

Direct marketing strategies: The rise of community supported fishery programs [☆]

Ayeisha Brinson ^{*}, Min-Yang Lee, Barbara Rountree

NOAA Fisheries, Northeast Fisheries Science Center, Social Sciences Branch, 166 Water Street, Woods Hole, MA 02543, USA

ARTICLE INFO

Article history:

Received 10 November 2010

Accepted 19 January 2011

Keywords:

Community Supported Fisheries

Direct marketing

Commercial fisheries

Local food

Sustainable seafood

ABSTRACT

Community Supported Fishery (CSF) Programs are arrangements between fishermen and consumers where consumers provide upfront payments to fishermen in exchange for scheduled seafood deliveries. They are modeled after the popular Community Supported Agriculture Programs, a form of direct-to-consumer-marketing in which a group of individuals support a farm. There are multiple market and non-market benefits from these programs. Fishermen receive higher prices for fish, are guaranteed a stable income, and can activate political and regulatory support through direct interaction with consumers. Consumers are provided with access to high-quality novel types of fish and benefit from interactions with the producers of their food. CSFs have frequently collaborated with non-governmental organizations to address the challenges associated with these programs. Under the catch share system in the Northeast US groundfish fishery, sectors may be well-positioned to implement a CSF. Direct marketing through a CSF is not likely to completely replace traditional markets for fishermen, but can be a valuable supplement to their operations.

Published by Elsevier Ltd.

1. Introduction

Community Supported Fisheries (CSFs) are a relatively new and innovative program modeled after Community Supported Agriculture (CSA) Programs. CSFs are a form of direct marketing in which consumers provide upfront payments to fishermen in exchange for scheduled seafood deliveries. As of October 2010, there were thirteen CSFs in existence: 10 in the Northeast United States, two CSFs in North Carolina, and one CSF in Nova Scotia, as listed in [Table 1](#). This research chronicles the growth and experiences of CSF programs in the US based on interviews with CSF fishermen and coordinators. The main goals of the CSF model are to increase profits for the local fishermen, provide high-quality seafood to interested consumers, and directly engage consumers using fishery products. This research describes CSAs and their similarities with CSF programs, examines the advantages and challenges facing CSFs, and identifies the implications of CSFs for US fisheries policy and management.

This research responds to growing public interest in local and sustainable food, particularly seafood [1,2]. In-person or phone interviews were conducted with representatives from seven CSFs

[☆] Any opinions, findings, and conclusions or recommendations expressed in this article are those of the authors and do not necessarily reflect the views of NOAA Fisheries.

^{*} Corresponding author. Tel.: +1 508 495 2007; fax: +1 508 495 2054.
E-mail address: ayeisha.brinson@noaa.gov (A. Brinson).

on the US East Coast ([Table 1](#)). The interviews examined CSF program details, advantages, and challenges.

CSFs share many operational similarities; however, their seafood products vary based on location, catch, season, regulations, and product type (whole versus fillet) offered to consumers. Some CSFs offer shareholders a 'basket' of variable seafood products while others specialize in specific species such as Northern shrimp or American lobster. In the Northeast, the products sold through CSFs include groundfish (which may include species such as American plaice, witch flounder, haddock, pollock, cod, redfish, and hake), monkfish, crab meat, squid, and cooked lobster. The North Carolina CSFs sell shellfish (blue crab, oysters, and clams) and also provide many finfish, such as black sea bass, kingfish, mackerels, groupers, snappers, and dolphinfish.

1.1. Fishery management regulations

Sea scallops and American lobster are the most valuable fisheries in the Northeast United States; however, the groundfish fishery has particular historical significance. It played a major role in the development of commerce, trade, and society in New England. In 2009, landings of cod, haddock, and yellowtail flounder were worth \$25, \$14, and \$5 million, respectively. The 19 stocks of groundfish are jointly managed under the Northeast Multispecies Fishery Management Plan because they are often harvested together: fishermen have imperfect control over the composition of their catch [3,4,5]. As of 2007, 11 of the 19

Table 1
Community Supported Fisheries, location and cooperating partners in the US and Canada.

