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Summary

Recent groundfish landings from Georges Bank have been far below catch allocations because the fishing industry was not able to efficiently target and catch healthy stocks. Fishing constraints include the inability to access closed areas and bycatch of “choke” stocks like yellowtail flounder. We met with groundfish industry members to consider possible approaches for designing a bycatch avoidance program for flatfish and other species. Feedback from the industry meetings indicated that a bycatch reduction program was not practical under the current status of the fishery. With guidance from our industry collaborators, and approval from the funding organization, we revised our objectives to focus on understanding the market constraints for yellowtail flounder, and to identify possible mechanisms to rebuild the market and increase economic viability for the groundfish fleet. Market analysis indicated that the yellowtail flounder market has collapsed because of the limited supply, fluctuations in landings and leasing prices, as well as public opinion. A demand for yellowtail flounder is not expected to return until the species is consistently landed, because it can no longer compete with Pacific substitutes.

Introduction

The 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act required all US regulated fish stocks to be managed under output controls, termed Annual Catch Limits (ACLs; USDOC, 2007). The ACL system was to be implemented for overfished stocks by 2010 and all other stocks by 2011. All stocks managed under an ACL were also required to have Accountability Measures (AMs) to ensure the ACLs were not exceeded, or to mitigate for overages, if they occurred. AMs could be implemented in-season to prevent overages of the ACL (preventative measures), or could be implemented in subsequent fishing years if an overage occurred in a previous year (reactive measures). The ACL system was implemented in the Northeast Multispecies Fishery in May 2010.

Simultaneous to the implementation of the ACL system, the New England Fishery Management Council adopted Amendment 16 to the Northeast Multispecies Fishery Management Plan (NEFMC, 2009). Amendment 16 changed the management strategy for the New England groundfish fishery from an input control-based days-at-sea system to an output-controlled fishing cooperative system, termed sectors. The sector system established fishing cooperatives where each participant receives an allocation of managed stocks based on personal landings history, called the potential sector contribution. The combined potential sector contributions from all sector members determined the sector’s Annual Catch Entitlement (ACE) of each stock managed under an ACL. Although the sector system was designed to increase flexibility for business planning and to allow leasing of portions of the sector ACE to either supplement business operations, or ensure any ACE overages could be mitigated, the fishery was unable to fully utilize the ACE for all stocks due to the constraint of low allocations of certain “choke” stocks (i.e., stocks with low allocation relative to other species and their availability). Low allocations of species, such as Georges Bank yellowtail flounder, prevented targeting of healthy stocks, such as Georges Bank haddock, and resulted in foregone yield. The constraint of choke stocks and inability of several stocks to rebuild to mandated levels were partially responsible for an economic decline in the fishery, leading to an economic disaster declaration by the Secretary of Commerce for the 2013 Fishing Year.

Since 2010, landings of haddock from Georges Bank have been far below allocated levels, indicating that the fishery’s ability to target and catch the healthy stock have been impacted by several factors,

including the inability to access the stock in closed areas, and bycatch of yellowtail flounder. Northeast Fishery Science Center bottom trawl survey results indicate that haddock can aggregate in the northern portion of Closed Area I in the fall. Restriction to accessing fishing grounds in Closed Area I is a possible reason for the lost yield of the Georges Bank haddock stock. Although fishermen can access fishing grounds in the Eastern Georges Bank stock area, there are restrictions on gear type that may impact haddock catch rates and not completely eliminate yellowtail flounder bycatch. The rope and separator trawls have been effective in reducing flatfish bycatch (Beutel et al., 2008), but with the current and projected future low allocation of Georges Bank yellowtail flounder, further bycatch reductions are needed to allow the fishery to target haddock.

The New England Fishery Management Council also developed AMs for unallocated stocks, such as northern and southern windowpane flounder, which have impacted the groundfish fleet as a whole. When the bycatch of a non-allocated groundfish stock exceeds an ACL, time/area closures and/or gear restrictions can severely constrain the fishing industry's ability to fully access and utilize their portfolio of allocated healthy stocks. In the 2012 fishing year, the groundfish industry exceeded the ACL for both northern and southern windowpane flounder leading to an AM in fishing year 2014 that implemented fishing restrictions in large areas on Georges Bank and in southern New England. Only modified gears that exclude the catch of most flatfish are allowed in the restricted areas, limiting the ability to target healthy flounder stocks, such as winter flounder. The National Marine Fisheries Service Greater Atlantic Regional Fisheries Office estimated that the AM could affect approximately 120 vessels and could result in millions of dollars in lost revenues for commercial groundfish vessels (NMFS, 2014).

Landings and revenues in the New England groundfish fishery substantially decreased after implementing output controls in 2010. Since 2009, revenue from all species decreased 16% (Murphy et al. 2014). During the period of Annual Catch Limits and catch shares, the proportion of allocations caught by New England groundfish sectors varied by stock, with an overall uptake of less than 42% in each year, from 2010 to 2013 (Murphy et al., 2014). Several reasons for lack of uptake exist. One reason is that annual catch allocations do not reflect the availability of fish on the fishing grounds, creating 'choke' stocks that limit the ability for full uptake of the multispecies allocation (Cadrin, 2016). The relatively low allocation of choke stocks and inability to catch other species without some bycatch of choke stocks drove up the lease value of choke stocks. As a result, transfer of allocated quota was limited. The value of quota leased decreased 46% from 2011 to 2012, and reductions in revenues due to quota costs were 4%-26% (Murphy et al., 2014). Windowpane flounder AMs also constrained the groundfish fleet's ability to catch their allocation, with estimated economic impacts of \$7.3 million to \$13.2 million in groundfish revenue (NEFMC, 2014), and even greater negative economic impacts in the scallop fishery. Finally, fishermen reported that the low catches of species like yellowtail flounder caused a loss of markets.

Social performance indicators were also negative for the recent output control system. In the first year of the output control system, a survey of groundfish permit holders concluded that fishermen were dissatisfied with the fishery management system and had apprehension about the new catch share system (Holland et al., 2010). Since the transition from an input control system to an output control system, the number of fishing vessels has decreased 29%, and metrics of employment have decreased to record lows (Murphy et al., 2014).

The lack of near real-time information for fishing decision making in the groundfish fishery has impacted the fleet's ability to avoid or reduce bycatch while targeting healthy stocks. There is a time lag in the availability of data to support on-the-water changes in behavior, and a lack of trust about the information that is derived from federal resource surveys and trips observed at-sea. Accurate catch accounting information is typically not available for several months after the end of the fishing year. Although AMs were designed to mitigate for overages of the ACL, often they cannot be implemented for several years due to the lagged information on catch. This delayed reaction can lead to stock depletion if fishing continues in areas of high bycatch or can increase bycatch of other species that is not considered in AM design (O'Keefe and Cadrin, 2011).

Various bycatch mitigation strategies, including gear modifications and restrictions, time/area closures, and quota systems can be successful in meeting conservation goals (Alverson et al. 1994). However, these methods can impose increased operational costs on the fishing industry, and increased administrative responsibility on managers and enforcement agencies (Catchpole and Gray 2010). An alternative or complementary approach to reducing bycatch is avoidance of non-target species through fleet communications (e.g., O'Keefe and DeCelles, 2013). This approach requires cooperation from fishing industry participants to exchange spatial and temporal bycatch information (Gauvin et al. 1996; Watson et al. 2003). Socioeconomic incentives to avoid fisheries bycatch must also exist in order to influence changes in fishing behavior.

Cooperative approaches to reduce bycatch that include input from fishermen, scientists and managers can be successful for harvesting valuable target species while conserving non-target species. Within the cooperative context, fishing industry members play a role in defining objectives and desired outcomes of harvest strategies (Pinto da Silva and Kitts 2006; Johnson and van Densen 2007). Often these goals differ from scientific and regulatory objectives that focus on biological and ecological mandates. A cooperative approach to bycatch avoidance can ensure that objectives of the fishery participants are acknowledged and prioritized. While outcomes of bycatch avoidance programs can be ecologically beneficial, specific aspects of program design can include measures that lead to socioeconomic benefits as well (Bethoney et al. 2013).

Objectives

Our initial objective was to assist vessels to increase yield of healthy stocks, such as Georges Bank haddock and winter flounder, by avoiding bycatch of yellowtail and windowpane flounder on Georges Bank and in southern New England. To achieve this objective, we proposed to work collaboratively with groundfish industry members to examine a holistic approach to changing fishing behavior in order to avoid or reduce flatfish bycatch. However, we revised our objectives based on feedback from meetings with industry members indicating that a bycatch reduction program was not practical under the current status of the fishery. During the port meetings, industry members had suggestions for increasing the economic viability of the fishery through additional exempted fishing opportunities, changes to current regulations and rebuilding markets for certain species. With guidance from our industry collaborators, Richie Canastra and Mark Phillips, we decided to focus our efforts on understanding the market constraints for yellowtail flounder, and to investigate possible mechanisms to rebuild the market and increase economic viability for the groundfish fleet. The revised objectives and scope were approved by the Northeast Consortium.

Industry Meetings

We organized meetings with groundfish industry members in four New England ports (Table 1) to scope possible approaches for designing a bycatch avoidance program for flatfish and other species. The meetings were organized as listening/brainstorming sessions, focused on understanding issues surrounding bycatch and low ACLs at the individual, Sector and port levels. Fishermen provided background information on fishing areas and timing, quotas and monitoring, and current measures being employed to reduce or avoid certain species. The groups brainstormed a variety of possible tools and techniques that could be applied in fishing year 2015 to alleviate the constraint of low ACLs. Finally, the groups discussed options that may be beneficial to their individual businesses, Sector operations, and port management for fishing year 2015, and beyond.

Table 1. Locations, dates and number of fishing industry participants for the project scoping meetings held in the spring of 2015.

Port	Date	Number of Industry Participants
Gloucester, MA	15 April 2015	5
Scituate, MA	16 April 2015	7
Seabrook, NH	5 May 2015	8
New Bedford, MA	17 June 2015	4

Feedback from the port meetings indicated that the proposed approaches to reduce bycatch of certain species in order to increase yield of healthy stocks were likely not viable under the current status of the fishery. Industry members indicated that only a few fishermen have actively targeted yellowtail on Georges Bank in recent years, and targeting is limited to the month of April when there is a surplus of yellowtail quota at the end of the fishing year. The surplus occurs because fishermen avoid yellowtail, and use personal ACE only to cover yellowtail bycatch when targeting other species, specifically haddock. For these reasons, real-time bycatch avoidance and quota pooling for yellowtail flounder were deemed impractical for the 2015 fishing year. For windowpane flounder, a non-allocated bycatch species of concern, there are large areas currently closed to most gears due to Accountability Measures. Additional area closures and gear modifications were also deemed impractical for the current fishing year.

Several factors impacting the potential viability of a holistic bycatch reduction program were discussed. There has been an ongoing reduction in active fishing vessels since 2010, with a consequent reduction in overall fishing effort. With very few vessels fishing in overlapping areas, real-time information sharing was considered ineffective for reducing bycatch. Industry members informed us that fluctuating lease prices for yellowtail quota have influenced fishing behavior and impacted fishermen's ability to target healthy stocks. Price data from New Bedford's Whaling City Seafood Display Auction indicated an average price of \$0.80 for landed yellowtail recently, and quota lease prices have varied from \$0.10 – \$1.00. As discussed at the port meetings, the fluctuating prices throughout the fishing year influence when and where targeting of specific stocks can occur so that trips remain economically viable. Fishermen and sector managers indicated that price and quota availability are constraining factors towards the potential application of quota risk-pooling within the current status of the fishery. Finally, fishermen indicated that area closures and gear modifications may be useful tools for bycatch reduction. However, they considered the current gear closures for windowpane flounder to be too large to allow for targeting of other stocks on Georges Bank, and gear regulations are already in place. Fishermen expressed concerns about the idea of additional closures

or regulated gear modifications until the windowpane Accountability Measure gear restricted areas are re-opened.

