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Outcomes of the West Coast Groundfish Trawl Catch Share Program: The First Five Years

Lisa Pfeiffer

Fisheries Resource Analysis and Monitoring, Northwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Seattle, Washington, USA

In fisheries, catch limits are commonly implemented to keep harvests within sustainable levels. Without complementary incentive-based policies, however, overcapitalization (i.e., an excess of fishing vessels and harvesting capacity) may result. Overcapitalization can lead to a range of problems such as overfishing, low profitability, high discard rates, derby-style competition, and environmental degradation. *Catch shares* are a fishery management tool designed to address these problems in which individuals, cooperatives, communities, or other entities are allocated a secure portion of total allowable fishing catch. Catch share programs have been implemented in fisheries around the world to meet a suite of economic and biological goals, including ensuring annual catch limits are not exceeded, reducing the costs to produce seafood, reducing market gluts and increasing dockside prices, extending fishing seasons, reducing bycatch, and improving fishermen's safety.¹ To date, 16 catch share programs have been implemented in the U.S., and many others have been enacted internationally.

This issue focuses on evaluating outcomes of one particular catch share program: the West Coast Groundfish Trawl Catch Share Program. The program is unique in that the data available for analysis have great breadth as the result of mandatory and voluntary data collections, including pre-implementation “baseline” data collections. These data collections support routine program management in addition to the wide range of analyses included in this special issue. The data enable in-depth analysis of the performance of the program against its stated goals and objectives and are critical to support successful long-term management. The data include full catch accounting, mandatory cost and earnings data from harvesters and fish processors, full at-sea observer (and/or electronic monitoring) coverage, and a multi-year coast-wide social survey that has tracked evolving perspectives and social impacts related to the transition to catch share management. The West Coast Groundfish Trawl Catch Share Program is one of the first catch share programs designed with reference to emerging U.S. national catch share policy, which was developed to help standardize the design and evaluation of new programs (Morrison 2017a). The program is also one of the first to be evaluated in accordance with the national guidance (Morrison 2017b) as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA, 16 U.S.C. 1853a).

While collectively the papers included in this issue may be considered a “case study”, they are of broad interest to policymakers as they provide advice and lessons that can

be applied to fishery management programs around the world. The papers in this special issue may serve as a model for policy-makers to understand how different types of data collection programs can be useful, how they can be implemented, and what performance metrics and social indicators should be calculated and tracked over time to evaluate a broad suite of topics or problems of interest.

The West Coast Groundfish Trawl Catch Share Program was ambitiously designed and its provisions underwent extensive *ex-ante* evaluations (PFMC and NMFS 2010). Managers attempted to balance economic, social, and environmental objectives, which they recognized would require tradeoffs between not-necessarily complementary goals. The goal of the West Coast Groundfish Trawl Catch Share Program was to:

Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.

The goal is supported by the following *objectives*:

- Provide a mechanism for total catch accounting.
- Provide for a viable, profitable, and efficient groundfish fishery.
- Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.
- Increase operational flexibility.
- Minimize adverse effects from an individual fishing quota (IFQ) program on fishing communities and other fisheries to the extent practical.
- Promote measurable economic and employment benefits through the seafood catching, processing, distribution elements, and support sectors of the industry.
- Provide quality product for the consumer.
- Increase safety in the fishery.

The above goal and objectives should be achieved subject to the following *constraints and guiding principles*:

- Take into account the biological structure of the stocks including, but not limited to, populations and genetics.
- Take into account the need to ensure that the total optimum yield and allowable biological catch are not exceeded.
- Minimize negative impacts resulting from localized concentrations of fishing effort.
- Account for total groundfish mortality.
- Avoid provisions where the primary intent is a change in the marketing power balance between the harvesting and processing sectors.
- Avoid excessive quota concentration.
- Provide efficient and effective monitoring and enforcement.
- Design a responsive mechanism for program review, evaluation, and modification.
- Take into account the management and administrative costs of implementing and overseeing the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and Federal resources available.