Name	Location	Start	Species	Partners
Port Clyde Fresh Catch	Port Clyde, ME	2007	Shrimp, groundfish	Island Institute, Midcoast Fishermen's Association
Cape Ann Fresh Catch	Gloucester, MA	2009	Groundfish	NAMA ^a , GFWCA ^b , MIT Sea Grant, Turner's Seafood
Community Fish	Stonington and Mount Desert Island, ME	2009	Shrimp, groundfish	Penobscot East
Eastman's Local Catch	Seabrook, NH	2009	Groundfish	NAMA
Hannah Jo ^c	Portland, ME	2009	Groundfish	NAMA
Maple Ridge Farm and Fishery	Yarmouth/Portland, ME	2009	Lobster and scallops	NAMA
Walking Fish	Beaufort/Durham, NC	2009	Mixed finfish and shellfish	Duke University, NC Sea Grant, Carteret Catch
Yankee Fishermen's Cooperative	Seabrook Harbor, NH	2009	Shrimp and groundfish	NH Sea Grant
Cape Cod Commercial Hook Fishermen's Association ^d	Chatham, MA	2010	Groundfish, scallops, lobster	USDA, Cape Cod EDA ^e , Buy Fresh Buy Local Cape Cod
Cape Cod Weir Harvest	Chatham, MA	2010	Whole groundfish	NAMA
Core Sound Seafood	Chapel Hill/Raleigh, NC	2010		
Linda Kate Lobster Coop	Falmouth, ME		Lobster	NAMA
Off the Hook	Halifax, Nova Scotia	2010	Groundfish	Ecology Action Center, Nova Scotia Dept. of Fisheries
Revolutionary fish	New Bedford, MA	2010	Scallop, groundfish	

^a Northwest Atlantic Marine Alliance.

^b Gloucester Fishermen's Wives Association.

^c The Hannah Jo CSF disbanded after one season.

^d The Cape Cod Commercial Hook Fishermen's Association CSF is a pilot program for Fall 2010.

^e Economic Development Association.

groundfish stocks were classified as overfished and experiencing overfishing [6]. The Northeast groundfish fishery has undergone many changes throughout the history of fisheries management, particularly in terms of regulations and catch profitability. Prior to May 1, 2010, the primary management tool was an input control, Days-at-Sea (DAS) under which fishermen were allocated a maximum number of fishing days. In addition, rolling area closures, gear restrictions, and trip limits were used to manage catch in this fishery. A catch share management system was implemented to replace Days-at-Sea management in the groundfish fishery. Seventeen self-organized sectors were created and allocated a transferable group quota; vessels not affiliated with a sector are managed under DAS coupled with a strict limit on total catch.

The Northern shrimp fishery is managed by a mix of input and output controls, including size limits, trip limits, and Total Allowable Catch. Currently, the shrimp stock is healthy, with no evidence of overfishing, allowing a 180-day winter season [7]. The vast majority (over 80%) of Northern Shrimp is landed in Maine. Processing shrimp is very capital intensive and there are few market outlets for Northern shrimp. All processing facilities for this species are located in Maine, limiting the marketability of shrimp caught in other states.

2. Direct marketing strategies in food production

2.1. What is Community Supported Agriculture?

Farm-to-fork programs, such as Community Supported Agriculture (CSA) programs, have increased in popularity in the United States; these programs are briefly reviewed to provide context for the development of CSF programs. CSAs have exploded in popularity since the 1950s, when the first US based CSA was started [8]. There are currently more than 2500 CSAs in the US [9]. This direct marketing approach aims to connect consumers to agricultural producers, providing a seasonal supply of local, high-quality agricultural products to consumers while ensuring a reliable and stable income for farmers. Consumers,

referred to as shareholders, receive seasonal, weekly deliveries of fresh, local produce at competitive prices.

There are four characteristics of CSA programs that distinguish them from traditional food marketing: risk sharing, advance payment, direct connections to producers, and increased sustainability [10]. In a CSA, a share represents a fraction of total annual production. Therefore, shareholders accept some of the risk from poor growing seasons. Advance payment provides income for farmers during non-growing seasons and can fund operating expenses. Through farm visits, personal interaction, and risk sharing, CSAs build community and social connections. Finally, many CSAs use sustainable farming practices and reduce food miles to minimize the environmental impact of food production. The impacts of CSAs on farmers have been mixed; studies have found that CSAs do not increase revenues, but that farmers are usually satisfied with these programs [10–13].

2.2. How do Community Supported Fisheries differ from Community Supported Agriculture?

An important component of CSAs is that farmers and consumers share the risk of agricultural production; risk sharing in CSFs follows a different model. CSFs do not sell shares that are based on a fraction of the daily catch; instead, shares are typically marketed as a fixed weight of fish to be delivered weekly. CSF participants are subject to timing risk instead of production risk. Poor weather, mechanical difficulties, or regulatory closures may disrupt the normal scheduled delivery of shares. To accommodate their customers, many CSFs increased fish delivery in subsequent weeks or lengthened the season to handle these unforeseen circumstances.

In a typical CSA, there is a large range of produce delivered in a weekly share and an even greater range across the entire growing season [14]. CSF share composition is less diverse than typical CSA shares. The CSFs in the Northeast tend to specialize in groundfish, shrimp and lobster; however, they are commonly sold separately depending on seasonal availability. The CSFs that offered groundfish to their shareholders received feedback indicating a preference for greater variety in their weekly shares. CSF operators

reported two reasons for lower levels of diversity in CSF shares. First, shares of 4–6 pounds of whole fish are frequently filled with just one fish, which obviously limits the variability within a weekly share. Second, fishermen have limited ability to control their catch composition due to gear selectivity, knowledge, regulations, and seasonal migrations of fish stocks. For example, vessels based in the Gulf of Maine will prefer to fish for cod and other round fish in the inshore area while fishing for flatfish requires slightly different gear and longer travel times. Increasing the number of vessels, wharves, or partnerships within a CSF may address some, but not all, of these issues.

