Northeast Fisheries Science Center Reference Document 16-12

Summary of Findings by the Center for Independent Experts Regarding Setting Excessive Share Limits for the Northeast Multispecies Fishery

edited by Chad Demarest

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Preface

This document represents the findings of an independent peer review of a report commissioned by the New England Fishery Management Council (NEFMC) for independent expert advice on setting an excessive share limit in the Northeast Multispecies fishery. Three reviewers were provided by the Center for Independent Experts (CIE); 1 was contracted independently by the NEFMC, and the Chair was a member of the NEFMC's Science and Statistical Committee. The CIE provides scientific expertise to conduct independent scientific peer reviews for National Marine Fisheries Service (NMFS) based on specific Terms of Reference (TORs) provided to the reviewers. The Chair coordinated the production of the summary report but did not contribute an independent review. The review was coordinated by the NMFS Northeast Fisheries Science Center (NEFSC). The CIE, NEFSC, and NEFMC all consider the purpose of an independent review to be to examine the scientific merit of reports and not to make policy recommendations. The report being reviewed, *Recommendations for Excessive-Share Limits in the Northeast Multispecies Fishery*, was prepared for the NEFMC by Glenn Mitchell and Steven Peterson on behalf of Compass Lexecon (Appendix A). The review panel met at the Hawthorne Hotel in Salem, MA on June 12 and 13, 2014 to conduct a public review of the report, to accept public comment, and to question the consultants who prepared the report.

This document is intended to preserve the findings of the review for future use as other fisheries and organizations wrestle with the difficult concepts of excessive shares, relevant markets, and market power. It includes only the summary report and individual peer reviewer reports. The peer review reports included here are in the reviewers' own words with no adjustments from the NEFSC editorial staff. Additional documents were provided to the reviewers in advance of the review, many of which are referenced in the various reports.

Several people made extraordinary contributions to this process. I wish to thank Rachel Feeney at the Council for her diligence in administering the contract for the report, her help in coordinating the review, and her skill and persistence in translating these issues for the NEFMC and public. My colleague John Walden provided invaluable guidance and wisdom. I also thank the peer review panelists and especially the chair for their thoroughness and their insights as they carefully and clearly reconciled critical industrial organization concepts with the complex regulatory structure that governs the Northeast multispecies fishery.

Chad Demarest
Social Sciences Branch, Northeast Fisheries Science Center
May, 2016

Review Panel Terms of Reference

1. Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast multispecies fishery.
2. Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of this TOR, comment on any constraints that may hinder application of the proposed approach.
3. Evaluate application of the proposed methods or process to the Northeast multispecies fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.
4. Review and comment on the data requirements necessary for applying the proposed methods or process.
5. Provide any recommendations for further improvement.

Peer Review Panel Summary Report

Background

The New England Fishery Management Council (NEFMC) is preparing Amendment 18 to the Northeast Multispecies Fishery Management Plan (FMP). Among other things under consideration, Amendment 18 would establish an excessive share threshold for the fishery consistent with National Standard 4 of the Magnuson-Stevens Fishery Conservation and Management Act. To provide the needed expertise to establish an excessive share threshold, the NEFMC contracted the economic consulting firm Compass Lexecon (see Appendix A for Compass Lexecon's TORs) to conduct an empirical analysis to determine if excessive shares existed in the fishery today and to consider the necessary constraints to prevent accumulation of excessive share in the future. Compass Lexecon completed its study and submitted its final report to the NEFMC on December 31, 2013.

At the request of the NEFMC, a review panel has been convened to provide a peer review of Compass Lexecon's report (see Appendix B for review panel TOR). The peer review panel was comprised of 3 experts provided through a contractual arrangement between NMFS Office of Science and Technology and the Center for Independent Experts (CIE) and 1 expert contracted by the NEFMC (see Appendix Bfor panelist names and affiliations). The peer review panel was chaired by a member of the NEFMC's Science and Statistical Committee (SSC). Peer reviewers were provided with the Compass Lexecon final report, a multispecies fishery background document, the meeting announcement, and the TORs for the peer review. The review panel meeting took place in Salem, MA, on June 12-13, 2014.

Meeting Summary

The panel review meeting consisted of a session on June 12th that was open to the public and a session on June 13th that was not. The June 12th session (see Appendix B for the meeting agenda) began with a presentation provided by NEFMC staff on the purpose and need for the excessive share study of the Northeast multispecies fishery conducted by Compass Lexecon. This presentation was followed by an overview provided by Compass Lexecon's lead investigators of their methods, data, and findings. Throughout these 2 presentations the review panel sought clarification on both the operational aspects of the Northeast Multispecies Sector Program and Compass Lexecon's procedures in the conduct of the excessive share study. During the afternoon of the 12th, the review panel sought additional clarification on each of the panel's TOR for the peer review. Answers to the panelists' questions were provided by Compass Lexecon's lead investigators, NEFMC staff, Greater Atlantic Regional Fisheries Office (GARFO) staff, and the Northeast Fisheries Science Center's (NEFSC) Social Sciences Branch (SSB) staff. These deliberations were informed by comments from members of the public in attendance.

On June 13th the review panel met to further discuss the peer review TORs where attendance was limited to the members of the peer review panel, the panel chair, and staff from the NEFMC, GARFO, and NEFSC's SSB. The peer review panel succeeded in addressing all of the TORs.

Findings on Terms of Reference

The peer review panel's findings on each of the TORs are noted below.

TOR 1: Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast multispecies fishery.

The review panel concurred that this term of reference was largely descriptive. The process used by Compass Lexecon included the following:

- A 7-step process was applied to determine an excessive share cap;
- Qualitative data collected on product market and Annual Catch Entitlement (ACE) trading markets were obtained through unstructured voluntary interviews;
- The Herfindahl-Hirschman index (HHI) was used to measure concentration using data provided by NMFS;
- HHI calculated at the Group-ID for
  - Yearly harvest by species (Appendix A, Table 1);
  - Yearly ACE holdings by species (Appendix A, Table 6) and stock (Appendix A, Table 7);
- HHI calculated at sector level for
  - Yearly ACE holdings by species (Appendix A, Table 3) and stock (Appendix A, Table 4);
- Horizontal Merger Guidelines were used to evaluate present levels of HHI
  - 1500 selected as level consistent with competitive markets.

TOR 2: Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of this TOR, comment on any constraints that may hinder application of the proposed approach.

The peer review panel concurred that defining market power in terms of excessive shares is appropriate. However, the review panel noted a number of concerns with the procedures used by Compass Lexecon in developing its recommendations.

Theory

The underlying theory of market power in a regulated multiproduct fishery was not well developed. That is, the underlying theory needs to take regulators into account in terms of quota setting in order to determine the competitive market solution as a benchmark against which market power may be measured. The theory that was developed was based on a single species model which is too simplistic.

Qualitative Data Collection

The unit of observation for regulation was influenced by the qualitative information collected through webinars, interviews, and the survey. The peer review panel noted that insufficient information was provided to evaluate whether or not the qualitative information was representative of the population of

individuals involved in the fishery. The panel was particularly concerned with the low response rate (12 of 800) to the survey. Neither the methods used to attempt to obtain a representative sample nor the survey questions were documented.

Relevant Product Market

The general principles involved in determining the relevant market were noted in the Compass Lexecon report. However, no documentation was provided to establish whether and how the relevant market for groundfish in the Northeast was determined. The report indicates that import data were obtained, but the manner in which these data were used to ascertain the size of the relevant market was not documented.

ACE trading

The peer review panel noted that Compass Lexecon's recommendations were based on existing conditions and not sufficiently forward-looking to what the fishery may be in the future. That is, sectors are institutions that exist to achieve coordination among sector members. There is concern that the potential for collusion by any 1 sector or among sectors has been dismissed primarily based on interviews. The unit of regulation should be any level that allows for institutions to coordinate; there is no scientific basis for ruling out the possibility that sector level coordination would not occur.

> **TOR 3: Evaluate application of the proposed methods or process to the Northeast multispecies fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why**.

The peer review panel found that the information included in the Compass Lexecon Final Report and the additional information provided at the meeting were not sufficient to verify the findings that market power is not being exerted in both the final product market and ACE trading market under current conditions. Note that while the review panel did not necessarily disagree with Compass Lexecon's findings, it was the consensus of the review panel that the scientific basis to validate the findings was lacking.

Evidence in Product Market

The description of product markets was insufficient even in general terms. Broader consideration of the aggregate market, role of imports, and substitutes should have been evaluated. While a formal statistical analysis of market demand may not have been possible, a review of the relevant literature would have been informative and would have bolstered the case for a competitive product market.

The peer review panel noted that it may have been possible to directly test for market power in the product market by using established econometric methods. These methods could have been applied by Compass Lexecon or the reasons why such testing could not be done for this fishery should have been noted.

ACE Trading Market

In the Northeast multispecies sector allocation program there are 2 markets; 1 for permanent share contract s(PSC) and 1 for ACE. However, the share limit would apply to PSC and not to ACE. Compass Lexecon notes that the demand for ACE is downward sloping, but there is no information on the slope of the demand. Absent ACE trading data, there is no underlying scientific basis for finding that ACE trading markets are competitive or otherwise.

The peer review panel noted that the conditions under which the ability to exert market power in multiproduct ACE market have not yet been established in the economic literature. This has implications for whether there is any theoretical or empirical basis for setting any specific excessive share limit.

TOR 4: Review and comment on the data requirements necessary for applying the proposed methods or process.

The review panel identified the following data requirements needed to apply the proposed methods.

The analysis conducted by Compass Lexecon was based on Group-IDs. The NEFMC is considering adopting a share limit at the person level. This approach would require information on ownership stake. Absent a new data collection requirement, equal share among all affiliated persons may be used as a default. The peer review panel noted that setting limits at the person level would complicate the use of the HHI as a means for setting a share limit or monitoring the performance of the fishery.

In addition to the information needed to set and monitor share limits the peer review panel recommended:

- Creation of an ownership registry to include transactions and prices;
- Cost and earnings studies at the vessel and sector level;
- Monitoring of quota prices (if prices are near zero and annual catch limit [ACL] is not exceeded then this would be evidence of a competitive market, whereas under the same conditions an increase in quota prices may be reason for concern).

TOR 5: Provide any recommendations for further improvement.

The review panel made the following recommendations for further improvement:

- Use of HHI and Horizontal Merger Guidelines; and,
- Compass Lexecon backed 15.5% out of an HHI of 1500 from Department of Justice (DOJ) Horizontal Merger Guidelines as an upper limit. The peer review panel noted that the DOJ still considers and allows mergers at higher levels.

The peer review panel noted that setting a percentage share at 15.5% does not take into account the possibility that any scale efficiencies may be lost based on current or future technology and cost structure.

An alternative approach would be to establish 1500 as the HHI above which ownership would not be allowed, rather than setting a cap of 15.5%. Doing so would provide greater flexibility to allow entities

to grow, while maintaining the HHI at a level that is considered to be competitive.

Cost Efficiencies

As previously noted, the peer review panel emphasized the need to consider tradeoffs between economies of scale (economic efficiencies) and ownership caps. Doing so requires consideration of production function or cost relationships at the vessel-level and/or enterprise level. Additionally, there may be sector level economies of scale in terms of sector transactions costs or through ability to bargain for lower input prices and/or engage in marketing.

Full consideration of scale efficiencies would require cost data to evaluate structure of industry and the potential to realize lower costs through consolidation or expansion

The Relevant Unit of Regulation

The peer review panel expressed concern over whether individuals are the sole relevant unit of regulation. As previously noted, sectors exist as institutions to achieve a certain level of coordination among their members. Under present conditions, this coordination is limited to facilitating reporting requirements to the NMFS and executing intersector trades. This rules out the possibility that coordination in ACE trading or product markets may occur in the future.

Other Comments

The Compass Lexecon's TOR included the possibility that market power metrics other than the HHI may be appropriate. The peer review noted that the 4-firm concentration ratio may such an alternative.

The peer review panel noted that further consideration should be given to the role that permit banks, nonprofit permit banks, and lease-only sectors may play in leasing markets and product markets.

The peer review panel noted that it may not be necessary to have a share limit for all stocks.

Peer Review Report by Dr. Trond Bjorndal

Executive Summary

- The New England Fishery Management Council (NEFMC) is preparing Amendment 18 to the Northeast Multispecies Fishery Management Plan (FMP). Among other things, Amendment 18 would establish an excessive share threshold for the fishery consistent with National Standard 4 of the Magnuson Stevens Fishery Conservation and Management Act. The NEFMC contracted Compass Lexecon to conduct an empirical analysis to determine if excessive shares existed in the fishery today as well as the necessary constraints to prevent accumulation of excessive share in the future. Compass Lexecon submitted its final report to the NEFMC on December 31, 2013.
- The reason for the concern about excessive shares is that the existence of such could allow an economic agent to exercise market power. In the case of the fishery, this could apply not only to the output markets for fish but also to the markets for fishing "rights". If this possibility exists, the economic agent can exploit market power to his advantage which would not be socially desirable.
- The Compass Lexecon report – henceforth the Report - provides an overview of the Northeast multispecies fishery. In fishing year 2011, total landings were over 61 million pounds with associated revenues of more than $ 90 million. In the same year, there were 1,421 limited access eligibilities of which 1,279 were associated with vessels. Over 420 vessels reported revenue from a groundfish trip.
- Prior to May 2010, the fishery was regulated through input controls such as trip limits, days at sea, gear restrictions and area closures.
- Since 2010, the fishery is regulated using output controls. Output is regulated with annual catch limits. Each permit provides an owner a potential sector contribution (PSC) which is a share of the Annual Catch Limit (ACL) for each of the allocated stocks and is based on the catch history of the permit. The permit owners that join together as a sector combine their PSC.
- Sectors are managed by a sector manager who serves as an agent between sectors and the NMFS. Sector managers also coordinate the development of sector operations plans and manage ACE trades. Sectors have limited ability to monitor and enforce compliance by their members and thus are somewhat reliant on moral suasion and reciprocal trust among members. Coordination of activities within a sector may improve economic efficiency through cost savings and enhanced revenues.
- The Report presents limited information on the relevant fisheries. There is little, if any, information on the product markets. No information is provided on cost of production and stock sizes. However, it is understood that profitability is poor and that boats have left the industry in recent years.
- Although information on the fishery is also available from other sources, I believe the Report should present a self contained description of the fishery as background for the analysis to be undertaken.
- The classical definition of rent is defined as the payment to a resource in fixed supply. Rent will exist for any quota that is binding. Moreover, one may distinguish between resource rent and

producers' surplus. Producers' surplus consists of the rent that intra- marginal inputs of labour and capital receive so that this may exist even under competitive equilibrium, where resource rent is reduced to zero. These concepts, which are essential for the management of a fishery, are not properly discussed in the Report.

- The analysis of the multi-output production process in the fishery is inadequate. The central issue here is that of selectivity: to what degree are fishermen able to *target* particular stocks?
- A consequence of having a multi-output production function is that the cost function becomes multi output as well so that the cost of harvesting one unit of stock A depends on how much is harvested of other stocks.
- As for economies of scale, these may occur at different levels: the individual boat, the firm, operating several boats, and at the sector level. These economies of scale involve potential efficiency gains. The stronger these potential gains are, the stronger the incentives for industry participants to adjust their business operations.
- A succinct analysis of the "driving" forces of the industry should have been the starting point of the Report. How have incentives changed as a consequence of the regulatory regime shift in 2010 and what impact has this had, and is likely to have, on the structure of the industry? This also depends on the profitability of the sector, including the cost structure, with stock and quota sizes very important factors.
- It is difficult to analyse incentives toward greater concentration of the industry without a clear understanding of what is driving the industry.
- The report provides no information about the basis for setting quotas in this fishery. This is important, not only in light of the rents that can be achieved, but also in terms of biological sustainability and as a factor that may influence whether quotas are actually harvested.
- The best example of the management of multispecies fisheries with output controls is the British Columbia groundfish fishery. Much information could be gleaned from British Columbia in terms of changes in incentive structures, the potential for efficiency gains and, possibly, also moves towards greater concentration in the industry.
- A multi-output cost function implies a multi-output supply function. In other words, we may be dealing with joint supply functions rather than single supply functions. This would have theoretical ramifications. This is why information about the fisheries is so essential. If there is specialisation, the jointness in output may be less important and much easier to deal with.
- For the final product market, there are two dimensions to the "relevant market", namely a product dimension and a geographic dimension. There are essentially two ways to measure the relevant market. The first is to undertake empirical demand analyses that will give information about own price and cross price elasticities. The second is co-integration studies, where the development in prices over time of different products is subjected to statistical analysis to determine whether they belong to the same market.
- The matter of possible market concentration in the quota market is considered at three levels, the sector level, the in-season ACE lease market and at the level of permit owners.
- The functioning of the sectors appears to be very similar to "fish pools" in Danish groundfish fisheries which are also regulated with output controls. "Fish pools" are voluntary organisations of fishermen/boat owners. An important function of "fish pools" is

to facilitate trade or exchange of quotas among member.

- I agree with the conclusion of the Report that sectors do not exercise any kind of market power. However, I believe that, if market power were to be exercised in this market, it would have to be at the sector level.
- In principle, individuals could exercise market power in the ACE markets by acquiring ACE within the fishing year. The Report concludes that "The likelihood of successfully exercising market power by acquiring a large position in one or more stocks' ACE during the fishing year is quite low and would likely be detected if it were attempted". As information on market transactions for ACE is available, market data should have been used to verify this result.
- Finally, there is the issue as to whether individual permit owners may exercise market power. As information about individuals' ownership of permits is not available, the analysis is on the basis of GroupIDs. The level of concentration is found to be low for all species/stocks, and there is no time trend in the level of concentration across stocks.
- The Report recommends the following: "It is reasonable for the NEFMC to recommend that NMFS establish an excessive-share cap to maintain *unconcentrated* (HHI below approximately 1,500) distribution of PSC by capping individual PSC for each stock that can be conferred to any permit owner". I disagree with this recommendation which I find to be arbitrary as a market may be competitive even with an HHI greater than 1,500. It would be more appropriate to recommend that NMFS *monitors* the industry with respect to competitive behavior should the HHI exceed 1,500 but without any *a priori* explicit trigger for the imposition of an excessive-share cap.
- The Report recommends the following: "We recommend setting an excessive-share cap so that no permit owner owns or controls permits conferring more than 15.5 percent of the PSC for a stock." I disagree also with this recommendation, which I find arbitrary.
- My assessment of this industry is that it is competitive in both output and input markets. For this reason, at present I see no need to introduce an excessive-share cap.
- I recommend that cost data should be collected on an annual basis for a representative sample of vessels. Cost data should also be collected at the sector level.
- I recommend the introduction of improved transferability of potential sector contributions (PSC), including divisibility, which is likely to improve the efficiency of the management system.
- The Report states that quotas may be held back, i.e., unused in attempts to exercise market power. To the extent that unused quota is an issue in this fishery, and not caused e.g. by low profitability, the fisheries administration may consider whether this is a regulatory instrument it can or should make use of.
- I recommend that the establishment of an ownership registry should be considered. This could be combined with a registry of all ACE transactions both in terms of quantity and price. An open registry would provide transparency which is important not only for fishermen to make good business decisions, but also for fisheries managers.

Background

The New England Fishery Management Council (NEFMC) is preparing Amendment 18 to the

Northeast Multispecies Fishery Management Plan (FMP). Among other things under consideration, Amendment 18 would establish an excessive share threshold for the fishery consistent with National Standard 4 of the Magnuson Stevens Fishery Conservation and Management Act. To provide the needed expertise to establish an excessive share threshold the NEFMC contracted the economic consulting firm Compass Lexecon to conduct an empirical analysis to determine if excessive shares existed in the fishery today as well as the necessary constraints to prevent accumulation of excessive share in the future. Compass Lexecon completed its study and submitted its final report to the NEFMC on December 31, 2013.

The reason for the concern about excessive shares is that the existence of such could allow an economic agent to exercise market power which means price(s) could be influenced so as to increase profits. In the case of the fishery, this could apply not only to the output markets for fish but also to the markets for fishing "rights", as such rights are required to participate in the fishery (Mitchell and Peterson, 2013, p.2). If this possibility exists, the economic agent can exploit market power to his advantage which would not be socially desirable.

The format and contents of this review are stipulated in annex 1, while the terms of reference are given in appendix 2. This review is organized as follows so as to address these requirements. Section II describes the role of the reviewer in review activities. Section III gives a detailed analysis of the Compass Lexecon report addressing the five points of my terms of reference. Conclusions and recommendations are presented in section IV. In addition, there are an annex and four appendices.

Description of Reviewer's Role in Review Activities

In May, 2014, I was invited by the Center for Independent Experts (CIE) to join a review panel to provide a peer review of Compass Lexecon's report. The members of the review panel are listed in appendix 3.

As part of my preparations for the assignment, I was provided with the Format and Contents of my report (annex 1), the Terms of Reference for the assignment (appendix 2), Compass Lexecon's report - Mitchell and Peterson (2013) – henceforth referred to as the Report, a background report on the fisheries of the area, NEMFC (2014), and a report by Anderson and Holliday, editors, (2007).

A meeting of the review panel took place in Salem, MA on June 12-13, 2014. The panel review meeting consisted of a session on June 12th that was open to the public and a session on June 13th that was not. The June 12th session (see Appendix 4 for the meeting agenda) began with a presentation provided by Council staff on the purpose and need for the excessive share study of the Northeast Multispecies fishery conducted by Compass Lexecon.

This presentation was followed by an overview provided by Compass Lexecon's lead investigators of their methods, data, and findings. Throughout these two presentations the review panel sought clarification on the operational aspects of the Northeast Multispecies Sector Allocation programme as well as Compass Lexecon's procedures in the conduct of the excessive share study. During the afternoon of the 12th the review panel sought additional clarification on each of the panel's terms of

reference (TOR) for the peer review. Answers to the panelist's questions were provided by Compass Lexecon's lead investigators, Council staff, Greater Atlantic Regional Fisheries Office (GARFO) staff, and the Northeast Fisheries Science Centre's (NEFMC) Social Sciences Branch (SSB) staff. These deliberations were informed by comments from members of the public in attendance.

On June 13th the review panel met to further discuss the peer review TORs where attendance was limited to the members of the peer review panel, the panel chair, and staff from the Council, GARFO, and NEFSC's SSB.

I actively participated in this meeting, obtaining more relevant information from those present as well as discussing various aspects of the Report with fellow panel members. In addition to this information and that included in the reports referred to above, NEMFC provided additional studies, in particular Anon. (2014) and Murphy *et al.* (2014). I have also consulted other relevant literature as referenced in appendix 2.

Evaluation of the Study "Recommendations for Excessive-Share Limits in the Northeast Multi-species Fishery"

The Terms of Reference (ToRs) for my evaluation, consisting of five points, are given in appendix 2. I will address each point – to be bolded below – separately.

> **TOR 1: Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast Multispecies Fishery.**

Very briefly, the method/process can be outlined as follows:

- a seven-step process was applied to determine an excessive share cap (Report, pp. 3- 4 and chapter V);
- the analysis is based upon theoretical work, presented in the Report, and information on product markets and annual catch entitlement (ACE) trading markets obtained from various sources as well as through unstructured voluntary interviews;
- the Herfindahl-Hirschman Index (HHI) was used to measure concentration using data provided by NMFS;
- HHI calculated at the Group-ID level for yearly harvest by species (table 1) and yearly ACE holdings by species (table 6) and stock (table 7);
- HHI calculated at sector level for yearly ACE holdings by species (table 3) and stock (table 4);
- Horizontal Merger Guidelines were used to evaluate present levels of HHI. 1,500 was selected as a level consistent with competitive markets.

Many of these issues will be discussed in detail in the following.

The Report also provides an overview of the Northeast multispecies fishery. According to the Report, there are 13 species of groundfish (p. 6); for some species there are several quota allocations.