Market Analysis - *All auction data and information was provided by the auction system of the Whaling City Seafood Display Auction of New Bedford, MA.*

A market is the exchange of goods or services by buyers and sellers. In some instances, the buyers and sellers do not come in contact for the exchange, but rather institutions will conduct the sale. With the buying and selling of seafood, seafood auctions are often used to create an open marketplace for both the buyer and the seller. In New Bedford, Whaling City Seafood Display Auction (WCSDA), allows fishermen to sell and display their product at an auction house. Buyers, often processors, will see the product on display and then bid online from their offices. The auction provides the fair market price for the products at the time of sale. Products on the auction will experience typical market fluctuations due to market supply and demand. The fresh product sold at the auction can be influenced by many factors, including: quantity, consistency, other competitive species, substitutes, and marketing. Our market analysis is based on sales information from the WCSDA.

Three factors affect the success of any seafood market: supply, price, and demand. The three factors influence each other in a cyclical manner. Landings at market provide the quantity of fish on the market board. Price signifies the cost to lease certain species in order to harvest the product, as well as the final price at the product's sale at auction. Lastly, demand indicates the need for a certain species at the time of sale.

Georges Bank yellowtail flounder is both a conservation concern and a constraining stock in the groundfish fishery. The 2015 Transboundary Resources Assessment Committee's (TRAC) assessment of Georges Bank yellowtail flounder indicated that combined US and Canada catches for fishing year 2014 (159mt) were the lowest value in the assessment time series, and that discards were greater than landings for the first time in 2014 (TRAC, 2015). A common scientific interpretation is that the inability of the fleet to catch the ACL reflects a depleted stock (e.g., Legault and Alade, 2015). In advance of the NEFMC's Science and Statistical Committee (SSC) meeting to determine Acceptable Biological Catch (ABC) advice for Georges Bank yellowtail for fishing year 2016, two industry letters were submitted to the SSC, related to low utilization of Georges Bank yellowtail allocations in recent years. The industry letters listed several reasons for low catch levels of yellowtail, including: low allocations, reduction of effort due to reduction in active fleet size, restricted fishing areas associated with windowpane flounder Accountability Measures, variable lease prices, and loss of market and price fragility.

The SSC recommended a status quo ABC for fishing year 2016 (354mt), and recognized that several factors impact the utilization rate of Georges Bank yellowtail flounder. In their report to the NEFMC in September 2015, the SSC recognized that low catches and utilization rates should not be considered as an indication of biomass. Furthermore, they recommended that "*the interacting management, market and biological factors that determine actual catch from the stock should be more closely examined in order to better understand why catch remains substantially below ABC and how that disparity might change in the future*" (SSC, 2015).

Georges Bank yellowtail flounder was once a thriving, profitable species in New England. Fishermen were able to target yellowtail, and there was a high demand for the product in New Bedford. Processed fillets were sold to larger cities such as New York, Philadelphia and Baltimore. Presently, the fishermen of Georges Bank have to avoid yellowtail. Many of the former top producing vessels are out of business, with their vessels sitting at the dock, and their quota leased to other fishermen. As an outcome of the steady decrease in landings over the past ten years, the market for yellowtail flounder is nearly nonexistent. There is not enough yellowtail landed daily to create a stable price. If little is landed, fishermen may get a good price, but there will be a substantial reduction in price if a vessel unexpectedly lands over 1,000 pounds. Processors are no longer equipped to process this fresh, local flatfish.

Fishermen experienced price fragility of yellowtail flounder over the past fifteen years, and the market collapsed in the last five years. A market collapse of a seafood product will occur when there is an inconsistent supply available to process and meet consumer demands. Processors are under pressure to satisfy customer orders, whether for restaurants or grocery stores. If yellowtail is not landed on a daily basis at market, then processors must find other dependable, alternative products to meet consumer demands.

Prior to 2010, yellowtail flounder experienced typical market trends in which prices were affected by supply and demand. For example, in 2004 groundfish fishermen were allowed access to Closed Area II. The rush to fish created a glut, and prices crashed to as low as \$.05 per pound (Table 2); prior to the opening of the closed area, yellowtail was averaging \$1.80 per pound. The primary months for yellowtail fishing tend to be in May and the winter months. Vessels were accustomed to a slight price decrease in these months when supply would increase. However, in June of 2004 the auction had an overwhelming 1,256,067 pounds of large yellowtail landed. Compared to the 146,620 pounds of large yellowtail landed the year before. The overwhelming supply caused prices to crash, yet the market never collapsed. Buyers were buying the yellowtail since they had a market and a consumer demand, specifically for yellowtail fillets. Buyers made a profit on the yellowtail crash, while vessels suffered from low prices. Yet, fishermen were used to the market fluctuations of price. Once landings returned to normal, prices increased and remained stable for the remaining months of the year. In the following year, 2005, the yellowtail fishery experienced an increase in landings for the primary months. When landings were higher, prices declined; yet, the minimum price never dropped below \$.30 per pound (Table 2).

Reductions in fishing effort associated with estimates of low stock size and scientific uncertainty severely limited catch and impacted the market. Odell (2015) testified that “*pressure to reduce the ACL below 2,000 metric tons effectively eliminated the directed fishery which resulted in permanent loss of market.*” In 2004, Georges Bank yellowtail flounder contributed 29% of the total groundfish landings at the New Bedford auction and accounted for 21% of the revenue (Table 3). By 2016, yellowtail accounted for only 2.5% of the value of landings at the auction. Yellowtail flounder is now a bycatch species and considered to be a ‘choke’ stock by many ground fishermen. The decrease in landings from regulatory changes has caused a market collapse.

Table 2. Landings and prices of large (bold) and small (not bold) Georges Bank yellowtail flounder in the months of April, May, June, July, August in 2004 (opening of Closed Area II) and the adjacent years of 2003 and 2005.

	April		MAY		JUNE		JULY		AUGUST	
	Weight (lbs)	Min Price	Weight (lbs)	Min Price	Weight (lbs)	Min Price	Weight (lbs)	Min. Price	Weight (lbs)	Min Price
2003	307,035	\$0.52	485,010	\$0.20	146,620	\$0.41	132,420	\$0.66	112,435	\$0.70
	79,214	\$0.55	88,820	\$0.10	78,562	\$0.20	77,906	\$0.10	99,960	\$0.37
2004	323,500	\$0.54	443,454	\$0.40	1,256,067	\$0.26	1,191,290	\$0.07	818,955	\$0.14
	53,492	\$0.58	42,501	\$0.40	169,577	\$0.10	338,884	\$0.05	405,817	\$0.10
2005	26,860	\$1.90	292,342	\$0.75	290,484	\$0.50	220,016	\$0.30	123,782	\$1.00
	24,416	\$1.00	187,434	\$0.46	273,797	\$0.28	123,181	\$0.13	111,275	\$1.00

Table 3. Weight and value of Georges Bank yellowtail flounder in comparison to total groundfish landings in the New Bedford auction from 2000- 2016.

Weight				Value			
Year	Yellowtail	Total	% of YT	Year	Yellowtail	Total	% of YT
2000	5,898,621	17,472,703	33.80%	2000	6,285,671.46	19,215,525.45	32.70%
2001	6,143,939	21,770,045	28.20%	2001	6,050,984.59	21,862,838.71	27.70%
2002	4,843,263	20,460,870	23.70%	2002	5,664,291.71	23,662,946.72	23.90%
2003	4,735,247	22,065,529	21.50%	2003	5,791,226.44	24,970,449.10	23.20%
2004	6,700,007	23,144,683	28.90%	2004	4,939,212.96	23,061,887.78	21.40%
2005	3,903,514	18,250,866	21.40%	2005	4,726,606.71	23,991,170.05	19.70%
2006	1,751,660	12,498,989	14.00%	2006	2,898,403.62	19,332,532.39	15.00%
2007	1,497,303	12,867,952	11.60%	2007	2,898,928.46	20,116,409.98	14.40%
2008	1,416,585	18,466,080	7.70%	2008	2,078,693.16	25,665,705.22	8.00%
2009	1,455,872	19,881,021	7.30%	2009	1,972,254.42	25,555,685.43	7.70%
2010	1,255,538	21,056,903	6.00%	2010	1,819,636.76	30,051,543.00	6.10%
2011	1,818,101	21,829,986	8.30%	2011	2,179,096.60	34,534,996.06	6.30%
2012	1,584,514	17,821,006	8.90%	2012	2,160,896.60	31,757,633.16	6.80%
2013	990,374	12,987,889	7.60%	2013	1,439,916.50	21,765,059.18	6.60%
2014	526,694	15,551,086	3.40%	2014	735,981.64	24,454,829.64	3.00%
2015	357,202	11,812,067	3.00%	2015	538,706.63	18,934,590.40	2.80%
2016	231,182	10,271,354	2.30%	2016	432,059.17	17,553,841.69	2.50%

Processor substitutes and new marketing strategies over the last decade have caused a change in the consumer mindset. Often, eating locally caught fish is no longer a priority. Consumers are satisfied purchasing cheaper white fillets at grocery stores. Therefore, there is no longer a demand for a species such as yellowtail flounder, because other species can produce a white fillet order. Markets

will collapse when there is an inconsistent supply to meet consumer demand on a daily basis. Buyers will purchase a species as long as they can earn a profit and meet customer demands, determining the state of the fresh market at ports. Since the collapse of the yellowtail market, buyers have found other sources to satisfy customers.

For yellowtail flounder, the market collapse began with low landings coming to port, which in turn affected the prices received at auction. The demand for the flatfish was absent without consistency at market, and buyers began to replace yellowtail with similar flatfish species, such as sea dabs (WCSDA product name for American plaice). The sea dab market is stronger, because landings are consistent, with at least 2,000 pounds on a weekly basis. Currently, the yellowtail market is weak in comparison, with very few landings amounting to no more than 500 pounds per vessel trip. This steady decrease in landings coming to port over the last decade created the current, fragile state of the yellowtail market. Many claim that in order to rebuild the yellowtail market, there needs to be at least 2,000 pounds a day at the auction. The groundfish fishery of New Bedford has low utilization of the Georges Bank yellowtail flounder quota because there is no longer market for the resource.

Three main factors that have impacted the marketability of yellowtail flounder were examined that may help to explain why catch remains substantially below annual catch limits, and how that disparity may be changed in the future. The first factor considered in the loss of market for yellowtail flounder was the reduction in catch and fishing effort, resulting from reduced allocations and subsequently reduced landings. The thirteen vessels that currently target yellowtail accounted for 22% of the New Bedford landings in 2006 (Table 4). The reduction in effort targeting yellowtail flounder has caused a significant reduction in yellowtail market supply. Low supply has caused processors to find alternative products, compounding the loss of a yellowtail market. Fluctuations in yellowtail flounder catch have had market impacts throughout several episodes in recent history. We identified episodes when markets collapsed or rebuilt, and associated market information with fishery regulations and quota setting decisions.

Table 4. Landings of large and small market category yellowtail in fishing year 2006 by vessels based in New Bedford, MA. The highlighted vessels were the only remaining vessels landing yellowtail flounder in New Bedford in 2015.

Vessel Name	Landings of Large Yellowtail (lbs)	Landings of Small Yellowtail (lbs)
Northern Crusader	46,765	21,230
Sancor	43,320	17,340
Illusion	69,505	36,961
Sao Paulo	13,975	2,755
Atlantic Star	26,305	11,473
Costa & Corvo	22,210	7,635
United States	16,580	9,920
Sea Siren	60,840	16,210
Seel	12,325	2,888
Travis & Natalie	11,735	9,348
Imigrante	36,215	9,185
Neves	59,945	24,280
Blue Seas II	56,990	23,370
Total	476,710	192,595

The second factor considered in the loss of market for yellowtail flounder is the fluctuations in landings and leasing prices. As the supply of yellowtail has continued to decline, the demand for yellowtail also declined, which resulted in reduced landings prices for fishermen. Under the current fishing regulations in New England, fishermen are avoiding yellowtail flounder when targeting haddock, resulting in a surplus of quota at the end of the fishing year. The majority of this quota is sold to one or two fishermen, resulting in a high volume of landed yellowtail over the course of two weeks in April, the end of the fishing year. This type of market flooding results in lower landings prices despite the higher level of supply. Leasing yellowtail quota at other times during the fishing year can result in an economic loss as lease prices continually fluctuate, and most quota lessors try to move allocations in large packages which makes collecting quota even more costly. With unrestricted access to the Whaling City Seafood Display Auction database, we examined trends in supply, demand and price for a range of species to determine how price influences marketability. We also interviewed seafood processors in southern New England that previously purchased yellowtail to gain an understanding of current substitute products.