3. Advantages of Community Supported Fisheries

3.1. Market benefits

CSFs can provide market benefits by shortening the food distribution process. In the Northeast US, fish are traditionally sold by vessels to wholesale dealers, often at the five large auctions in New England. Wholesalers then distribute seafood to processors, fish markets, and restaurants. Processors convert whole fish into fillets, steaks, or frozen products before reaching the consumer. These steps require labor, capital, time, and transportation costs. As a direct marketing operation, a CSF integrates these activities into a single firm, capturing the profits associated with these tasks and reducing some of these costs, thus benefiting both fishermen and consumers.

In addition to reducing costs, direct marketing can increase revenues received by fishermen in at least three ways. First, CSFs can sell fish at a premium over wholesale prices. Second, a CSF can provide a market outlet for species that have low value in the traditional market. Finally, just as CSAs can stabilize revenues for farmers, a CSF can insulate fishermen from price volatility, guaranteeing them a known price for their fish.

In order to compare CSF prices with wholesale prices, transactions data were extracted from the NOAA Fisheries “dealer” database for sales in Massachusetts, Maine, and New Hampshire, where many of the CSFs are located. The wholesale prices

represent the first sale of fishery products from vessels to dealers in the traditional marketing system. Data were aggregated at the weekly level by species to produce average prices and total quantities. Prices for CSF-distributed fish were obtained from websites, share-ordering forms, and through in-person interviews. When sold through traditional markets, round fish are typically gutted, while shrimp and delicate flatfish are delivered whole; however, CSF products may be delivered with some level of processing, for example, fillets or shelled shrimp. When necessary the CSF prices were adjusted using published yield tables to facilitate an apples-to-apples comparison of wholesale and CSF prices [15].

Figs. 1–4 plot historical prices and landings for three selected finfish (cod, redfish, and witch founder) and Northern shrimp. These species were chosen because they illustrate the extremes in fish pricing. Horizontal lines represent the adjusted price at which various CSFs distribute fish and are usually well above wholesale pricing. For example, the implied prices of CSF-distributed cod in 2009 and 2010 were \$4.30 and \$5.16 per pound at Eastman’s Local Catch, respectively. Cape Ann Fresh Catch delivered whole fish in 2009; therefore, no adjustments were necessary to their pricing in that year. Interestingly, the wholesale price of cod was higher than the Cape Ann Fresh Catch price on two occasions. The wholesale price of winter flounder also was high on two separate occasions, while wholesale prices for redfish were always comfortably lower than the implied CSF price. Finally, prices for Northern Shrimp delivered through a CSF were substantially higher than wholesale prices and varied widely between the organizations. These figures suggest that CSFs could increase fishermen’s income by providing (1) a constant, premium price for all fish and (2) an outlet for fish with low market prices.

CSF fishermen use various techniques to provide fresh, locally sourced, sustainable products that may not otherwise be available in traditional markets. For example, fishermen who supply Cape Ann Fresh Catch use enhanced techniques to maintain freshness and quality, including brining, using stainless steel equipment, and enhanced cool down techniques. Furthermore, CSF fishermen targeting Gulf of Maine Northern shrimp have gone beyond mandated regulations to use gear that virtually eliminates