In addition, fishermen may also target non-quota fish stocks. In fishing year 2012, total groundfish landings were over 46 million pounds with associated revenues of almost $70 million as compared to almost 62 million pounds in 2011 with associated revenues of $90 million. In 2012, non-groundfish landings were 258 million tonnes with revenues of almost $236 million. Total gross revenue in 2012 was over $ 305 million, down from almost $331 million in 2011, but higher than 200 and 2010 (Murphy *et al.*, 2014). According to the Report, in 2011, there were 1,421 limited access eligibilities of which 1,279 were associated with vessels. Over 420 vessels reported revenue from a groundfish trip.

Prior to May 2010, the fishery was regulated through input controls such as trip limits, days at sea, gear restrictions and area closures. Since 2010, the fishery is regulated using output controls (see Anderson and Holliday, 2007, and Bjorndal and Munro, 2012, on input and output controls in fisheries). Output is regulated with annual catch limits (ACL). Each permit provides an owner a potential sector contribution (PSC) which is a share of the Annual Catch Limit (ACL) for each of the allocated stocks and is based on the catch history of the permit. The permit owners that join together as a sector combine their PSC. Based on the combined PSC for each stock, the sectors are allocated ACE. Each sector can determine how to allocate its ACE among its members; usually this is in proportion to the PSC each contributed to the sector (Report, pp. 8-9). Boats and sectors are free to trade ACE, however, these are in- season/year trades, while permanent leases or sales are not permitted. A permit can be sold with all the PSC for relevant species attached.

Sectors are managed by a sector manager who serves as an agent between sectors and the NMFS (Holland et al., 2014). Sector managers also coordinate the development of sector operations plans and manage ACE trades, among other duties. Twelve of 17 sectors were organised under the Northeast Seafood Coalition, a large and emergent fishermen's organization in New England. According to Holland *et al.* (2014), sectors have limited ability to monitor and enforce compliance by their members and thus are somewhat reliant on moral suasion and reciprocal trust among members. Economic performance may be improved by cooperation and information sharing within and amongst sectors.

Holland *et al.* (2014) point out that coordination of activities within a sector may improve economic efficiency through cost savings and enhanced revenues. An example of the latter is marketing cooperatives: one has already been set up by the Port Clyde sector, while New Hampshire sector members are in the process of setting up a cooperative. This mechanism is known also from other countries (Bjorndal and Munro, 2012).

Membership of a sector is voluntary. Permit owners accounting for approximately 98 percent of access privileges have joined sectors. A large number of very small permit holders continue to operate in a common pool system (Report, p. 9). Their combined harvest of groundfish is negligible, however, their harvest of non-groundfish is fairly substantial (Murphy *et al.*, 2014).

The Report presents limited information on the relevant fisheries. There is little, if any, information on the product markets in terms of geography, products, product forms and possible substitutes, market niches (supermarkets, restaurants, hospitality etc.), quantities (domestic landings and imports from elsewhere) and product prices. In terms of the fisheries, no information is provided on

cost of production and stock sizes, although it is understood that data availability may be limited. In most years, many or possibly even most quotas are not harvested. Moreover, it is understood that profitability is poor and that boats have left the industry in recent years (Murphy *et a*l., 2014). Although information on the fishery is available in NEMFC (2014), Murphy *et al.* (2014) and Anon. (2014), I believe the Report should present a self contained description of the fishery as background for the analysis to be undertaken.

> **TOR 2: Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of this TOR, comment on any constraints that may hinder application of the proposed approach.**

The authors state that, under certain conditions, a fishery will produce "economics rents" which is "…a payment to a factor of production in excess of the payment required to keep that factor at its current use" (Report, p. 8). This definition is not very precise and does not distinguish between different types of rent that can exist in a fishery.

The concept of resource rent extends from the more general concept of rent. The classical definition of rent is defined as the payment to a resource in fixed supply (Robinson, 1939). As Arnason (2011) illustrates, assuming a profitable fishery, there will be positive rent for any quota set at a binding level. Moreover, Arnason distinguishes between resource rent and producers' surplus. Producers' surplus consists of the rent that intra-marginal inputs of labour and capital receive so that this may exist even under competitive equilibrium, where resource rent is reduced to zero.

Copes (1972) argues that the benefits to society of renewable resources are maximized when resource rent, consumer surplus and producer surplus are taken into consideration in resource harvesting. These concepts, which are essential for the management of a fishery, are not properly discussed in the report.

The analysis of the production process in the fishery is inadequate. According to the Report, there are 13 species of groundfish (Report, p. 6); although there are more quota allocations. In addition, fishermen also target non-groundfish stocks. The central issue here is that of selectivity: to what degree are fishermen able to *target* particular stocks? (Pascoe, Koundouri and Bjorndal, 2007). Only limited information is provided, but the Report talks about "choke stocks" so that once the quota for one fishery is reached, all (or several) fisheries are closed; however, they also say that "…different fishermen have different abilities to selectively target species while avoiding catching a limited stock…." (Report, p. 29). According to Murphy *et al.* (2014), the groundfish fishery is carried out using both fixed gears and trawl gears, where fixed gears include gillnet and hook gears such as bottom longline, tub trawls and rod and reel. These different technologies are likely to have different selectivity.

A consequence of having a multi-output production function is that the cost function becomes multi

output as well so that the cost of harvesting one unit of stock A depends on how much is harvested of other stocks (Bjorndal and Gordon, 2001).

As for economies of scale, these may occur at different levels. For the individual boat, unit cost of harvesting is likely to decrease as output (harvest) is expanded – at least up to a certain level. A firm, operating several boats, may also experience economies of scale: by increasing the number of boats, the firm may be able to avail itself of more specialised factors of production as well as make more efficient use of inputs. At the sector level, there are also likely to be economies of scale: setting up a sector implies set up (fixed) costs so that an increase in the number of boats belonging to the sector will reduce average cost. These economies of scale involve potential efficiency gains. The stronger these potential gains are, the stronger the incentives for industry participants to adjust their business operations provided this is feasible within the given regulatory framework.

As a minimum, I would have expected a very thorough discussion of these issues. Moreover, it must be kept in mind that targeting is very much a dynamic concept. First, selectivity may be less of a problem in some geographical areas than in others as well as during some parts of the year. Second, if one quota is particularly constraining, there will be incentives to improve gear selectivity so as to lessen the impact of this constraint. In other words, there is scope for specialisation and more so in the long run than in the short run.
In addition to these multispecies interactions in the production function, it may also be the case that there are biological interactions between the species in terms of growth. No information is provided about this.

What should have been the starting point of the report is a succinct analysis of the "driving" forces of the industry. How have incentives changed as a consequence of the regulatory regime shift in 2010 and what impact has this had, and is likely to have, on the structure of the industry? This, of course, also depends on the profitability of the sector, including the cost structure, with stock and quota sizes very important factors. According to Murphy *et al.* (2014), the total number of active groundfish vessels in the fishery continues to decline; the fishery lost 152, or 16.6%, of its active vessels over the 2009-2012 period, and consolidation in the industry continues. For the vessels remaining in the fishery, the percentage enrolled in sectors is increasing while the percentage remaining in the common pool is declining.

It is difficult to analyse incentives toward greater concentration of the industry without a clear understanding of what is "driving" the industry.

The bioeconomic literature, emphasizing the open access fishery, is briefly summarized (Report, p. 7). There are few references to this literature, except for Scott Gordon (1954) and Clark (1990). Although those are seminal contributions, they do not in any way provide a comprehensive review of the relevant literature.

A bioeconomic model is a combination of a model of population dynamics and an economic model of the fishery. As for regulatory regimes, two "extremes" are often considered. One is the common pool (open access) equilibrium, corresponding to what the authors denote the "competitive"

equilibrium. For this outcome, resource rent is fully dissipated, while there may be intra-marginal rent (and consumers' surplus).

The other "extreme" is the outcome associated with a sole owner, or social planner. Essentially this aims at maximizing the total rents from the fishery (resource rent and producers' surplus), either in a static or a dynamic context. Most real world management regimes will lie somewhere between these two outcomes.

Models of this nature, including for multispecies fisheries, are developed and described in Bjorndal and Munro (2012).

A bioeconomic model can also be used to derive a supply curve for a fishery. The open access supply curve was first derived by Copes (1970). Bjorndal and Nostbakken (2003) estimate an empirical supply curve for North Sea herring. For the sole owner, there is no supply curve as such but rather a supply point.

This theory is relevant to the current analysis in several ways. First, the authors use "general" supply curves from microeconomic theory but without any reference to the underlying bioeconomics. Moreover, dynamics is an integral part of supply in a fishery: if sustainable supply from a stock is to be changed, this can only take place over time as stock size is allowed to adjust.

It is pointed out that while the fishery may be regulated with the goal of "maximising the economic value", it may also be regulated for the maximum sustainable yield or "according to other biological standards" (Report, p. 8). This is, of course, correct, however, we are not told on what basis quotas are set in this fishery. This is important, not only in light of the rents that can be generated, but also in terms of biological sustainability and as a factor that may influence whether quotas are actually harvested. There is no information about the status of relevant fish stocks and what implication this has for the setting of quotas.

> **TOR 3: Evaluate application of the proposed methods or process to the Northeast Multispecies Fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.**

The best example of the management of multispecies fisheries with output controls is the British Columbia groundfish fishery. This fishery is prosecuted by a large number of vessels, representing different technologies, and covers many different stocks distributed over large areas. When individual transferable quotas were introduced in 1997, total allowable catch limits (TACs) were established for 55 stocks. Over time capacity in the fishery has declined. Moreover, many vessels have specialised, either in area or species, which has also led to important efficiency gains. This case study is briefly described by Bjorndal and Munro (2012); see also Turris (2000).

Fishing rights are more easily transferable in British Columbia than in the Northeast multispecies

fishery. Nevertheless, much information could be gleaned from British Columbia in terms of changes in incentive structures, the potential for efficiency gains and, possibly, also moves towards greater concentration in the industry.

As noted above, a multi-output production function implies a multi-output cost function. This in turn implies a multi-output supply function. In other words, we may be dealing with joint supply functions rather than single supply functions. This would have theoretical ramifications. This is why information about the fisheries is so essential. If there is specialisation, the jointness in supply may be less important and much easier to deal with.

As for the final product market, as the Report states, there are two dimensions to the "relevant market", namely a product dimension and a geographic dimension (Report, pp. 21- 22). There are essentially two ways to measure the relevant market (Asche and Bjorndal, 2011, ch. 7). The first is to undertake empirical demand analyses that will give information about own price and cross price elasticities (as well as income elasticities). The second is called co-integration studies, where the development in prices over time of different products is subjected to statistical analysis to determine whether they belong to the same market. Neither approach is used in this study, however, with time and budget limitations, that would also not be expected. Nevertheless, the analysis is not satisfactory.

To measure market power in the markets for fish, the Report uses landings concentrations for group IDs by species and fishing year which except for two cases gives an HHI of less than 1,500 (table 1, Report, p. 27). The number of Group IDs ("firms") is seen to be reasonably large. I do not find this approach to be adequate as the basis for determining that market power does not exist in these markets.

First, as a minimum, the authors could have obtained some information about the quantity of imports of some, if not all, species in question[1]. This could have been done with relative ease and would have given information about the "market share" for landings from the Northeast.[2] Second, a literature study on demand and market integration studies could have been undertaken. Although the geographical markets covered by this Report may not have been subjected to such studies, several studies include many groundfish species; e.g. cod and hake have been extensively studied (see e.g. Nielsen, Smith and Guillen, 2009, for a fairly recent example).

My *a priori* hypothesis is that many of the products listed in table 1 are in the same market (e.g. all the flounders and plaice). In addition, there is likely to be close substitutes not listed in table 1. Although this hypothesis could not be corroborated by econometric methods, due to time and resource constraints, it would have been possible to get a much better understanding of the relevant markets by the fairly simple procedures I have outlined.

1 According to the Report, "…we relied upon … import/export data…." (Report, p. 4). Presumably this refers to trade data, however, no quantitative data on imports/exports are presented.

2 According to Anon. (2014), there are indications of loss of market share and processing capacity because Northeast groundfish is not currently a reliable supply for market.

Then to the matter of possible market concentration in the quota market. This matter is considered at three levels, the sector level, the in-season ACE lease market and at the level of permit owners.

The first question relates to possible actions by sectors: "If sectors were to combine members' ACE holdings and market them jointly, there would be concerns regarding the effect of this conduct on competition (and it may also raise potential legal concerns….)" (Report, p. 32).

The Report indicates that sectors do not exercise market power. This is done by considering ACE holdings concentrations of sectors, by species and year (Report, table 3), ACE holdings concentrations for sectors, by species/stocks and years (Report, table 4) as well as the number of sector "firms" by species/stocks and years (Report, table 5). Moreover, it is reported that "…discussions with sector managers and others indicate, without exception, that sectors do *not*, in fact, operate to maximise the joint value of the ACE allocated to the sector" (Report, p. 32).

The functioning of sectors appears to be very similar to "fish pools" in Danish groundfish fisheries which are also regulated with output controls (Asche, Bjorndal and Bjorndal, 2014). "Fish pools" are voluntary organisations of fishermen/boat owners. There are several such "pools" and fishermen may move from one pool to another if they are not satisfied with the organisation. An important function of "fish pools" is to facilitate trade or exchange of quotas among member.

I agree with the conclusion of the Report that sectors do not exercise any kind of market power. This is supported by Holland *et al.* (2014) who state that sectors have limited ability to monitor and enforce compliance by their members. However, I believe that, if market power were to be exercised in this market, it would have to be at the sector level. This would, of course, imply that sectors would assume other roles than they do today, in particular, be able to coordinate sector members activities in a way that does not happen now, which would also have legal implications. Nevertheless, fisheries authorities may wish to consider this in the future as is also acknowledged in the Report (Report, p. 48). The activities of quota banks, which may be state owned or private (NEMFC, 2013), would also need to be considered in this regard.

In principle, individuals could exercise market power in the ACE markets by acquiring ACE within the fishing year (Report, p. 33). As for this type of market power, it is concluded that "The likelihood of successfully exercising market power by acquiring a large position in one or more stocks' ACE during the fishing year is quite low and would likely be detected if it were attempted" (Report, p. 34). I believe this is a correct observation, however, it should and could have been established on a much stronger foundation. Apparently ACE transactions are observable, so that market data could have been used to verify this result. Moreover, a thorough analysis of the actual industry structure and what I have previously referred to as the "driving" forces of the industry would also have given useful information that could help corroborate this result.

Finally, there is the issue as to whether individual permit owners may exercise market power. This comes about because "…the sector system would allow an entity with a large share of the PSC for a stock or stocks to control a large ACE position if the entity owned permits that provided a large

PSC position" (Report, p. 35). As complete information about ownership of permits is not available, the analysis is on the basis of what is called GroupIDs. The Report evaluates ACE holding concentrations for GroupIDS by species, stock and year (Report, tables 7 and 8) and also presents the number of GroupID "firms" by species, stock and year (Report, table 8). The level of concentration is found to be low for all species/stocks, and there is no time trend in the level of concentration across stocks. Also, as the Report points out, the rather broad definition of ownership as represented by the GroupID concept leads to an overstatement of the shares of PSC controlled by individual entities. Finally, the number of GroupID "firms" for the different species/stocks/years varies between 331 and 635 (Report, table 8), which means that a large number of firms is active in the industry. This is supportive of the fact that concentration is low.

As for the recommendations regarding excessive share caps in the fishery, although the Report maintains that no market share is currently exercised in this fishery, the Report gives eight statements (Report, pp. 47-48) that partly summarise some of the Report, and partly provide recommendations. I will in the following comment on these statements, denoted S-1 to S-8, with statements given in italics.

S-1: *The information NMFS has on permit ownership may not be sufficient …. to reliably define ownership and control of permits and the PSC they confer.*
Comment: This is an observation rather than a recommendation. I will deal with this under Terms of Reference 4 below.

S-2: *There is sufficient competitive information to determine that the relevant markets for ACE trading are the markets for the trading of each stock's ACE. If an operator requires the ACE for a particular stock, there is not a good substitute available.*
Comment: These two sentences appear to be observations rather than recommendations.

S-3: *We cannot exclude the possibility of the exercise of market power as the result of the fishery's output regularly receiving the regulated level, which would indicate competitive conduct within the framework of the output regulation. Thus, examination of appropriate caps is necessary.*
Comment: The issue of market power in output markets is discussed above. As stated, my hypothesis is that output markets are competitive.

S-4: *It is reasonable for the NEFMC to recommend that NMFS establish an excessive-share cap to maintain unconcentrated (HHI below approximately 1,500) distribution of PSC by capping individual PSC for each stock that can be conferred to any permit owner.*
S-5: *The cap required to ensure an HHI below 1,500 would be 25 percent with a competitive fringe of 38 percent, or 15.5 percent with no competitive fringe.*
Comment: I disagree with both of these recommendations. Although HHI values of less than 1,500 are indicative of an unconcentrated industry, the industry may well remain competitive for HHI values in excess of 1,500. Thus, I find S-4 and S-5 to be somewhat arbitrary. It would be more appropriate to recommend that NMFS *monitors* the industry with respect to competitive behaviour should the HHI exceed 1,500 but without any *a priori* explicit trigger for the imposition of an excessive-share cap.

S-6: *Sectors do no own or control PSC or ACE. Therefore, capping the amount of PSC or ACE held in the aggregate by members of a particular sector would not provide protections against the exercise of market power or the development of inordinate control.*
Comment: This issue is discussed above.

S-7: *We suggest using the grouping of permits by common ownership (based on information already available) for an initial determination of whether a permit transfer exceeds a share cap, but allowing for an optional follow-up.*
Comment: This is closely related to S-1. It would have been appropriate to combine S-1 and S-7 in one recommendation.

S-8: *We recommend setting an excessive-share cap so that no permit owner owns or controls permits conferring more than 15.5 percent of the PSC for a stock.*
Comment: I find S-8, i.e., recommending an excessive-share cap of 15.5 percent of the PSC for a stock, to be arbitrary.

My assessment of this industry is that it is competitive in both output and input markets. This conclusion cannot in any way be drawn only on the basis of the evidence presented in the Report. As I have already pointed out, the Report fails to highlight the driving forces of the industry. My conclusion is based on additional information about the fishery such as NEFMC (2014), Anon. (2014), Murphy *et al.* (2014) and Holland *et al.* (2014) as well as evidence presented at the two-day meeting in Salem, MA. I will in particular draw attention to some stylized facts. The products are sold in competition with imports, for some products probably from both the US and abroad; for products such as cod, haddock and hake there are international markets. In addition, there are numerous other substitutes some of which may not be fish. Consequently, this industry is likely to be a price taker in output markets.

As for production, although data about stock sizes appears limited, I understand there are indications that many stocks are at low levels, implying high unit cost of harvesting. Moreover, many vessels represent sunk cost and fish as long as revenues cover variable costs. This indicates low profitability. This is supported by the fact that vessels have left the industry in recent years. Despite exit in recent years, it should be noted that the number of operators in the fishery is large.

In many years, all ACLs are not harvested. There may be several reasons for that. Anon. (2014) points to the fact that location of stocks in closed areas may make it difficult to harvest the quotas while lack of transparency in the ACE market may lead to ACE being unused. The latter point is supported by Holland *et al.* (2014), who state that more information and greater transparency in the lease market may imply a potential for efficiency gains in terms of bring quota sellers and buyers together. Holland *et al.* (2014) also point out that sectors could facilitate sharing of information about how to avoid catching species with low quotas which may be particularly important to minimise the degree to which quotas or these species constrain catch of other species for which ACE allocations are not limiting.

Murphy *et al.* (2014) point out that many factors may contribute to the inability of sectors to catch their allocated ACE. This may include search frictions and/or structural impediments, but it may also be due to fish availability and/or imperfect quota setting, and insufficient technology to target particular stocks. At the Salem meeting, participants also indicated that it may not be profitable to harvest the full quotas.

On this background, and my experience from working with many fisheries in different parts of the world over a number of years, leads me to conclude that the industry is competitive. For this reason, at present I see no need to introduce an excessive-share cap.

Review and comment on the data requirements necessary for applying the proposed methods or process.

From what I understand, fairly detailed vessel level earnings data are available (landings of different species per unit of time and associated prices), see Murphy *et al.* (2014). Cost data, on the other hand, are not available. Cost and earnings studies are undertaken for fisheries in many countries on a regular basis. As for the Northeast multispecies fishery, such studies would be very important in terms of understanding the dynamics of the fishery in terms of incentive structure, including towards greater industry concentration.

Cost (and earnings) data at the sector level would also be important.

As has been highlighted above, exact data on individuals' ownership shares do not exist. These data are necessary for a precise evaluation of actual concentration of ownership.

Provide any recommendations for further improvement.

I would like to make the following recommendations:

1. Cost data should be collected on an annual basis for a representative sample of vessels. Cost data should also be collected at the sector level.

2. Improved transferability of potential sector contributions (PSC), including divisibility, is likely to improve the profitability and efficiency of the fishery.

3. The Report suggests that quotas may be held back, i.e., unused in attempts to exercise market power. In several countries unused quotas may be reallocated towards the end of the season. To the extent that unused quota is an issue in this fishery, and not caused e.g. by low profitability, the fisheries administration may consider whether this is a regulatory instrument it can or should make use of.

4. Comprehensive ownership data do not exist for PSC so it is not possible to ascertain the exact ownership shares of individuals. It should be considered whether an ownership registry should be established which could be combined with a registry of all ACE transactions both in terms of quantity and price. An open registry would provide transparency which is important not only for fishermen to make good business decisions, but also for fisheries

managers.[3]

Conclusions and Recommendations

The Report is a first analysis of current and potential excessive share limits in the Northeast multispecies fishery. I have identified a number of weaknesses with the Report, both in terms of theory and analysis. In particular, I find the recommendation about introduction of an excessive share limit not to be based on sound and thorough analysis and therefore rather arbitrary. Currently, I do not find any basis for introducing an excessive share limit.

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Peer Review Report by Dr. Jamie Brown Kruse

Executive Summary

The report entitled, "Recommendations for Excessive-share Limits in the Northeast Multispecies Fishery," outlines a seven step process for evaluating and establishing a cap on catch shares. The recommendations rely heavily on a measure of market concentration called the Herfindahl-Hirschman Index (HHI). The premise is that more highly concentrated markets lend themselves to strategic manipulation by the largest market share participants in the market. The Horizontal Merger Guidelines of 2010 establish threshold values of the HHI with 1500 and below corresponding to an "unconcentrated market."

CL concluded that both the final product market and access privileges market do not currently exhibit strategic exercise of market power. Further they concluded that the markets will remain competitive in the future. CL recommended a 15.5% cap on Annual Catch Entitlement as a maximum holding. Their conclusions, especially with respect to future exercise of market power, do not have a sound theoretical or empirical foundation. The recommendation of 15.5% is ad hoc.

One solution that potentially can satisfy the goals of Amendment 18 would be to require that 10-20% of ACE be made available on an open market to facilitate price discovery and maintain access to shares for all participants.

Background

The New England Fishery Management Council (NEFMC) is preparing Amendment 18 to the Northeast Multispecies Fishery Management Plan (FMP). Amendment 18 Goals are:

1. Promote a diverse groundfish fishery, including different gear types, vessel sizes, ownership patterns, geographic locations, and levels of participation through sectors and permit banks;
2. Enhance sector management of effectively engage industry to achieve management goals and improve data quality;
3. Promote resilience and stability of fishing businesses by encouraging diversification, quota utilization and capital investment; and
4. To prevent any individual(s), corporation(s), or other entity(ies) from acquiring or controlling excessive shares of the fishery access privileges.

Under Goal 4, Amendment 18 would establish an excessive share threshold for the fishery consistent with National Standard 4 of the Magnuson Stevens Fishery Conservation and Management Act. To develop a thoughtful, theoretically sound, and implementable approach to Goal 4, the NEFMC contracted the economic consulting firm Compass Lexecon to conduct an empirical analysis to determine if excessive shares existed in the fishery today, and establish an approach to determine if share holdings were excessively concentrated in the future. Compass Lexecon (CL) completed its study and submitted its final report to the NEFMC on December 31, 2013.