(PFMC and NMFS 2010: 5)

The Fishery Management Plan for the West Coast Groundfish Trawl Fishery covers over 90 species of rockfish, flatfish, and roundfish, and has a complex past leading up to the implementation of catch shares (Warlick, Steiner, and Guldin 2018). Management has sought to resolve two persistent problems: high amounts of discards and overcapacity. Throughout the 1980s and 1990s, the fishery was facing declining harvests as a result of

what is now recognized as overfishing (PFMC 2016). In 1992, a license-limitation program was implemented to address overcapacity and monthly and bi-monthly landing limits became standard to control effort. Despite this shift in management, between 1999 and 2002, nine species of groundfish were declared overfished, and the fishery was declared an economic disaster in 2000 (NOAA 2000). A federal buyback program in 2003 further reduced the size of the fleet, and fishery managers implemented rebuilding plans that drastically reduced landings limits and included a variety of effort control mechanisms (closed areas dubbed “Rockfish Conservation Areas” and reductions in daily, weekly, monthly, and bimonthly landings limits). These effort control mechanisms were time-consuming for managers and costly for harvesters; harvesters had to keep track of ever-changing species, gear, area, and season-specific limits, and the ability to target healthy stocks was restricted by low limits for co-occurring overfished stocks. This complex management arrangement created the incentive to discard any portion of the catch that exceeded individual species limits in order to continue fishing for other species. Unsurprisingly, discards were extremely high: from 2004 to 2010, an annual average of 5000 metric tons (one-fifth of total catch) of targeted stocks were discarded (Somers et al., 2018).

The West Coast Groundfish Trawl Catch Share Program was implemented in 2011 and covers the four sectors of the fishery: catcher-processors, motherships, catcher-vessels (both shoreside and at-sea), and shore-based processors. At-sea motherships (including at-sea catcher vessels) formed a cooperative, and the shoreside catcher vessel fleet were allocated individual (tradeable) quotas based mainly on their historical participation in the fishery. Catcher-processors were already operating as a cooperative at the onset of the program, and are not a primary focus of this issue. Catcher-processors, motherships, and at-sea catcher vessels primarily target Pacific whiting, whereas shoreside vessels target a variety of groundfish species in addition to Pacific whiting, such as sablefish, Dover sole, rockfish, Petrale sole, and lingcod.

This issue provides a rare opportunity to view the outcomes of a catch share program holistically. Catch share programs are typically designed to meet a suite of economic and biological goals for fisheries, including economic and environmental sustainability. However, as catch share programs limit access to the fishery, they may also change the nature of fishing and impact the culture of fishing communities. This issue represents collection of evaluation efforts grounded in social science theory that address economic, social, environmental, and program management goals and objectives.

In addition, this catch share program is among the first truly multispecies catch share programs to be extensively evaluated in the literature. The program manages over 90 species across the West Coast, and high rates of bycatch and discards of several overfished species helped to catalyze the implementation of the catch share program. The program dis-incentivized discarding through requirements that vessels cover all catches with quota, or cease fishing. The lessons learned from evaluating a catch share program in a multispecies fishery advance the theoretical literature, which has generally been of limited value to complex, real-world multispecies fisheries. Evaluations of the *post hoc* performance of catch share programs are therefore of great academic and policy interest.

The six papers in this special issue illustrate a range of questions and topics. Unifying these papers are three central questions: First, did the catch share program

meet its stated goals? Second, were outcomes consistent with expectations? Goals were explicitly outlined in the Fishery Management Plan amendment in which the program was adopted. Expectations come from a variety of sources including previous theoretical work and empirical evidence from other catch share programs. Finally, what lessons can be drawn for the development of future catch share programs in other fisheries?

The first two papers evaluate the program from an economics context, including net economic benefits, profitability, flexibility, and the utilization of harvest allocations (Errend et al. 2018, Guldin et al. 2010). A unique component of the program was mandatory cost and earnings data collection (“Economic Data Collection”) from all catch share participants, which makes such evaluation possible. “Economic Outcomes for Harvesters under the West Coast Groundfish Trawl Catch Share Program: Have Goals and Objectives Been Met?” examines a range of economic outcomes specific to the harvesting sector. This was the first program to administer full data collection from fish processors, which allows theoretical questions about the impacts of catch shares management on entities that purchase and process catch share fish to be empirically investigated. These findings are included in the second paper, “Shore-based Processor Outcomes under Catch Shares”. Together, the two papers find consolidation has occurred in both the vessel and processor sectors, with the greatest consolidation happening in the vessel sector. This consolidation, as well as the flexibility in fishing decisions afforded by the catch share program, has increased vessel profitability, although the distribution of outcomes is large. Processors have experienced fewer gains; the benefits from vessel flexibility may be realized as a cost (or at least, an adjustment cost) for processors. Processors equipped for small amounts of groundfish landings spread throughout the year (a result of the trip-limit system) must adjust to the less-steady flow of landings under catch shares. Processors have described this as a marketing challenge as well. Net economic benefits across all sectors of the fishery are analyzed in the first paper, and the analysis suggests substantial progress toward the goal of “increasing net economic benefits”; net benefits approximately doubled from the baseline period.

