

changes in the ratio are informative. For example, a declining trend in the ratio would imply a reduction in time spent per “earning opportunity” (a crew trip).

Total crew days for all vessel sizes combined decreased slightly (1.1%) from 2011 to 2012 for all vessels. Since total crew trips declined during the same time period at a higher rate (4.6%), the ratio of crew days to crew trips has increased. This suggests that, overall, the time spent per earning opportunity has increased, while at the same time earning opportunities have decreased. Total crew days decreased for all vessel size categories in 2012 with the exception of the 50’ to <75’ category, which saw a 1% rise (Table 43).

Total crew days declined in 2012 for the home port states of Massachusetts, New York, and Rhode Island, with New York experiencing the largest percent drop (7%). Connecticut, Maine, New Hampshire, and New Jersey all experienced increases in crew days in 2012 with Connecticut seeing the biggest percent increase (44%). Of all the home port states, only New York and Rhode Island had decreases in the ratio of crew days to crew trips in 2012. Connecticut had the largest increase in the ratio of crew days to crew trips in 2012 (33%) (Table 44). However, crew-based changes do not indicate, by themselves, whether crew incomes have changed. Crew income is influenced by many factors including a vessel’s revenue/cost sharing formula, the amount of revenue a vessel receives from fish sales, the costs of fishing, the number of vessels actively fishing, and the intensity of fishing.

8. NET REVENUES AND QUOTA TRADING

This section describes the actual trades of quota, both between and within sectors, as reported by sectors in their year-end reports to NERO. Data limitations, as well as the nature of trading in the market (trades are between sector members and not between vessels, per se), make it difficult to adjust individual vessel net revenues by additional income/cost from ACE trading, which is critical for understanding the full distribution of benefits from quota leasing. To accommodate for this, net revenues are summed to the sector member level (some sector members own multiple vessels) and observed ACE trades are used to estimate the additional economic implications attributable to participating in the quota market. That is, net revenues were estimated at the fishing trip level and then aggregated and reported at the vessel, sector member, and fleet levels. Since quota leasing costs/revenue cannot be calculated at the trip or vessel levels, only the sector member level net revenue estimates are adjusted for quota trading in this analysis.

8.1. Nominal Net Revenues

Nominal net revenues were estimated using trip costs³⁸ collected by Northeast Observers and At-Sea-Monitors, as well as other data sources. Net revenue is defined as gross revenue less trip costs. Typically, net revenue is then split between the vessel owner and the crew. Two types of net revenue analysis are provided: (1) yearly changes in average nominal net revenue per day; and (2) yearly changes in aggregate nominal net revenues for various vessel categories (vessel size and home port state categories).

³⁸ Trip costs are typically costs that vary with the amount of fishing effort such as fuel, bait, fishing hooks, etc.

Actual annual financial profit is the sum of the owner's share of net revenue for all trips made over a year less annual fixed costs.³⁹ While analysis of the owner's share of net revenue is just one component of annual financial profit, it is indicative of economic performance (at least in the short run). See Figure 15 for a graphical depiction of the components of annual financial profit and the relationship between owner's share and profit.

Trip costs used in these analyses include: fuel, oil, ice, supplies, bait, food, water, damage, lumpers fees⁴⁰, and sector membership fees. There may be additional trip costs (e.g., communications costs or trucking fees) that must be covered. One important cost that has not been included in the estimation of nominal net revenue is the cost incurred by sector vessels to purchase additional groundfish ACE in 2010 - 2012, or to purchase DAS in 2009 (and 2010 - 2012 for common pool vessels). However, these costs and revenues are addressed later in this section of the report.

Because not all trips are observed, and therefore actual trip cost information is not available for all trips, trip costs must be estimated for the universe of trips using cost information from the sampled trips. To do this, trip cost data were used to calculate average trip costs per day absent for 80 vessel types, based on gear used, vessel length, trip duration (single vs. multi-day trips), and fishing year (Table 45). For unobserved trips where actual trip costs were not available (or the data were insufficient to link a vessel trip report (VTR) record with an observed trip), the appropriate vessel type mean value was multiplied by the actual trip length (days absent) recorded in the VTR. The result is an estimate of the cost for each of the unobserved trips. From these data, an estimate of nominal net revenue was obtained by subtracting the cost estimate from the actual nominal revenue received for the trip (all species landed). For trips where there was a direct match between the observed data and VTR data, actual trip costs were used.