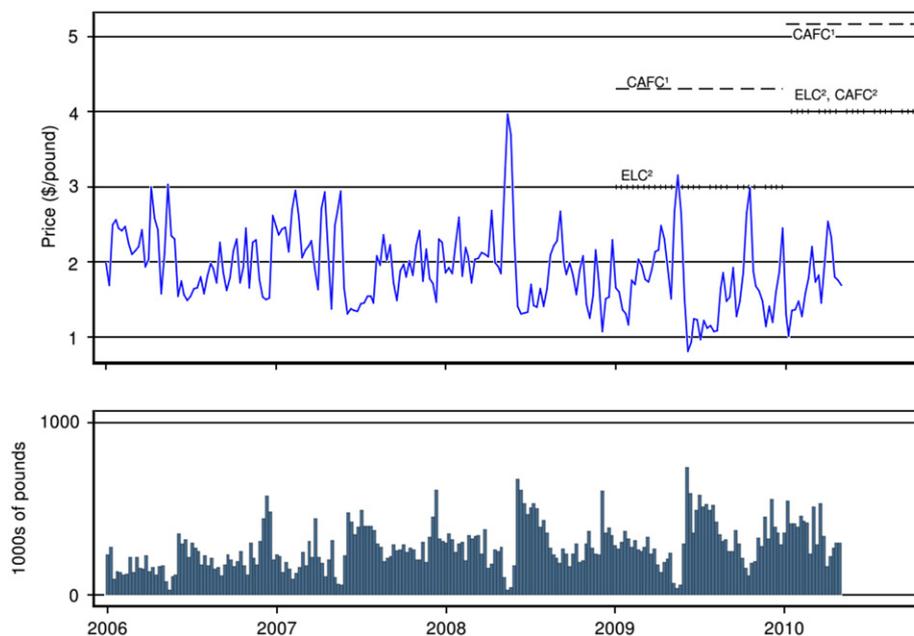


Fig. 1. Weekly Cod Prices and Landings in Maine, New Hampshire, and Massachusetts compared to CSF prices (CAFC=Cape Ann Fresh Catch and ELC=Eastman’s Local Catch).¹ indicates whole products and ² indicates filleted products.

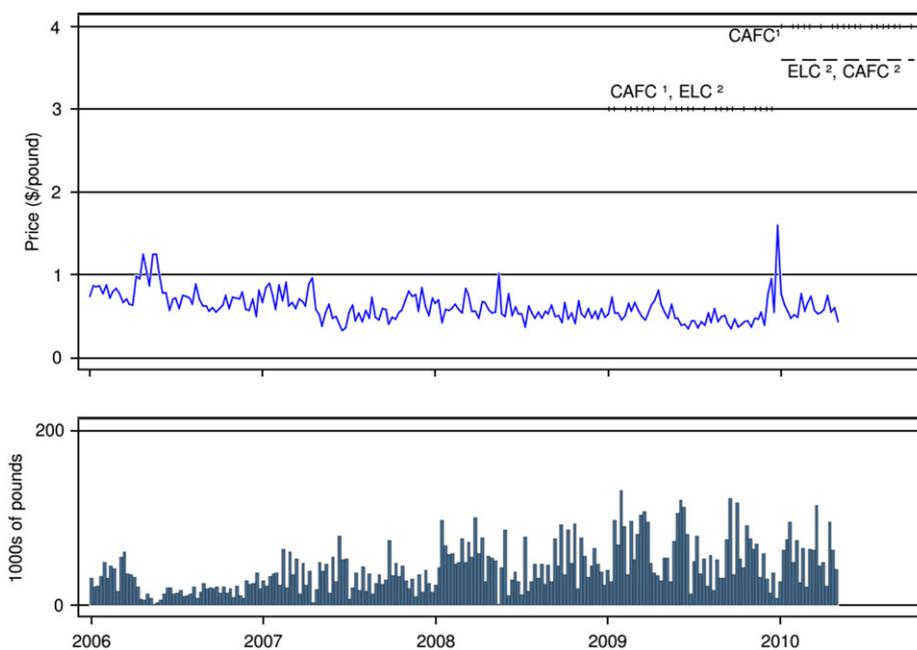


Fig. 2. Weekly Redfish Prices and Landings in Maine, New Hampshire, and Massachusetts compared to CSF prices (CAFC=Cape Ann Fresh Catch and ELC=Eastman's Local Catch). ¹ indicates whole products and ² indicates filleted products.

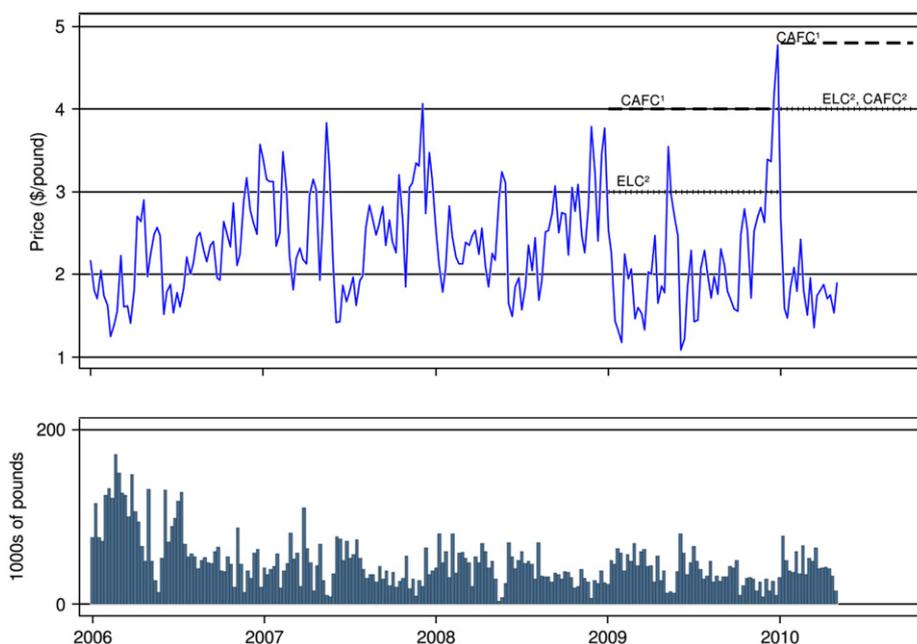


Fig. 3. Weekly Witch Flounder Prices and Landings in Maine, New Hampshire, and Massachusetts compared to CSF prices (CAFC=Cape Ann Fresh Catch and ELC=Eastman's Local Catch). ¹ indicates whole products and ² indicates filleted products.