At the request of the NEFMC a review panel has been convened to provide a peer review of Compass Lexecon's report (see Annex 2 for review panel TOR). The peer review panel was comprised of 3

experts provided through a contractual arrangement between NMFS Office of Science and Technology and the Center for Independent Experts (CIE) and one expert contracted by the NEFMC (see Annex 3 for panelist names and affiliations). The peer review panel was chaired by a member of the NEFMC's Science and Statistical Committee (SSC). Peer reviewers were provided with the Compass Lexecon final report, a multispecies fishery background document, the meeting announcement, and the TORs for the peer review. The review panel meeting took place in Salem, MA on June 12-13, 2014.

Description of Kruse's Role in the Review Activities

Dr. Jamie Brown Kruse was contracted by NEFMC to provide an expert review of the Compass Lexicon Report. Appendix 2 contains a copy of the contract for service which specifies services similar to those provided by the experts contracted through the Center for Independent Experts. Dr. Kruse has published research pertaining to market concentration in general and specifically related to permits (limited access privileges). In addition, she served as NOAA's Chief EĐoŶowîst in 2010 while on leave from East Carolina University. Her experience and research record is unique and complementary to the three experts contracted through the CIE. She reviewed all materials provided prior to the June 12-13 meeting and attended the public meeting on June 12 asking clarifying questions of representatives of Compass Lexecon, Glenn Mitchell and Steven Peterson. She attended the peer review panel meeting the following day and contributed comments to the Summary Report. Following the June 12-13 meeting in Salem, MA, she provided comments on the draft of the Summary Report and prepared an independent review of the Compass Lexecon report. The review report that responds to the terms of reference is contained in this document.

Summary of Findings for Each Term of Reference

> **TOR 1: Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast Multispecies Fishery.**

Compass Lexecon (CL) utilized a seven step process to evaluate the potential for exercise of market power through control of excessive shares of access to the Northeast Multispecies fishery. Briefly, the steps reported by CL include:

1. Assess quota information.

Quantitative fishery data was obtained from NMFS by permit/MRI. A variety of fishing industry stakeholders were informally interviewed to gain perspective on the industry, insight on the working of the market for groundfish, and the methods of exchange of permits and annual fishing entitlements. Transcripts of public meetings were reviewed as well as the annual sector and permit bank reports.

2. Assess competitive information.

Since the proposed procedure to evaluate excessive shares will rely on the Herfindahl- Hirschman Index (HHI), there are two categories of markets that must be evaluated to
determine the relevant size of the market: the market for landed fish and the market for allocated access privileges.

3. Check threshold condition.
This step amounts to checking whether the catch limit on each specie is sufficiently restrictive so as to mimic the limited quantity that a profit maximizing monopoly supplier would choose to bring to the market. In the case of a monopoly supplier, limiting supply to drive up price would yield profit well above a competitive rate of return. These so called monopoly profits are also called monopoly rent.

4. Establish concentration targets.
CL determine that the concentration target that should maintain an unconcentrated ACE distribution is an HHI below 1,500 for each stock.

5. Determine share limit-market concentration relationship.
Using an upper limit on HHI of 1500, CL report that share cap of 15.5% if market share is evenly distributed will maintain an HHI below the 1,500 target. If the market is characterized by a one or two large "dominant" holders with the remaining permit owners at the 1-2% level then a share cap of 25% would satisfy the "below 1500 upper limit target."

6. Identify regulatory and practical constraints.
CL identify the current reporting methods of individual ownership of permits that does not assign percentage ownership at the individual level as a potential constraint. They conclude that utilizing permit ownership by group ID as an initial threshold condition sufficient with the proviso that participants in noncompliant trades could provide additional information at the individual level.

7. Recommend an excessive shares cap.
CL recommend that an excessive share cap on permit owner of 15.5% of available PSC by specie.

> **TOR 2: Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g. whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of the TOR, comment on any constraints that may hinder application of the proposed approach.**

Defining excessive shares in terms of market power.
There is a long history behind the study of firms' ability to strategically and profitably control prices within a market by limiting output. Monitoring and regulation of the exercise of market power goes back to the earliest U.S. antitrust laws that are still enforced today (Sherman Antitrust Act of 1890 and Clayton Act). There are several factors that affect a firm's ability to wield and sustain such market or monopoly power. One factor is the size of the firm or coalition of firms relative to the market. Other factors include whether there are barriers to entry in the market or excess capacity. The creation of a permit system that limits the amount and kind of fish landed creates barriers to entry at the same time that it serves the purpose of managing Northeast groundfish to prevent overfishing.

An alternative purpose for setting an excessive share limit on holdings is to support Goal 1 of Amendment 18 "Promote a diverse groundfish fishery, including different gear types, vessel

sizes, ownership patterns, geographic locations, and levels of participation.....” Cost efficiency may favor certain ownership patterns and vessel sizes. Further, economies of scope and scale may lead to the expansion and acquisition of permits. If maintaining small operators is implied by the diversity goal, setting restrictive share limits may come at the expense of industry profitability.

Strengths and Weaknesses of Proposed Method.
The evaluation of the proposed process developed by CL is organized along the lines of the seven step format they adopted:

1. Assess quota information.
Quantitative fishery data was obtained from NMFS by permit/MRI. Identifying the scope of permit control by individuals and therefore defining the unit of analysis for permits is challenging. In general, a Group ID is assigned to a unique combination or two or more individuals that hold a stake in one permit/MRI or more. Individuals can be stakeholders in several group ID’s. Consequently the % share of PSC for each stock for each group ID can be calculated however, the % share for each stock for each individual cannot be derived from the data. While this is a weakness in the ability to assess ownership and control, it is a limitation due to the current reporting structure.

CL collected qualitative data but in an unsystematic way that limited its usefulness. Approximately 50 fishing industry stakeholders were interviewed to collect qualitative information. In addition, information was solicited through survey forms and a public webinar. Invitations were distributed to more than 800 individuals by email and were virtually ignored. No mention on attempted follow up and application of Dillman’s survey principles was mentioned.

Public meeting transcripts and sector and permit bank annual reports were reviewed for additional information. No qualitative data methods such as factor analysis were applied to organize or lend statistical support to the interview and observational data.

2. Assess competitive information.
Two categories of markets were of interest: the market for landed fish and the market for allocated access privileges.

Landed fish: CL describe the market for the thirteen stocks of landed groundfish as competitive and global in scope. CL do not clearly articulate what the relevant market definition should be. “We leave open the question of determining the relevant market for the output of the fishery.”(page 40) The CL determination of competitiveness is based on qualitative interviews and on low calculated species landing HHI’s by group ID.

Access Privileges: Since there is a limited number of Northeast fisheries groundfish permits, and annual catch entitlements these markets are clearly defined. The alignment of multispecies landings with a vessel’s portfolio of ACE is a nontrivial management challenge. Depending on environmental conditions, biophysical processes, and timing, the prospect of landing untargeted species (bycatch) can limit a vessel’s ability to pursue a target specie. With insufficient ACE to cover untargeted bycatch, target species ACE may go unfilled. This leads to the possibility that the untargeted species becomes a

constraining or “choke” stock. The potential therefore does exist that control of ACE for a crucial constraining stock can also lead to broader control of a target specie does exist that control of ACE for a crucial constraining stock can also lead to broader control of a target specie. The relevant market for access privileges could be partitioned by stock/ACE or could be studied at the permit/PSC level. The unit of ownership control could be at the individual, group ID, or sector level. Due to data availability, CL have focused on ACE holdings by sector and group ID for each specie. However, the ability to determine whether individuals are exercising market power is limited because information on permit transactions and ACE trading prices is not reliably available.

3. Check threshold condition.

A strength of the identified threshold condition (100% utilization of ACL) is that it depends on information that is currently collected and thus measureable on an annual basis. A weakness is that this condition is based on a simplistic single product, static, deterministic model. This industry is characterized by a multiproduct production process subject to significant, market, weather, and biological uncertainty. CL report substantial underutilization of ACL. “In FY10, FY11, FY12, there were four, six and eight stocks respectively, where less than 50% of the groundfish sub-ACL was caught.” (page 38) In other words, the observation that the catch limits were not constraining can be interpreted in a number of ways. One explanation is that the uncertainty associated with environmental and market conditions coupled with the potential to shut down the fishery if total ACL is met for a specie leads to underutilization of ACL. A second explanation that cannot be eliminated by the threshold condition is that there is strategic reduction in landings to reap extraordinary profit.

4. Establish concentration targets.

CL have adopted an HHI of 1500 as a target concentration level. This corresponds directly with the HHI of an “unconcentrated
market” according to the Horizontal Merger Guidelines (HMG) issued by the U.S. Federal
Trade Commission and the U.S. Department of Justice on August 19, 2010 to replace the guidelines originally issued in 1992.
. in addition, the 2010 HMG also state the presumption that any merger that raises the HHI less than 100 points is unlikely to have adverse competitive effects. A strength of this concentration target is that it is unequivocal and quantifiable. A weakness is that a single measure has been adopted from the 2010 HMG without consideration of other methods outlined in the HMG.

CL have elected to apply this target at the Group ID level on stock permits. While the analysis of the underlying stock right embodied in the permit is the proper instrument, group ID is probably less informative than currently unobservable individual market shares and transactions at the permit level. Further, as noted by the authors, the sector structure has the potential for fostering coordination. The 2010 HMG gives special attention to coordinated interaction and coordinated effects theory. The agencies note that coordinated effects can include concerns about conduct that is not otherwise condemned by the antitrust laws. At the sector level CL report HHI for ACE holdings of sectors by species that range from 817 to 2880 for 2012. This places two species (Redfish and White Hake) over the 2500 HHI target in the HMG described as “highly concentrated” markets.

5. Determine share limit-market concentration relationship.

The relationship between the sum of the squared market shares of all market participants and the HMG is mathematical. If the HMG guidelines are accepted indicators of unconcentrated (HHI<1500) moderately concentrated (1500<HHI<2500), and highly concentrated (HHI>2500) markets, then the calculation of HHI/market concentration is a straight forward process.

6. Identify regulatory and practical constraints.
As pointed out by CL, the current method used to record permit ownership is a stumbling block to understanding exactly who has decision-making control over the permit(s) and how much is actually held by the decision-maker.

7. Recommend an excessive shares cap.
The CL recommended share limit of 15.5% is both a strength and a weakness. Granted it provides a well-defined target (strength). However, this measure is ad hoc (weakness). It's relationship to theory is tenuous at best. It does not effectively "identify the conditions where entities could exert inordinate control of quota." (quoted from terms of reference).

> **TOR 3: Evaluate application of the proposed methods or process to the Northeast Multispecies Fishery. Are Compass Lexicon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.**

The proposed methods and process are quite simplistic. The theory they appeal to does not capture the multiproduct nature of the fishery harvesting process.

Product market
If the relevant final product market is in fact global in nature, the sheer number of vessels supports their conclusion that the final product market is competitive. CL do not address specialized local final product markets.

Production (quota) market
As discussed above, there are several ways to evaluate the market for fishery access privileges. The instrument that could be traded may be the permit, potential sector contribution, or the annual catch entitlement. The control/ownership entity may be defined by the individual, the group ID, or the sector. The thinnest market (most vulnerable to exercise of market power) would be at the permit level where reporting of transactions and trading prices is not standardized. The greatest potential for coordination is at the sector level. CL concluded that the sectors do not and will not exercise market power in fishery access privileges. Their conclusions were based on discussions with sector managers and others. While their conclusions may be correct, they are not scientifically supported. The qualitative data collection process and analysis was not systematic or rigorous. Of the quantitative information available, ACE holdings HHI by sector approaches highly concentrated (above 2500) for two stocks and moderately concentrated (between 1500 and 2500) for eleven stocks. CL note that sector members have independent control of the ACE holdings. However, economic theory would indicate that conditions exist where the members could find it in their best interest to coordinate their control of ACE holdings.

TOR 4: Review and comment on the data requirements necessary for applying the proposed methods or process.

The proposed method can be implemented with current information that is reported to NOAA and NEFMC. Tracking individual permits in a manner that allows a more accurate picture of concentration of control would enhance the proposed process.

TOR 5: Provide any recommendations for further improvement.

A reporting structure for both permit and ACE transactions that is open and accurate would improve the process.

A more theoretically sound approach would utilize current estimates of the industry cost structure and prices to estimate profit for different gear types and vessel sizes. This would give a more complete picture of whether a dominant position has supported successful and profitable exercise of market power.

Hold Out Market

If the purpose of Amendment 18 Goal 4 is limit the exercise of market power, then other alternatives or additions to a hard cap on shares may be considered. One way of maintaining a clear path of access to the market for all participants, is to use a "hold out" proportion of 10% to 20% of stock/ACE that is placed in an open market with full information on prices. Allowing current participants to access a portion of the ACE through a centrally- organized market can make it difficult and costly for entities to control excessive shares of fishery access privileges. Organization and oversight of the market at the NEFMC level would be one option with the revenue from the sales going back to the sectors to distribute to sector members in proportion to their PSC. The fishery-wide open market for ACE would promote price discovery by stock and help alleviate ACE/stock portfolio coordination issues for operators. With current underutilization of ACL noted by the authors, prices in the hold out market should be relatively low.

Conclusions and Recommendations

CL have articulated a process for determining the maximum possible allowable percentage share of the market for fishery access privileges. The process relies on the Herfindahl-Hirschman Index that is a traditional and accepted measure of market concentration updated in the 2010 Horizontal Merger Guidelines. Using HHI as a target, CL back out a maximum allowable share of 15.5% that roughly aligns with an HHI of a little more than 1500 if market shares are about equal. Although fairly simple to implement, the determination that market shares above 15.5% create conditions that foster inordinate control are not well supported by theory. A much more complete theory that reflects the biological and product market uncertainties and the multiproduct nature of the production process would be necessary to determine a theoretically sound approach.

I recommend direct calculation of the HHI to identify potentially excessive concentration. A target of

1500 by GroupID and ACE/stock is a reasonable maximum target. This is the concentration threshold utilized by CL in step 4 of their process.

Permit holders or sectors to restrict access to ACE for a particular stock. Also the price and volume information contained in a “hold out” market is valuable to individual permit owners, policy makers and the NEFMC.

Critique of the NMFS Review process including suggestions for improvements of both process and products.

The process that I participated in gave sufficient time to evaluate and contact with the authors to understand their recommendations better. Interaction with other learned professionals, NMFS Northeast Science Center, and members of the Northeast Fishery Council also led to a broader understanding of the industry and the challenges of implementing an excessive share cap. I have no substantive suggestions for improving the review process—I believe it worked very well.

Peer Review Report by Dr. Andrew Schmitz

Executive Summary

The New England Fishery Management Council (NEFMC) consulted with Compass Lexecon (CL) regarding the implementation of an access privilege quota system in the Northeast Multispecies Fishery (NMF). The concerns of the NEFMC were the accumulation of excessive shares or the further increase of excessive shares if they already existed. The report (CLR), entitled *Recommendations for Excessive-Share Limits in the Northeast Multispecies Fishery* was written by Glenn Mitchel and Steven Peterson (authors) in 2013. The Northeast Multispecies Fishery (or the "ground fish" fishery, as it includes thirteen species of groundfish) spans the Gulf of Maine, Georges Bank, Southern New England and the Mid Atlantic Bight. The fishery is regulated by sectors (contractually related groups of permit owners) that directly manage catch levels and annual catch limits (ACLs). The main conclusion of the report is that market power (MP) is not being exercised in the fishery through the withholding of Annual Catch Entitlement (ACE) in any part of the groundfish fishery.

It is my opinion that insufficient information was presented by Mitchel and Peterson (2013) to verify CL's finding that market power is not being exerted in either product or ACE trading markets. However, based on additional information at the meeting and general experience no market power is indicated in either product or ACE trading markets. Conditional on the above, there is no need for a market power limit. Also, future conditions of the fishery will determine the need for regulation.

To draw conclusions about market power in the NMF, one needs to have both theoretical and empirical evidence on:

1. the competitive equilibrium output level;
2. the actual quota levels;
3. actual output relative to the quota level; and
4. if market power exists, how did it come about (e.g., through dominant firm pricing, or buying out the competition).

The reasons why I don't agree with the CLR are:

1. Both the microeconomic theory and the determination of the quota were not adequately described. Fishermen make production decisions subject to the production quotas set by regulators. Proper analysis must discuss anti- competitive behavior within a quota-based model, relative to competitive equilibrium. In this context, under-used quota could be due to monopoly pricing.
2. There was no information on whether the sample of people interviewed was representative of the population.
3. There is no scientific basis for ruling out the possibility that sector level coordination may occur.
4. There was no statistical analysis of the product market or demand. They described the process for determining relevant markets, but did not fully consider the relevant market that includes imports.
5. There was no consideration given to the relevant literature on demand price elasticities in a multiple species framework.

6. Full consideration was not given to aggregate markets that would include the role of imports or substitutions among fish species.
7. Given several species in a multispecies market, there is no discussion of the possibility of price manipulation in only one or two of the species markets out of the total.
8. There is no discussion as to why the authors did not estimate directly, through econometric means, market power directly.
9. The unit of regulation should be any level that allows for institutions to coordinate activities to behave non-competitively. There is no scientific basis for ruling out the possibility that sector level coordination may occur.

Background

NEFMC is preparing Amendment 18 to the Northeast Multispecies Fishery Management Plan (FMP). Among other things under consideration, Amendment 18 would establish an excessive share threshold for the fishery consistent with National Standard 4 of the Magnuson Stevens Fishery Conservation and Management Act. To provide the needed expertise to establish an excessive share threshold the NEFMC contracted the economic consulting firm Compass Lexecon (see Annex 1 for Compass Lexecon's TORs) to conduct an empirical analysis to determine if excessive shares existed in the fishery today as well as the necessary constraints to prevent accumulation of excessive share in the future. Compass Lexecon completed its study and submitted its final report to the NEFMC on December 31, 2013.

At the request of the NEFMC a review panel was convened to provide a peer review of the CLR. I was one of the four peer review panel experts (see Appendix 3) under a contractual arrangement between the National Marine Fishery Service (NMFS) Office of Science and Technology and the Center for Independent Experts (CIE). Also, one expert was contracted by the NEFMC (see Annex 3 for panelist names and affiliations). The peer review took place in Salem, MA on June 12-13, 2014. The peer review panel was chaired by a member of the NEFMC's Science and Statistical Committee (SSC). Peer reviewers were provided with the CLR, a multispecies fishery background document, the meeting announcement, and the TORs for the peer review.

The panel review meeting consisted of a session on June 12th that was open to the public and a session on June 13th that was not. The June 12th session (see Annex 4 for the meeting agenda) began with a presentation provided by Council staff on the purpose and need for the excessive share study of the Northeast Multispecies fishery conducted by CL. This presentation was followed by an overview provided by CL's lead investigators of their methods, data, and findings. Throughout these two presentations the review panel sought clarification on both the operational aspects of the Northeast Multispecies Sector Allocation program and CL's procedures in the conduct of the excessive share study. During the afternoon of the 12th the review panel sought additional clarification on each of the panel's TOR for the peer review. Answers to the panelist's questions were provided by CL's lead investigators, Council staff, Greater Atlantic Regional Fisheries Office (GARFO) staff, and the Northeast Fisheries Science Center's (NEFMC) Social Sciences Branch (SSB) staff. These deliberations were informed by comments from members of the public in attendance.

On June 13th the review panel met to further discuss the peer review TORs where attendance was limited to the members of the peer review panel, the panel chair, and staff from the Council, GARFO, and NEFSC's SSB. The peer review panel succeeded in addressing all of the TORs. The peer review

panel's findings on each of the TORs are noted below.

The terms of reference (TORs) used for the Compass Lexecon study are:

1. Describe a theoretically sound method to specify the maximum possible allowable percentage share of the market for the fishery access privileges (permits, potential sector contribution) and/or the quota leasing (ACE trading) that would prevent an entity from obtaining an excessive share of the access privileges allocated under the Northeast Multispecies Fishery. Use the Herfindahl-Hirschman Index prescribed within the "US Department of Justice Horizontal Merger Guidelines" or other accepted rule as appropriate.
2. Apply the process or rule developed under Number 1 to determine if excessive shares already exist in this fishery. If excessive shares do not exist today, describe potential constraints that could prevent excessive shares from existing in the future. Alternatively, if excessive shares do exist, describe a process or rule that will allow for a theoretically sound procedure to prevent future increase.
3. If the rule cannot be applied because of incomplete data, provide suggestions of how to apply the rule in the best way possible that is consistent with the theoretical underpinnings of the rule. Also, identify data that would be necessary to apply the rule.
4. Identify conditions where entities, could exert "inordinate control" of quota as outlined in the National Standard 4 Guidelines. Such entities could include business entities holding permits, sectors, or organizations of sectors.
5. Alternate approaches to achieving the Amendment 18 goals (other than accumulation caps) may be proposed.

My peer review was conducted based on the following TORs:

1. Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast Multispecies Fishery.
2. Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is appropriate. As part of this TOR, comment on any constraints that may hinder application of the proposed outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in a general approach.
3. Evaluate application of the proposed methods or process to the Northeast Multispecies Fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.
4. Review and comment on the data requirements necessary for applying the proposed methods or process.
5. Provide any recommendations for further improvement.

Within this context, my review is based on NEFMC and NMFS (2014), Anderson and Holliday (2007), Mitchel and Peterson (2013), my expertise in the area, and information gleaned from comments made by participants of the June 12-13 meetings, including panel members, the authors of the CLR, fishery personnel, and the general public.

Description of Role

My responsibilities during the Review Activities were to familiarize myself with the background information, and to participate in the discussion. I also functioned as a review panelist.

Summary of Findings

The following is my peer review according to the TORs provided:

> **TOR1. Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast Multispecies Fishery.**

The process used by Compass Lexecon included the following:

1. Qualitative data was collected on the product market and ACE trading markets through unstructured voluntary interviews
2. A 7-step process was applied to determine an excessive share cap
3. The Herfindahl Hirschman Index (HHI) was used to measure concentration from data provided by NMFS
   - 3.1. The HHI was calculated at the Group-ID level for:
     - 3.1.1. Yearly harvest by species (Table 1)
     - 3.1.2. Yearly ACE holdings by species (Table 6) and stock (Table 7)
   - 3.2. The HHI was calculated at the sector level for:
     - 3.2.1. Yearly ACE holdings by species (Table 3) and stocks (Table 4)
4. Horizontal Merger Guidelines were used to evaluate levels of the HHI
   - 4.1. A HHI of 1500 was selected as the level consistent with competitive markets

Data sources:

NMFS Group identification at both the individual and sector levels was based on potential sector contribution (PSC), ACE, and landings. Also, import/export data were obtained from the National Oceanic and Atmospheric Association (NOAA). Qualitative data were collected voluntary through unstructured interviews with vessel owners, sector managers, Northeast Seafood Coalition, Auction house, and processors. There was also a webinar that included approximately 25 participants. The bibliography contains additional sources of information.

> **TOR2. Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass**

Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of this TOR, comment on any constraints that may hinder application of the proposed approach.

The peer review panel concurred that defining market power in terms of excessive shares is appropriate. However, the review panel noted a number of concerns with the procedures used by CL in developing its recommendations. I concur with the panel.
Major concerns include:

1. The CLR has a weak theoretical conceptualization of the problem at hand. In order to do this study properly, they needed to develop a detailed theoretical model of market power in a regulated multiproduct fishery setting and discuss empirical results in this context.
2. There was also no consideration of production function or cost relationships and no consideration of implications for economies of scale and multi- product cost relationships.
3. The theory needed to incorporate a discussion on regulators who set production quotas relative to the competitive equilibrium solution benchmark against which market power is measured.
4. Aside from theoretical considerations, another shortcoming of the CLR was the lack of documentation regarding the determination of the relevant market for groundfish in the Northeast.
5. Similar to the previous point, there was a lack of documentation provided regarding both the survey methods and the questions used to generate qualitative information.
6. The CLR did not seem to consider future conditions in the NMF. The authors also did not have a scientific basis for ruling out the possibility that sector-level coordination would not occur (the primary basis for this conclusion was information gleaned from the interviews that were conducted).