An additional trip cost not collected by observers—but reported by most sectors in their 2010 through 2012 year-end reports—is the sector organizational cost charged to sector members. Based on the information in these reports (which are submitted to NMFS), a landings fee paid to the sector by sector members was calculated according to the formula provided in the year-end reports. For sectors that did not provide this information, a representative formula was used.

A variety of crew and owner share arrangements are used in the groundfish fishery, with different percentage splits between owner and crew, different costs deducted from net revenue, and different points within the formula where the split occurs (e.g., some vessel owners divide gross revenue first and then deduct certain costs from the crew's share of the gross revenue). Data from the SSB's 2011 fixed cost survey were used to determine common lay systems according to vessel size and number of crew.⁴¹ Information is not available to determine if a vessel was operated by the owner or a hired captain. For vessels less than 75' with a crew size (including the captain) less than three, it was assumed that the operator was the owner. If the

³⁹ Fixed costs are typically costs that do not vary with the amount of fishing effort such as insurance.

⁴⁰ Lumper fee information is not collected by observers. Based on personal communications with fishermen, a rate of \$0.04 per pound of landed weight is assumed.

⁴¹ For vessels greater than 75', half of the trip expenses were subtracted from gross revenue and the owner's share was 50% of the resulting amount. The crew paid the other half of the trip expenses from their share. Vessels 50' to 75' in length and with a crew of three or more used the same lay system as the large (75'+) vessels. If the number of crew was less than three, the owner's share was 75% of gross revenue less all trip expenses. For vessels less than 50', all trip expenses were deducted from gross revenues and the owner's share was 70% of the resulting net revenue. If resulting owner and/or crew shares were negative, they were assumed to be zero.

crew size was three or more, it was assumed that the operator was a hired captain. For vessels 75' and greater, it was assumed that the operator was a hired captain regardless of the crew size. Due to changes in the way owner and crew shares were calculated and because additional costs were considered, the net revenue results in this report will vary from those in previous reports.

8.1.1. Average Owner and Crew Shares Per Day

Average vessel owner and crew shares⁴² of nominal net revenue per day, by trip type (groundfish vs. non-groundfish) and vessel size category, are reported in Table 46 and Table 47. The data in these tables are not adjusted for leasing activity. In 2012, average owners' shares per day on groundfish trips were the highest in the time series for all but the largest vessel length class. For vessels less than 30' in length, average owner share per day on groundfish trips increased by \$565 per day (60.2%) from 2011 to 2012. Over the same time period, average owner share per day on groundfish trips increased by \$934 per day (26.6%) for vessels 30' to < 50' in length, and by \$3,263 per day (102.1%) for vessels 50' to <75' in length. However, in 2012 the average owner of vessels in the largest length class ($\geq 75'$) earned \$650 less per day on groundfish trips, a 27.4% decline from 2011 (Table 46).

Average crew share per man per day on groundfish trips was at a 4 year high in 2012 for the two smaller length classes of vessels, those <30' in length and those between 30' and <50' in length, at \$604 and \$1,549 per man per day, respectively. For vessels 50' to <75', crew share per day on groundfish trips was higher in 2012 (\$907) than in 2011 (\$861), but down from its 2009 peak (\$1,069). For the largest vessels, average crew share was at a four year low in 2012 at \$163 per man per day, a 40.3% decrease from 2011 (Table 46).

On non-groundfish trips, the average owner's share dropped from 2011 levels for all vessel size categories, except for owners in the 30' to <50' length class, who saw a \$131 per day increase (5.7%) to a four year high. Vessels less than 30' in length saw an 11.2% decrease in average owner's share per day on non-groundfish trips from 2011 to 2012, and vessels between 50' to less than 75' saw a 5.2% drop. Vessels in the largest length class ($\geq 75'$) experienced a \$73 per day decrease in average owner's share on non-groundfish trips (1.3%). Crew share per crew member per day followed a similar pattern. Crew share declined from 2011 to 2012 across vessel sizes, with the exception of the 30' to <50' length class, where average crew share modestly increased by \$34 (3.9%) (Table 47).