bycatch, allowing only the larger shrimp to be caught. The use of these fishing methods raises costs of production; however, they also allow CSFs to produce and deliver higher quality goods to their customers. In theory, these high-quality fish should receive higher prices at auction. Consumers who value these attributes have a positive willingness-to-pay for fresh, high-quality fish products [16–19] or local or sustainably produced food [20,21]. However, it is possible that the traditional distribution process itself is a barrier to providing the highest quality fish to meet customers' demands; CSF programs streamline this process.

3.2. Non-market benefits

There are many benefits of CSF programs other than market-based benefits. One of the major goals of both CSA and CSF programs is to foster a social connection between producers and consumers. CSAs encourage shareholders to visit farms to learn about the production process and shareholders may even have the opportunity to pick their own vegetables. CSFs try to increase the interactions between these groups, but there are physical and liability limitations that can make viewing production on a fishing

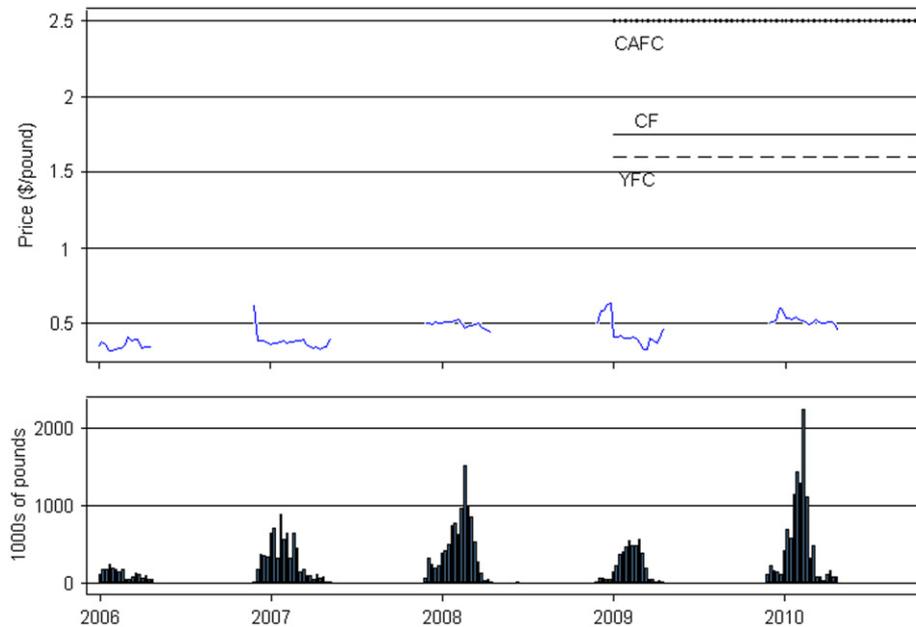


Fig. 4. Weekly Northern Shrimp Prices and Landings in Maine, New Hampshire, and Massachusetts compared to CSF prices (CAFC=Cape Ann Fresh Catch, YFC=Yankee Fishermen's Coop, and CF=Community Fish).

vessel difficult. Therefore, the consumers' primary connection to fishermen is usually through weekly encounters at the pickup location. Some CSFs have partnered with supporting organizations, which in turn interact with consumers at the pickup location. In other small CSFs, the husband fishes while the wife handles the marketing, distribution, and consumer interactions.

Social connections can be fostered on a secondary level through novel communication. Communication between CSFs and their shareholders is one of the key factors to success, particularly through alternative marketing efforts. CSFs are connected with consumers through innovative websites, newsletters, flyers, presentations at local events, filleting demos, tastings, the use of photographs of fishing vessels and fishermen, distribution of recipes, and most importantly, word-of-mouth. Cape Ann Fresh Catch hosts *Seafood Throwdowns*, a cooking contest where local chefs are given unknown fish to prepare for tasting events with the public. These public events and novel communication methods have fostered ties between the fishing industry and local community.

Both consumers and fishermen achieve benefits from these increased interactions. Consumers interact with members of the fishing community and learn about the entire fishing experience; this may result in consumers becoming fishermen's allies in the political and regulatory process. Fishermen themselves benefit from these interactions: they value support from the general public and realize that their contributions are, in turn, valued by society. Fishermen may also gain recognition in inland communities; for example, coastal states like North Carolina have a large portion of the population living inland with limited connection to the coast or fresh, seafood products. The Walking Fish CSF strengthens the bond between inland and coastal communities by delivering fresh seafood to urban areas located several hours away from the coast.