The third factor considered in the loss of market for yellowtail flounder is public opinion and marketing strategy. As the supply of yellowtail flounder declined, substitutions were introduced to the market, including Canadian and Pacific frozen flatfish products. These products have more consistent supply and can be marketed as “flounder”, providing a viable substitute for consumers. In addition to substitutions, the yellowtail market has been impacted by eco-labeling, consumer seafood guides, and seafood mislabeling. We considered strategies that would assist the seafood industry in rebuilding a market for yellowtail flounder, such as those employed by Ocean Choice International in Canada, and Seafish in the UK.

Factor 1: Supply (landings)

The recent history of the yellowtail fishery reveals the effect of effort regulations and catch on markets and price. In the early 2000s, the fishery was regulated by days-at-sea, and there were some indications of stock rebuilding (e.g., Stone et al., 2004). In 2004, Closed Area II, a historically traditional fishing ground for yellowtail flounder, was temporarily reopened after twenty years of closure. Landings of yellowtail flounder in New Bedford increased substantially from the access program (Table 5). Many fishermen were opposed to the access program because they predicted that the excessive landings would overflow the market. From June to August 2004, the yellowtail market experienced a crash. Landings increased to 2,681,711 pounds in June, and the price decreased to \$.10 per pound, then to a record-low \$.05 per pound (Table 2). Fishermen could barely afford to pay the unloading fees. After, 2004 the market returned, and the prices increased to typical levels for the months of May, June, and July.

In 2006, the landings of yellowtail flounder began to decrease as a result of regulations intended to rebuild the depleted stock. In fishing year 2006, yellowtail flounder landings did not exceed 215,000 total pounds in any month for both small and large market categories (Table 6). From 2006 onward, yellowtail flounder landings continued to decrease, especially in 2010 with the development of the catch share system with sector management.

Table 5. Landings and prices of Georges Bank yellowtail flounder, large (top) and small (bottom) market categories from 2004-2016.

Large YT	Weight	Value	Average Price	Min.	Max.
2016	51,854	\$128,148.00	\$2.47	\$0.50	\$3.90
2015	122,844	\$223,808.00	\$1.82	\$0.75	\$3.90
2014	193,012	\$347,212.00	\$1.80	\$0.50	\$3.82
2013	415,729	\$666,502.00	\$1.60	\$0.75	\$4.16
2012	804,215	\$1,212,456.37	\$1.51	\$0.10	\$3.09
2011	1,056,545	\$1,375,459.00	\$1.30	\$0.33	\$3.61
2010	737,632	\$1,108,011.00	\$1.50	\$0.50	\$3.38
2009	1,035,040	\$1,425,405.00	\$1.38	\$0.23	\$3.51
2008	850,986	\$1,320,895.00	\$1.55	\$0.35	\$4.25
2007	871,392	\$1,800,661.69	\$2.07	\$0.80	\$3.61
2006	1,095,901	\$1,861,541.00	\$1.70	\$0.70	\$4.39
2005	2,341,602	\$3,009,238.00	\$1.29	\$0.30	\$3.08
2004	5,029,640	\$3,635,554.00	\$0.72	\$0.07	\$3.26
Small YT	Weight	Value	Average Price	Min.	Max.
2016	76,225	\$129,472.09	\$1.70	\$0.49	\$3.10
2015	117,575	\$144,406.00	\$1.23	\$0.20	\$3.72
2014	213,214	\$267,656.00	\$1.26	\$0.40	\$3.58
2013	381,925	\$502,132.00	\$1.31	\$0.35	\$4.44
2012	466,350	\$553,198.00	\$1.18	\$0.10	\$3.97
2011	614,128	\$621,251.00	\$1.01	\$0.25	\$2.33
2010	363,397	\$463,556.00	\$1.28	\$0.50	\$2.99
2009	359,241	\$455,200.00	\$1.27	\$0.23	\$3.03
2008	564,669	\$756,629.00	\$1.34	\$0.20	\$3.60
2007	625,911	\$1,098,266.00	\$1.75	\$0.50	\$3.25
2006	655,759	\$1,036,861.00	\$1.58	\$0.25	\$4.00
2005	1,561,912	\$1,717,367.00	\$1.10	\$0.13	\$3.27
2004	1,670,367	\$1,303,659.00	\$0.78	\$0.05	\$2.57

Table 6A. Large Georges Bank yellowtail flounder monthly landings from 2000-2016.

Key	Top 2 Months of Large YT Landings											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	Sept	Oct	Nov	Dec
2000	X	X	443,650	462,470	374,485	209,518	105,070	83,670	111,132	107,910	521,615	625,905
2001	678,420	330,735	450,260	352,610	604,165	362,133	146,940	186,425	138,124	204,234	290,435	505,452
2002	478,535	414,095	476,990	328,725	505,895	186,990	115,070	85,245	175,047	258,510	80,140	324,652
2003	309,180	402,320	268,880	307,035	485,010	146,620	132,420	112,435	47,040	148,525	353,770	564,892
2004	268,940	277,986	102,279	323,500	443,454	1,256,067	1,191,290	818,955	279,714	50,785	2,145	14,525
2005	97,148	313,975	71,156	26,860	292,345	290,484	220,016	123,782	72,586	81,560	256,077	495,613
2006	127,136	291,169	80,813	7,300	143,968	91,960	61,783	46,174	34,498	21,730	48,488	140,882
2007	122,852	113,617	88,816	116,519	99,125	50,721	20,979	21,827	27,294	30,418	23,701	155,523
2008	115,797	18,913	16,683	17,646	97,292	108,801	67,590	60,326	75,742	93,598	53,263	125,335
2009	60,329	51,950	153,177	130,209	157,055	137,398	60,762	54,537	41,943	69,145	94,008	24,527
2010	17,888	10,933	35,708	216,015	105,956	81,297	41,576	42,790	28,163	48,595	50,913	57,168
2011	50,855	35,831	38,973	149,517	90,248	81,130	107,443	68,377	104,148	76,910	85,180	167,933
2012	132,450	86,550	75,320	194,352	34,934	10,927	10,753	56,341	12,793	47,310	51,000	111,485
2013	143,243	43,122	7,223	62,870	56,975	10,917	11,688	23,367	29,394	11,683	10,010	5,237
2014	26,660	21,322	5,302	29,325	19,216	5,009	3,695	9,935	15,245	34,994	5,215	17,094
2015	26,935	4,530	1,680	27,407	15,759	11,436	13,620	10,246	23,941	12,805	2,375	10,520
2016	8,003	6,040	20	3,456	2080	3210	2476	7272	7521	5933	3918	1925

Table 6B. Small Georges Bank yellowtail flounder monthly landings from 2000-2016.

Key	Top 2 Months of Small YT Landings											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	Sept	Oct	Nov	Dec
2000			211,840	136,960	230,776	150,778	120,923	90,448	105,319	98,040	285,237	416,789
2001	274,028	106,855	157,405	113,752	331,735	176,948	88,812	130,355	94,625	100,378	87,076	232,083
2002	133,772	87,255	105,135	105,785	146,955	86,008	94,045	100,596	96,781	121,470	42,080	293,487
2003	157,934	199,576	233,593	79,214	88,820	78,562	77,906	99,960	54,986	74,399	113,018	199,472
2004	112,990	195,730	130,795	53,492	42,501	169,577	338,884	405,817	98,918	33,998	3,651	84,014
2005	56,633	166,248	87,355	24,416	187,434	273,797	123,181	111,275	41,757	81,343	180,685	227,788
2006	89,284	122,677	72,439	3,754	12,353	72,825	40,858	36,275	40,335	40,886	51,183	72,890
2007	57,348	97,493	90,058	36,008	32,495	34,121	30,534	29,102	27,182	16,327	12,585	162,658
2008	107,436	20,292	31,845	18,201	44,453	55,122	39,083	78,782	69,508	45,160	22,535	32,252
2009	39,887	45,245	96,882	35,469	212,710	35,068	11,393	11,601	30,240	13,833	6,889	11,024
2010	23,291	21,703	28,710	49,871	32,779	36,877	26,015	22,055	16,795	26,106	41,127	38,068
2011	38,902	33,169	52,214	116,880	50,174	30,839	18,121	20,549	63,613	74,355	60,393	54,919
2012	34,470	55,050	99,777	113,053	39,449	14,783	10,234	24,973	9,334	21,356	23,429	21,042
2013	79,978	59,749	13,206	57,342	32,403	14,405	10,456	19,570	26,453	20,041	25,380	22,942
2014	44,770	32,665	9,985	14,735	19,007	13,923	13,444	14,398	12,506	15,948	7,298	14,535
2015	20,453	3,018	5,603	21,646	16,394	16,525	18,923	6,837	11,814	5,401	5,205	6,945
2016	2,201	4,140	15	9,885	5833	7206	11248	17367	9099	4016	2297	2928

Annual Catch Limits were at a level too low to target yellowtail. After the directed fishery was essentially closed, yellowtail became a ‘choke’ stock, and quota was used to allow for unintended bycatch when targeting other species, such as haddock, pollock, and sea dabs. As a result, almost 90% of the fleet either sold out or leased their quota to other fishermen (Table 7). In 2000, the auction had 44 vessels land at least 30,000 pounds of yellowtail for the year. By 2006, the fleet had decreased by 60% to 18 vessels that landed at least 30,000 pounds of yellowtail. The vessels that remained in the fishery were still profitable, landing at least 100,000 pounds for the year. However, after the change to sector management and catch shares, the fleet plummeted by 90% from 2010 to 2016. Currently, there are only two vessels that landed at least 5,000 pounds at the auction in 2016. The two vessels include the F/V Illusion, a once predominately yellowtail boat, and the F/V Morue, a vessel who primarily targets a substantial amount of haddock and caught the yellowtail as bycatch. Yellowtail now only comes to port as a bycatch from the very few draggers left in New Bedford.

In an interview, Captain Mark Phillips of the F/V Illusion discussed his experience as a yellowtail fisherman. Speaking to Capt. Phillips provided a unique opportunity to hear an opinion from a fisherman who devoted his life to catching yellowtail flounder. He attempts to fish a species that scientists now believe are collapsed on Georges Bank. Capt. Phillips is considered to be a yellowtail flounder expert, and the market data supports his skill as a fisherman (Table 8; Figure 1). Sales data reveal Capt. Phillips yellowtail fishing history. In the early 2000s, his landings were at least 53% yellowtail, with the exception of 2002. Unlike other fishermen, he did not land as much yellowtail in 2004 when Closed Area II was opened (Table 9) because he was opposed to the opening of the closed area. When each vessel was permitted to land 30,000 pounds, he realized that the market would be flooded and the price would crash. In the following year, Capt. Phillips fished south and west of the closed area, where he caught yellowtail that spilled over from the closed area. On his ‘Christmas trip’ of 2005 he landed 50,765 pounds of yellowtail, comprising 92% of the trip (Table 10).

Table 7. Vessels catching Georges Bank yellowtail flounder in the years: 2000, 2006, 2010, and 2016; highlighted vessels indicates new vessels for that year. For 2000, 2006, and 2010, vessels landing a minimum of 30,000 pounds are included, for 2016, vessels landing a minimum of 5,000 pounds are listed.