To help explain some of the factors behind net revenue changes, both average revenue per day and average trip costs per day are also provided in Table 46 and Table 47. In 2012, average revenue per day on groundfish trips were the highest in the time series for all but the largest vessel length class, which saw a \$1,414 (20.4%) decrease in average revenue per day on groundfish trips. Average trip costs per day on groundfish trips in 2012 remained stable for the smallest and the largest vessel size categories and increased for vessels 30' to <50' and 50' to >75' (Table 46). On non-groundfish trips, trip costs per day remained stable in 2012. Decreases occurred in average revenue per day on non-groundfish trips from 2011 to 2012 in all vessel length classes, except for vessels 30' to <50' in length. The decreases ranged from 4.1% to

⁴² The average share of nominal net revenue that individual crew members receive per day absent provides information about how they may be faring financially. This is a function of gross revenue, trip costs, the crew share system used, trip length, and the number of crew on the trip. All of this is captured in average crew's share of nominal net revenue per day per crew member.

17.0%. For vessels 30' to <50' in length, average revenue per day on non-groundfish trips increased 7.3% from 2011 to 2012 (Table 47).

8.1.2. Average Owner and Crew Shares per Vessel

Average owner and crew shares of nominal net revenues may also be expressed at the vessel level rather than per day (Table 48). For all vessel size categories, the average owner and crew shares declined from 2011 levels, but were not as low as most of the 2009 and 2010 levels. It should be noted that the average crew share values are independent of the number of crew – these are average amounts paid to the entire crew regardless of size. Also, crew shares are an expense for vessel owners and represent earnings for crew. It is possible that these declining crew earnings were shared by fewer crew (as is suggested by some of the increasing crew share per man per day values on groundfish trips as seen in Table 46).

8.1.3. Aggregate Owner and Crew Shares

Owner and crew shares of nominal net revenues aggregated by fleet segments (vessel size and homeport state) are presented in Table 49 and Table 50, and reflect the combined result of shifts in average vessel performance and the shifts of activity among fleet segments. Total owner shares decreased from \$143.1 million in 2011 to \$129.8 million in 2012. Total crew shares similarly declined from \$82.8 million in 2011 to \$75.5 million in 2012 (Table 50). For the 30' to <50' size category, total aggregate owner and crew shares were the lowest in the time series (Table 49).

Aggregate vessel owner and crew shares declined across all homeport states except Connecticut. In Connecticut, both aggregate owner and crew shares were at a four year high in 2012. Shares in Massachusetts, the state with the most groundfish activity, declined to the second lowest levels in the four year time series. For owners in Massachusetts, aggregate share declined by \$8.6 million (11.7%) from 2011 to 2012. Over the same time period, aggregate crew share in Massachusetts fell by \$4.8 million (10.9%) (Table 50). Given these declines in the aggregate measures of owner and crew shares, it appears that while improvements are being made on average returns per day on groundfish trips, reductions in quota and other factors limit how many of these higher average return days can be taken.

Fishery-wide impacts of quota trading on net revenues are neutral overall because aggregate quota costs equal aggregate quota revenues. However, quota trading has distributional effects that are evident by comparing the impact of quota trades on net revenues by certain sector member characteristics. In Section 8.3 below, the impact of quota trades on net revenues will be discussed.

8.2. Quota Trading

Trades between sectors are archived in a database by the National Marine Fisheries Service (NMFS). Trades within sector are not tracked by NMFS; ACE is assigned to a sector with no restrictions on how and by whom it may be fished. However, sectors are asked to voluntarily report their within sector trades in reports submitted to NMFS at the end of each fishing year. Sectors also voluntarily report which sector members transfer quota out of the sector and which sector members receive quota from another sector. Not all sectors report these

within and between sector trades in the same fashion, but the self-reported data are illuminating and form a sufficient foundation for this analysis. However, if improvements can be made in quota trade reporting, a more accurate accounting of profitability in the fishery could be achieved without reliance on simulation.