4. Challenges for Community Supported Fisheries

Despite many benefits to consumers and fishermen from distribution through a CSF, operating a CSF has many challenges.

Many of these challenges have been overcome with the assistance of other organizations, especially in the initial stage of development. CSFs require large startup costs for marketing, promotion, distribution, and outreach; fishermen may not have human or financial capital to start a CSF without assistance. Non-profit organizations and fishermen's groups have often filled this role. Partnering with a non-profit organization can shift these costs and time burdens away from fishermen, until the CSF can grow to a self-sustaining size. These costs can be even lower when fishermen leverage existing relationships to administer a CSF. Historically, women, particularly fishermen's wives, took responsibility for business activities during the day while men were out fishing [22,23]. This tradition has continued with CSFs: the Gloucester Fishermen's Wives Association operates Cape Ann Fresh Catch and a husband-and-wife team runs Eastman's Local Catch. Women administering the business aspects of food production are not unique to CSFs; Tegtmeier and Duffy [10] found that women often run CSA programs.

Formation of a CSF can allow the fishermen to capture profits associated with a larger portion of the marketing chain. However, this vertical integration requires fishermen to invest in both human capital (marketing or accounting skills) and physical capital (refrigerated trucks or processing facilities). Some fishermen have opted out of the CSF model because of the additional time commitment: "I'm a fish killer; I don't have time to get on the internet and read emails" (former CSF fishermen, personal communication, March 2010). In addition to acquiring new human and physical capital, distribution through a CSF risks alienating traditional partners, particularly fish dealers. CSFs need to maintain a business relationship with the traditional infrastructure in order to sell the non-CSF portion of their catch. Federal regulations require fish to be sold to a registered dealer; therefore, it is necessary to have (or obtain) a dealer's license. Alternatively, fishermen work with wharves or coops that are already licensed federal dealers.

Most CSFs initially attempted to deliver whole, gutted fish, as a means to minimize waste, increase connections between fishermen and consumers, and offer a unique product. However, delivery of whole fish poses a challenge to CSFs because it is

difficult to source fish that are small enough to fulfill a typical-sized share. Furthermore, producing filleted products requires additional inspection, licensing, and capital investment. Alternatively, CSFs can sub-contract this task to existing processors; Cape Ann Fresh Catch does this with its filleted products. All seafood products must adhere to food safety (HACCP) guidelines. Additional legal requirements that vary by state or species must also be obeyed. Despite these constraints, almost all CSFs now offer both whole and filleted products after incorporating feedback on shareholders' preferences.

Another challenge facing CSFs is attracting a critical mass of shareholders to achieve profitability; this threshold has not been met by all CSFs. For example, in 2009 the Yankee Fishermen's Cooperative in Seabrook, NH, operated a shrimp CSF. However, the CSF did not have a direct impact on fishermen's pay and only a small fraction of total shrimp landings was distributed through the CSF. This situation is not unique to the Yankee CSF. Cape Ann Fresh Catch likely had enough shareholders to support only a single fishing vessel working fulltime; however, this organization sourced fish from more than six vessels. The Walking Fish CSF has chosen to remain small; they have attained their self-imposed cap of 450 shareholders and maintain a waiting list of interested consumers. While they work to expand the number of weeks per year, they are not interested in adding shareholders.

4.1. What is local and sustainable?

CSFs promote local products that are harvested by sustainable methods. Emphasizing the local attributes of production may be a reaction to the dominance of imported seafood, especially aquacultured products, in traditional markets. In 2009, 84% of the seafood consumed in the US was imported [24]; nevertheless, consumers value local food systems. However, research has revealed inconsistent definitions for local products among consumers [25–27]. Consumers may define local by port, state, region, or country. Therefore, CSFs have considerable flexibility in using this term for marketing purposes. However, expanding local too far risks alienating consumers who have diverse ideas about this term. For example, the Port Clyde CSF in Maine provides overnight shipping options to New York City while marketing their products as local.

The term sustainable also has multiple meanings and can encompass many metrics. Sustainable seafood may be described as products that have high stock abundance, low levels of fishing pressure, nominal bycatch levels, minimal adverse gear effects, negligible habitat damage, or effective management [28]. Consumers are barraged by sustainability cards, news reports, advertising, and propaganda about sustainable fishing practices, including gear choices. For example, many governmental and non-governmental organizations have recommended sustainable seafood choices based on various criteria, but final recommendations can be inconsistent [28]. Consumers may have, warranted or unwarranted, beliefs about sustainability, particularly in terms of fishing gear choices. CSFs have the opportunity to educate consumers about sustainability and gear choices, but ultimately they must be responsive to consumers' preferences.

CSA research revealed that consumers valued provenance, traceability, and short supply chains [29,30]. These findings suggest that traceability is important for seafood as well. Organizations that source fish from multiple boats may find a traceability program challenging. Increased traceability can forge tighter social connections between fishermen and consumers. Traceability can be used by CSFs to differentiate their products from traditional seafood, enhancing claims of local and sustainable production.