2000	2006	2010	2016
(at least 30,000 lbs)	(at least 30,000 lbs)	(at least 30,000 lbs)	(at least 5,000 lbs)
Antonio Jorge	Atlantic Star	Bulldog	Morue
Atlantic Star	Blue Seas II	Fisherman	Illusion
Blue Seas II	Buzzard's Bay	Green Acres	
Buzzard's Bay	Costa & Corvo	Humbak	
Condestavel	Curlew II	Ilha do Corvo	
Corvo II	Green Acres	Illusion	
Costa & Corvo	Hen Lee	Lady Patricia	
Dinah Jane	Ilha do Corvo	Lucimar	
Heritage	Illusion	Sao Marcos II	
Huntress I	Imigrante	Sea Siren	
Illusion	Lady Patricia	So.Crusader II	
Imigrante	Lucimar		
Jason Danielle	Neves		
Jessica & Susan	N.Crusader		
Jersey Princess	Sancor		
Kelly Marie	Sea Siren		
Legacy	S.Crusader		
Lutidar	Travis & Natalie		
Lucimar	Victory		
Luso American I			
Mary Elena			
Chrismar			
Nancy & Christine II			
Neves			
Northern Crusader			
Orion			
Pontos			
Resolute			
Rita Sophia			
Sancor			
Santa Queen			
Sao Marcos II			
Seafarer			
Sea Escape			
Sea Siren			
Seel			
Southern Crusader			
Sunsine			
T.Luis			
Travis & Natalie			
Triunfo			
United States			
Vic-ter-rae			
Victory			
Yankee Pride			

Table 8. Yellowtail flounder sales order overview for the F/V Illusion 2000-2016

Date	# Sales Orders	Total Weight	Large YT	Price \$	Small YT	Price \$	% of YT
2000	8	219,558	114,945	1.33	38,865	0.97	70.05%
2001	14	521,699	249,700	1.09	65,375	0.99	60.39%
2002	18	548,409	166,045	1.10	37,320	1.10	37.08%
2003	8	240,152	138,245	1.49	21,700	1.32	66.60%
2004	14	401,788	169,350	1.14	47,062	1.11	53.86%
2005	21	474,273	188,315	1.40	100,117	1.16	60.82%
2006	17	230,806	69,505	1.64	36,961	1.53	46.13%
2007	18	242,770	71,210	2.30	35,495	2.11	43.95%
2008	14	210,180	34,010	1.56	9,200	1.38	20.56%
2009	10	142,784	30,360	1.06	1,740	0.99	22.48%
2010	15	261,491	27,725	1.35	3,875	1.20	12.08%
2011	21	671,887	47,805	1.35	21,066	0.84	10.25%
2012	22	439,237	45,655	1.48	12,700	1.15	13.29%
2013	15	235,140	25,360	1.47	6,885	1.07	13.71%
2014	15	274,686	25,415	2.11	8,880	1.78	12.49%
2015	13	117,084	18,595	1.42	14,851	0.81	28.57%
2016	8	108,155	5,475	2.37	977	1.63	5.97%

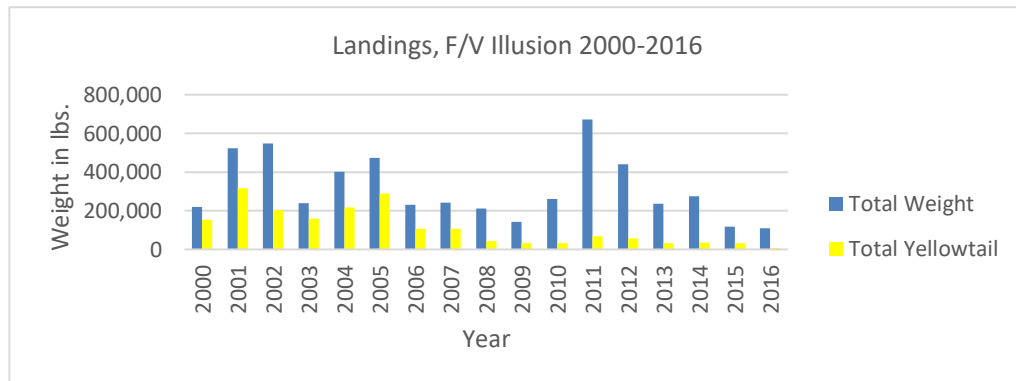


Figure 1. Landings of the F/V Illusion: GB yellowtail compared to total landings from 2000- 2016.

Table 9. Auction sales orders of the F/V Illusion in 2004

Order Breakdown 2004				
Sales Order #	Date	Yellowtail	Total Landed	% Yellowtail
1	1/5/04	44,200	47,418	93.00%
2	1/14/04	17,710	20,128	87.00%
3	1/28/04	21,590	40,310	53.00%
4	2/13/04	25,475	29,906	85.00%
5	2/27/04	20,765	23,334	88.00%
6	3/11/04	2,420	14,120	17.00%
7	3/26/04	0	18,787	0.00%
8	4/12/04	77	24301	0.03%
9	4/23/04	23,480	45,039	52.00%
10	5/25/04	27,000	44,140	61.00%
11	5/26/04	21,000	21,205	94.00%
12	6/30/04	14,030	46,872	29.00%
13	11/17/04	0	3,288	0.00%
14	11/29/04	0	22,940	0.00%

Table 10. Auction sales orders for the F/V Illusion in 2005

Order Breakdown 2005				
Sales Order #	Date	Yellowtail	Total Landed	% Yellowtail
1	2/7/05	14,705	23,755	61.00%
2	2/15/05	14,640	31,915	45.00%
3	3/1/05	0	18,372	0.00%
4	3/9/05	0	15,525	0.00%
5	3/23/05	0	16,205	0.00%
6	4/4/05	47	17,902	0.26%
7	4/14/05	0	24,805	0.00%
8	4/19/05	0	715	0.00%
9	4/22/05	0	16,772	0.00%
10	5/2/05	0	14,412	0.00%
11	5/11/05	58,480	62,954	92.89%
12	10/12/05	11,385	19,708	57.77%
13	10/24/05	25,500	32,645	78.11%
14	11/3/05	25,220	28,064	89.87%
15	11/16/05	36,000	40,147	89.67%
16	11/29/05	43,150	47,140	91.54%
17	12/7/05	50,765	55,096	92.14%
18	12/15/05	7,240	7,789	92.95%

Sales records from the F/V Illusion in 2005 indicate the trends of a yellowtail fisherman. The months of February include trips that were 45-61% yellowtail flounder. For the months of March and April, he did not land yellowtail, but instead focused on cod and haddock. By the month of May, the F/V Illusion made two targeted yellowtail trips consisting of 92-93% yellowtail flounder. Lastly, the fishing continued from November to December where trips were 89-93% yellowtail flounder.

Another vessel that exhibits similar trends to that of the F/V Illusion was the F/V Travis & Natalie, a once profitable yellowtail vessel. An overview of the F/V Travis & Natalie's landings from 2000 to 2015 shows 2005 to be the most profitable yellowtail year with yellowtail as 84% of the total landings (Table 11; Figure 2). A sales order breakdown for the years 2004 and 2005 displays a similar fishing trend to that of the F/V Illusion. In 2004, the vessel made a directed fishing trip in the month of May that was 100% yellowtail (Table 12). The F/V Travis & Natalie also made a profitable Christmas trip the following year catching 82% yellowtail flounder (Table 13). Now, ten years later, the F/V Travis & Natalie has been sold, and the F/V Illusion is one of the last vessels landing yellowtail flounder in New Bedford.

A breakdown of the sales orders for the F/V Illusion and F/V Travis & Natalie shows how regulations have affected the fishery and the market. Most importantly, it is evident that the current timing of landings has altered the fishery. In the years prior to 2006, these two vessels primarily caught yellowtail flounder. At each major regulation change, their fishing effort changed as a result. In 2011, The F/V Illusion's overall landings increased, but with a decrease in yellowtail. Whereas, the F/V Travis & Natalie left the fishery.

Table 11. Auction sales order overview of the F/V Travis & Natalie from 2000-2015.

Date	# of Sales Orders	Total Weight for year	Large YT	Price	Small YT	Price	% of YT
2000	15	353,647	154,400	\$1.15	94,240	\$0.98	70.31%
2001	11	398,025	167,675	\$0.94	72,455	\$0.78	60.33%
2002	4	177,382	15,755	\$1.37	7,960	\$1.13	13.37%
2003	18	425,211	113,645	\$1.37	44,185	\$1.19	37.12%
2004	5	175,792	65,665	\$0.83	6,701	\$1.04	41.17%
2005	7	277,542	121,935	\$1.04	111,740	\$0.70	84.19%
2006	7	168,280	11,735	\$2.01	9,340	\$1.65	12.52%
2007	7	10,090	800	\$1.47	2,200	\$1.10	29.73%
2008	3	56,162	3,340	\$1.44	2,000	\$1.41	9.51%
2009	3	59,040	14,345	\$0.97	200	\$0.49	24.64%
2010	1	4,008	X	X	X	X	0.00%
2011	4	87,300	4,200	\$0.83	17,147	\$0.48	24.45%
2012	X						
2013	X						
2014	X						
2015	X						

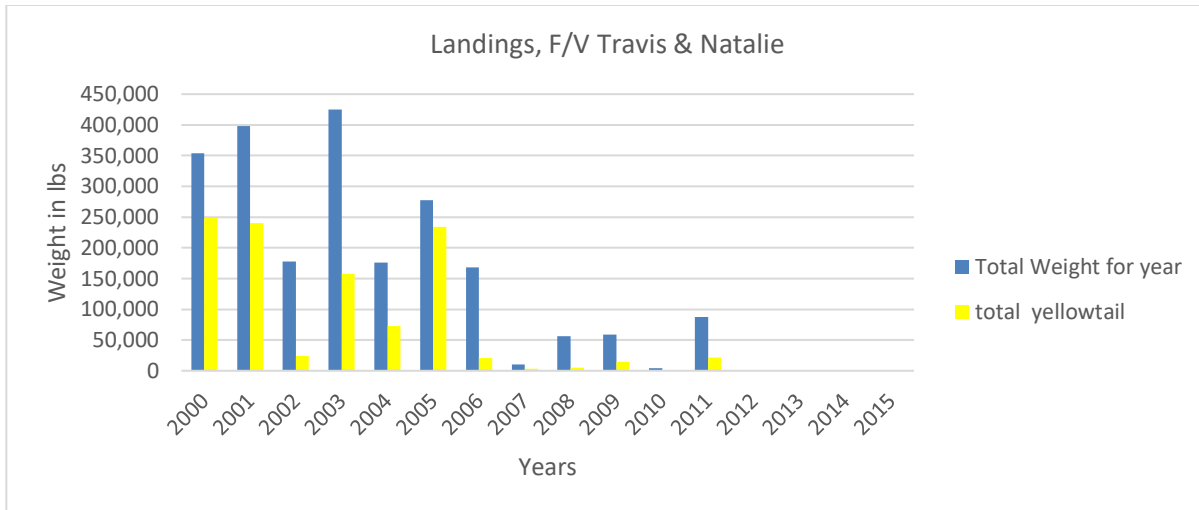


Figure 2. Landings of the F/V Travis & Natalie: yellowtail flounder compared to total landings.

Table 12. Auction sales order breakdown for the F/V Travis & Natalie in 2004.

Order Breakdown 2004				
Sales	Date	Yellowtail	Total Landed	% Yellowtail
1	5/20/04	12,900	28,932	44.59%
2	5/21/04	40,500	40,500	100.00%
3	6/2/04	9,885	42,100	23.48%
4	6/15/04	117	39,230	0.30%
5	10/11/04	8,970	25,030	35.84%

Table 13. Auction sales order breakdown for the F/V Travis & Natalie in 2005.

Order Breakdown 2005				
Sales Order #	Date	Yellowtail	Total Landed	% Yellowtail
1	5/18/05	40,075	51,595	77.68%
3	6/1/05	29,600	34,935	84.73%
4	6/13/05	53,705	76,270	70.41%
5	6/28/05	51,845	64,845	79.95%
6	12/20/05	40,950	49,882	82.09%

Capt. Phillips was only able to make three directed yellowtail trips in 2015, in which he specifically set out to catch yellowtail. He made the only three directed trips of the fleet by receiving the quota from other fishermen. These three trips were made in the month of April before the end of the fishing year. The three trips amounted to a total of 35,145 pounds, as compared to 2005 when he was able to land 58,480 pounds in one trip (Table 14). Although Capt. Phillips was able to make three directed

yellowtail trips, he was unable to benefit from the directed trips. The time constraint for the month of April affected the prices he received for the catch. Locating and catching the yellowtail flounder was not an issue, but the timing of the landings affected the price when he landed a greater volume.