Seventeen of twenty sectors⁴³ provided a member identification number and a cross-link to the moratorium right identification (MRI⁴⁴) numbers associated with each sector member. These links are essential for associating sector member characteristics to quota trade data. Many sector members own multiple vessels but the data do not distinguish which permits were responsible for leasing in, or out, quota. In addition, fishing permits can be associated with different MRIs, due to ownership changes and other reasons, and can move in and out of confirmation of permit history (CPH) status.⁴⁵ This further complicates associating vessels with actual quota trades.

As a result of these data limitations, we limit our analysis of quota trade impacts on net revenue at the sector member level. To do this, we first report average owner and crew share of net revenue by type of sector member. Sector member types are characterized by the number of vessels (excluding permits in CPH) each member has enrolled in the sector and the average length of those vessels. Average shares are expressed at the sector member but also at the vessel level (by dividing the member's net revenue by the number of vessels owned) in order to make comparisons across types. Next, average revenues (average cost if the value is negative) from quota trades are reported by the same sector member types. Average net revenues are then adjusted by the average revenues/costs from quota trading.

The average net revenues adjusted for quota trading are only for sector members that were identified in the sector year-end reports, resulting in the averages being based on a subset of the population of sector members. In contrast, net revenues reported in Section 8.1 earlier in this report are based on the full population of active vessels (not sector member based) and include common pool vessels. The average revenues/costs from quota trading are also based on a subset of all quota traders due to data limitations.

The values of quota traded are based on species and stock-level lease prices from the hedonic model, which were discussed earlier in Section 5.2 of this report. This means that, for this analysis, all trades of a given stock are assumed to be at a constant price -- an admittedly weak assumption given that supply and demand for quota leases vary dynamically but one that cannot be avoided at this time. This analysis does not capture, for example, the effect of a sector member buying Gulf of Maine cod at a low price in the beginning of the fishing year and selling it for a higher price at the end of the fishing year.

Except for Figure 16 and Figure 17, quota trade summaries are net of all transactions. That is, the net position for any given sector (or any given sector member) for any given stock is represented.⁴⁶ The value of quota transferred around throughout the course of the 2012 fishing year totaled \$14.1 million. But once all sales and purchases are netted out for each sector

⁴³ Two of the three sectors that did not provide member information were the permit banks. These sectors operate differently from traditional sectors in that they acquire permits for the sole purpose of leasing the quota to other sectors and so the permit bank is the owner of record.

⁴⁴ A NMFS generated number that tracks the potential sector contribution (PSC) of each sector member.

⁴⁵ CPH provides a temporary holding place for inactive permits while allowing the fishing history (and ultimately the quota) to be used on another permit.

⁴⁶ For example, even though a sector member may have carried out 20 different trades during the fishing year for Gulf of Maine cod quota, we only report the final annual balance of Gulf of Maine cod quota (which will either be a net financial gain or net cost) for that vessel after all of the trades for the year have been tallied.

member, a total of \$11.2 million worth of quota was transferred from net lessors of quota to net lessees of quota. In cases of multiple vessel ownership, quota was transferred internally -- in effect, a paper transaction. That is, if a vessel owner transfers quota from one of his vessels to another, he (they) simultaneously paid for quota and received revenue from quota, resulting in a wash. These types of trades were not reported by sectors in their year-end reports. This characteristic of the market further supports estimating quota trading impacts at the sector member level.

8.2.1. *Observed Quota Trading*

The total value of quota traded between sectors in fishing year 2012 was \$6.2 million. Figure 16 shows the values of the quota leased out, leased in, and the net result for each sector. The Fixed Gear Sector and Northeast Fishery Sector 4 (a lease only sector) were the two largest net lessors of quota in terms of value. Northeast Fishery Sector 2 and Northeast Fishery Sector 9 were the two largest net lessees of quota.