TOR3. Evaluate application of the proposed methods or process to the Northeast Multispecies Fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.

The peer review panel found that the information included in the CLR was not sufficient to conclude that market power is being exerted in both the final product market and ACE trading market. The review panel did not necessarily disagree with CL's findings. It was the consensus of the review panel that the scientific basis to validate their findings was lacking. I concur with the panel.

The quantitative analysis underlying their findings is weak. Mitchel and Peterson (2013) imply that they used statistical methods and mathematical modeling, but I find neither. The authors needed to take into account (in a more rigorous manner), the nature of the multispecies fishery, and therefore need to determine the cross-price elasticities of demand for multiple species. There is no theoretical foundation or model to support the evaluation of market power (MP) in ACE markets. One is dealing with a multiproduct market and there is no specific guidance on determination of market power in this setting.

A major limitation of the CLR is that there is no statistical analysis of the product market or demand. They described the process for determining relevant markets, but did not fully consider the relevant market that includes imports. There was no consideration given to the relevant literature on demand price elasticities in a multiple species framework. Full consideration was not given to aggregate markets that would include the role of imports or substitutions among fish species. There was insufficient information given which makes it nearly impossible to replicate the authors' methodology. The CLR concluded that underutilization of quota may be evidence of potential market power (page 41 Section c).

The question arises as to why the authors did not estimate market power directly through the econometric techniques that have often been reported in relevant literature. This would have required demand elasticities to be estimated for multiple species. But, by so doing, the authors would have shed a great deal of light on the degree of competition in the fishing industry. In this framework, why is there no discussion of the possibility of price manipulation for at least one or two of the species? Is it not possible that for at least one of the species (not necessarily all of them), price collusion exists?

Additional Details

1. *Evidence in Product Market*
   - 1.1. The description of product markets was insufficient even in general terms. Broader consideration of the aggregate market, role of imports and substitutability among products should have been evaluated. While a formal statistical analysis of market demand may not have been possible, a review of the relevant literature would have been informative, and would have bolstered the case for a competitive product market.
   - 1.2. It may have been possible to directly test for market power in the product market using established econometric methods. These methods could have been applied by CL or the reasons why such testing could not be done for this fishery should be noted.

2. *ACE Trading Market*
   - 2.1. In the Northeast Multispecies sector allocation program there are two markets: one for PSC (permanent share) and one for ACE. However, the share limit would apply to PSC and not to ACE. CL notes that the demand for ACE is downward sloping, but there is no information on the slope of the demand curve. Absent ACE trading data, there is no underlying scientific basis for finding that ACE trading markets are competitive or otherwise.
   - 2.2. The conditions under which the ability to exert market power in multiproduct ACE market have not yet been established in the economic literature. This has implications for whether there is any theoretical or empirical basis for setting any specific excessive share limit.

Findings of the Panel

The panel finds that insufficient information was presented to verify CL's finding that market power is not being exerted in either product or ACE trading markets under current conditions. I agree. However, based on additional information from the two day June 11-13 meeting and general experience with the industry, I conclude that no market power is indicated in either product or ACE trading markets under

current conditions. Therefore there is no need for a market power limit.[4]

The seven-step process: The authors argue that MP isn't being exercised in the NMFS. With respect to recommending excessive-share caps, they follow the seven-step procedure discussed below, upon which I provide comments:

1. *Assess quota ownership information: The information NMFS has on permit ownership may not be sufficient, for all potential permit transactions, to reliably define ownership and control of permits and the PSC they confer.*

Even though the authors have information on individual permit holders and permit holders by sector, their argument that sectors cannot exert market power is very weak and is not supported by either theory or empirical evidence. They do not fully explore the possibility that many permit owners may operate under the same identity (i.e., who owns what permit). It seems that some crucial questions not addressed are: who owns the permits and how fish is caught by those owning permits?

2. *Assess competitive information: There is sufficient competitive information to determine that the relevant markets for ACE trading are the markets for the trading of each stock's ACE. If an operator requires the ACE for a particular stock, there is not a good substitute available.*

In the summary section of their report, the authors conclude that there is sufficient competitive information to proceed with the determination of an excessive share cap. Why discuss excessive share caps when there appears to be excess competition in the industry? How much consolidation would there have to be before the recommended caps would be binding? The necessary amount of consolidation required to exert market power is far beyond conditions that currently exist in the fishing industry.

3. *Check threshold condition: One cannot exclude the possibility of the exercise of market power as the result of the fishery's output regularly reaching the regulated level, which would indicate competitive conduct within the framework of the output regulation. Thus, examination of appropriate caps is necessary.*

There is no evidence provided on where the quota is set, relative to competition. In Figure 1 below, if the regulator sets output at q_1, the firms would behave as a monopolist by charging p_1.

4 A general concern is the CLRs determination that market power is not exerted at the sector level. There is no theoretical foundation or model to support the evaluation of market power (MP) in ACE markets. One is dealing with a multiproduct market and there is no specific guidance on determination of market power in this setting. It is difficult to determine MP when the authors do not provide any information on price elasticities of demand. The conditions under which the ability to exert market power in multiproduct ACE markets have not yet been established in economic literature.

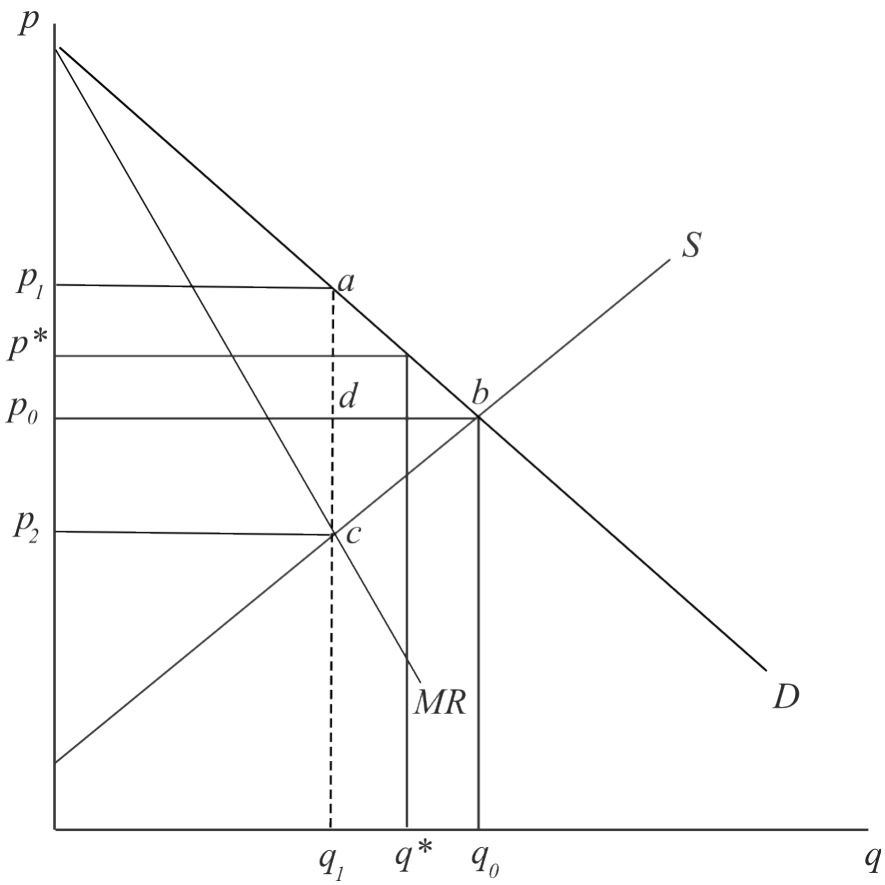

Figure 1: Competitive Equilibrium, Quota Level, and Monopoly Output

They gain from the quota in the amount ($p_1 p_0 da$) □□(dcb). It is true that firms would not attempt to restrict output below q_1 because there would be a loss from doing so. I agree with the authors' statement because in this context, an excessive share limit has no meaning.

Now consider a quota set by the regulators for example, at the competitive equilibrium quantity q_0 . In this case, the quota level is well beyond the monopoly levels q_1 . But this does not imply that monopoly pricing does not exist. Consider the case where firms monopolize, and produce q^* and receive price p^* in the presence of quota q_0 . In this case, output is less than the quota imposed. The very nature of monopolization implies that output be restricted below the quota set by the regulator (except in the case of q_1). Therefore, if q^* exists as an amount smaller than q_0 , there is concern for monopoly pricing. The problem that arises is of an empirical nature. One has to empirically determine the competitive equilibrium in relation to the quota level, and actual fishery output. However the existence of unused quota does not necessarily imply non-competitive behavior. In the model presented above, (q_0 □□q^*) represents unused quota. I find no evidence of these calculations.

An important quote is taken from the CLR (p. iv):

> *"…there has been substantial underutilization of allowable catch for many species with ACE data, especially in 2012. Haddock landings, for example, accounted for just 21 percent of ACE in 2010 and dropped further to just 4 percent in 2012. Cod landings were over 80 percent of ACE in 2010 and 2011, but dropped under 45 percent in 2012."*

As the above model shows, excess capacity is consistent with monopoly pricing.

In regard to the exercise of market power, it is important to keep the definition of excessive share limits firmly in mind. The authors define an excessive share to be a share of access rights that would allow a permit owner or sector to influence to its advantage the prices of the fishery's output or the prices paid for leased ACE (p i). The author's go on to state (p 1):

> "*There is no standard economic definition of "excessive shares." However, the fishery management plan must comply with National Standard 4 of the Magnuson Stevens Fishery Conservation and Management Act. The National Standard 4 Guidelines state: An allocation scheme must be designed to deter any person or other entity from acquiring an excessive share of fishing privileges, and to avoid creating conditions fostering inordinate control, by buyers or sellers, which would not otherwise exist. From a broad economic perspective regarding what could constitute "inordinate control," we define an excessive share to be a share of access rights that would allow a permit owner or sector to influence to its advantage the prices of the fishery's output, the prices paid for leased Annual Catch Entitlements ("ACE"), or prices paid for permits. Such influence may disadvantage other holders of fishery access rights relative to prices that would otherwise result. The ability to manipulate prices to one's advantage based on the share of participation in a market is a typical example of what economists call market power."*

In the above context, consider for example, where through monopolization, output is restricted to q^*. Theoretically, several means are potentially available to fishermen to achieve this outcome. One approach, as discussed in Appendix 4, is through dominant firm pricing, whereby the dominant firm, relative to competition, reduces output. Alternatively, a model exists where several large producers could essentially buyout the fringe suppliers and achieve a monopoly. In this case, output increases for the larger firms and smaller firms exit the industry, giving rise to a reduction in total quantity, relative to the competitive levels.[5] Now a key question arises: How does one interpret the data on actual fish catch by individual fishermen? Are the data consistent with monopolization, and if so, by what means?

4. *Establish concentration targets: It is reasonable for the NEFMC to recommend that the NMFS establish an excessive-share cap to maintain an unconcentrated (HHI below approximately 1,500) distribution of PSC by capping individual the PSC for each stock that can be conferred to any permit owner.*

5 There are additional models of non-competitive price behavior that could be considered, such as Cournot-Nash and Stackelberg.

Why establish concentration targets if no MP exists? In the report (p. v), the authors determine that this target can be achieved without interfering with economies of scale. Unfortunately, the authors do not rigorously determine or describe economies of scale in the fishing industry (both currently and in the future). It may well be that the authors are implying that caps may be imposed due to future monopolization and economies of scale.

5. *Determine share limit-market concentration relationship: The cap required to ensure an HHI below 1,500 would be 25 percent with a competitive fringe of 38 percent, or 15.5 percent with no competitive fringe.*

This is also misleading because a cap is not needed if there is no market power exercised.

6. *Identify regulatory and practical constraints: Sectors do not own or control PSC or ACE. Therefore, capping the amount of PSC or ACE held in the aggregate by members of a particular sector would not provide protections against the exercise of market power or the development of inordinate control.*

I totally agree.

7. *Recommend an excessive shares cap: I suggest using the grouping of permits by common ownership (based on information already available) for an initial determination of whether a permit transfer exceeds a share cap, but allowing for an optional follow-up submission of detailed ownership information prior to final determination. I recommend setting an excessive-share cap so that no permit owner owns or controls permits conferring more than 15.5 percent of the PSC for a stock.*

In the executive summary point 7, (p. 9), the authors conclude:

> *"…given the lack of evidence for scale economies continuing to occur for individual owners above 10 to 12 percent of a stock's ACE, we recommend setting an excessive-share cap on the PSC conferred to permit owner at 15.5 percent of available PSC."*

The authors provide little evidence of scale economies and about the nature of the supply curve for fish in general. The cost curve for the fishery may well decrease over time due to economies of scale brought about by new technologies. Without intervention, at least theoretically, this leads to a natural monopoly solution. If this were the case, then it seems like some form of a future cap would be in order.

TOR4. Review and comment on the data requirements necessary for applying the proposed methods or process.

1. The analysis conducted by CL was based on groupids. The NEFMC is considering adopting a share limit at the person level—an approach that would require information on ownership stake. Setting limits at the person level would complicate the use of the HHI as a means for setting a share limit or monitoring the performance of the fishery.
2. In addition to the information needed to set and monitor share limits it is necessary to:
   2.1. create of an ownership registry to include transactions and prices.
   2.2. conduct cost and earnings studies at the vessel and sector level

2.3. monitor the price of quota. If it is near zero and ACL is not exceeded, then there is evidence of a competitive market. Likewise an increase in quota prices may be reason for concern.

TOR5. Provide any recommendations for further improvement.

As previously stated, the CLR provides little theoretical basis for its findings. I recommend that further work in this area of monopolistic pricing should follow the discussion below. This model discusses the potential for price-fixing within the context of production quotas that may be set by a regulatory agency. These quotas are set based on the concept of a sustainable fish yield, and often do not have any bearing to competition as defined by economists. The major conclusion is that determining anti-competitive behavior in the fishing industry is extremely difficult as the following models show. This is because the quotas are set based on biological principles, and this quota may be far from that determined by competitive equilibrium economic conditions. Quotas can give rise to rents for fisherman because of the quantity restriction by about three quarters. To determine anti-competitive behavior, one has to know imperially the competitive price and quantities and these have to be related to the quantities set by the regulator and the amount actually produced by fisherman.

1. Consider the model presented in Figure 2. The total demand for fish is given by D and total supply of fish by S . Assume that of the total supply S , three larger firms out of a total of 20 produce output (fish) q^*, while the remaining firms produce $(q_0 - q^*)$ of fish at a price p_0 (the fringe suppliers constitute the 17 firms). S^* is the supply curve of the dominant firm, and is assumed to be equal to the supply curveof the fringe suppliers.

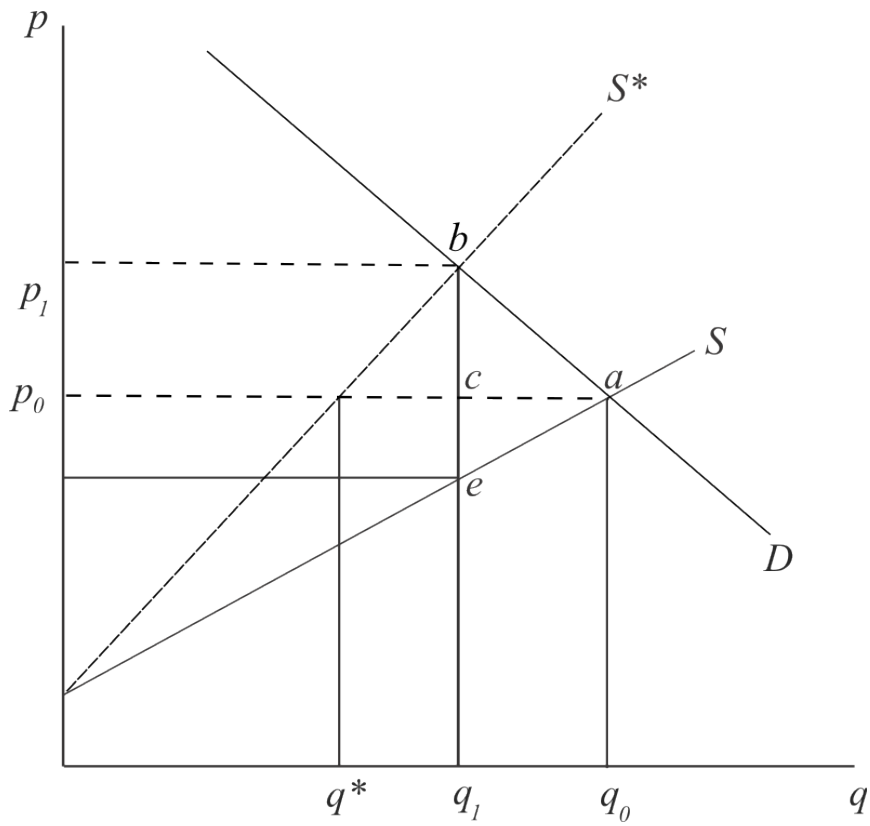

Figure 2: Introduction of quota in a fishery

Under standard welfare analysis, producing q_0 of fish at a price p_0 leads to the social optimum. However quotas can lead to social optimality in the presence of negative externalities (i.e., over- fishing if left to unfettered market forces).

Consider the introduction of a production quota q_1 that raises price to p_1 . As a result of the quota, consumer lose $(p_1 pab)$, producers gain $[(p_1 pcb) - cea]$ and there is a net efficiency loss of (bea). A production quota is a second best policy based on conventional welfare economics.

The intent of setting a quota on fishing is not to create a second- est solution. For a quota to improve welfare over competitive levels, there has to exist some form of a negative externality generated from the free market solution. If the social optimum is at $q_1 p_1$ and not $q_0 p_0$, then producers are better off by $[(p_1 p_0 cb) - (cea)]$. Consumers in the long run would also gain as a sustainable amount of fish would be available at a catch rate that guarantees q_1 of product. Hence, the argument is that competition leads to over-fishing, and regulators, at least in theory, set the quota at q_1.

2. Here, the argument made is that the quota is needed to achieve a first best policy solution. In Figure 3 the competitive solution is point d , but under a quota, the price is p_1 and the corresponding quantity is q_1 . The quota is used here to correct the negative externality. But, the producers gain from the quota by an amount $[(p_1 p_0 ab) - (acd)]$. This is because producers'

variable costs are only (ghq_1c) to produce output q_1. Suppose instead of using a quota to correct the externality, a producer tax is imposed of $(igcb)$. Now producers lose by an amount $[(p_0\,gd)$ $-(p_1ib)]$. Producers clearly support a production quota over a production tax.

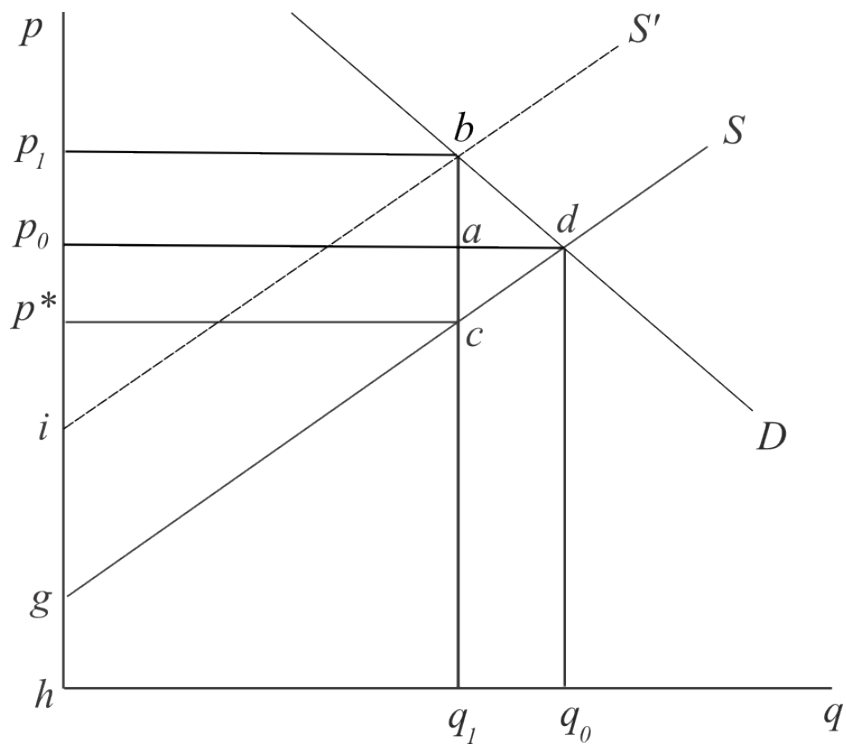

Figure 3: Production Quota vs Production Tax

3. The CLR suggests the possibility that part of the amount of production is less than allowed under the quota. Consider Figure 4 where this is the case, but from a different perspective than discussed above. The production quota is set at q_1 to the right of the competitive output q_0. However, in the absence of a production subsidy, producers only produce q_0, the competitive equilibrium quantity. If they produced quantity q_1 instead, they would experience a loss of $(p_1\,jyx)$.

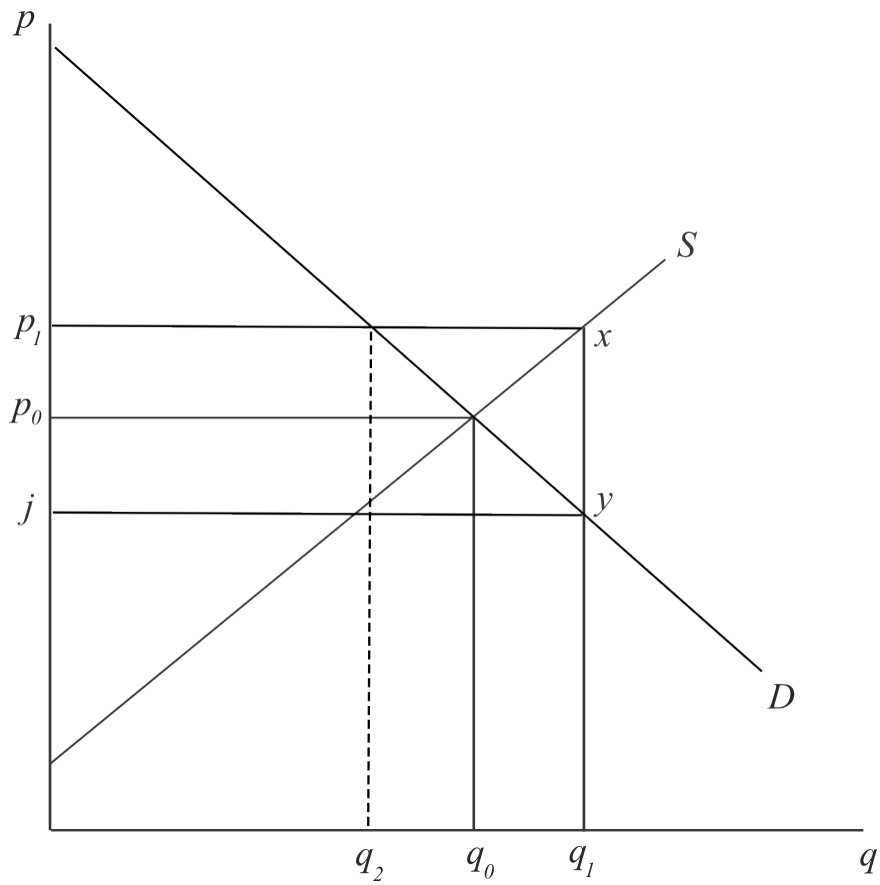

Figure 4: Unused Quota

As a caveat, one could argue that given the optimal quota $q1$ (set so that there is no overfishing of this amount), a positive externality exists hence a production subsidy is one possible instrument to correct for the externality.