The third paper, “Adapting to Catch Shares: Perspectives of West Coast Groundfish Trawl Participants” explores the challenges and opportunities of the catch share program through the perspective of fishery participants, and discusses the ways in which fishery participants have been adapting to the catch share program (Russell et al. 2018). Qualitative and quantitative survey data are used to explore the use of quota leasing strategies, fishery diversification, gear innovation, and community quota funds as adaptation strategies for the new challenges facing harvesters under a catch share program. Fishermen have struggled with the financial cost of full observer coverage as well as the incongruence between the central values of freedom and independence in commercial fishing culture and the intensely monitored work environment under the catch share program. However, fishermen also expressed appreciation for certain aspects of the program including the increased flexibility to participate in other fisheries, experiment with alternative gear types, or lease quota in order to retire.

The fourth paper, “Using Incentives to Reduce Bycatch and Discarding: Results Under the West Coast Catch Share Program” describes the benefits of full catch monitoring and the shift from landings limits to individual catch limits (Somers et al. 2018). The authors

found that discard amounts decreased over time for all species and declined to historic lows after the implementation of the catch share program, with much less inter-annual variability. Mean annual discards of two highly-targeted quota species, sablefish and Dover sole, showed the greatest decreases, falling by 97% and 86%, respectively. The proportion of overfished quota species discarded fell by 50% on average. This paper documents unambiguous achievement of the goal and objectives to “consider environmental impacts and achieve individual accountability of catch and bycatch” and “Promote practices that reduce bycatch and discard mortality and minimize ecological impacts” by establishing policies that “Take into account the need to ensure that the total optimum yield and allowable biological catch are not exceeded,” “Account for total groundfish mortality,” and “Provide efficient and effective monitoring and enforcement” (PFMC and NMFS 2010). Both this paper and the third paper, “Adapting to Catch Shares: Perspectives of West Coast Groundfish Trawl Participants”, describe a variety of gear modification strategies that participants have found value in adopting to avoid unwanted catch.

The fifth paper, “Implementation challenges for quota set-asides: Policy analysis to inform fisheries management decision-making” describes a quota set-aside program known as the “Adaptive Management Program” that was included as a provision in the catch share program (Nayani and Warlick 2018). The reserved quota was meant to serve as an insurance policy during the substantial changes that were expected to occur under the new management regime. The authors describe, however, how this program has not yet been fully developed. The built-in delay in decision-making and the controversial nature of allocating quota have contributed to the continuous pass-through of this quota to harvesters. The authors propose and analyze a decision-making scoring framework for evaluating tradeoffs between potential alternative uses of the quota set-aside, which could serve as an example for this and other programs with multiple competing objectives.

Finally, the sixth paper in this special issue, “Crew in the West Coast groundfish catch share program: changes in compensation and job satisfaction” explores the impacts of the catch share program on fishing vessel crew—an integral yet often overlooked component of any fishery (Steiner et al. 2018). This interdisciplinary paper draws from cost-earnings and social survey data to explore measures of crew wages and well-being through the transition to catch shares. The authors find increases in daily and annual crew wages, higher pay satisfaction, and high (but not increasing) job satisfaction following catch shares, but a relatively small proportion of crew expressed support for the catch share program. This suggests that job satisfaction and support for the program are likely influenced by other factors in addition to compensation.

Conclusions

The collection of papers in this special issue advance coastal management by detailing how theoretical expectations contributed to the design of a multispecies catch share program and how a range of data collection efforts support empirical evaluations of an economically important fishery. Such thorough policy assessment sets an example for future policy-making, particularly for complex multi-species fisheries.

Specifically, these papers support a growing body of evidence that catch share programs are effective tools for improving economic conditions through reducing excess capacity, increasing profits for remaining participants, and eliminating derby conditions, while concurrently improving ecological conditions and scientific certainty by reducing bycatch and discards. However, more complex and even competing goals have proved more difficult to evaluate. For example, it is unclear how to balance the goals of increasing net benefits and profitability with the objective of minimizing adverse impacts on participants and communities because the primary source of both is consolidation (Errend et al. 2018, Russell, Van Oostenburg, and Vizek 2018 and Steiner et al. 2018). Similarly, the goal of full utilization may compete with the goal of increasing operational flexibility; the flexibility of individual harvesters and processors to make the decisions that maximize individual profits may result in less-than-full utilization of the quota (Errend et al. 2018, Guldin et al. 2018). The framework for evaluating options that involve tradeoffs and multiple sources of costs and benefits provided by Nayani and Warlick (2018) may be helpful in making these difficult decisions.

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Disclosure statement

No potential conflict of interest was reported by the author.

Note

1. <https://www.fisheries.noaa.gov/insight/catch-shares>.

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