The total value of quota traded within sectors in fishing year 2012 was \$7.9 million.⁴⁷ Figure 17 shows the value of quota traded within each sector by stock. In value terms, Northeast Fishery Sector 9, Northeast Fishery Sector 2, and the Sustainable Harvest Sector 1 exhibited the largest amount of internal trading. Georges Bank winter flounder was the stock with the highest value of quota traded. Note that the within sector trade data do not capture quota that may have been transferred between vessels owned by the same sector member.

After calculating net quota trading positions at the sector member level, the within-sector and between-sector trades were combined into one data set. The results are summarized at the sector/stock level in Figure 13 and Figure 14. The net value of quota leased out (revenue) totaled \$11.2 million (Figure 13). The Sustainable Harvest Sector 1 obtained \$2.0 million of quota revenue, followed closely by Northeast Fishery Sector 9 (\$1.9 million) and the Northeast Fishery Sector 4 (\$1.7 million). The value of quota leased in (expenditures) also totaled \$11.2 million (Figure 14). The two largest buyers of quota, both from within their own sector and from other sectors was Northeast Fishery Sector 9 (\$2.8 million), followed by members of the Sustainable Harvest Sector 1 (\$1.8 million) and the Northeast Fishery Sector 2 (\$1.6 million). The stocks with the highest net transfer values were Georges Bank winter flounder (\$1.9 million), white hake (\$1.8 million), Gulf of Maine cod (\$1.6 million), and Georges Bank cod West (\$1.6 million).

The quota revenue from all vessels with positive net quota trading positions (net lessors of quota), as well as the quota costs from all vessels with negative net quota trading positions (net lessees of quota), were summed by sector along with final net positions (Figure 20). The two sectors with the largest net quota expenditures were Northeast Fishery Sector 9 (\$1.0 million) and Northeast Fishery Sector 2 (\$0.9 million). The two sectors with the largest net quota revenues were Northeast Fishery Sector 4 (\$1.7 million) and the Fixed Gear Sector (\$1.0 million).

⁴⁷ The values of quota traded between and within sectors (a total of \$14.1 million) in Figures 14 and 15 are not net results -- these values reflect total quota trading activity.

8.3. Adjustments to Net Revenue for Leasing Activity

The report on FY2011 quota trading (Kitts and Demarest 2013) simulated the market in order to adjust net revenues for quota costs at the fishing vessel level. The simulation was performed again using FY2012 data, but the results did not correspond with the observed data – even after changing some of the assumptions. As a result, that approach was abandoned and the approach of adjusting sector member average net revenues by average quota trading revenues/costs, described above, was used instead.

The number of sector member types was limited to twelve (four average vessel length categories and three vessel ownership categories). Further disaggregation resulted in too few members per type for reporting averages. However, Table 51 provides an indication of the geographic distribution of sector members as well as how many members of each type also held CPH permits, which are important sources of quota. Within Table 51 are counts of the total population of members, how many of those traded quota, and how many members fished in FY2012. Overall, there were 533 sector members, of which 417 traded quota and 374 engaged in fishing. The majority of sector members (82%) own a single vessel.

Table 52 provides the average owner and crew share of net revenue for the sub-component of identifiable sector members. The per-vessel averages are comparable to those in Table 48. Table 53 provides the average revenue (cost if value is negative) from quota trading by sector member type. Average values in Table 52 and Table 53 are summed in Table 54 to show the net revenues adjusted by quota trading. Information is currently not available about the degree to which quota costs are absorbed by crew. Therefore, we assume the owner pays all quota costs and do not make adjustments to average crew shares in Table 54.

Reductions in the average owner share of net revenue per vessel due to quota costs range from 3.9% to 25.7%. Sector members that own a single vessel less than 30' in length were net sellers of quota and their average net revenues increased by 167.1%. The average net revenue for sector members that own two vessels and the average length of those vessels is less than 30' increased by 17.0% (Table 54).