In the model, the norm against which to assess the competitive nature of the industry is with reference to $p0$ and $q0$, not the unused quota of $(q1q0)$. Furthermore, unlike the earlier discussion where the quota is binding, the chances for a strategy by the dominant firms to raise prices is no more likely to be pursued since the payoff to the dominant firm is now with reference to $p0$ and $q0$, and not some binding quota of $q2$. In the latter case, part of the rents to producers have already been obtained as a result of the quota itself.

4. With reference to unused quota, there are at least two possible conclusions that can be drawn. The first is where production is less than under a binding quota and the second is where quota is set at a level that exceeds the competitive equilibrium quantity. Both cases are discussed with reference to Figure 5. A binding quota of $q2$ leads to price of $p2$ and a quantity of $q2$. In this case there also can be unused quota if producers restricted output below $q2$. For example, the monopoly solution of $p*$ and $q*$ generates an unused quota of $(q2q*)$.

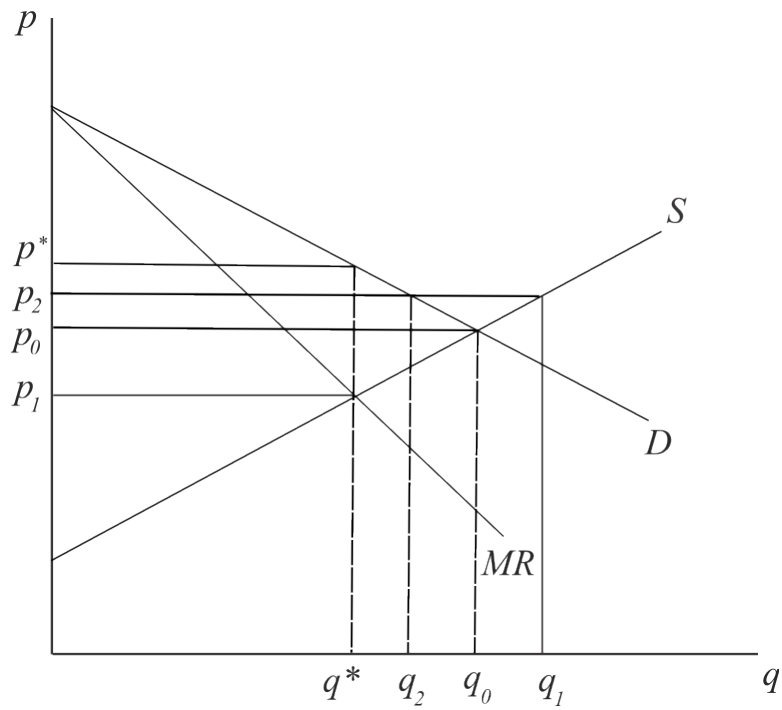

Figure 5: Binding and Non-Binding Quotas

For a quota of $q1$, as discussed earlier, under competition, $(q1q0)$ of the quota remains unused. As a result, from a theoretical perspective, the existence of unused quota may or may not support anti-competitive behavior on the part of producers. However, true quota rents exist only under the binding production quota model.

5. In the previous discussions the production quota referred to is set by biologists using a reference point "maximum sustainable yield". It is not set only with reference to economic supply and demand analysis as is the case for quota supply managed sectors in agriculture. If this is true, then the setting of a production quota of $q1$ or $q2$ has little reference to S and D and competitiveness as defined by economists. This makes it very difficult to establish the reference point up on which to base conclusions concerning anti- competitive behavior, and to define rents correctly!

TOR 5 (continued)

The following recommendations consider the future state of the fishery. In determining the potential for imperfect competitive behavior, it is necessary to consider the following:

1 Use of HHI and Horizontal Merger Guidelines
- 1.1 Based on theory alone, there is a limited possibility for price collusion.
- 1.2 CL backed 15.5% out of an HHI of 1500 from DOJ Horizontal Merger Guidelines as upper limit, but the DOJ still considers and allows mergers at higher levels.
- 1.3 The setting of a percentage share at 15.5% does not take into account the possibility that any scale efficiencies may be lost based on current technology and cost structure or that of

the future.

1.4 An alternative approach would be to establish 1500 as the HHI above which ownership would not be allowed rather than setting a cap of 15.5%. Doing so would provide greater flexibility to allow entities to grow while maintaining the HHI at a level that is considered to be competitive.

1.5 The HHI should be monitored. If it falls within the range of 1500 to 2800 then review conduct and market performance.

2 Cost Efficiencies

2.1 As previously noted, the peer review panel emphasized the need to consider tradeoffs between economies of scale (economic efficiencies) and ownership caps. Doing so requires consideration of production function or cost relationships at the vessel-level and/or enterprise level. Additionally, there may be sector-l level economies of scale in terms of sector transactions costs or through ability to bargain for lower input prices and or engage in marketing. The full consideration of scale efficiencies would require cost data to evaluate structure of industry and the potential to realize lower costs through consolidation or expansion.

2.2 There are sector level economies of scale (as well as individual) through ability to bargain for lower input prices and or engage in marketing.

2.3 There are sector operating cost savings tied to that have the potential to exert MP.

3 The Relevant Unit of Regulation

3.1 There is a question over whether individuals are the sole relevant unit of regulation. As previously noted, sectors exist as institutions to achieve a certain level of coordination among their members. Under present conditions, this coordination is limited to facilitating reporting requirements to the NMFS and executing inter-sector trades. This rules out the possibility that coordination in ACE trading or product markets may occur in the future.

4 Other Comments

4.1 The CL's TOR included the possibility that market power metrics other than the HHI may be appropriate. Such an alternative may be the 4-firm concentration ratio.

4.2 The possibility exists on estimating market power using econometric methods, or identifying why it could not be done for this fishery (the NEFMC should be aware that these methods are established in the literature).

4.3 Their findings were based on anecdotal evidence, but importantly, what questions were asked? There was no information on whether the sample of people interviewed was representative of the population. The potential for collusion by sector or among sectors cannot be dismissed based on interviews alone, since institutions exists to achieve coordination among sector members. The unit of regulation should be any level that allows for institutions to coordinate activities to behave non-competitively. There is no scientific basis for ruling out the possibility that sector level coordination may occur.

4.4 The authors should have considered the empirical relationship between actual quota levels set by regulator, actual production of the fishermen and competitive prices and quantities. As shown theoretically, unless this is done, drawing conclusions on anti-

competitive behavior is hazardous at best. If the theory were rigorously developed, one could help determine the potential for monopoly pricing.

4.5 The authors should have provided the time that their data and analysis cover. Further consideration should be given to the role that permit banks, non-profit permit banks and lease-only sectors may play in leasing markets and product markets.

4.6 It may not be necessary to have share limit for all stocks.

Review of NMFS Process

The review process was very well carried out and extremely informative. Having the authors of the CLR give their findings to us (and to the general public) was well served. Many of my conclusions were based on the interaction between authors, panel reviewers, and fishery personnel at the June meeting.

References

Schmitz, A, McCalla, A.F., Mitchell, D.O., Carter, C.A. 1981. Grain Export Cartels. Ballinger Publishing Company.

Peer Review Report by Dr. Quinn Weninger

Executive Summary

The Northeast Fisheries Management Council (NEFMC) contracted the economic consulting firm Compass Lexecon (CL) to conduct an analysis to (1) determine if excessive shares and market power currently exist in the Northeast multiple-species fishery and (2) recommend an ownership cap limit to prevent exercise of market power in the future. The report finds that the evidence that was collected and analyzed by CL does not support the conclusion that market power is currently being exercised in the Northeast multispecies (NEMS) fishery. The CL report recommends setting an excessive share cap on the potential sector contribution (PSC) conferred to permit owners at 15.5% of available PSC.

This conclusion and recommendation is based on the application of a seven-step procedure (see below). The CL findings rely on informal interviews conducted by CL in 2013, as well as calculation of the Herfindahl-Hirschman Index (HHI) at the individual fishermen and sector level and across individual ground fish species. Methods used by CL to determine current and potential for market power in the Northeast multispecies fishery do not meet standards for conducting research in the field of economics. The CL recommendation of a 15.5% ownership cap at the individual level is not supported by reliable empirical evidence. The recommended appears to derive primarily from a misinterpretation of Department of Justice guidelines for using HHI indices to assess non-competitive mergers.

Additional deficiencies in the CL methodology center around: (1) over reliance on informal and unverifiable qualitative information; (2) miss-interpretation and over- reliance of threshold HHI values; (3) lack of evidence supporting the recommendation that the appropriate unit of regulation is an individual fisherman (the ability of sectors to exercise market power was dismissed based on anecdotal testimony of interviewees); (4) unsubstantiated conclusions regarding economics of scale, size and scope; (5) absent theoretical argument or empirical evidence to support conclusions; and (6) miss- characterization of factors that determine permit prices and potential for market power in multiple-species, quota managed fisheries. The methods employed and additional deficiencies raise serious doubt about the validity of the CL finding and recommendation.

CL findings and recommendation should be viewed cautiously. Harvest permit caps that are set unnecessarily low can prevent the realization of economics of scale, size and scope, and place unnecessary administrative burden on fishery managers. HHI values should be used (as by the U.S. Department of Justice) as a warning system for the potential existence of market power inefficiencies. If HHI's reach values that signal markets for PSC or annual catch entitlement (ACE) are concentrated, established econometric methods should be employed to empirically test for, and measure market power inefficiencies. Steps could then be taken to break apart accumulated concentration and restore competitive conditions in the Northeast multispecies fishery.

The potential for a sector to exercise market power should not be dismissed based on unstructured qualitative feedback from industry. Similarly, permit banks that may control large amounts PSC should be examined as potential conduits of market power inefficiencies.

Background

The NEFMC contracted CL to provide independent advice regarding the establishment of caps on holdings of access privileges to the NEMS fishery to prevent the accumulation of excessive shares of harvest permits. CL defined an “excessive share" to be an access rights share that would allow a permit owner to influence to its advantage prices in the fisheries output or harvest permit market. Setting an ownership cap that is too low can interfere with fishing firms' ability to organize their businesses in a way that minimizes operating costs. Setting a cap too high may result in market power which will itself lead to economic inefficiency and a socially undesirable distribution of economic rents. It is therefore important to determine if market power currently exists in the NEMS fishery, whether an ownership cap policy can prevent market power, and if so, the form that an ownership cap policy should take.

The CL report finds: (1) that the evidence that was collected and analyzed does not support the conclusion that market power is currently being exercised in the NEMS fishery; and (2) recommends setting an excessive share cap on the PSC conferred to permit owners at 15.5% of available PSC.

Role of reviewer: I was contacted by the Center for Independent Experts and asked to participate in a peer review of the CL report (titled “Recommendations for Excessive Share Limits in the Northeast Multispecies Fishery"). I received the report and other background materials from Chad Demarest on June 3, 2014. I reviewed these materials and attended the meeting of CIE reviewers, which was held in Salem, MA on June 12 and 13, 2014.

Reviewer qualifications: My academic research has studied aspects of transferable quota management programs in marine fisheries with a focus on their implications for market structure and performance, and economies of scale, size and scope. I have considerable experience conducting empirical research on market structure in quota-managed fisheries, including multiple-species fisheries. I have written and published research papers that characterize multiple-species production decisions of fishermen (targeting behavior and bycatch avoidance). I have studied bio-economic outcomes under tradable harvest permits or quota regulations, landings taxes and revenue quotas. My recent work examines fishing behavior and market performance in fisheries under uncertainty and trading frictions, costly avoidance of bycatch species, and transactions costs in permit trading markets. In the fall of 2013, a colleague, graduate student and I began a project to identify conditions that facilitate the exercise of market power in multiple-species fisheries managed with tradable fishing permits. The intent is to extend to the multiple- product or species setting, research by Hahn (1984), Anderson (1991, 2008) and others (e.g., Maleug and Yates, 2009), which seeks to identify conditions conducive to the exercise of market power in single-output industries. This work is in progress.

Summary of findings

Description of methods used by Compass Lexicon

The CL report finds: (1) that the evidence that was collected and analyzed does not support the conclusion that market power is currently being exercised in the NE groundfish fishery; and (2)

recommends setting an excessive share cap on the PSC conferred to permit owners at 15.5% of available PSC. It will be convenient hereafter to refer to the item (1) as the *conclusion* and item (2) as the *recommendation*.

The above conclusion and recommendation are based on the application of a seven step procedure: (1) assess quota ownership information; (2) assess competitive information; (3) check threshold condition; (4) establish concentration targets; (5) determine share limit-market concentration relationship; (6) identify regulatory and practical constraints; and (7) recommend excessive share cap.

Two types of data were analyzed by CL in application of the seven-step process. Qualitative data was collected during a series of unstructured and voluntary inter-views with fishery stakeholders, including industry members and representatives, government representatives and nongovernmental organizations. Second, CL researchers analyzed PSC ownership data that were provided to them by the NMFS. Methods used to collect and analyze the qualitative data and analyze the PSC ownership data are discussed next.

Qualitative interview data collection and analysis

The CL report indicates that it "received input from about 50 individuals [interviewees]" in total. These individuals include managers of six groundfish sectors, fishing vessel captains, industry representatives and other individuals connected to the fishery (see page 4-5 of the CL report). CL also solicited information "through survey forms and a public webinar that was hosted by NEFMC." An invitation to participate in the webinar was posted on the NEFMC website and an email invitation was sent to 800 individuals. This latter report produced "about a dozen survey responses." Given a respondent pool in excess of 800, the response rate to the survey was less than 1.5%.

The CL report states that CL personnel "reviewed transcripts and summaries of public meetings including scoping hearings on Amendment 18, NMFS reports on the fishery and annual reports prepared by sectors and state-operated permit banks."

It should be emphasized that the CL report states only that interviews were con-ducted. It does not indicate whether a formal sampling procedure was followed. The report does not report the survey questions that were asked of interviewees nor does CL report the actual responses or provide transcripts of interviews that were conducted.

PSC ownership analysis

The CL report indicates CL personnel received and reviewed "data covering landings, catch and allowable catch for species and stock area by permit from fishing seasons 2010 through 2012, along with groupings of permits based on ownership information." The CL report states that CL personnel "also examined ex-vessel prices, and data on quantities of imported" fish and fish products available from the NMFS website" and obtained data "from NOAA on fishery product imports and exports (page 6)."

CL calculate and report HHI indices and the number of entities owning PSC at various levels of aggregation, e.g., across individual species, and at the sector level.

Strengths and weaknesses of the Compass Lexicon proposal

Strengths

The main strength of the CL methodology is simplicity and ease of implementation. HHI indices are easily calculated using spreadsheet software. The HHI can be understood by people who have a modest mathematical background. Implementing an ownership cap policy based on a 15.5% share cap by species would likely present a relatively small administrative burden for regulatory agencies responsible for implementing the policy.

Weaknesses

The CL conclusion and ownership cap recommendation has several weaknesses. Overall, the methods used by CL to obtain their results do not meet standards for research in the social sciences.

The conclusion and recommendation appear to be based on casual observation of a very small and likely unrepresentative sample of industry stakeholders, and incorrect use of HHI indices. No theoretical justification is offered in support of the methods used.

Evaluation of Compass Lexicon methodology

Using qualitative information to find evidence of market power

The CL methodology relies heavily on unstructured qualitative information about current conditions and potential for market power in the NEMS fishery. Methods used to collect the qualitative information do not meet standards for conducting social science research. For example, CL claims that 50 interviews were conducted and that results from these interviews support particular conclusions regarding cur-rent market power. The report does not list questions that were posed or answers received. Importantly, the CL methodology does not explicitly link interviewer responses (because none are reported) to the specific conclusions that they make in their analysis.

There are well established and accepted techniques that can be used to gather information through surveys and personal interviews. There are also numerous complications that can bias information gathered (see Tourangeau, Rips and Rasinski, 2000).

It is apparent that CL interviewed a non-random sample of individuals who agreed to speak with CL. The method of eliciting voluntary feedback may be necessary for collecting qualitative information. The small sample size raises questions about the representativeness of the feedback that was gathered by CL. Moreover, CL personnel then summarized the unstructured feedback using a procedure that is not documented in their report. It is conceivable that their effort to collect qualitative information produces subjective opinions of a small and non-representative sample of stakeholders. Furthermore since conclusions from the qualitative data require subjective interpretation by CL personnel, the entire qualitative data collection e ort and analysis should be interpreted cautiously. There is no way to verify or refute findings based on qualitative data.

The CL report states that additional data sources, e.g., transcripts and summaries of public meetings, including scoping hearings on Amendment 18, NMFS reports on the fishery and annual reports prepared by sectors and state-operated permit banks, were consulted. However, there is no

discussion of the contents of this additional material in the CL report.

In the summary of findings obtained in the interview process CL states, “stakeholders also provided highly similar descriptions across different sources for several of the key factual matters for our analysis, including: a) the methods used for trading ACE, b) whether there have been observed instances of withholding of ACE or fishing effort in order to raise prices, c) how much variation in the fishery performance occurs across seasons, d) who effectively controls ACE within the sectors, and e) how well (or poorly) participants are able to predict which stocks will be in short supply during a fishing year." (page 5). CL report authors state “our data analysis conformed with the qualitative information we received from stakeholders…" (page 5). This is again a subjective interpretation that is difficult to verify or refute.

The standard for conducting scientific research is that the study methods be de-scribed in sufficient detail to allow an independent researcher to replicate and verify the results. The CL report is not a scientific research study. However, it should provide enough detail for the reader to understand the basis on which each conclusion is drawn. This was not done.

Interpretation of HHI indices for making inference on market power

The conclusion and recommendation of the CL report appears to rely almost entirely on the premise that HHI's below 1,500 are sufficient for a competitive market outcome and are therefore safe. The CL report miss-interprets the implications of the HHI index and the role of threshold values reported in the US Department of Justice Horizontal Merge Guidelines. The guidelines suggest that HHI values below 1,500 are consistent with an industry that is not concentrated, that values between 1,500-2,500 are consistent with an industry that is moderately concentrated, and values exceeding 2,500 are consistent with an industry that is highly concentrated. The HHI measures concentration. It is a tool that is used to identify mergers that could ultimately result in non-competitive market outcomes. Page 19 of the guideline states:

> *The purpose of these thresholds is not to provide a rigid screen to separate competitively benign mergers from anticompetitive ones, although high levels of con-centration do raise concerns. Rather, they provide one way to identify some mergers unlikely to raise competitive concerns and some others for which it is particularly important to examine whether other competitive factors conform, reinforce, or counteract the potentially harmful effects of increased concentration. The higher the post-merger HHI and the increase in the HHI, the greater are the Agencies potential competitive concerns and the greater is the likelihood that the Agencies will request additional information to conduct their analysis.*

As suggested in the above, the HHI index is neither necessary nor sufficient for anti- competitive behavior in a market. It is an easily calculated index that serves as an early warning system. It can signal the need for further investigation to determine if a merger will, in fact, result in anti-competitive behavior.

This is important because the CL recommendation of a 15.5% ownership cap on PSC ownership is derived from the HHI threshold value of 1,500, i.e., the lower bound value for a moderately concentrated industry. Page 44 of the CL report explains that, “When there is no competitive fringe, a cap of about 15.5 percent would be required to prevent the HHI from exceeding 1,500." There is no theoretical basis and no compelling argument provided in the CL report to support this rule. More importantly, there is no theoretical foundation or compelling argument offered by the CL report to indicate that this particular threshold of 15.5% is capable of preventing market power in a multiple-species fishery that is managed with a system of sectors, PSC, ACE, etc.

In sum, the methods used by the CL report for determining whether market power exists currently, and for the recommendation of a 15.5% ownership cap are not defensible.

Unit of regulation

CL recommends “setting an excessive share cap on the PSC conferred to permit owner at 15.5 % of available PSC." The unit of regulation is taken to be an individual entity. A unique feature of the NE ground fish fishery is that it is managed with a system of sectors, wherein multiple PSC owners participate in a form of a coop. Sector members may share resources and perhaps work collectively to achieve common goals. They employ a sector manager whose function includes, among other services, coordination of PSC and ACE trades within and across sections (Labaree, 2012).6 The fishery also includes organizations referred to as *permit banks*, whose purpose was described as one of controlling PSC so that is can encourage harvesting by particular groups of fishermen, e.g., fishermen from a particular state or fishermen who are new to the industry. Market power stems from the perception or realization of an economic agent that their production decisions in either the output or the factor input market are significant enough to have an influence on equilibrium prices. Sectors appear to have the means to control large quantities of PSC and ACE. Under the CL recommendation of a 15.5% cap at the individual level, it would be easy for a single sector's participants to own 100% of PSC and ACE.

The CL report does discuss (page 29) the possibility of sectors exercising market power. However, the report dismisses the possibility based on feedback obtained in the unstructured interview process. The report states “However, discussions with sector managers and others indicate, without exception, that sectors do *not*, in fact, operate to maximize the joint value of ACE allocated to the sector." The CL report offers additional arguments to support this claim. However, CL's conclusion that sectors do not and will not exercise market power is based on interviewee feedback. It seems highly unlikely that evidence of participation in criminal activity will be revealed through voluntary interviews. Furthermore, the behavior of sectors currently is not a perfect predictor of future behavior. For example, Labaree (2012) states, “Finally, sector members may find benefit from planning their

6 Labaree, 2012 reports, “The sector manager’s job varies from sector to sector, but has three basic components: tracking and reporting the sector’s landings, discards, and trades on a weekly basis; keeping track of the internal division or allocation and catch; and overseeing the trade of allocation with other sectors. Some managers take on additional duties, such as overseeing the sector’s finances. Some sectors have subcontracted the tracking and reporting task to a third party. In all cases, the sector manager is hired by and reports to the sector’s board of directors.”

activities around their sector's total allocation rather than treating each member's allocation as an individual quota." In contrast to the CL interpretation of sector function, other researchers have explicitly noted the potential for sectors to operate in a way that maximizes the collective profits of its members. Finally, current laws allow sectors to undergo various bargaining and marketing activities with the goal of increasing member prof-its (see Sullivan et al., 2012 for a complete discussion of sector relevant antitrust law).

The above paragraph should not be interpreted as a suggestion that sectors are currently or will in the future exercise market power. The point being made is that the CL report does not provide sufficient evidence to dismiss the possibility that market power does or could exist at the sector and permit bank level.

Economies of scale, size and scope

The historical development of the NEMS fishery has followed a path seen in many other fisheries. Commercial fishing typically begins under open access regulation. Input control regulation was then adopted, followed by the current system of output control or quota- based management. Input control regulation in the NE ground fish fishery took the form of constraints on the number of days that vessels can be at sea, restrictions on the type of gear that can be used, closed areas, and limits on the quantity of fish that can be caught on each fishing trip. These regulations effectively limit the quantity of fish that can be harvested by a vessel during each fishing season. The regulations result in dis-economies of size, i.e., the average cost per unit of harvest would fall if a vessel operator could increase his/her seasonal harvest quantity. There is published evidence (although somewhat dated) that suggests input control regulations have led to a build-up of fleet harvesting capacity that exceeds current aggregate harvest limits (Waldon and Kirkley, 2000).

Economic theory and empirical evidence con form that rights-based management approaches provide incentives to re-align fleet harvesting capacity with aggregate harvests (e.g., Grafton et al., 2000; Matulich, et al., 1996; Singh et al., 2006). The fleet rationalization process (shedding of excess vessel, and in some cases, processing capacity) can be delayed (Weninger, 1996, 1998). What is not clear is the extent to which the fleet rationalization process has played out in the NEMS fishery since output control management began in 2010.