Table 14. Auction sales orders for the F/V Illusion in 2015.

Sales Order Breakdown 2015				
Sales Order #	Date	Yellowtail	Total Landed	% Yellowtail
1	4/6/15	16,800	18,063	93.00%
2	4/22/15	12,125	16,763	72.00%
3	5/1/15	6,220	13,453	46.00%
4	5/19/15	0	2,030	0.00%
5	6/3/15	595	40,995	1.45%
6	6/15/15	885	5,529	16.01%
7	6/25/15	365	1,910	19.11%
8	7/20/15	0	13,794	0.00%
9	7/30/15	45	1,233	3.65%
10	8/10/15	115	1,431	8.04%
11	9/8/15	130	1,523	8.54%

Most fishermen are no longer landing yellowtail flounder due to quota constraints. Capt. Phillips must wait until April to fish yellowtail flounder before the fishing year ends. In 2015, he was given 90,000 pounds of free yellowtail quota from the members of his sector. Sector members typically hold onto their yellowtail quota until the end of the fishing year to be used as a bycatch while targeting haddock. Although he was given the free quota, he did not have enough time to target such a substantial amount of weight. In April 2016, he was only able to catch 790 pounds of the 90,000 allotted to him. Capt. Phillips explained that the yellowtail become more available to catch in May, so fishing the entire quota in April would not be profitable. The potential 90,000 pounds of quota was forfeited and the new fishing year began. Capt. Phillips offered an explanation as to why fishermen stopped harvesting yellowtail:

“The groundfish trawl fleet does not catch the Georges yellowtail TAC for several reasons. The first reason is that we need the small allocation as a safety net to allow us to catch haddock and winter flounder. The only time we target yellowtails is in April, when boats are sure they will not need them to catch haddock and winter flounder. The introduction of the sector system has forced effort and fishing behavior to change drastically,” (letter from Phillips to SSC, 2015).

Market statistics and Capt. Phillips’s interview suggest that yellowtail landings are low because it is not in the fishermen’s favor to fish their quotas under the given circumstances. In a letter written by Capt. Phillips to NOAA in 2014, he discusses why the TAC for Georges Bank yellowtail cannot be reached. He wrote, *“NOAA bringing up the fact that we are under harvesting GBYTs is a NOAA created issue not a stock abundance issue, NOAA does this all the time by creating restraints that make it impossible to harvest a stock because of restrictions on other species”*. He explained that for

the majority of the fishing year, he had to avoid yellowtail. If he were to catch yellowtail and exceed his quota, he would have to pay a set rate of \$1.50 per pound. Capt. Phillips has the most quota for his sector at 7,000 pounds for the year, so he can feasibly catch haddock while saving his quota. Capt. Phillips stresses how the management system does not correspond well to the typical yellowtail harvesting patterns, and asked the question, “*How does a boat justify going on Georges to catch fish when they have less than 100 pounds of GBYT for the year?*” (letter from Phillips to NOAA, 2014).

The monthly yellowtail landings for 2000-2016 reveal how regulations can affect the landings of the resource. Prior to 2004, yellowtail landings were greatest in May and the winter months of November to February (Figure 3). However, in 2004 there was a shift in landings to the months of June through August (Figure 4). As Capt. Phillips mentioned in his interview, the greatest yellowtail landing months for the year tend to be in May and the winter. However, with management decisions, such as the opening of closed areas, the harvesting strategies will change as a result. In 2010, after the change to catch shares, landings of yellowtail began to increase in the month of April (Figure 5). There was a substantial increase in landings during April, and a decrease in landings in the usual winter months. When there is a significant change to the system, fishermen will adapt, and the landings will reflect the regulations. Economically, it was better for fishermen to reserve their yellowtail quota to allow for unintended bycatch of yellowtail while catching haddock. A threshold of landings needs to be met, to feasibly begin to rebuild the market. The market will not be able to rebuild itself without consistent supply, which is being constrained by the seasonal pattern of fishermen reserving quota for bycatch.

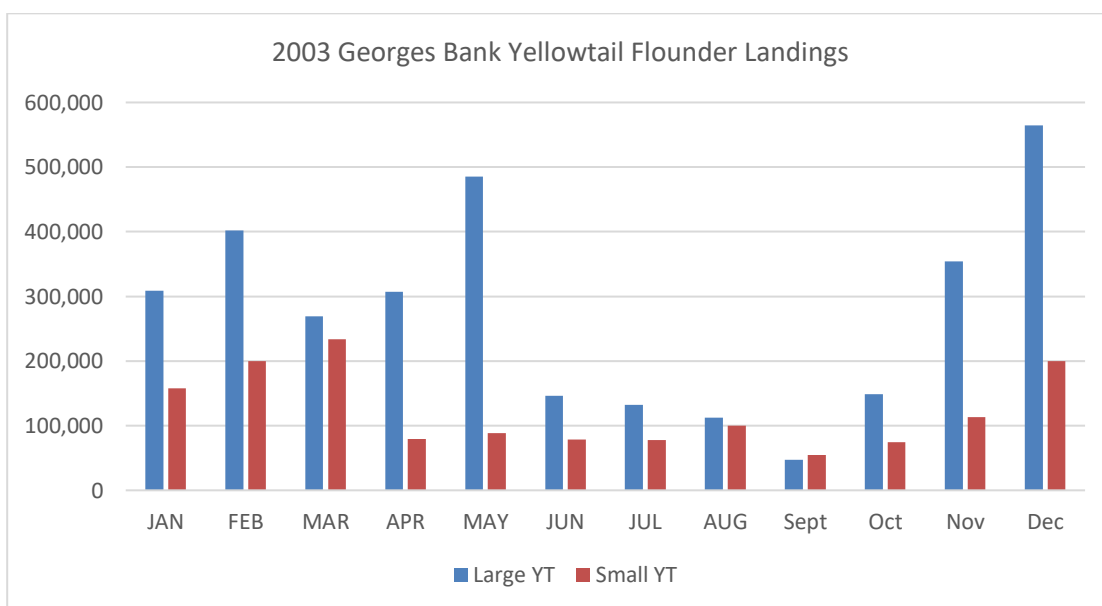


Figure 3. Georges Bank yellowtail flounder monthly landings in 2003

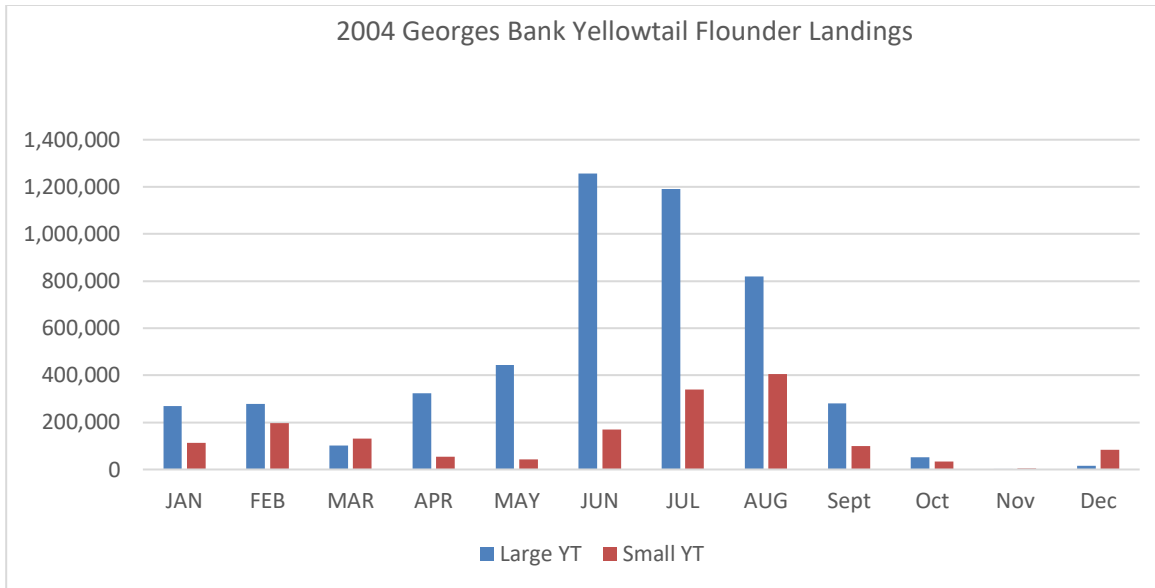


Figure 4. Georges Bank yellowtail flounder monthly landings in 2004

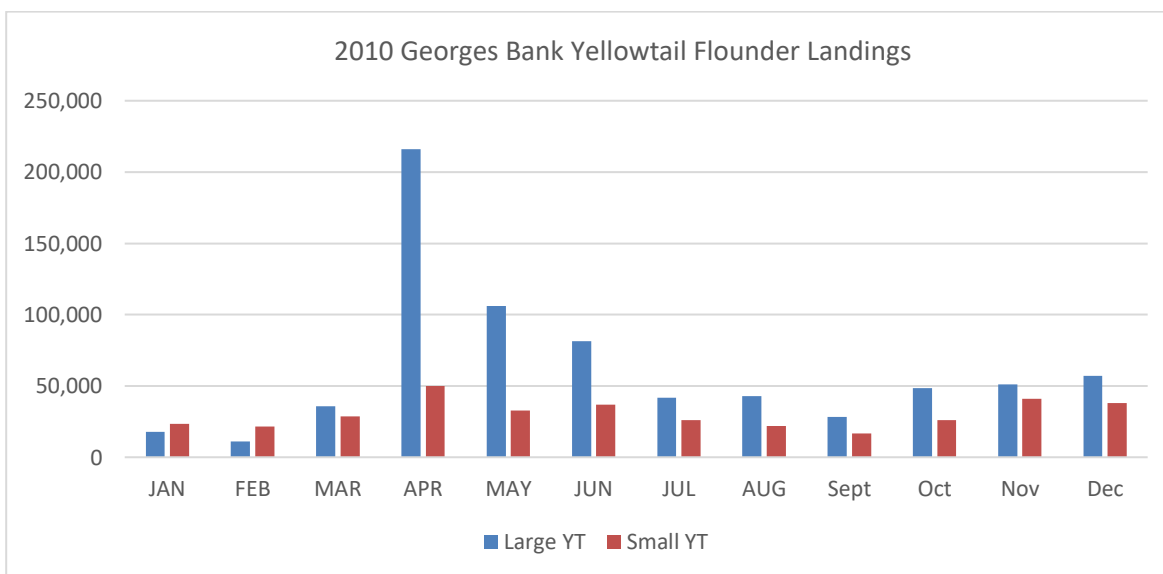


Figure 5. Georges Bank yellowtail flounder monthly landings in 2010

Factor 2: Consistency of Supply and Price

The consistency of supply will affect the price of the product at market. The price of a seafood product usually reflects the typical market trends of supply and demand. In 2004, with an increase in supply, the price crashed in response. Likewise, when yellowtail landings are lower, the price will be higher since there is a demand from the consumer for the product. These price trends have been consistent for yellowtail over the years. However, 2008 was the last year to have consistent prices with a substantial amount of weight (Table 5). Since that year, the average price for both large and small yellowtail has steadily declined. With lower landings, prices would be expected to rise. However, a lack of consistent landings at port resulted in a market collapse.

Without daily landings, there is no market for the buyers to rely upon. Capt. Phillips recalls a time when yellowtail flounder was sought after by chain restaurants. When processed, the yellowtail flounder produces smaller fillets, which is ideal for restaurants who focus on portion control. Chain restaurants demand large quantities of products to fill orders nationwide. When a resource is not consistently landed, consumers will find other species to complete their orders. Regulations affect the harvesting patterns of the fishermen, as well as market dynamics.

