for several different arrangements to answer different research questions and engage with the appropriate partners at each step. The collaborative approach facilitated the industry's sustained engagement and allowed for the development of an effective and practical solution that worked for both the industry and managers.

Cooperative research in practice

Cooperative research overview

Dr. Suzanne Kohin, Highly Migratory Species Biology, Survey and Data Management Programs Leader, Fisheries Resources Division, Southwest Fisheries Science Center, NOAA Fisheries

Dr. Kohin provided the group with an overview of cooperative research arrangements, highlighted federal funding opportunities, and discussed the role of NOAA's Cooperative Research Working Group (CRWG). Cooperative research has been defined in a number of ways, and can leverage the experience and expertise of scientists, fishermen, and other partners through different arrangements and activities. In its most ideal form, cooperative research engages all parties in all stages of research (e.g., design, data collection, analysis and communicating results), leverages resources and funding, builds relationships and trust, and produces information that is effectively incorporated into assessments and management decisions.

The CRWG was established in 2001 to meet the requirements of the cooperative research program authorized under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (Section 318). The group is comprised of 14 members including NOAA Fisheries employees from the science centers and regional offices, Office of Protected Resources, Highly Migratory Species Division, and Office of Habitat Conservation, the Bycatch Reduction Engineering Program (BREP), and one national coordinator located at NOAA Fisheries Headquarters. As outlined in their terms of reference, responsibilities of the CRWG include:

- Providing national coordination and oversight for cooperative research projects;
- Developing funding allocations, including coordination of a competitive award process;
- Coordinating policy development;
- Enhancing communication; and
- Conducting outreach activities.

To support the implementation of the national cooperative research program, the CRWG administers a budget of over \$10 million per year. Of these funds, \$1.5 million supports a national award program that provides funding for cooperative research programs led by NOAA scientists through a competitive granting process. Each regional science center is also allocated approximately \$700k to support cooperative research in their region. Additional funds are allocated to the Northeast and Southeast Science Centers to support ongoing cooperative research programs and activities. The regional allocation of funding allows each region to administer their apportionment according to their own priorities. These priorities are region-specific, but place emphasis on addressing stakeholder needs and requests, research or management priorities, and alignment with science center strategic plans and MSA requirements. In addition to funding administered through the national program, the CRWG also assists in coordinating cooperative research funded through the BREP and Saltonstall-Kennedy (S-K) Programs.

Blueline tilefish EFP

Dr. Brian Chevront, Fishery Economist, South Atlantic Fishery Management Council

Dr. Chevront shared his experience executing a cooperative research project in the blueline tilefish fishery. To reduce bycatch of two overfished stocks (speckled hind and warsaw grouper), the South Atlantic Fishery Management Council closed a large portion of their EEZ to bottom fishing and prohibited possession or harvest of deepwater snapper grouper species, including blueline tilefish. Fishermen in the blueline tilefish fishery approached the North Carolina Division of Marine Fisheries (NC DMF) requesting the opportunity to prove, as state trip tickets and federal logbooks indicated, that the two overfished stocks were not present in the region where the blueline tilefish fishery is prosecuted. Working together, fishermen, NC DMF managers and staff at the NOAA Fisheries Southeast Regional Office (SERO) engaged in an iterative process to develop and execute an exempted fishing permit (EFP) to explore this question. The resulting data showed speckled hind and warsaw grouper were not present, contributed biological information to support stock assessments, and provided management-relevant insights to the Council regarding the deepwater closure.

Integral to the success of the EFP was the commitment of all parties involved. NC DMF played a central role, negotiating the terms with fisherman and NOAA Fisheries, coordinating and funding observer coverage through the state's existing observer program, and bringing legitimacy to the cooperative research project. NOAA Fisheries supported NC DMF in developing the EFP, and moved the permit through the process swiftly. Leadership within the blueline tilefish fishery was also critical to organize fishery participants, engage with state and federal managers, coordinate the EFP and comply with the increased monitoring and reporting requirements.

Scallop research set-aside survey

Dr. Cate O'Keefe, Research Associate, University of Massachusetts - Dartmouth, School for Marine Science and Technology (SMAST)

Dr. O'Keefe discussed the role of cooperative research in supporting management of the Northeast sea scallop fishery. In the mid 1990s, the sea scallop resource was deemed overfished and effort was restricted through direct management controls as well as the closure of several large areas to protect depleted groundfish stocks. Biomass of scallops increased dramatically in the closed areas, prompting the first cooperative survey in Georges Bank with SMAST, NOAA Fisheries and the scallop industry. The survey confirmed high abundance of scallops and highlighted the need for additional fine-scale research. The resulting video survey was designed to provide a cooperative, inexpensive and non-invasive platform for collecting spatially explicit data that could be incorporated into existing data streams and inform management. The survey has broadened in scale and scope since 1999, and now produces size and abundance data for the resource, which is combined with other existing surveys to produce annual harvestable biomass estimates. In addition, the survey has evolved to contribute information to stock assessments, support habitat decisions and explore specific questions relevant to the industry and managers.

The scallop industry has been heavily involved in the design, development and execution of the cooperative research surveys, including donations of money, crew, and vessel time. In addition to industry donations, the survey is supported through a research set-aside (RSA) program, where a portion of the acceptable biological catch (ABC) is allocated to support cooperative research. The RSA program is guided by annual priorities, which are set collaboratively by scientists, managers and industry. Over time, the survey has built cooperative relationships with industry members, and increased buy-in of both positive and negative results. Improved collaboration with NOAA Fisheries has resulted in more robust survey methods, increased acceptance of survey results, and better incorporation of survey outputs into the management process. The sea scallop cooperative research program has grown in participation and scale over the years and plays an important role in supporting a strong, well-managed resource and an economically viable industry.