Testimony from a sector representative, Maggie Raymond, during the June 12, 2014 public comment period suggested that industry members have been in a PSC consolidation *holding pattern* due to the uncertainty surrounding the pending ownership cap regulation that is currently being crafted by the NEFMC. If this characterization is accurate, it is possible (likely) that additional and substantial fleet rationalization and concentration of PSC ownership will occur in the NEMS fishery (depending, of course, on the particular ownership cap regulation that is adopted). It is reasonable to suspect that the motive for further rationalization is exploitation of unrealized economies of size, scale and scope. Because an ownership cap policy would prevent the realization of such economies, it is important to determine the extent to which scale, size and scope economies currently exist.

The CL report claims that there is a “lack of evidence for scale economies continuing to occur for

individual owners above 10 to 12 percent of a stocks ACE..." CL personnel further suggest that the adoption of a 15.5% ownership cap will not interfere with the industries' ability to exploit economics of scale. CL personnel have apparently made this determination based on discussions with interviewees. This is not a valid method for testing for and measuring economies of scale, size or scope. Further, the statement on page 42 which states, “The existence of some larger fleets indicate there are opportunities for economies of scale within the Northeast Multi-species Fishery or at least that efficiency concerns do not preclude larger fleets", is not informative about current or potential scale economies in the NEMS fishery.

Accepted econometric-based methods can and should be used to test for and mea-sure scale economies (e.g., Weninger, 1998). CL does not employ these methods and therefore has no basis for claiming that a 15.5% ownership cap will not impede such economies from being realized.

Theoretical and empirical basis for setting ownership caps in quota- managed fisheries

Anderson (1991, 2008) and Anderson and Holliday (2007) offer a theoretical foundation to establish ownership caps in quota-managed fisheries. While there are differences between the setting studied by Anderson and the NEMS fishery, his work offers theoretical context for assessing market power in quota-managed industries. As correctly noted in the CL report, market power may arise in the consumer or ex-vessel market for fish and/or in the market for harvesting permits. An agent who attempts to exert market power does so with the goal of increasing his/her private profits. There are conditions which must hold in a quota-constrained market for such price manipulation to be pro table. In particular, it may be possible to raise ex-vessel prices by holding back fishing permits from the permit market thus reducing industry-wide harvest. This strategy can raise private profit for the agent only if the demand for fish is sufficiently inelastic (see Anderson, 2008). The CL report attempts to infer this elasticity by discussing the relevant markets for NE ground fish. CL does not measure demand elasticities, nor do they consult existing literature that sheds light on the magnitude of ground fish demand elasticities (see for example Lee and Thunberg, 2013). The approach used by CL - to base inferences about demand elasticity from qualitative data obtained in unstructured interviews - does not meet standards for scientific research.

The theoretical foundation for manipulating markets for harvesting permits, either PSC or ACE, in multiple-product is complicated.7 The statement in the CL report on page 35 that “There is no entity operating in the fishery that would be at all likely to succeed a successfully raising the price of ACE by withholding it from other in the fishery" is not supported with evidence.

As stated earlier, market power inefficiencies can arise when economic agents' production decisions impact equilibrium market prices. The inefficiency arises because agents forego trades that are otherwise welfare improving, in order to maintain favor-able prices and increase private profits. In the context of the NEMS fishery, an agent may choose to trade less or more PSC or ACE to manipulate trading prices in their favor. It is important to realize that if aggregate harvest quotas bind, one agent's purchase (sale) of a harvesting permit necessarily implies a reduction (increase) in permits

7 I am unaware of any literature that outlines the conditions for exercising market power in multi-product quota-managed industries.

held by some other agent or agents. In this setting, it is hard to imagine a case where prices are not affected by the redistribution of PSC and ACE among industry members. Permit trading and price changes do not by any means imply inefficiency. In a multiple-product, quota-managed industry, efficiency is characterized by an equal marginal principle; harvesting is cost efficient if the distribution of permits across active and non-active fishermen (potential entrants) is such that the marginal cost of harvesting an additional unit of fish is equal across all permit holders and across all species. Determining if this condition is met requires detailed information about the structure of the multi-species harvesting cost technology. CL does not have this information, and therefore has no basis to make claims one way or the other regarding market power in the PSC or ACE market.

"Choke species" in multiple-species fisheries: implications for market power

The CL report (executive summary) states: "The need to have ACE for each species caught and the likely need for some fishermen to have to buy ACE to cover the fish they will actually harvest presents additional opportunities for large holders of ACE to exercise market power in the markets for ACE. In particular, imbalances between ACE holdings and availability of species sometimes create a situation in which a species has a low catch limit and may not be itself commercially viable for harvest, but cannot be avoided by fishermen harvesting other species (what some in the fishery call "choke stocks"). A large holder of ACE for a choke stock could potentially engage in the exercise of market power in either the output market for fish or in the markets for ACE trading."

This statement is overly simplistic and has potential to mischaracterize fishing behavior and market outcomes in a multi-species fishery.[8] First, no formal definition of a "choke stock" is provided. In a multiple-species fishery, the marginal profit from harvesting one more unit of a particular species stock, given the array of other species being harvested, can be high. The equilibrium quota price for this species will be equal to the marginal profit and therefore the quota price will be high.

Under weak output disposability technologies, the cost of harvesting a particular mix of species can actually fall if the quantity of some species in the mix is increased. The reason this occurs can be understood with a simple example. Consider a fishery that harvests two species, A and B. Suppose the two species stocks are roughly equal in size or abundance within the geographic boundary of the fishery. Suppose also that species A and B fish co-habitat in the marine environment and are both susceptible to the fisherman's gear. The fisherman can affect the mix of species caught by adjusting fishing practices (e.g., fishing at different locations and times of the day or year, using different baits or gear). Finally, suppose the fishery manager sets equal aggregate catch limits for species A and B.

Next, consider a fisherman who has allocated equal amounts of PSC for the two species. Following the NEMS fishery regulatory structure, the fisherman will also hold equal amounts of ACE. Harvesting the ACE will likely require few, if any, *targeting* efforts or activities. The fisherman can drag his net through the water anywhere within the fishing grounds whenever he chooses and, on average across the fishing season, catch a mix of species that matches his ACE holdings.

8 Boyce (1996), Singh and Weninger (2009) characterize harvesting/targeting behavior and quota price determination in multiple-species, quota-managed fisheries under joint- in-inputs and weak-output-disposability harvest technologies

Suppose the next season the manager decides to reduce the aggregate catch limit for species A dramatically, say by 75%. Nothing else changes from the example above. In this scenario, the fisherman's ACE holding no longer matches the mix of stocks intercepted by his gear, unless costly steps are taken to avoid species A and/or *target* species B. In order to harvest a mix that matches ACE holdings, which are now 1 unit of species A for each three units of species B, the fisherman may have to fish only in certain locations and/or at certain times of the day or year. He may have to pull his net from the water more often to make sure he is not catching too much species A fish. He may have to move to a new location often to obtain the 1:3 mix of species A to B that is required by the regulation. Because *avoiding* species A is costly, the fisherman will likely want to buy more of the species A ACE. Doing so allows him to undertake fewer costly avoidance measures, and this cost saving will be reflected in the trading price for ACE. Alternatively, if avoiding species A is too costly given harvests of the other species, ex- vessel prices for species A and B and the stock conditions in the fishery, a profit maximizing fisherman may choose to leave some of his species B ACE unfished (this may describe the current situation in the NEMS fishery).

Several important insights emerge from the example above. First, the mix of species harvested by the fisherman is an endogenous choice that is determined by technology, market prices and ecological conditions. The marginal profit associated with a particular species, and thus the equilibrium permit price, depends on the full array of prices, stocks and cost complementarities embedded in the harvesting technology. Third, fishermen will have a derived demand for PSC and ACE that depends on all prices, total allowable catches, stock conditions and technological constraints. Most importantly, the conditions under which an agent can exercise market power in PSC and ACE markets are not well understood.

There is no theoretical or empirical basis for the assertions made by CL regarding market power in the ACE market. There is no basis for focusing only on low catch limit species in an investigation of market power. Use of the term “choke stocks" should be avoided unless a formal definition of the term is provided, and unless a complete and rigorous characterization of its role in multiple-species quota-managed fisheries is provided.

Data requirements

The CL recommendation of imposing a 15.5% ownership catch limit requires that a record be kept on ownership of PSC. It is my understanding that this is currently done by the NMFS, and therefore no additional data would be required if the CL recommendation is adopted.

Recommendations for further improvement

The CL conclusions regarding market power currently in the NE ground fish fishery, and the recommendation of a 15.5% ownership cap appears to be based on a subjective interpretation of a small and likely non-representative sample of feedback from industry stakeholders (i.e., opinions and anecdotes). The report would be improved if an analysis of market power in the NEMS fishery were based on accepted methods from the field of economics.

Conclusions and recommendations

The methods used by CL to obtain conclusions regarding market power in the New England ground fish fishery do not meet standards of economic research. Designing an ownership cap policy in the Northeast multiple-species fishery based on the CL conclusion and recommendation is not advised. National Standard 2 of the Magnuson- Stevens Fisheries Management and Conservation Act which requires, "Conservation and management measures shall be based upon the best scientific information available."

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Appendix A

Recommendations for Excessive-Share Limits in the Northeast Multispecies Fishery

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December 31, 2013

About Compass Lexecon

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Executive Summary

A. Assignment

The New England Fisheries Management Council ("NEFMC") has asked us to provide independent advice regarding the establishment of caps on holdings of access privileges to the Northeast Multispecies Fishery, in order to prevent the accumulation of excessive shares or the further increase of excessive shares if they already exist. We define an excessive share to be a share of access rights that would allow a permit owner or sector to influence to its advantage the prices of the fishery's output or the prices paid for leased Annual Catch Entitlements ("ACE").

For our analysis, we relied upon theoretical work cited below, quantitative fishery data provided by the National Marine Fisheries Service ("NMFS") and other sources, and qualitative information gleaned from minutes of public meetings, articles, and our own survey and interviews with fishery stakeholders. Our work here has been guided, in part, by a general framework developed for a similar analysis we conducted for the Surfclam and Ocean Quahog Fishery in 2011[1], captured in the following seven steps: 1) assess quota ownership information, 2) assess competitive information, 3) check threshold condition, 4) establish concentration target(s), 5) determine relationship between share limit and market concentration, 6) identify regulatory and practical constraints, 7) recommend an excessive-share cap.

B. Northeast Multispecies Fishery

The Northeast Multispecies Fishery, commonly referred to as the groundfish fishery, covers the Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic Bight and includes thirteen species of groundfish.[2]

Prior to May 2010, the groundfish fishery was regulated through input controls, such as trip limits, days-at-sea, gear restriction, and area closures. With the implementation in 2010 of Amendment 16 to the Northeast Multispecies Fishery Management Plan ("FMP"), the fishery is now regulated using output controls based on annual catch limits ("ACLs") and sectors to directly manage catch levels.[3]

The allocation of the ACL is administered through sectors, which are contractually related groups of permit owners. Each permit owner (each owner of a vessel

[1] Mitchell, G., Peterson, S., and Willig, R. "Recommendations for Excessive Share Limits in the Surfclam and Ocean Quahog Fisheries," May 3, 2011; Compass Lexecon, Boston.

[2] Tammy Murphy, *et al.*, "2011 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2011-April 2012)," U.S. Department of Commerce, December 2012, (hereinafter "2011 Final Report") p. 1

[3] Amendment 16.

that has a permit to operate in the groundfish fishery) is provided with potential sector contribution ("PSC"), or share of ACL. Permit owners holding the vast majority of access rights have elected to affiliate with a sector. ACE is allocated to sectors based on the combined PSC of the sector members for each stock. Generally, sectors retain a percentage of their ACE as a reserve and allocate the unreserved ACE back to sector members in proportion to the PSC each contributed to the sector.

ACE may be traded within a sector or across sectors for cash or by trading ACE for ACE or "fish for fish." The competitive price of a species' ACE reflects the actual scarcity of its available ACE relative to the availability of that species, as well as, in some circumstances, the value allowing for bycatch of the species during harvesting of other species.

C. Market Power and Competition

The ability to manipulate market outcomes to one's advantage based on the share of PSC or ACE in the groundfish fishery would be a typical example of what economists call market power. In markets that are not competitive, some sellers may find that as their output increases the prices they receive fall, in which case they have an incentive to unilaterally reduce output. With reduced output due to the exercise of market power, the operation of the market leaves gains from trade unrealized. In a multispecies fishery, it may also be possible to exercise market power in the markets for the fishing privileges of individual stocks, such as the lease market for ACE.

In markets generally, potential for expanded output (either from existing competitors or from new entrants) can be a constraint on the exercise of market power. The market for fishery access rights is somewhat different. In the fishery, regulators set the allowable catch or the supply of ACE for each stock – there can be no entry or expansion into the market for ACE to replace the withheld ACE.

The groundfish fishery is regulated, in part, with output caps on each regulated species, further delineated in some cases to a specific "stock" (a species in a particular geographic region within the fishery). The need to have ACE for each species caught and the likely need for some fishermen to have to buy ACE to cover the fish they will actually harvest presents additional opportunities for large holders of ACE to exercise market power in the markets for ACE. In particular, imbalances between ACE holdings and availability of species sometimes create a situation in which a species has a low catch limit and may not be itself commercially viable for harvest, but cannot be avoided by fishermen harvesting other species (what some in the fishery call "choke stocks"). A large holder of ACE for a choke stock could potentially engage in the exercise of market power in either the output market for fish or in the markets for ACE trading. This would be inconsistent with the principles of fairness embodied in National Standard 4, and could affect investment in new vessels and gear that would ultimately be to the detriment of the long-term efficiency of the fishery.

The regulation of market power requires a trade-off between potentially increasing efficiency by controlling market power and potentially reducing efficiency by over-regulating market transactions. In the groundfish fishery, overly restrictive caps could limit the growth of efficient firms when there is no material threat of the exercise of market power. Furthermore, conditions in the fisheries have changed over time and will change in the future. If the level of the cap is not revisited periodically, the potential for the excessive-share cap to become an inefficient means to limit the exercise of market power grows.

The U.S. Department of Justice and the Federal Trade Commission ("Agencies") share responsibility in the United States for determining if a proposed merger is likely to harm competition. The *Horizontal Merger Guidelines* describes the methods the Agencies use to evaluate the competitive impact of proposed mergers, explains the determination of sets of products or services that constitute relevant markets, and describes market concentration thresholds and other considerations that, if satisfied, would indicate that a merger is unlikely to create market power. A standard measure of the level of concentration is the Herfindahl-Hirschman Index, or HHI.[4] Markets with HHIs below 1500 are considered *unconcentrated*; markets with HHIs between 1500 and 2500 are considered *moderately concentrated*; and markets with HHIs greater than 2500 are considered *highly concentrated*.[5]

With respect to the output from the fishery, there is some evidence of competition from sources outside the fishery and across species within the fishery. However, industry participants suggest that there can be some types of fish (such as locally sourced fresh fish) and pockets of time (or locations) where substitution has been limited. While it may generally be true that the relevant market for groundfish includes substantial quantities from outside the fishery, we have not ruled out the possibility that smaller relevant markets exist for some species at some times. Therefore, we conservatively measure concentration annually from 2010 to 2012 by species, based on landings by permit, grouped together by common permit owners in our analysis of markets for fish, or output markets.

Among the allocated species, landings in the fishery have generally been *unconcentrated*. For example, landings for cod have consistently been the least concentrated species, with HHI ranging from 188 to 280. Only winter flounder has had landings in the *moderately concentrated* range, with HHI of 1,680 in 2011 and 1,600 in 2012. We do not observe a clear time trend in concentration – two species have consistently increasing concentration, one species has consistently decreasing

[4] The HHI is equal to the sum of the squared market shares of the participants in the market. Thus, if there are three firms with shares of 50 percent, 30 percent, and 20 percent, the HHI is equal to 3800 ($3800 = 50^2 + 30^2 + 20^2 = 2500 + 900 + 400 = 3800$).

[5] See U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, August 19, 2010, p. 19.

concentration, and six have stayed the same or moved up and down from year to year. Concentration for landings would be considerably higher if measured by sector, rather than permit ownership. In theory, a sector able to exert long-term control over ACE could provide opportunities for sector members to exercise market power. As an empirical matter, however, the current institutional structure grants sectors no practical ability to control the behavior of market participants, and thus sectors cannot exercise market power.

With respect to markets for ACE, there are no substitutes outside the fishery (nor is there any potential for entry). We also measure ACE concentration that flows from entities ownership of permits and the PSC the permits confer annually from 2010 to 2012 by species and stock. Among the nine species with ACE data, ACE holdings in the fishery have been *unconcentrated*, every year for every species. In fact, ACE species-level HHIs never exceeded 700 and concentration is roughly similar for individual stocks. Again we observe no time trend in concentration – one species had consistently increasing concentration, three species had consistently decreasing concentration, and five have stayed the same or moved up and down from year to year.

Also, there has been substantial underutilization of allowable catch for many species with ACE data, especially in 2012. Haddock landings, for example, accounted for just 21 percent of ACE in 2010 and dropped further to just 4 percent in 2012. Cod landings were over 80 percent of ACE in 2010 and 2011, but dropped under 45 percent in 2012.

D. Conclusions

The evidence we analyzed does not support a conclusion that market power is currently being exercised through the withholding of ACE in any part of the groundfish fishery, nor is there evidence of market power in the sales of fish or transfers of permits.

Our step-by-step analysis of an excessive-share cap concludes:

1. *Assess quota ownership information:* NMFS has sufficient information on permit ownership to implement an excessive-share cap based on groups of permits with common ownership. However, this grouping of permits does not reliably indicate the entity that controls a particular permit, which is the economically relevant owner. Use of the broad measure of common ownership NMFS currently tracks could lead to unfair application of an excessive-share rule and to economic inefficiencies. We also note that the NMFS would need to have information on long-term (multiple-season) lease transactions, unless such transactions remain prohibited.

2. *Assess competitive information:* There is sufficient competitive information to proceed with the determination of an excessive-share cap. While we find some evidence of competition from outside the fishery for the output of the fishery, and across species within the fishery, we leave the question of

relevant market for groundfish open. This is because any excessive-share cap addressing ACE trading should be sufficient to also prevent market power in the output market, even if the market for some species is limited to the fishery. For ACE trading, the relevant market is the ACE for a stock in the fishery, and there are no competitive substitutes.

3. *Check threshold condition:* When output regulation limits harvest to below the level that a monopoly supplier would produce, there is no opportunity for market power to be enhanced by accumulating shares. If this condition were to apply, then it would not be necessary to set an excessive-share cap, and the analysis could end right here. With the groundfish fishery, however, each of the output limits is well above the quantity that a monopolist would produce for each regulated category of groundfish. Thus, it is necessary to continue on to the next step of the analysis.

4. *Establish concentration targets:* Due to the variety of institutional and competitive constraints preventing participants from accumulating market power through temporary (single-season) leasing of access rights, there is no need for consideration of an excessive-share cap related to landings. It is reasonable, however, for the NEFMC to attempt to maintain *unconcentrated* ACE distribution by species and by "stock," which means aiming to keep the HHI below approximately 1,500 for each stock. As discussed below, this target can be achieved without interfering with economies of scale.

5. *Determine share limit-market concentration relationship:* The relationship between ownership shares of PSC or ACE and market concentration can vary depending on the distribution of ownership shares. An important competitive condition for ACE trading is whether there is a substantial supply of ACE from numerous suppliers that hold very small shares (what economists call a "competitive fringe" of suppliers with small single-digit shares). For species with a large number of PSC-holders with small shares (*i.e.*, a large competitive fringe), maintaining ACE distribution at an *unconcentrated* level can be achieved with a high share cap. For example, a competitive fringe of 38 percent (*i.e.* at least 38 percent of ACE is allocated to many permit owners that hold at most 1 or 2 percent share) means that a share cap of 25 percent would prevent an HHI in excess of 1500. Without a competitive fringe, however, a share cap of 15.5 percent would be necessary.

6. *Identify regulatory and practical constraints:* Without information about who has controlling ownership for permits with multiple owners, regulators may not always be able to identify the economically relevant owner of each set of shares, and this could impede successful implementation of an efficient excessive-share cap. However, gathering information required to determine beneficial ownership for every PSC allocation could be prohibitively costly and unnecessarily intrusive and there appears to be sufficient information to make a "two-stage" procedure practical. We recommend using the grouping

of permits by common ownership (without determination of beneficial ownership) as an initial threshold requirement – "provisionally" blocking any transfer resulting in an excessive share for a group of permits under some common ownership. In order to avoid erroneously blocking some harmless transactions involving permits that happen to have some overlapping owners, we recommend providing an optional follow-up process that would allow permit holders of a "provisionally" blocked transaction to submit detailed ownership information sufficient to determine who has controlling interest in each permit. If this additional information shows that each controlling ownership share is below the excessive-share cap then the transaction would be allowed.

7. *Recommend an excessive shares cap:* Given the lack of evidence for scale economies continuing to occur for individual owners above 10 to 12 percent of a stock's ACE, we recommend setting an excessive-share cap on the PSC conferred to permit owner at 15.5 percent of available PSC. We cannot envision any reasonably likely circumstances, however, under which a lower cap would be necessary to prevent excessive shares of fishing access privileges.

We do not find any evidence that an excessive-share cap is an effective means to achieve progress promoting diversity, enhancing sector management, or encouraging diversification. Any excessive-share cap attempting to meet those goals would also sacrifice the efficiency benefits that motivated the adoption of PSC allocation and ACE trading rules. Instead, we note that the PSC allocation and ACE trading can co-exist with other regulations, and that NEFMC should address other goals through these other regulations.

I. Introduction

A. Statement of Work and Terms of Reference

Amendment 16 of the Northeast Multispecies Fishery Management Plan ("FMP") transformed the regulation of the Northeast Multispecies Fishery. Rather than using input controls, the fishery is now primarily regulated using annual catch limits ("ACLs") for each regulated stock. A share of each stock's ACL is granted to organizations of permit holders known as sectors, which further manage the fishing access privileges and allocate them to their members. Amendment 18, which is under development, may implement into this regulatory arrangement additional criteria to address a number of goals, including fishery diversity and preventing excessive accumulation of fishery access privileges.

The New England Fishery Management Council ("NEFMC") has identified four goals of Amendment 18:

1. *"Promote a diverse groundfish fishery, including different gear types, vessel sizes, ownership patterns, geographic locations, and levels of participation through sectors and permit banks;*
2. *"Enhance sector management to effectively engage industry to achieve management goals and improve data quality;*
3. *"Promote resilience and stability of fishing businesses by encouraging diversification, quota utilization and capital investment; and*
4. *"To prevent any individual(s), corporation(s), or other entity(ies) from acquiring or controlling excessive shares of the fishery access privileges."*

The NEFMC has asked us to provide independent advice regarding appropriate accumulation limits that may prevent excessive shares or the further increase of excessive shares if they already exist.

There is no standard economic definition of "excessive shares." However, the fishery management plan must comply with National Standard 4 of the Magnuson-Stevens Fishery Conservation and Management Act. The National Standard 4 Guidelines state:

> An allocation scheme must be designed to deter any person or other entity from acquiring an excessive share of fishing privileges, and to

avoid creating conditions fostering inordinate control, by buyers or sellers, that would not otherwise exist.[6]

From a broad economic perspective regarding what could constitute "inordinate control," we define an excessive share to be a share of access rights that would allow a permit owner or sector to influence to its advantage the prices of the fishery's output, the prices paid for leased Annual Catch Entitlements ("ACE"), or prices paid for permits. Such influence may disadvantage other holders of fishery access rights relative to prices that would otherwise result. The ability to manipulate prices to one's advantage based on the share of participation in a market is a typical example of what economists call market power.