The 2016 market trends at the New Bedford auction, displays unusual price fluctuations. For example, in the months of January and April, when there was an increase in landings of large yellowtail flounder, the price decreased as expected (Figure 6). However, in October and November there was an unusual price decrease, despite a decline in product. Normally, buyers will pay more for a product when there is a lack of supply. Consequently, when buyers cannot rely on the product, they will lose interest. Similar to large yellowtail flounder, the small yellowtail flounder showed the same trends, even though there are larger quantities at port. Figure 7 shows how an increase in supply can actually cause an increase in price. From June to April, the supply steadily increases and causes a price increase, indicating that buyers have developed an interest in the product. However, the price declines again when the supply becomes too abundant in the month of August. Even though the supply declines in September, the price still continues to decline. These unusual trends expose how much the market depends on quantity consistency. The yellowtail flounder market cannot be restored until there is a steady supply coming into New Bedford on a daily basis.

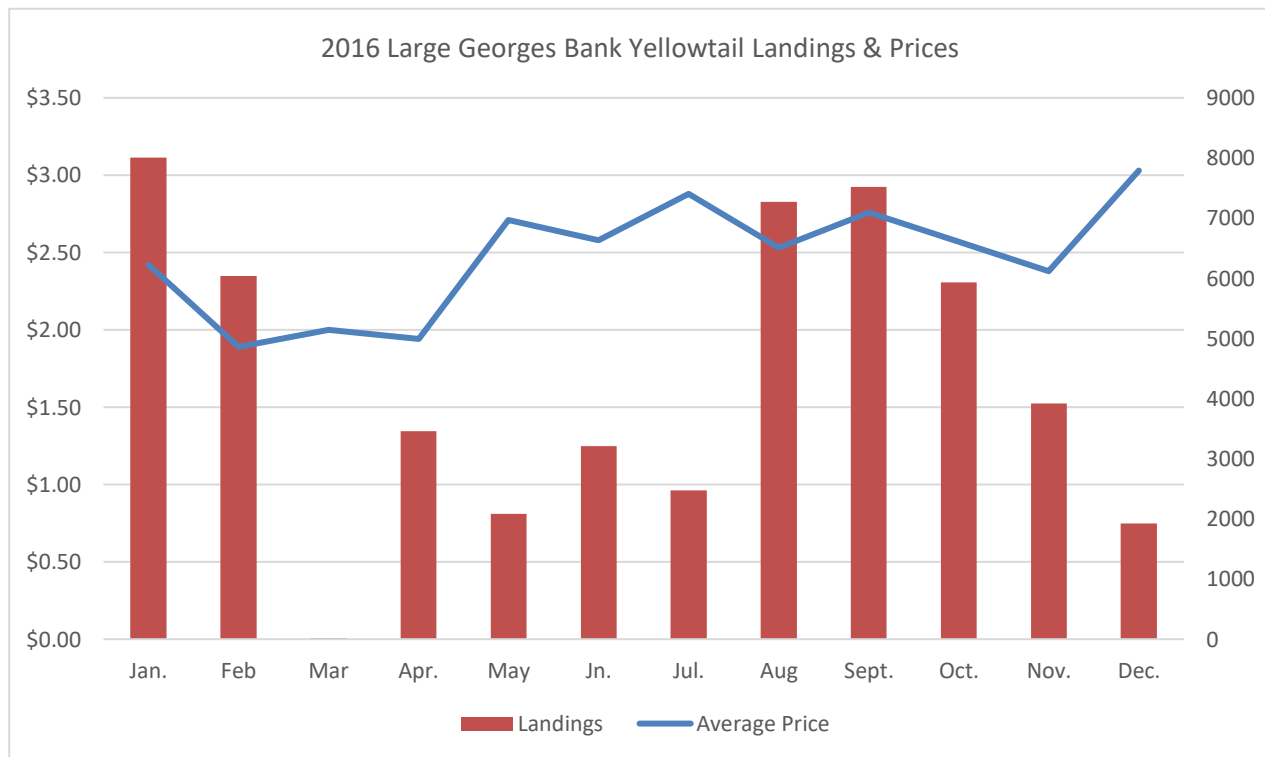


Figure 6. Landings and prices for large Georges Bank yellowtail flounder in 2016.

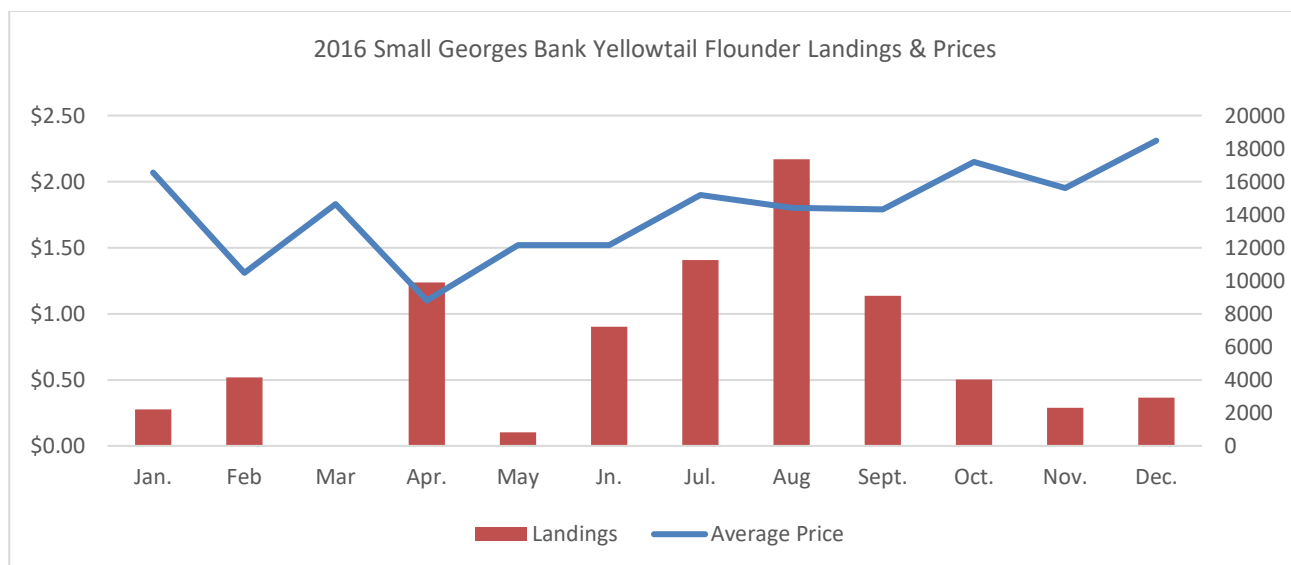


Figure 7. Landings and prices for small Georges Bank yellowtail flounder in 2016.

Processors began purchasing sea dabs, because they were the only product that was dependable at the auction and had a similar price range as substitutes that began coming to New Bedford. Sea dabs were once disregarded, but now there is a demand because they meet the criteria of what processors need to produce fillets. The month of April in 2016 provides an interesting comparison of yellowtail flounder and sea dabs, that illustrates the effect of consistent supply (Table 15). For the monthly averages, large yellowtail flounder averaged 216 pounds and small yellowtail averaged 618 pounds. By contrast, sea dabs had more consistent landings for the month with large sea dabs averaging 947 pounds daily and small dabs at 1,670 pounds. Although, both products had a decrease in price with an increase of product, sea dabs had a steadier price. The highest price for yellowtail, \$3.36 per pound, was on April 4th, but there were only 10 pounds. On that same day, large sea dabs had 952 pounds, with a similar price of \$3.24. That day prices were greater overall, but the sea dabs were not affected by having more landings. On April 25th, the small yellowtail had their highest landing of the month at 2,405 pounds, which caused the price to drop to \$0.91 per pound. In comparison, the small dabs were at a higher price of \$1.62 per pound at less weight. Therefore, the consistency of product on the board, determines the prices for the product. Buyers will pay more for the sea dabs on a day when there is more yellowtail because they have consistency in purchasing sea dabs and they have a market for the product.

Table 15. Auction landings and prices for April 2016: Georges Bank yellowtail flounder in comparison to sea dabs.

Yellowtail flounder							Dabs					
Date	LG		SM		MX		LG		MED		SM	
	Weight	price	weight	price	weight	price	weight	price	weight	price	weight	price
29-Apr	280	\$1.58	810	\$0.65	223	\$0.66	1490	\$1.78	1174	\$1.63	1842	\$0.73
28-Apr	238	\$1.88	785	\$0.81	528	\$0.40	962	\$1.72	1,168	\$1.81	3,100	\$0.84
27-Apr							190	\$2.00	670	\$1.82	2,095	\$1.08
26-Apr	225	\$1.86	750	\$0.77	515	\$0.71	557	\$2.33	604	\$1.60	1,361	\$0.79
25-Apr	865	\$1.81	2,405	\$0.91	1,658	\$0.75	1,362	\$1.84	622	\$1.62	1,853	\$0.78
22-Apr	500	\$1.99	1,425	\$1.24	1407	\$1.00	1076	\$1.85	795	\$1.94	1598	\$0.80
21-Apr	690	\$2.37	465	\$1.34					15	\$1.87	759	\$1.35
20-Apr	95		410				1435	\$3.21	790	\$2.74	2408	\$0.94
19-Apr	155	\$2.46	740	\$1.61	4133	\$1.39	1171	\$3.58	497	\$2.91	2174	\$1.20
18-Apr	205	\$2.77	435	\$2.15	425	\$1.86	856	\$3.33	1099	\$2.28	1748	\$1.66
15-Apr	20	\$2.51	135	\$1.86	738	\$1.73	1585	\$3.10	2243	\$2.36	4317	\$1.34
14-Apr	20	\$3.05	195	\$2.14	3785	\$1.78	653	\$3.07	572	\$2.41	1947	\$1.85
13-Apr											200	\$2.35
12-Apr	63	\$3.03	245	\$2.21	1030	\$2.12					38	\$2.31
11-Apr	42	\$3.05	430	\$2.27	3375	\$2.09	737	\$3.29	525	\$3.35	1204	\$2.18
8-Apr	38	\$2.44	285	\$1.65			540	\$3.54	760	\$3.18	547	\$2.35
7-Apr	10	\$2.49	205	\$2.15	2807	\$1.98	638	\$3.74	676	\$3.37	1419	\$2.39
6-Apr												
5-Apr												
4-Apr	10	\$3.36	165	\$2.32	1311	\$2.67	952	\$3.24	946	\$3.08	1453	\$2.81
1-Apr												
Average Weight	216		618		1687		947		822		1670	
Average Price		\$2.44		\$1.61		\$1.47		\$2.77		\$2.37		\$1.54

The month of April was chosen to examine Capt. Phillips' claims of the difficulties selling yellowtail at that time of year. Total value and landings patterns show that the market has changed to favor sea dabs. Table 16 displays the yearly landings and values at the auction for both yellowtail flounder and dabs in 2004 and 2015. From 2004 to 2015, there were decreases for yellowtail flounder. The value of large yellowtail decreased by 1157% and the value for small yellowtail decreased by 648%. However, the value of sea dabs increased by 44% for the large and 83% for the small. Although the dabs had increased supply of landings, the demand for the product increased, which in turn increased prices. Landings of yellowtail flounder decreased so much that the value declined as a result. Landings of dabs were more consistent, so the market was stronger.