5. Policy implications

The Northeast groundfish fishery has recently transitioned to a catch share management system. Catch share programs can eliminate overfishing and result in more profitable fisheries, while addressing social objectives [31]. Under this system, groups of fishermen, referred to as sectors, are allocated a portion of the Annual Catch Limit (ACL). Individuals are jointly and severably liable for actions of their sector, including overages. Sectors decide on the appropriate distribution of fishing within their sector and may trade with other sectors. This management system has resulted in a new organizational infrastructure. Sector managers are responsible for regulatory compliance and catch monitoring for all vessels in their sector. Managers may be well-positioned to implement a fully traceable CSF program because they have knowledge of individual vessel behavior.

CSFs can build on newly created social connections to engage shareholders and other members of the public. This can lead to an educated public that advocates for fishermen and fishing communities in the regulatory process, which is an explicit goal of Northwest Atlantic Marine Alliance, an organization supporting multiple CSFs. CSFs can be a mechanism to foster collaboration among fishermen to improve the viability of their livelihoods. As explained in a National Public Radio interview: "instead of competing against one another, as they [Port Clyde fishermen] had done for generations, they formed a co-op" [2]. CSF organizations have many features that have facilitated collaboration in other fisheries and other industries: social capital, trust among members, and small groups [32]. The unified incentives of fishermen in a CSF lend themselves to a collaborative relationship. For example, a case study of collaborative behavior among members of the tilefish industry showed how these factors were instrumental in advancing this behavior [33].

CSFs provide a means for fishermen to increase profits within the current regulatory framework. By focusing on marketing, the CSF model can produce, in theory, higher profits with minimal changes to inputs and outputs. For example, traditionally marketed Northern shrimp is difficult to process and has suffered from competition from imports, resulting in a low dockside price. Direct marketing through a CSF can increase consumer awareness of less-known species like Northern shrimp, shifting the demand curve for this species.

6. Conclusions

Community Supported Fishery Programs are a new, innovative form of direct marketing in which consumers provide upfront payments to fishermen in exchange for weekly seafood deliveries during a season. These programs, modeled after Community Supported Agriculture, provide benefits for fishermen, consumers, and the local community.

Fishermen benefit from these programs in multiple ways: a CSF can be utilized to receive premium and stable prices, capture profits from a larger portion of the supply chain, build support for fishing in the community, and provide an outlet for low-priced species. Consumers benefit from access to diverse, local, and sustainable seafood, and from having an open dialog with the producers of their food. CSFs benefit communities by providing an outlet for local seafood products. "Local" fishermen are also more likely to reinvest profits into their community and employ local workers.

Fishermen in a CSF can use pricing power as a means to earn higher profits from a fixed allocation of fish under a catch share system. Monitoring programs developed for catch share management can be leveraged to increase traceability, a feature valued by

consumers. In the long-run, the programs' non-market benefits may prove to be the most important. Strong ties between fishermen, partner organizations, and consumers will both activate and ensure future support for fishing and local fishermen. At the very minimum, CSFs have elevated the visibility of fishermen in local communities. The future of CSFs is uncertain. At this time, fishermen cannot completely replace traditional markets with CSF programs, but direct marketing strategies can be a valuable component of their operations.

Acknowledgments

The authors would like to thank all the CSFs for taking the time to share their experiences. We are thankful for comments provided by participants at the 2010 Annual Meeting of the American Fisheries Society and by three anonymous reviewers. We also would like to acknowledge comments and suggestions made by Susan Andreatta at the University of North Carolina, Greensboro.