The NEFMC provided the following Terms of Reference to guide the project:

1. Describe a theoretically sound method to specify the maximum possible allowable percentage share of the market for the fishery access privileges (permits, PSC) and/or the quota leasing (ACE trading) that would prevent an entity from obtaining an excessive share of the access privileges allocated under the Northeast Multispecies Fishery. Use the Herfindahl-Hirschman Index prescribed within the "US Department of Justice Horizontal Merger Guidelines" or other accepted rule as appropriate.
2. Apply the process or rule developed under Number 1 to determine if excessive shares already exist in this fishery. If excessive shares do not exist today, describe potential constraints that could prevent excessive shares from existing in the future. Alternatively, if excessive shares do exist, describe a process or rule that will allow for a theoretically sound procedure to prevent future increase.
3. If the rule cannot be applied because of incomplete data, provide suggestions of how to apply the rule in the best way possible that is consistent with the theoretical underpinnings of the rule. Also, identify data that would be necessary to apply the rule.
4. Identify conditions where entities, could exert "inordinate control" of quota as outlined in the National Standard 4 Guidelines. Such entities could include business entities holding permits, sectors, or organizations of sectors.
5. Alternate approaches to achieving the Amendment 18 goals (other than accumulation caps) may be proposed.

[6] National Marine Fisheries Service, 2009. NMFS National Standards Guidelines. 50 CFR 600310 et seq.

B. Research Methods

Our analysis here is based on economic principles and analysis of the data available on ownership and control of fishing rights and the functioning of markets for ACE and for fish. Economic analysis incorporates economic theory as well as empirical analysis of data. Economic empirical analysis is conducted on quantitative data, often with some statistical analysis, but is also supplemented by qualitative information relevant to the economic issues and markets under consideration. Qualitative information is useful for determining the proper focus of the more detailed analysis of data.

We focus our analysis of accumulation limits on the determination of levels of shares that may allow permit holders to influence market outcomes, such as prices and the quantity of a stock harvested, while also accounting for other efficiency-related issues, such as potential economies of scale. Thus, our work addresses the potential for large owners of access rights to influence markets, which could raise the price of fish above competitive levels or transfer wealth among participants in the fishery.

We (along with Robert Willig) previously conducted a similar analysis for the National Marine Fishery Service ("NMFS") and the Mid-Atlantic Fishery Management Council regarding accumulation limits for Surfclams and Ocean Quahogs, culminating in a published report similar to this one ("SCOQ Report").[7] Although many details of the Surfclam and Ocean Quahog Fishery are substantially different from the Northeast Multispecies Fishery, our work here has been guided, in part, by a general framework developed for the SCOQ Report. As is the case here, that analysis followed the general approach used by economists and that is described in the *Horizontal Merger Guidelines* published by the Department of Justice and the Federal Trade Commission. The peer-review panel for the SCOQ Report determined that this general framework was an appropriate approach to use for analyzing excessive-share limits for catch share fisheries. It is represented by the following seven steps:

1. Assess quota ownership information;
2. Assess competitive information;
3. Check threshold condition for permit owners to influence markets;
4. Establish concentration target(s);
5. Determine relationship between share limit and market concentration;

[7] Mitchell, G., Peterson, S., and Willig, R. "Recommendations for Excessive Share Limits in the Surfclam and Ocean Quahog Fisheries," May 3, 2011; Compass Lexecon, Boston.

6. Identify regulatory and practical constraints

7. Set the excessive-share cap.

For the analysis here, we relied upon theoretical work cited below and quantitative fishery data obtained from the National Marine Fisheries Service ("NMFS") and import/export data obtained from the National Oceanic and Atmospheric Association ("NOAA"). We were also able to glean qualitative information from minutes of public meetings, articles, and our own survey and interviews with fishery stakeholders. Due in part to a federal shutdown during our research period that delayed the production of data, we conducted our quantitative analysis after collecting extensive qualitative information.

Qualitative information provides essential insights for the analysis of economic data. For example, interviews can help identify issues in need of specific economic analysis. For example, interviews may uncover opinions that certain markets are functioning well or functioning poorly, and can reveal issues where market participants generally agree (or generally disagree). This information can be substantiated (and disagreements reconciled) through economic analysis of the markets.

For the reasons described above, our research began with telephone and in-person interviews with a variety of fishery stakeholders, with particular focus on those able to provide insight into the operation of markets for permits, ACE, and fish. Interviews continued over the course of the project. Many were initiated by the stakeholders themselves, who contacted us to express their views. Others we initiated, to ensure that we had input from a diverse set of stakeholders.

In total, we received input from about 50 individuals. Interviewees included:

- Managers and presidents of at least six groundfish sectors based in Rhode Island, Massachusetts, New Hampshire, and Maine, and from within and outside the Northeast Fishery Sector network;

- Vessel captains and owners, including:

    - owner-operators and shore-based owners,

    - stakeholders operating in off-shore and in-shore areas, and

    - stakeholders owning both a small and large number of fishery access privileges;

- Representatives of the Northeast Seafood Coalition and Northeast Sector Services Network;

- Representatives of the Environmental Defense Fund;
- And other individuals connected to the fishery, such as community fishing supporters, academic researchers, fish processors, and fish auction operators.

We also solicited information more broadly through survey forms and a public webinar that was hosted by the NEFMC. The invitation to participate in the surveys and webinar were posted on the NEFMC website and distributed to over 800 people via email. These invitations encouraged people to call or email if they did not want to or could not participate in the surveys or webinar.

We received about a dozen survey responses (two through email and the rest on line). Four of the respondents identified themselves as vessel operators active in the fishery (with the rest split between sector managers, academics, other stakeholders and three respondents who did not identify their role related to the fishery). We presented initial findings and solicited feedback at a public NEFMC meeting with an on line "webinar" – there were 24 participants of the webinar, including five NEFMC staff, 3 NMFS staff, 11 industry members or representatives, four representatives of environmental or research non-profit organizations, and one state agency staff member.

In addition, we have reviewed transcripts and summaries of public meetings, including scoping hearings on Amendment 18, NMFS reports on the fishery, and annual reports prepared by sectors and state-operated permit banks.

We presented preliminary results of our analysis at a public meeting of NEFMC's Groundfish Oversight Committee. Feedback from Committee members informed the analysis performed and the conclusions below.

The various stakeholders we interviewed and met with represent a range of concerns and views as to the immediate problems facing the fishery and the appropriate regulation of the fishery. Economic analysis, however, is based on facts and data. Stakeholders expressed to us a variety of dissimilar opinions regarding policy matters. Importantly, however, stakeholders also provided highly similar descriptions across different sources for several of the key factual matters for our analysis – including: a) the methods used for trading ACE, b) whether there have been observed instances of withholding of ACE or fishing effort in order to raise prices, c) how much variation in fishery performance occurs across seasons, d) who effectively controls ACE within the sectors, and e) how well (or poorly) participants are able to predict which stocks will be in short supply during a fishing year. Thus, our data analysis conformed with the qualitative information we received from stakeholders, among whom we did not observe meaningful disagreement for issues relevant to our analysis.

After securing appropriate data access agreements, we received quantitative fishery data from NMFS via the NEFMC related to the groundfish fishery. This data covered landings, catch, and allowable catch for species and stock area by permit from fishing seasons 2010 through 2012, along with groupings of permits based on ownership information. We also examined ex-vessel prices, and data on quantities of imported fish and fish products available on the NMFS website. We also obtained data from NOAA on fishery product imports and exports.

The regulation under consideration in our analysis, excessive-share caps on fishery access privileges, addresses potential consolidation of the fishery, which has many potential social impacts. For example, consolidation may reduce the number of ports with active fleets, leading to social hardships associated with lost employment in the fishery and so forth. These issues are important, but are beyond the scope of our economic analysis of excessive-share caps. In addition, potential consolidation may have implications for economic efficiency, such as loss of efficiency due to market failure or gains in efficiency to due to cost reductions with increased scale.

II. Overview of the Northeast Multispecies Fishery

The Northeast Multispecies Fishery covers the Gulf of Maine, Georges Bank, Southern New England, and the Mid-Atlantic Bight. The fishery includes thirteen species of groundfish and is often referred to as the groundfish fishery.[8] In Fishing Year (FY[9]) 2011, landings of all species groundfish were over 61 million pounds. Revenues associated with groundfish landings were over $90 million.[10] Massachusetts ports account for the lion's share of the landings. Over $77 million of groundfish landings occurred in Massachusetts. Landings in Maine and New Hampshire totaled over $10 million. The remaining landings are spread across the other coastal New England and Mid-Atlantic states. In 2011, there were 1,421 limited access eligibilities. Of these, 1,279 were associated with vessels. As described below, this figure overestimates the number of independent entities with access privileges, because some entities own more than one

[8] Tammy Murphy, *et al.*, "2011 Final Report on the Performance of the Northeast Multispecies (Groundfish) Fishery (May 2011-April 2012)," U.S. Department of Commerce, December 2012, (hereinafter "2011 Final Report") p. 1.

[9] The fishing year is May 1 to April 30.

[10] 2011 Final Report, Table 2. These figures include fish harvested on non-groundfish trips as well as groundfish trips.

permit. Nevertheless, fishing activity is still highly dispersed, with over 420 vessels reporting revenue from a groundfish trip.[11]

Fisheries are an archetypal common-property resource: absent regulation, there are no limitations on who may access and use the resource or on the intensity of use. Generally, the result of free entry into a common property resource is that the resource is overexploited. The incentive for overexploitation exists, because individuals consider only their private costs and gains associated with their use of the resource. However, each user of the resource has a negative effect on the other users. For example, in a fishery, a vessel that catches fish reduces the number of fish available for others to catch. Individual vessel owners do not take the negative effect of their fishing on others into account, however. The result is that individuals acting on their individual incentives overuse the resource in the aggregate.[12]

Fisheries are renewable resources. This means that there is a return to leaving some fish in the fishery to multiply and provide harvestable fish in the future. When there is no fishing activity, the stock of fish grows until there is insufficient food to support a larger stock of fish. At this stock level, the stock is in equilibrium—it does not rise or fall. When fishing removes a portion of the stock of fish each year, the stock of fish may rise or fall depending on the rate that the remaining stock reproduces. With fishing, the stock of fish is stable when the annual harvest of fish is equal to the annual rate at which the stock replenishes itself. The expanding stock of fish benefits everyone who harvests in the fishery, but each individual could take a few more fish without affecting next year's catch appreciably. Of course, when all fishermen take some additional fish, the productivity of the fishery can be significantly reduced.

Open access to the fishery creates incentives for fishermen to expend more effort than maximizes the economic return on the fishery resource, and the individual incentive for a fisherman to leave fish in the fishery to reproduce is generally quite small. Private incentives can lead to overfishing. Economically, overfishing occurs when the catch each year is lower than it would be with the same total fishing effort.[13] This outcome is economically undesirable.

[11] 2011 Final Report, Table 10.

[12] See, e.g., Gordon, H. Scott, "The Economic Theory of a Common-Property Resource: The Fishery," *The Journal of Political Economy*, Vol. 62, Issue 2, April 1954.

[13] For a discussion of these issues see National Research Council, *Sharing the Fish, Toward a National Policy on Individual Fishing Quotas*, 1999 (hereinafter "Sharing the Fish"), pp. 22-23; Clark, Colin W., *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, Second Edition (New York: John Wiley & Sons, Inc. 1990), Chapter 2. The definition of overfishing varies.

When access to a fishery is limited and harvests regulated to maximize the value of the fishery, the fishery will produce "economic rents" (this is the term economists use to describe a payment to a factor of production in excess of the payment required to keep that factor in its current use). The rents occur because with regulated fishing effort, total fishing activity is reduced to a level where the negative effects of each vessel's operations on other vessels is limited. At the economically optimal output level the revenue from the fishery is greater than the total cost of fishing operations, including a return on the capital invested.[14] Access rights to the fishery are valuable because they allow vessels with access to earn above-competitive profit levels. These rents (or profits) are not the result of market power or other manipulation of market outcomes. They result from the fact that at the regulated output level nature provides fish that are less costly to catch and sell than they are worth in a competitive market for fish. Of course, the existence of these economic rents provides individual incentives to expand output to capture a greater share of the available rents. Unregulated expansion of output would eventually eliminate the rents, as described above.

Fisheries need not be regulated with the particular goal of maximizing the economic value of the fishery. Fisheries may be regulated to allow for the maximum sustainable yield or according to other biologic standards. However, if restrictions on access to the fishery reduce fishing effort below the level that would occur without restrictions, the fishery will generate rents. These rents are economically beneficial. It is necessary, however, to distinguish economic rent from above-competitive profits associated with a permit owner using its large ownership stake in access privileges to influence market outcomes.

Prior to May 2010, the groundfish fishery was regulated through input controls, such as trip limits, days-at-sea, gear restriction, and area closures.[15] With the implementation of Amendment 16 to the FMP, the fishery is now regulated using output controls rather than input controls. Output is regulated using annual catch limits.[16] There are thirteen groundfish species covered by the FMP, but ACLs are not allocated for all

[14] The relevant measure of costs include the long-run costs necessary to maintain the capital and labor required to mount fishing operations.

[15] See, *e.g.*, New England Fishery Management Council, 2009. Amendment 16 to the Northeast Multispecies Fishery Management Plan Including an Environmental Impact Statement and Initial Regulatory Flexibility Analysis. 905 p.; Statement of Work; Catherine A. Latanich, "Hard Catch Limits in the Northeast Multispecies Fishery: Balancing Accountability and Opportunity in a Multispecies Complex," 2007, p. 3.

[16] Statement of Work.

thirteen species.[17] Some species also have different stocks that are defined by area (e.g., cod is managed by Gulf of Maine and Georges Bank stocks).

The allocation of the ACL is primarily administered through sectors, which are contractually related groups of permit owners. Permit owners accounting for approximately 98 percent of access privileges have joined sectors. A relatively large number of very small permit holders continue to operate under in the common pool and are subject to "effort" regulations such as trip limits and time and area closures.[18] The small permit holders operating outside of sectors are competitively irrelevant in that they do not have any prospect of influencing the price of fish. Our analysis focuses on permit holders operating within sectors.

Each permit provides its owner a potential sector contribution ("PSC"). A permit's PSC is a share of the ACL for each of the allocated stocks of groundfish and is based on the catch history of the permit.[19] The permit owners that join together as a sector combine their PSC. Based on the sector members' combined PSC for each stock, the sectors are allocated ACE. Each sector can determine how to allocate its ACE among its members. In most cases, ACE is allocated back to sector members in proportion to the PSC each contributed to the sector, after the sector retains a percentage of their ACE in reserve.

Sectors are free to trade ACE. Sector managers report that they carry out the trades on behalf of fisherman. In some cases, sector managers may take a greater role in ACE trading by serving as a broker for ACE trades and take a commission on transactions. In these instances, the broker may advise fisherman on the market price for ACE and the best options for disposing of or acquiring ACE. In either case, sector managers indicate that the decisions regarding the use, purchase, and sale of the ACE allocated to an individual permit holder remains with the permit holder.[20]

ACE may be traded within a sector for cash or by trading ACE for ACE or "fish for fish." ACE is controlled at the sector level. Thus, trades between members of the same sector amount to a reallocation of ACE within the sector. ACE can also be traded

[17] 2011 Final Report, p. 1.

[18] 2011 Final Report, p. 2.

[19] 2011 Final Report, p. 1.

[20] Sectors may set rules for transfers by sector members – for example, requiring members leasing ACE to offer leases other sector members before going outside the sector. As a practical matter, however, any sector member who found a particular sector's restrictions objectionable could simply change to another sector (in the next season). Sectors provide no long-term constraint on the behavior of sector members.

between sectors. In practice, individuals who are members of different sectors will agree on the terms of the trade and the sector managers will broker the trade on their behalf. The trade occurs, however, as if it were between the two individuals, despite the need for the sectors to participate in the trade as the official holders of the ACE. This system operates much like an individual transferable quota system with individual permit owners deciding how to use or sell their catch entitlement, but it is the sectors rather than the sector members that are allocated ACE.[21]

The competitive price of a species' ACE reflects the actual scarcity of its available ACE relative to the availability of that species. When fishermen expect catch levels to be well below the ACL, then ACE is abundant and would trade competitively at relatively low prices (even with abundant ACE, however, the price must cover the cost of conducting the transaction). When fishermen expect catch levels to be near the available ACE for a stock, the competitive price of the stocks' ACE may be quite high.

The value of ACE for some stocks can be driven by the fact that the stock is frequently caught as "bycatch" when other species are being targeted. In fact, it is possible that the competitive price of ACE for some species with very low catch limits may exceed the value of the fish at the dock, provided there is sufficient value in harvesting related stocks with an unavoidable associated catch of the limited species (which some in the fishery refer to as "choke stocks"). The value of the stock's ACE in this instance is that it allows a vessel to fish for other species that are caught with the limiting stock. Thus, the competitive price of the limiting stock's ACE captures not just the value of being able to harvest the species directly covered but also the value of being able to harvest other species.

III. The Economics of Market Power

A. The General Case

In perfectly competitive markets, each market participant's individual purchases or sales have no influence on the equilibrium market price.[22] Competition among sellers

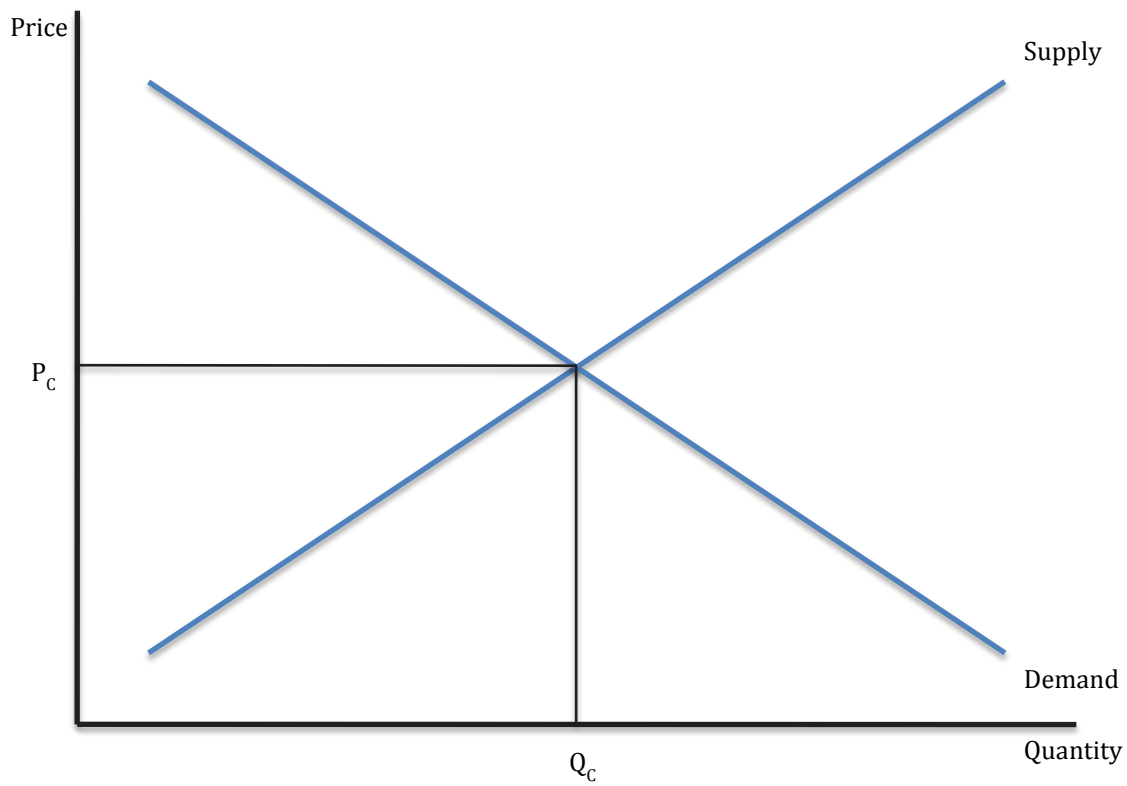
[21] Trades between sectors are generally subject to the right of first offer by members of the seller's sector, with the goal of keeping ACE within the sector if it can be efficiently utilized.

[22] The standard competitive model assumes that there are many small buyers and sellers, which is why no individual participant can influence equilibrium price. However, markets with large firms may behave competitively, depending on the nature of strategic interaction between firms, and markets with small firms may not behave competitively, depending on the differentiation of products across competitors.

in a competitive market leads them to expand their output until the cost of producing an additional unit just equals the revenue received from selling it. Consumers similarly purchase until the benefit of an additional unit falls just equal the market price. The competitive price brings supply and demand into balance, with suppliers offering just the quantity of goods that consumers want to buy. At this point, all of the gains from trade have been realized. If suppliers increased their output, the cost of doing so would exceed the benefit that consumers would obtain from additional consumption and their willingness to pay for the additional goods.

Figure 1 illustrates competitive market equilibrium. The downward sloping market demand curve indicates willingness of consumers to pay for the good at each output level. The upward sloping supply curve indicates the cost that competitive suppliers must be paid to bring the indicated quantity to market. Equilibrium occurs at the price P_C, where the quantity supplied equals the quantity demanded, Q_C. Each supplier receives that price regardless of the quantity each supplier produces, so each supplier-specific demand curve (not shown on the graph) is a horizontal line at the market equilibrium price.

Figure 1
Competitive Market Equilibrium

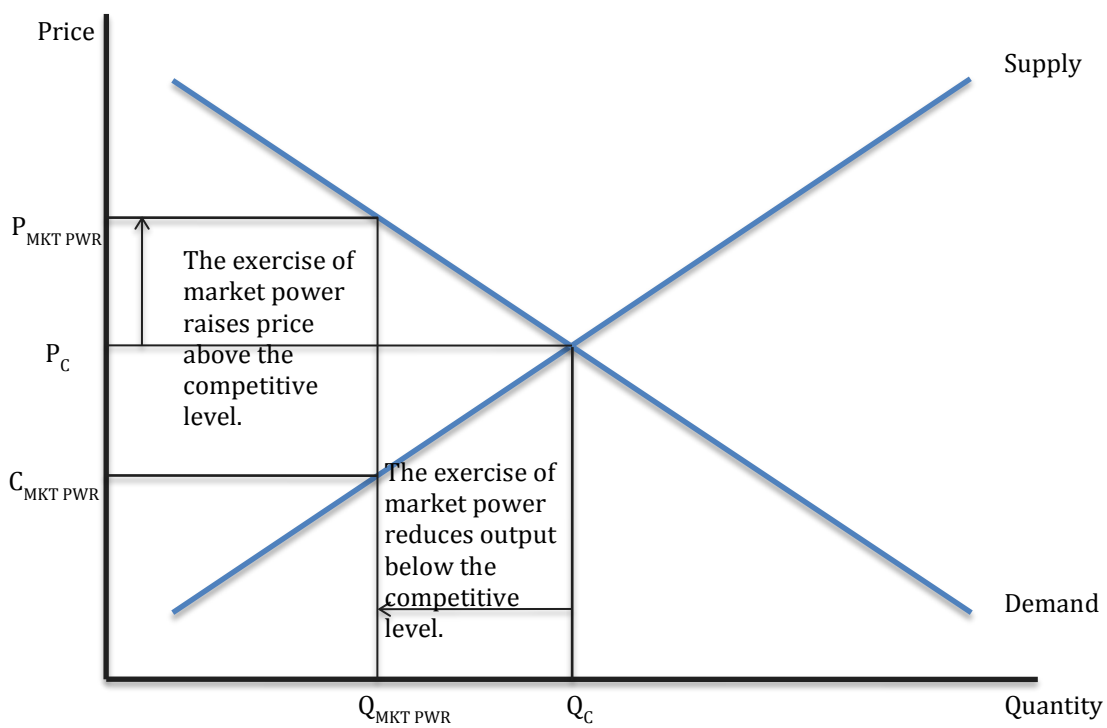


In markets that are not competitive, some sellers may realize that the level of their sales influences the market price they receive. Specifically, they find that as their output increases the prices they receive fall. This outcome reflects a downward slope for the supplier-specific demand curve. As output from that supplier become less scarce, buyers are willing to pay less for each additional unit.