Table 16. Weight & value of landings at the auction from 2004-2015 for Georges Bank yellowtail flounder and sea dabs

Species	Weight (lbs)		% change	VALUE (\$)		% change	AVG \$/lb		% change
	2004	2015		2004	2005		2004	2015	
Large Yellowtail	5,029,640	161,254	-3019.10%	\$3,635,554.24	\$289,325.84	-1156.60%	\$0.72	1.79	59.70%
Small Yellowtail	1,670,367	138,734	-1104%	\$1,303,658.72	\$174,313.30	-647.90%	\$0.78	\$1.26	37.90%
Large Sea Dabs	123,991	133,347	7.00%	\$168,658.23	\$298,271.98	43.50%	1.36	2.24	39.20%
Med Sea Dabs	72,345	181,849	60.20%	\$318,123.13	\$347,529.10	8.50%	1.17	1.91	38.90%
Small Sea Dabs	87,241	279,123	68.70%	\$69,059.37	\$402,095.29	82.90%	\$0.79	\$1.44	45%

Factor 3: Demand

An interview with previous Seafresh manger, Richard Goulart, who has been in the seafood processing industry for forty-seven years, explained what happened to the product of local yellowtail as a result of inconsistent landings. Goulart described his once profitable business of processing whole yellowtail flounder. In the early 1980s, he was shipping over 200,000 pounds of yellowtail fillets a week to New York and Philadelphia. They processed about 150,000 pounds of whole yellowtail per day in New Bedford. In the 1990s, Seafresh would typically purchase all the yellowtail flounder that was landed in New Bedford. However, landings began to decrease after 2010, which caused many processors to lose interest in yellowtail. Goulart claims, *“No one makes phone calls when there is only 2,500 pounds of yellowtail a week, there is too much of a risk. The menu for restaurants is set Monday and they need a ‘go to’ fish. There would need to be 2,000 pounds of yellowtail every day, 1,000 pounds from each vessel landed to rebuild the market. If there was that amount of weight on the auction board each week, you’d have a market again.”*

Goulart insists that consistency is the key to the market, not just for yellowtail but for all groundfish species. If a product is not on the auction board daily, buyers will lose interest and turn to other products that they can market to customers on a regular basis. Goulart explains that processors will ignore a product until it is frequently put in front of them. A sudden landing of yellowtail flounder will cause the price to crash, because no buyer wants to risk buying too much at once. Processors need to fulfill fillet orders, and without a consistent supply, they will turn to other species that they can process daily.

Another factor that affects the price of fresh landings are substitutes that can replace a similar product in size and appearance. When landings of yellowtail decreased in New Bedford around 2010, processors had to develop a market for other species. Goulart discussed the use of the substitutes that came into New Bedford. The fish was frozen at sea, headless and gutless, and frozen into forty pound blocks. The blocks were sold for \$1.25 a pound, and then resold as fillets for \$3.25-3.95 a pound. The market was profitable because there was a set price and they could order 10,000 pounds a day. With a

consistent supply of a whitefish alternatives coming to New Bedford, there was no longer a need to purchase fresh yellowtail flounder.

These substitutes began to drastically affect the market for the fresh fish landed in New Bedford. The frozen products were at a set price, and larger volumes were coming in daily. The once highly sought after fresh seafood of New England was replaced by these substitutes. Processors changed their production. They replaced human yellowtail flounder fish cutters with machines that could process the frozen blocks of substitutes into fillets. The processors that buy on the auction have found other species to replace yellowtail flounder, and they are no longer equipped to process yellowtail. Processors try to find the cheapest way to fill fillet orders. Finding other species to replace yellowtail flounder, as well as replacing workers with machines, have significantly lowered their processing costs. The processors can now rely on a steady supply of flatfish at a set rate with less labor costs. For 2014, the U.S. commercial landings consisted of arrowtooth flounder (112,018,000 pounds), yellowfin sole (335,452,000 pounds), and flathead sole (38,609,000 pounds; Lowther, 2014). By comparison, the total U.S. yellowtail flounder landings were only 3,918,000 pounds (Lowther, 2014). The large amounts of flatfish landed in the Pacific were much more dependable for processors.

With the change in production, many processors in New Bedford went out of business as a result of low landings. Goulart's company Seafresh went out of business due to the lack of production and a decrease in available local products. Goulart claims that in the past twenty years, at least 15 processors have left the industry. According to auction records of buyers over the past 20 years, there has been a substantial decrease in buyers of yellowtail flounder. The records show that in 2000, 79% of the buyers at the auction were purchasing yellowtail flounder, but by 2016 only 53% of the buyers purchased yellowtail (Table 17). The data on buyers includes buyers who purchase yellowtail, active buyers who do not purchase yellowtail, and buyers that have left the auction. The most notable transition is from 2010 to 2016. Within the six-year time period, 15 buyers left the auction, five stopped purchasing yellowtail, and ten new buyers joined the auction, four of which purchased yellowtail. The buyers that joined and purchased yellowtail, were smaller buyers that use the product for retail and can benefit from smaller weighted lots at auction. The decrease in yellowtail buyers by 20 members, reflects the current market conditions. The majority of these buyers were purchasing 200,000-500,000 pounds a year in 2000, and have now left the market in search of a substitute with a greater resource. The 50,000 pounds of large yellowtail flounder landed in 2016 was not enough to supply any major processor.

After Seafresh went out of business, Goulart started working for a fish buyer in New York. He still attends the auction every day and focuses primarily on grey sole (WCSDA product name for witch flounder). Unlike yellowtail flounder, grey sole has a highly developed market as a whole fish. The Asian population in New York City seeks the whole flounder on a daily basis at fresh seafood markets. At the auction on April 22, 2016, Goulart purchased grey sole for \$3.98 per pound, and the company will mark up the product and sell it for \$25 a pound at market in New York City. The mark up indicates that the consumer will pay high prices to obtain the product. As for yellowtail, consumers will not pay top dollar for a product that is not seen daily at the fish markets. Yellowtail flounder was primarily used for fillets, so it could easily be replaced by any fish that could mimic the white fillet. Grey sole flounder was not affected by this since it is predominantly sold as a whole fish.

Table 17. Buyers of the auction (WCSDA) in 2000, 2010, 2016. Refer to key.

Buyer	2000	2010	2016
Buyer 1	✓	X	X
Buyer 2	✓	✓	✓
Buyer 3	✓	X	X
Buyer 4	✓	ACTIVE	✓
Buyer 5	ACTIVE	ACTIVE	ACTIVE
Buyer 6	✓	ACTIVE	✓
Buyer 7	✓	✓	X
Buyer 8	ACTIVE	ACTIVE	X
Buyer 9	ACTIVE	X	X
Buyer 10	✓	X	X
Buyer 11	✓	ACTIVE	✓
Buyer 12	✓	✓	✓
Buyer 13	✓	X	X
Buyer 14	✓	✓	✓
Buyer 15	✓	✓	ACTIVE
Buyer 16	✓	✓	ACTIVE
Buyer 17	✓	ACTIVE	X
Buyer 18	✓	X	✓
Buyer 19	✓	ACTIVE	X
Buyer 20	ACTIVE	ACTIVE	ACTIVE
Buyer 21	✓	✓	X
Buyer 22	✓	X	X
Buyer 23	✓	X	X
Buyer 24	✓	✓	✓
Buyer 25	ACTIVE	X	✓
Buyer 26	✓	ACTIVE	X
Buyer 27	X	✓	X
Buyer 28	X	ACTIVE	X
Buyer 29	X	✓	✓

KEY	
✓	Purchasing YT
X	out of the auction
ACTIVE	active, no YT

Buyer 30	X	✓	X
Buyer 31	X	✓	X
Buyer 32	X	✓	X
Buyer 33	✓	X	X
Buyer 34	X	✓	ACTIVE
Buyer 35	✓	X	X
Buyer 36	X	✓	ACTIVE
Buyer 37	X	✓	X
Buyer 38	ACTIVE	X	X
Buyer 39	X	ACTIVE	✓
Buyer 40	X	✓	X
Buyer 41	X	✓	✓
Buyer 42	X	✓	X
Buyer 43	X	ACTIVE	X
Buyer 44	X	ACTIVE	X
Buyer 45	X	✓	X
Buyer 46	X	ACTIVE	ACTIVE
Buyer 47	X	X	ACTIVE
Buyer 48	X	X	ACTIVE
Buyer 49	X	X	ACTIVE
Buyer 50	X	X	✓
Buyer 51	X	X	ACTIVE
Buyer 52	X	X	✓
Buyer 53	X	X	✓
Buyer 54	X	X	ACTIVE
Buyer 55	X	✓	✓
Buyer 56	X	X	✓
Buyer 57	X	X	ACTIVE
Total:	29	35	30
YT buyers:	23	20	16

Grey sole buyers come to market seeking the whole product, and do not want to replace it with an alternative. This is evident in auction landings for the month of April 2016. Yellowtail flounder and grey sole flounder had similar average landings by weight, but grey sole flounder had significantly higher prices (Table 18). Therefore, consumers' purchasing choices of a final product of fish will determine the auction pricing. The consumers demand for the whole grey sole flounder keeps prices higher than other flounder species. In fact, the lower landings of grey sole flounder will only benefit prices at market. Retailers and fish markets typically seek smaller lots of fish. Thousands of pounds a day would be too much when the fish is being sold whole. For a buyer like Goulart, purchasing 50-100 pounds a day is an optimal amount of weight. As seen on April 29th, too much weight of grey sole will cause a price drop (Table 18). The demand for this product is in smaller amounts to supply a fresh, retail seafood market.

Table 18. Landings and prices of Georges Bank yellowtail flounder in comparison to grey sole (witch flounder) for the month of April, 2016.

Yellowtail flounder					Grey sole					
Date	LG		SM		LG		MED		SM	
	weight	price	weight	price	weight	price	weight	price	weight	price
29-Apr	280	\$1.58	810	\$0.65	6	\$4.45	102	\$3.73	1271	\$1.12
28-Apr	238	\$1.88	785	\$0.81	10	\$4.85	101	\$4.28	1527	\$1.18
27-Apr							27	\$4.15	1,425	\$1.40
26-Apr	225	\$1.86	750	\$0.77	6	\$4.15	127	\$5.00	1,272	\$1.70
25-Apr	865	\$1.81	2,405	\$0.91	17	\$5.65	57	\$5.45	539	\$2.43
22-Apr	500	\$1.99	1,425	\$1.24	11	\$5.45	128	\$4.18	1029	\$1.80
21-Apr	690	\$2.37	465	\$1.34			190	\$4.60	905	\$1.97
20-Apr	95		410		17	\$5.90	62	\$4.95	331	\$2.91
19-Apr	155	\$2.46	740	\$1.61	15	\$6.00	39	\$4.65	289	\$3.10
18-Apr	205	\$2.77	435	\$2.15			181	\$3.15	1041	\$2.27
15-Apr	20	\$2.51	135	\$1.86	17	\$6.20	172	\$4.72	1727	\$2.29
14-Apr	20	\$3.05	195	\$2.14			15	\$4.15	152	\$2.78
13-Apr										
12-Apr	63	\$3.03	245	\$2.21						
11-Apr	42	\$3.05	430	\$2.27	4	\$5.35	24	\$4.80	974	\$3.34
8-Apr	38	\$2.44	285	\$1.65			53	\$4.08	544	\$2.97
7-Apr	10	\$2.49	205	\$2.15	5	\$6.20	33	\$5.45	252	\$3.55
6-Apr										
5-Apr										
4-Apr	10	\$3.36	165	\$2.32	24	\$5.75	158	\$5.75	1036	\$3.21
1-Apr										
Average weight	216		618		12		92		895	
average price		\$2.44		\$1.61		\$5.45		\$4.57		\$2.38

Grey sole have a highly developed market, in which lower auction landings will not affect the retail mark up for the product. When the customer is willing to pay high prices, the buyer will consistently buy the product to meet their demands. Yellowtail flounder and grey sole are similar species but different products, and the grey sole is currently desired more by the consumer. The general public appears to be overlooking yellowtail flounder because so many products can be used as a substitute at markets or restaurants. In the 1980s and 1990s, yellowtail flounder was once on the menu at restaurants. Now menus consist of dishes with a whitefish fillet, labeled as ‘sole.’ However, the type of fish used for fillets is no longer important, especially when these fillets will often be “value added” with breading and other fillers.

Mislabeling seafood products has become a problem in recent years. Retailers have replaced products such as yellowtail flounder fillets with other white fish fillets, both in fish markets and restaurants. Buyers demand a white fish fillet, but often do not know what they are purchasing. The Boston Globe conducted an investigation where they tested 183 samples and discovered that 48% of the samples were mislabeled (Abelson, 2011). The article cites the example of a flounder fillet sampled at a

restaurant in Dorchester, MA. According to their findings, “*the \$23 flounder fillet turned out to be a Vietnamese catfish known as swai - nutritionally inferior and often priced under \$4 a pound*” (Abelson, 2011). The researchers concluded that consumers were often paying more for a less desirable species, and were unaware of what they were actually consuming. Many would argue that the consumer no longer has a demand for specific seafood. The supply of locally caught seafood has greatly decreased, so the consumer has become accustomed to eating a generic, white fillet substitute.