In addition to the net sellers of quota that also fished, mentioned above, there were sector members who did not fish for allocated groundfish and were net sellers of quota. About a third of the vessels enrolled in sectors do not catch allocated groundfish and lease their quota to other vessels that were catching allocated groundfish. This does not necessarily imply that vessels that did not catch allocated groundfish were not fishing at all or that those vessels that purchased quota caught the entire amount of quota they bought. Average revenue for the members that leased quota out ranged from \$4,900 to \$48,287 (Table 55). It is likely that there were more members who did not catch allocated groundfish and received revenue from selling quota that could not be identified -- and so were not included in Table 52.

For vessels that need quota in order to fish, obtaining quota is a true cost and the financial significance of that cost becomes greater with declining net revenues. Because the method for estimating the impact of quota trading changed, it is difficult to make direct comparisons between FY2011 and FY2012. Nevertheless, the percentage reduction in net revenues from quota purchases remained at similar levels of about 6% to 8% for most categories examined. The 2012 analysis did show a wider range of impacts for some components – as low as a 3.9% decrease in one case and as high as a 25.7% decrease in another.

While the choice to use average quota trading revenues and costs to show quota trading impacts was driven primarily by difficulties with the simulation, this study also highlights that

profitability (or indicators of profitability) might best be measured at the sector member level, rather than at the vessel level. Sector members use vessels for different purposes – some vessels are held for the associated PSC while others are used to fish. Additionally, some complex vessel ownership networks might share resources. Both factors argue for re-thinking how financial viability is typically measured in this fishery.

9. CONCLUDING REMARKS

Our analyses of fishery performance measures of the limited access Northeast Multispecies (Groundfish) Fishery showed marked changes in the fishery during 2011-2012, with many of the positive economic trends observed in last year's groundfish performance report reversing their course in 2012. After increasing in 2011, landed pounds of groundfish are at their lowest point in 2009-2012 for all vessels. Non-groundfish landings are at a four year high, but grew less than 1% from their 2011 levels. Non-groundfish landings and revenues did not compensate for losses in groundfish landings and revenues. This is because non-groundfish landings have not increased significantly and because average non-groundfish price has fallen to its lowest level in the past three years. Overall, total landings have fallen by 5.4% and total gross nominal revenue declined by 7.7% from 2011.

Fishermen actively groundfishing in the Northeast are a shrinking group. The total number of active groundfish vessels continues to contract, with a reduction of 152 vessels over 2009-2012, and 165 fewer vessels taking groundfish trips in 2012 than in 2009. For those vessels remaining in the fishery, the percentage enrolled in sectors is increasing, while the percentage remaining in the common pool is declining. In addition, there are 119 fewer active vessel affiliations in 2012 than there were in 2009. Opportunities for vessel crew are decreasing except for a few limited instances. Overall, there is less effort targeting groundfish in the fishery: fewer boats taking groundfish trips and fewer groundfish trips. However, when fishermen are able to fish, in many cases, their trips appear to be longer. Economic indicators of net revenue suggest that average earnings per day are improving for groundfish trips. However, fishermen may face various limitations in the number of groundfish trips they are able to take, in the form of quota restrictions or other constraints, as aggregate owner's share of net revenue on groundfish trips has declined for most vessels.

Consolidation in the fishery continues, as all species and groundfish revenues are earned by smaller numbers of vessels and vessel affiliations. The high level of concentration of revenues earned by fishermen for all species, and especially for groundfish, continues to persist. The potential movement of the fishery in 2011 towards more equitable distributions of all species and groundfish revenues appears to have come to a standstill in 2012.

In the past year, the Northeast Fisheries Science Center (NEFSC) moved closer to understanding the profitability of different segments of the fleet by expanding its analysis of net revenue to reflect the impacts of leasing activity. For example, sector members that own one vessel with a length of 30' to < 50' are net buyers of quota and their average owner share of net revenue per vessel is reduced by about 5% as a result of this cost. Sector members that own one vessel with a length of <30' are net sellers of quota, and their average owner share of net revenue per vessel is increased by about 167% from revenues earned by selling quota. Reductions in average owner share of net revenue per vessel due to quota costs range from 3.9% to 25.7% based on sector member type, with type being based on number of vessels owned and average vessel size.