References

- [1] Clifford S. Wal-Mart to Buy more local produce. *New York Times*; 2010. B1 New York edition.
- [2] Gotbaum R. Fishermen break tradition to keep jobs. *National Public Radio*, Morning edition; 7 September 2010.
- [3] Squires D. Long-run profit functions for multiproduct firms. *American Journal of Agricultural Economics* 1987;69:558–69.
- [4] Kirkley J, Strand I. The technology and management of multi-species fisheries. *Applied Economics* 1998;20:1279–92.
- [5] Bisack K, Sutinen J. Harbor porpoise bycatch: ITQs or time/area closures in the New England Gillnet fishery. *Land Economics* 2006;82:85–102.
- [6] Northeast Fisheries Science Center. Assessment of 19 Northeast groundfish stocks through 2007. Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, MA, August 4–8, 2008. NOAA Fisheries, Northeast Fisheries Science Center Reference Document 08–15; 2008a.
- [7] Atlantic States Marine Fisheries Commission (ASMFC). 68th Annual Report of the Atlantic States Marine Fisheries Commission. Washington, DC: Atlantic States Marine Fisheries Commission; 2010.
- [8] Henderson E, Van En R. Sharing the harvest, revised and expanded. White River Junction, Vermont: Chelsea Green Publishing; 2007.
- [9] Local Harvest. CSA by the numbers; January 2010. <<http://www.localharvest.org/newsletter/20100128/>> [accessed 1 October 2010].
- [10] Tegmeier E, Duffy M. Community supported agriculture (CSA) in the Mid-west United States: a regional characterization. Ames, IA: Iowa State University, Leopold Center for Sustainable Agriculture; 2005.
- [11] Sabih S, Baker L. Alternative financing in agriculture: a case for the CSA method. *Acta Horticulture (ISHS)* 2000;524:141–8.
- [12] Lass D, Brevis A, Stevenson GW, Hendrickson J, Ruhf K. Community supported agriculture entering the 21st century: results from the 2001 national survey. Amherst, MA: Department of Resource Economics, University of Massachusetts, Amherst; 2003.
- [13] Lizio W, Lass DA. CSA 2001: an evolving platform for ecological and economical agricultural marketing and production. Amherst, MA: Department of Resource Economics, University of Massachusetts, Amherst; 2005.
- [14] Kantor LS. Community food security programs improve food access. *Food Review* 2001;24:20–6.
- [15] Waterman JJ. Measures, storage rates, and yields of fishery products. *Torry Advisory Notes – No. 17*; 2001. <<http://www.fao.org/wairdocs/tan/x5898e/x5898e01.htm>> [accessed 29 September 2010].
- [16] McConnell K, Strand I. Hedonic prices for fish: tuna prices in Hawaii. *American Journal of Agricultural Economics* 2000;82:133–44.
- [17] Johnston RJ, Wessels CR, Donath H, Asche F. Measuring consumer preferences for ecolabeled seafood: an international comparison. *Journal of Agricultural and Resource Economics* 2001;26:20–39.
- [18] Kristofersson D, Rickertsen K. Efficient estimation of hedonic inverse input demand systems. *American Journal of Agricultural Economics* 2004;86(112): 7–1137.
- [19] Kristofersson D, Rickertsen K. Hedonic price models for dynamic markets. *Oxford Bulletin of Economics and Statistics* 2007;69:387–412.
- [20] Huang CL, Lin BHA. Hedonic analysis of fresh tomato prices among regional markets. *Review of Agricultural Economics* 2007;29:783–800.
- [21] Darby K, Batte MT, Ernst S, Roe B. Decomposing local: a conjoint analysis of locally produced foods. *American Journal of Agricultural Economics* 2008;90: 476–86.
- [22] Thomson P. Women in the fishing: the roots of power between the sexes. *Comparative Studies in Society and History* 1985;27:3–32.
- [23] Brinson AA, Die DJ, Bannerman PO, Diatta Y. Socioeconomic performance of West African fleets that target Atlantic billfish. *Fisheries Research* 2009;99: 55–62.
- [24] NOAA Fish Watch. <http://www.nmfs.noaa.gov/fishwatch/trade_and_aqua_culture.htm>, [accessed 1 June 2010].
- [25] Kitts A, Schneider G, Lent R. Carbon footprint of commercial fisheries in the Northeast United States. In: Shriver A, editor. Proceedings of the fourteenth biennial conference of the international institute of fisheries economics & trade, July 22–25, 2008, Nha Trang, Vietnam: achieving a sustainable future: managing aquaculture, fishing, trade and development. Corvallis, OR. ISBN: 0-9763432-5-8. CD ROM.
- [26] Durham CA, King RP, Roheim CA. Consumer definitions of "locally grown" for fresh fruits and vegetables. *Journal of Food Distribution Research* 2009;40: 56–62.
- [27] Hand MS, Martinez S. Just what does local mean? *Choices* 2010;25.
- [28] Roheim CA. An evaluation of sustainable seafood guides: implications for environmental groups and the seafood industry. *Marine Resource Economics* 2009;24:301–10.
- [29] Marsden T, Banks J, Bristow G. Food supply chain approaches: exploring their role in rural development. *Sociologia Ruralis* 2000;40:424–38.
- [30] Thompson E, Jr, Harper AM, Kraus S. 2008. Think globally—EAT Locally. San Francisco Foodshed Assessment, American Farmland Trust. <<http://www.farmland.org/programs/states/ca/Feature%20Stories/San-Francisco-Foodshed-Report.asp>> [accessed 20 October 2010].
- [31] Costello C, Gaines S, Lynham J. Can catch shares prevent fisheries collapse? *Science* 2008;321:1678–81.
- [32] Ostrom E. *Governing the commons: the evolution of institutions for collective action*. Cambridge, UK: Cambridge University Press; 1990.
- [33] Rountree B, Kitts A, Pinto da Silva P. Complexities of collaboration in fisheries management: The Northeast US tilefish fishery. In: Townsend R, Shotton R, Uchida H, editors. Case studies in fisheries self-governance. Rome: Food and Agriculture Organization of the United Nations; 2008. Fisheries Technical Paper No. 504.