Consumers are generally unaware of these market dynamics, and the demand for the once plentiful yellowtail flounder has diminished. Currently, yellowtail flounder is considered to be “overfished”, because of a low stock size, but it is being managed and fished responsibly, according to the Magnuson-Stevens Act. The “overfished” label affects the general public’s opinion about a product. Most consumers are not educated about what “overfished” means, and once that label is placed on the species, many will look towards other more sustainable products.

Importation of seafood into the US is another factor that affects the demand for yellowtail flounder. Buyers will import species at much cheaper prices to fill orders and often their final products will be mislabeled. The U.S. seafood importation numbers support how often this could potentially be occurring in the US. According to NOAA, 28% of all edible seafood imports were fillets (Lidell, 2014). In 2016 alone, 10,403,706 kilograms of flounder was imported into the US (NMFS, 2016). Other resources are being used to replace once profitable local markets. The US Department of Agriculture lists the amount and value of imported seafood from 1996-2014 (Table 19). The importation rate increased every year, and the value declines steadily. Fish Watch, an informative website provided by NOAA, states that 90% of the seafood consumed in the U.S. is imported (FishWatch, 2016). A portion of this seafood is American caught, exported for processing, and then imported back to the US, creating an even larger global footprint. With mislabeling and importation on the rise, refocusing on how to promote locally caught sustainable seafood products is needed to rebuild markets.

Marketing Solutions

To achieve the management objectives of optimum yield (“*provide the greatest overall benefit to the Nation, particularly with respect to food production...*” US DOC 2007), the market for Georges Bank yellowtail flounder will need to be rebuilt. If the product can be consistently landed, then the market is expected to re-establish. Marketing campaigns can be developed to highlight the locally caught seafood. Currently, there are campaigns that emphasize species that are “under loved” such as dogfish and redfish. A marketing campaign at a larger level needs to be created to promote local seafood as a whole. Currently, the Massachusetts Division of Marine Fisheries is developing a program that promotes the seafood landed in Massachusetts. The program intends to increase awareness and to develop a preference for local seafood products, and will attempt to educate the general public about local seafood. The program is a step in the right direction to brand and market local seafood and to teach the public the importance of knowing where the seafood on their plates originates from. Despite the value of such a program, landings coming into Massachusetts need to increase to actually supply a developed market. The overall values of the groundfish landings at the auction from 2000-2016, indicate that the entire market is at an all-time low (Figure 8). The decline in value of all the groundfish species indicates that markets for locally caught products are suffering as a whole.

Table 19. Imported Seafood of the U.S. 1996-2014 (USDA, 2016).

Year	Value	Weight (metric tons)
2014	20.2	2,523,120
2013	18.0	2,458,757
2012	16.7	2,441,516
2011	16.6	2,421,076
2010	14.8	2,474,946
2009	13.1	2,341,242
2008	14.2	2,370,477
2007	13.7	2,425,084
2006	13.4	2,449,468
2005	12.1	2,320,120
2004	11.3	2,245,671
2003	11.1	2,225,598
2002	10.1	2,008,136
2001	9.9	1,860,652
2000	10.1	1,804,517
1999	9.0	1,763,536
1998	8.2	1,654,279
1997	7.8	1,514,492
1996	6.7	1,437,806

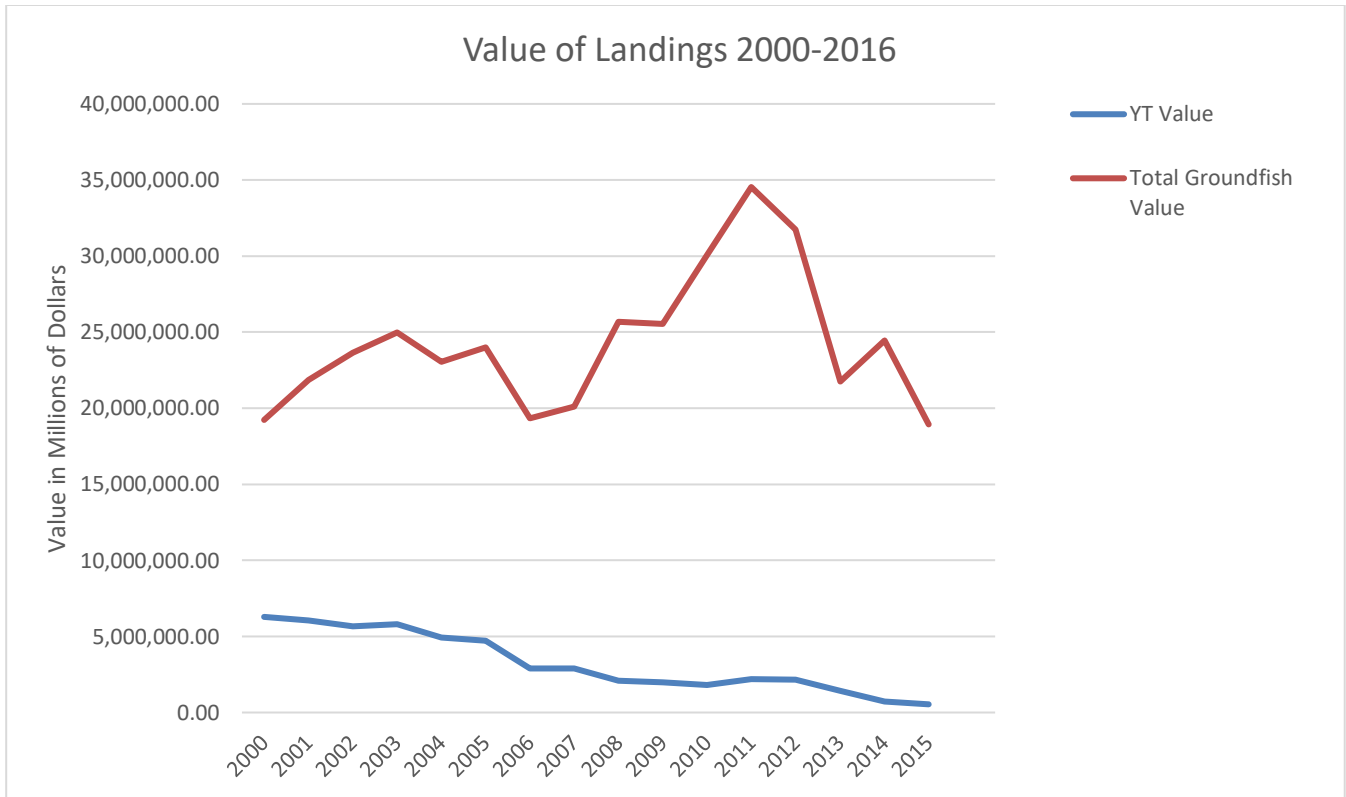


Figure 8. The value of auction landings for Georges Bank yellowtail flounder in comparison to the total value of groundfish landings from 2000-2015.

In order to more effectively utilize Annual Catch Limits in the groundfish fishery, there needs to be an improvement of market understanding. A market analysis should be considered in assessments to make more effective management decisions. In view of the information provided in these analysis, new factors need to be contemplated in stock assessments. Input from fishermen and more cooperative research is expected to improve public awareness. For example, listening to the perspectives of fishermen, such as Capt. Phillips, will develop a much better understanding of their harvesting strategies and market dynamics. The perceived notion that fishermen are exceeding management limits that has arisen from the terminology “overfished” and “overfishing” needs to be corrected. Even if quotas were to be increased in the future, many fishermen would argue that it needs to be done slowly overtime. A sudden increase in catch will flood the market, especially for Georges Bank yellowtail flounder, and the price will dramatically crash. If the species can be landed regularly and not at large, sporadic volumes, then the market will slowly return. To rebuild the market in New Bedford, other market success stories need to be considered and used as a guide.

In 2010, the Canadian company, Ocean Choice International received certification from the Marine Stewardship Council (MSC) for the yellowtail flounder fishery on the Grand Banks. The MSC certification was an effective marketing strategy for the company. Consumers are more likely to purchase seafood that has been MSC certified, as the label indicates that the seafood product is sustainable and the fishery abides by strict rules in order to maintain the MSC status. Over the past twenty years, Ocean Choice has worked to improve gear to minimize seafloor contact. They also implement seasonal closures to improve the fishery. According to the Ocean Choice website, “with

over 90% of the Canadian quota for this stock, OCI plays a lead role in the data collection and management of this resource. In the next 14 years after the fishery reopened, this stock has improved incredibly, supported by solid science, daily communication and cooperation between our fleet management team and the Canadian government who oversees the stock, sound harvesting strategies and investment in technology” (OCI, 2016). Their success in creating cooperation between the fleet and the government has allowed both parties to work together to rebuild the stock.

Rebuilding a fishery can lead to a successful marketing campaign through programs like the MSC certification. However, the yellowtail fishery of New England is much different than the fishery of Canada. Ocean Choice International owns 90% of the Canadian yellowtail flounder quota. By contrast, the quota of New England is owned by multiple boat owners. Working with one owner is much easier when making management decisions. Although we can learn from the Canadian example, the difference in fisheries must be considered as well. Many fishermen in New Bedford would ask, “how can we compete with Canada?” The biggest hurdle when competing with the Canadian yellowtail market is that the fish is frozen at sea. Therefore, the price is a frozen price and can remain steady for weeks at a time. Fresh seafood prices fluctuate dramatic from one week to the next. Unfortunately, as previously stated by Richard Goulart, a processor would much rather rely on a product with a steady price.

Program Outreach

We held four industry outreach meetings to discuss the proposed and revised objectives and scope of work (Table 1). These meetings included a total of 24 industry members, consisting of fishermen, Sector managers, processors and dealers. Additional outreach meetings are scheduled for March and April, 2016.

C. O’Keefe presented information related to the project at the 2015 ICES Annual Science Conference and the Gulf of Maine Research Institute Fall 2015 Seminar Series:

- O’Keefe, C.E., Cadrin, S.X., Canastra, R. and Phillips, M. 2015. Collaborative approaches to optimize harvest within bycatch constraints in the New England multispecies fishery. ICES Annual Science Meeting L:24, Copenhagen, Denmark. September 2015.
- O’Keefe, C.E. 2015. Optimizing by Avoiding? Managing multispecies fisheries under low Annual Catch Limits. Gulf of Maine Research Institute Fall 2015 Seminar Series, Portland, ME. October 2015.

C. Canastra presented information related to the project as part of her Master’s degree in the class “Advising Fishery Managers” during the fall 2015 semester:

- Canastra, C. 2015. Georges Bank yellowtail flounder: The truth behind the overfished stock. Advising Fishery Managers class presentation, Fairhaven, MA. October 2016.
- Canastra, C. Georges Bank yellowtail flounder: The collapsed market. Advising Fishery managers class presentation, Fairhaven, MA. November 2015.
- Canastra, C. 2015. Getting involved: Developing a sustainable industry for the New England fishery. Advising Fishery Managers class presentation, Fairhaven, MA. December 2015.

S. Cadrin presented part of this information in a keynote address for the Lowell-Wakefield Symposium on “Assessing and Managing Data-Limited Fish Stocks” (Anchorage AK, May 2015)

Conclusions

The Georges Bank yellowtail flounder market collapsed because of low landings and irregular supply, resulting in less demand for the species as a product. The decreased landings over the last decade affected the supply coming to market. Ultimately, the factors of effort, price, and demand have impacted the yellowtail flounder market. Regulations affect the supply coming to port, and low landings will affect the price at market since yellowtail flounder cannot be landed on a consistent basis. The demand for yellowtail flounder will not return until the species is consistently landed. Yellowtail flounder can no longer compete with Pacific substitutes. Until there is a consistent supply of a yellowtail product on the auction, the fresh market will remain collapsed for this species of flounder. Marketing programs, like those of Ocean Choice, cannot be considered until managers develop a holistic rebuilding plan that includes input from processors and fishermen about the dynamics of the market.

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