Suppliers that are large enough for their increased output to lower market prices on all of their output have a unilateral incentive to withhold some output from the market in order to raise the market price. Figure 2 shows a market where a firm has withheld supply from the market. The price, $P_{MKT\ PWR}$, is above the competitive level and the quantity supplied to the market, $Q_{MKT\ PWR}$, is below the competitive output level. This is inefficient because buyers would be willing to pay more than the cost of supplying additional output. (The height of the demand curve at $Q_{MKT\ PWR}$, which indicates willingness to pay for more output, is above the height of the supply curve at $Q_{MKT\ PWR}$, which indicates the cost to suppliers of increasing output.) With reduced output due to the exercise of market power, the operation of the market leaves gains from trade unrealized.

Figure 2

Equilibrium in a Market with Market Power



B. Market Power in a Fishery

The basic economic principles describing market power apply within a multispecies fishery with output regulation. However, it is important to keep track of two issues that arise in the application of the economic principles. First, it is possible for the output limitations on the fishery to be the limiting constraint on catch of some or all species. This is not market power. Moreover, output limits can be the binding constraint on output even when there are large holders of access rights who could exercise market power under other market conditions. Second, it is not possible for fishermen to be perfectly selective when targeting particular species within a multispecies fishery. Therefore, to target one (or more) species requires privileges to catch other, non-targeted species. Differences between the allocation of catch entitlements and the species actually caught can affect whether it is possible to exercise market power in a multispecies fishery.

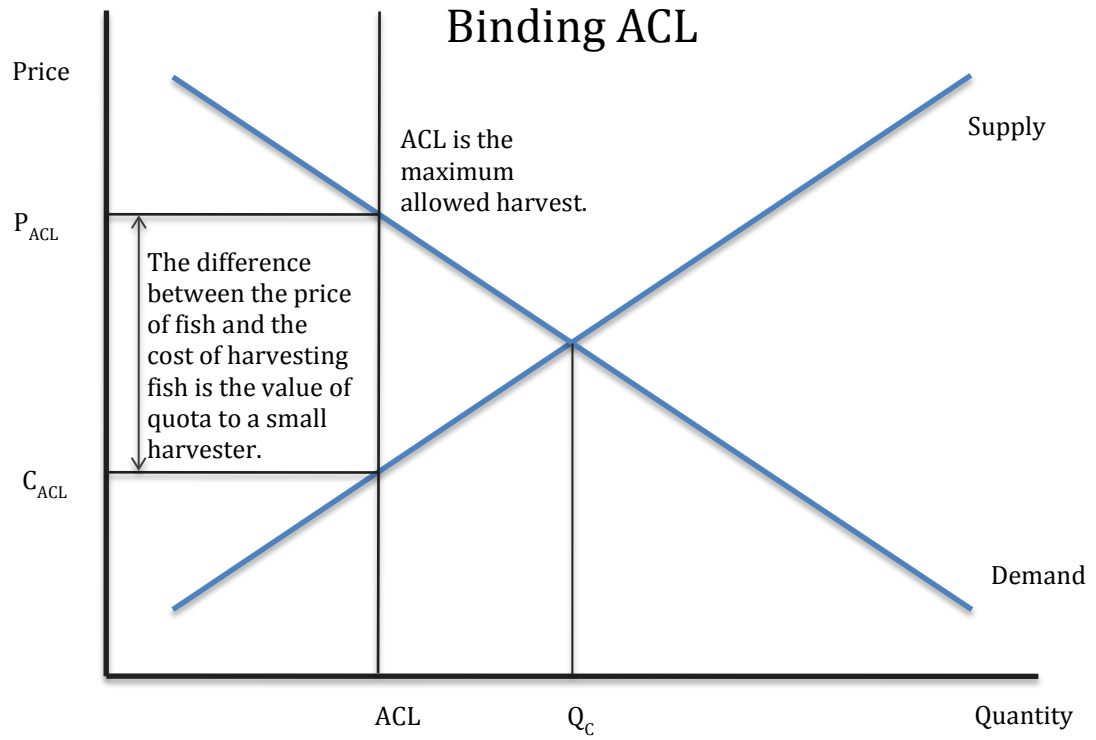
The description of market power above pertains to the exercise of market power to raise prices in the market for fish. We first consider the effect of annual catch limits and transferable access rights for a single species. We then consider how this discussion applies to a multispecies fishery, in which it may also be possible to exercise market power in the markets for the fishing privileges of individual stocks. This would occur if a large holder of access privileges withheld some access privileges from the market in order to raise the price of the privileges it did sell. Such an exercise of market power enriches one participant in the fishery at the expense of another. The exercise of market power by one permit holder against other permit holders in, say, the lease market for ACE suggests the permit holder with market power has inordinate control.

1. Market Power with Annual Catch Limits

Exercising market power to raise the market price of a good, such as fish or ACE, requires withholding supply of the good from the market. In an output-controlled fishery, the limitation on supply may come from the regulation of the fishery itself. This circumstance is illustrated in Figure 3. The figure shows supply and demand for the fish from the fishery. The vertical line represents the maximum harvest permitted, or the ACL. In Figure 3, the ACL is below the competitive market output of the fishery. The ACL is, therefore, the binding constraint on how many fish will be harvested. The market price in Figure 3 is equal to $P_{ACL,}$ which is above the competitive price. The market price is also above the cost of bringing additional fish to market, as indicated by the height of the supply curve where it intersects the vertical line where output equals the ACL, or C_{ACL}. The difference between the price of fish and the cost of harvesting additional fish shown in Figure 3 is the source of the rents created by a limited access fishery described above.

Figure 3

Competitive Equilibrium in a Regulated Fishery with Binding ACL

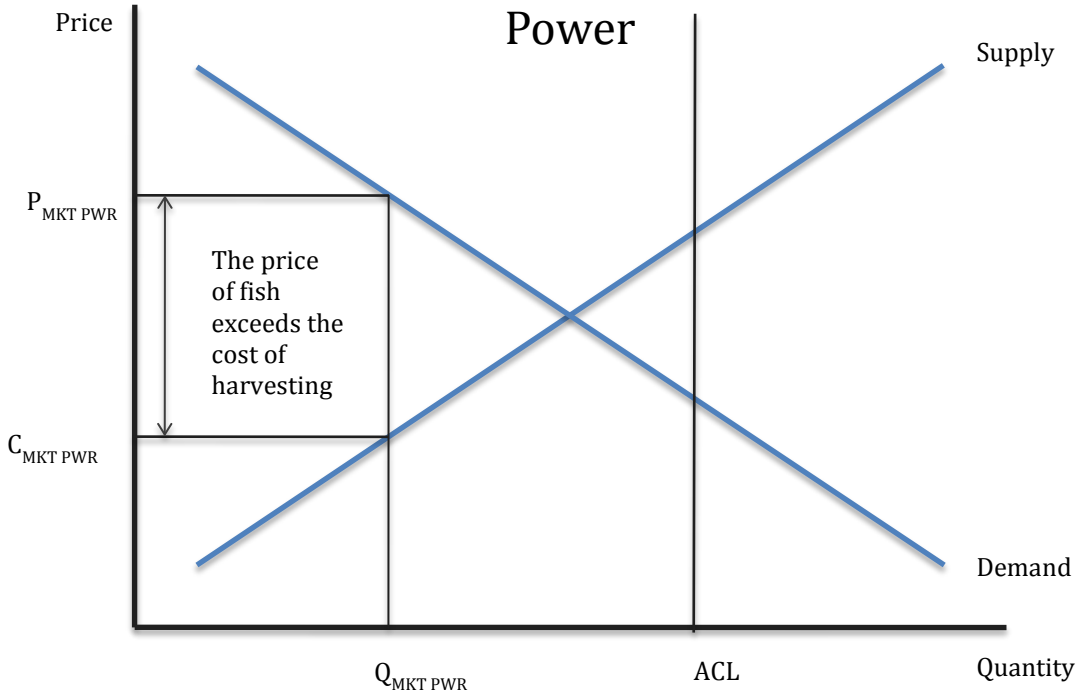


The outcome for a fishery with ACLs below competitive equilibrium is similar to the outcome resulting from the exercise of market power. The price is above the competitive level and output is below the competitive level. The reduction in output below the competitive level arises directly from the regulation of the fishery rather than from the withholding of ACE or fish from the market. Unlike the exercise of market power, the limitation of output from a fishery can be efficient, because it reduces the inefficient application of fishing effort.

The output of a fishery can be below the ACL, and this can occur with or without the exercise of market power. If demand for the output of a fishery is low relative to the cost of harvesting fish, competitive forces rather than fishery regulation limit the total catch. Alternatively, it could be the case that the output limit on the fishery does not bind, and that participants in the fishery are withholding supply to raise prices. This circumstance is shown in Figure 4. In the groundfish fishery, this could occur if large holders of ACE (e.g., individuals, sectors) were to neither use nor sell their ACE in order to reduce the annual catch below the allowed limit and with the goal of increasing prices.

Figure 4

Equilibrium in a Regulated Fishery with Market Power



In Figure 4, the exercise of market power raises the price of fish above the cost of catching additional fish, which is shown by the height of the supply curve at the fishery's output level, $Q_{MKT\ PWR}$. A large owner of access privileges restrains the output of the market, because each additional unit it produces lowers the price on the units it would otherwise sell at the higher price, reducing its profits. In contrast, a small owner of access privileges does not have the ability to influence the price. Therefore, a small owner will view the value of additional catch as the difference between the market price of fish and the cost of catching additional fish. Since this is positive, a small owner of access privileges will want to expand output, if it had the ability (privileges) to do so.

The discussion above illustrates that large and small owners have different incentives regarding withholding supply from a market, whether the market is for fish or for access privileges (*i.e.*, ACE). Sufficiently small market participants *cannot* benefit by withholding either access privileges or fish from the market. By definition, the exercise of market power entails an entity withholding from the market to influence prices *to its*

advantage. Small market participants acting independently cannot influence prices. They simply respond to the prices they face.

A simple example of the different incentives of large and small holders of access privileges illustrates the inability of owners of small shares of access privileges to profitably influence prices. Consider a large owner of privileges with 50 units of a fishery's 100 access privileges. The owner has a 50% share of the available privileges. If the large owner does not fish, but simply leases privileges, consider the circumstances under which the owner makes more money by withholding some of the access privileges. Suppose the price of privileges is $1 apiece when the owner sells all of its privileges, but that the price of privileges would rise if the owner withholds 5 units (10% of the large owner's holdings). The owner would earn $50 selling all of his privileges. If the owner is to make more money by selling 45 privileges than by selling 50 privileges, then price would have to rise to just over $1.11 (50 times $1 equals 45 times $1.11). This is an 11% increase in the price of privileges. Is this plausible? The large owner has withheld 5% of the available privileges from the market and needs the price of privileges to rise by more than 11%. This requires the elasticity of demand for privileges to below 0.45 (5%/11%=0.45).[23] A demand curve with an elasticity of about one-half is considered inelastic, but the elasticity is not necessarily implausibly low.

Now consider whether it would be worthwhile for a small owner of 10 units (10% of the total privileges) to withhold from the market to raise price. If the small owner withheld one privilege (10 percent of the small owner's holdings), then again, the price would have to rise from the competitive price of $1 to just over $1.11 in order for the owner's revenue to rise (10 times $1 equals 9 times $1.11). This is the same price increase as would have to occur for the large owner, but in this case, the price change would have to occur in response to a much smaller reduction in quantity. In this case, withholding just 1% of the privileges in the market must increase the market price by more than 11%. In order for this price increase to occur, the demand curve would have to be extremely sensitive to changes in the available privileges. The elasticity of demand would be less than 0.09 (1%/11%=0.0909). Such a demand curve is highly price inelastic (and outside the range that would be plausible for the Northeast Multispecies Fishery).

The relevant comparison between the two cases is that the responsiveness of prices to a change in available privileges would have to be five times as large for the small rights holder to profitably withhold relative to the large rights holder. In the example above, the small owner needs the same 11% price increase as the large seller,

[23] The elasticity of demand is the percentage change in quantity divided by the percentage change in price. The presentation here is informal and adopts some common simplifying conventions. For example, the actual result of the elasticity calculation is a negative number, reflecting the downward sloping demand curve, but we discuss the elasticity as if it were positive.

but the small seller needs this price increase to occur when one unit is withheld rather than five units. Thus, small holders of access privileges are significantly less likely to be able to exercise market power profitably than larger holders.

In markets generally, potential for expanded output (either from existing competitors or from new entrants) can be a constraint on the exercise of market power. In order for sellers in a market to successfully exercise market power, they must be able to withhold supply from the market without that supply being replaced by other firms. Frequently, the high prices generated by the withholding of supply would attract new firms to the market and with them, expanded output. Expanded output would bring prices back down toward competitive levels.

The market for fishery access rights is somewhat different. In the fishery, regulators set the allowable catch or the supply of ACE for each stock. If a firm withholds ACE, small, unconsolidated holders of ACE can release additional ACE to the market to take advantage of the high prices and will have the incentive to do so. However, there can be no entry or expansion into the market for ACE to replace the withheld ACE. Only the regulator can expand the total supply of ACE for a stock.

2. Market Power in a Multispecies Fishery

The Northeast Multispecies Fishery is regulated with output caps on each regulated stock. Permit owners are assigned PSC (and, ultimately, receive their ACE from their sector) based on the catch history of the permits they own.[24] Since conditions change over time, fishermen may hold rights to catch fish that are poorly aligned with fish that are available to catch in the fishery. For example, some fishermen may be short of one species and long on another relative to the capacity of their vessels to actually catch fish given fishery conditions. This means that fishermen will find it in their interest to trade ACE to match their expected catch. The need to have ACE for each species caught and the likely need for some fishermen to have to buy ACE to cover the fish they will actually harvest presents opportunities for large holders of ACE to exercise market power in the markets for ACE.[25]

[24] A permit's potential sector contribution depends on the catch history of the permit. In practice, sectors allocate ACE to their members in proportion to the PSC they bring to the sector. Therefore, fishermen generally start the fishing year with catch entitlements that are determined by the catch histories of the permits they own.

[25] ACE is an input into the "production" of fish. There may be instances where withholding ACE would not influence the price of fish in the output market. However, if there are fishery rents (unrelated to market power) associated with the use of a particular stock's ACE, it may be possible for someone with large ACE holdings to capture those rents from other fishermen (even without changing the price

A large holder of ACE for a particular stock may choose to not use all of its ACE holdings and to refuse to sell ACE to others who would use it. Such withholding of ACE could reduce the supply of the species from the fishery and, if the withholding were to have a substantial impact on output quantity, could raise the price of the species to the advantage of the large ACE holder. In the multispecies fishery, restricting the catch of one species may also reduce supply and raise prices of other associated species that are caught alongside the species with ACE being withheld from the market. Whether the withholding of ACE, and thus fishery output, for one or more species of fish will raise the price of fish depends on a number of factors. If, for example, the species is available from other fisheries, the supply of fish will not, in fact, be reduced and prices will not rise. Another possibility is that customers are willing to switch their consumption to other species when the price of the withheld species increases, making it difficult to increase prices without losing substantial sales. These issues are addressed below.

Imbalances between ACE holdings and availability of species sometimes create a situation in which a species has a low catch limit and may not be itself commercially viable for harvest, but cannot be avoided by fishermen harvesting other species (what some in the fishery call "choke stocks"). If a catch limit is sufficiently low and fishermen cannot adjust their fishing to avoid the species, then the constraint creates a substantial cost for harvesting associated species. Thus, the total amount of choke stock available can strongly affect the output and price of multiple species in the fishery or in a stock area. A large holder of ACE for a choke stock could potentially engage in the exercise of market power in either the output market for fish or in the markets for ACE trading.

Depending on competition with other substitute products, such as other species or fish brought in from other regions, including imports, it may not be possible to raise the price of fish by withholding ACE. Even in those circumstances, however, a large holder of a choke stock's ACE may still be able to exercise market power in the market for ACE.

When a particular species' ACE is in short supply relative to other stocks caught concurrently, different fishermen will have different levels of demand for the limiting stock's ACE. Some will have a balanced portfolio of ACE even where one stock limits the harvest of others. Some may fish areas (or use gear) for which it is relatively easy to avoid catching the limiting stock while targeting other species. Other fishermen will have relatively more difficulty avoiding the limiting stock, because they have gear that is less selective or because their home ports are near fishing grounds where the limiting stock is relatively abundant. The variation in the importance of the limiting stock's ACE to different fishermen means that each fisherman has a different willingness to pay for the

of fish in the output market). Allowing such rent capture would be inconsistent with National Standard 4 Guidelines.

limiting stock's ACE and that the demand curve for the limiting stock's ACE is downward sloping.

Under these circumstances, a holder of a sufficiently large share of the limiting stock's ACE can withhold some of its ACE in order to raise the price to fishermen looking to acquire it. Exercising market power in this fashion need not raise the price of fish to consumers. However, the exercise of market power in markets for ACE does transfer income between fishermen operating in the fishery because some fisherman must pay more than the competitive market price for the choke stock's ACE.

It is the portion of the price above the competitive level that is the relevant transfer between fishermen. The exercise of market power in the markets for ACE would be inconsistent with the principles of fairness embodied in National Standard 4. In addition, if the extraction of income from one group of fishermen were to persist over time, investment in new vessels and gear would ultimately be affected to the detriment of the efficiency of the fishery.

C. Excessive-Share Caps to Regulate Market Power in a Fishery with Output Regulation

Access to a fishery subject to an output limit is valuable when the regulation restricts fishermen from inefficiently expanding output and eroding profits or "rents." Access to the groundfish fishery is controlled by permit ownership, which results in fishermen obtaining effective control of ACE that they can trade among themselves. Thus, the rents associated with access do not flow directly to vessel owners harvesting the fish but to those who hold ACE. The rents attributable to access to the fishery have been severed from the harvesting of fish. This is most clear in the case of a permit owner that does not fish, but sells its ACE to others who do fish. The market value of a stock's ACE is the rent associated with catching that stock for the vessel owner that is just willing to purchase the ACE and the permit owner just willing to sell the ACE. This rent is the value of the fish the ACE allows the least efficient user of the ACE to catch (which may include other stocks) less than the cost catching the fish.

On the buyer side of the market, many buyers may get surplus when buying ACE at the market price – meaning the buyer acquires the ACE at a price lower than the buyer values the ACE. However, the market price is established by the value placed on the ACE by the *marginal* buyer – the vessel owner just willing to buy the ACE when supply equals demand. This vessel owner is indifferent between buying and not buying and is the buyer that uses the ACE least efficiently among the group of those who actually choose to buy. All other buyers use the ACE more efficiently and receive surplus from the transaction.

On the seller side of the market, the market value is equal to the value placed on the ACE by the *marginal* seller – the seller that is just willing to sell the ACE rather than

use it himself when supply equals demand. This is the seller that would use the ACE most efficiently among the group of sellers that actually choose to sell ACE. All other sellers would use the ACE less efficiently and gain by selling it rather than using it in their own operations. These sellers place a lower value on the ACE in their own operations and receive a surplus from their sales.

The paragraphs above indicate that ACE trading in *competitive* markets is *expected* to price some vessel owners out of the markets for ACE. In fact, this is the very purpose of high competitive market prices. When a product is scarce, the price rises leading to a reduction in the quantity demanded as buyers who cannot afford the high price choose to do with less or to do without entirely. This is not a consequence of market power. Rather, it is the natural operation of competitive markets. This result is to be expected in a multispecies fishery that is regulated using access privileges for individual stocks that can be traded among vessel operators through their sectors. The concern for regulation is that when permit owners are able to exercise market power, they are able to artificially create scarcity by withholding supply. Scarcity and high prices arising because the total amount of available ACE is low is not a competitive concern.

As noted above, market power could be exercised in two ways. Withholding ACE may reduce the supply of fish, raising the price to consumers to the benefit of some fishermen. Withholding ACE can also raise the price of the ACE traded to other fishermen above the competitive level. When this occurs, fishery rents that should accrue to one group of fishermen are transferred to the entity exercising market power.

Market power hurts consumers and causes economic inefficiency. Some industries, such as electricity and natural gas distribution, are directly regulated to control the exercise of market power. Other industries are subject to the antitrust laws, which forbid mergers and anticompetitive conduct that perpetuate significant market power. An excessive-share rule falls into this second category of regulation because it would restrict some permit or ACE transactions but allow others.

The government has an interest in controlling the exercise of market power through the accumulation and withholding of fishing privileges. The regulation of the fishery through catch entitlements that fishermen effectively control and can trade was intended to better husband the fishery's resources and to make the fishery operate more efficiently. The exercise of market power is counter to these goals. Therefore, the government has an interest in seeing that the catch entitlements it created do not become a means for the exercise of market power.

Regulating market power carries its own risk. The regulation of market power limits what firms can do, and may forbid them from engaging in pro-competitive conduct as well as in anticompetitive conduct. Since pro-competitive conduct helps drive market efficiencies, regulation intended to limit market power has the potential to generate its own set of inefficiencies. At a minimum, the design of regulations to control market

power should reflect the fact that limiting the exercise of market power involves a trade-off between the benefits of limiting market power and the risks of reduced efficiency from the regulations. For example, an excessive-share cap could limit the growth of some firms (fleets) operating in fishery. To the extent efficient firms are the ones that grow, limiting firm growth could be detrimental to the efficiency of the fishery and to investment in the fishery. Limiting the growth of such a firm when there is not a realistic prospect that it could exercise market power is not economically justified.

There are options for controlling market power other than an excessive-share cap that may be more efficient under a wide array of circumstances. It is not a threat to competition for one or more firms to grow relatively large as long as other firms remain small and will continue to act competitively, even if larger firms were to attempt to exercise market power. Balancing the benefits of limiting the exercise of market power with the potential costs of unintended over-regulation may require a portfolio of regulatory tools. The benefits of an excessive-share cap is that it is a means of limiting the potential for the exercise of market power that it is easy to apply and treats all firms equally. However, if the level of the cap is not revisited periodically, the potential for the excessive-share cap to become an inefficient means to limit the exercise of market power grows.

D. The *Horizontal Merger Guidelines*

The U.S. Department of Justice and the Federal Trade Commission ("Agencies") share the responsibility for investigating mergers in the United States. This requires the Agencies to determine whether a particular merger is likely to harm competition. To undertake their work the Agencies have developed expertise in the analysis of competition and the influence of mergers on competition. To aid their work and to help firms that are considering a merger understand how the Agencies will evaluate their particular merger, the Agencies publish the *Horizontal Merger Guidelines*, which describe the methods the Agencies use to evaluate competition and how mergers will influence competition.

1. Relevant Market Definition

Competition analysis is the study of what products and firms compete with one another for sales to consumers. To address this issue, competition analyses frequently begin with the definition of the "relevant market." The relevant market contains the products and suppliers that customers treat as being good substitutes for one another. A relevant market has two dimensions, a product dimension, which includes the product

that is central to the analysis and its close substitutes, and a geographic dimension, which includes the locations of the sources of supply that buyers view as close substitutes.[26]

The standard and accepted approach for the identification of the contours of the relevant market is the "hypothetical monopolist test." This test begins by selecting a candidate market comprising a product that is central to the question under investigation and determining whether a hypothetical profit-maximizing firm that was the only present and future seller of the product(s) in the candidate market could profitably impose at least a small but significant and non-transitory increase in price (a "SSNIP") on at least one product in the market.[27] A SSNIP is typically assumed to be about a five percent increase in price. If the SSNIP would not be profitable because consumers would substitute other goods for the product with the increased price, the "candidate market" is too small. In this case, the closest substitute product is added to the candidate market and the hypothetical monopolist test is run again. This process is repeated until the product dimension of the market contains a sufficiently large number of substitutes that a hypothetical monopolist of all of them could profitably impose a SSNIP. A similar procedure is used to identify the sources of supply of the products in the relevant product market to define the sources of supply in the relevant geographic market.

If a set of products satisfies the hypothetical monopolist test, a larger group of products will also often satisfy the hypothetical monopolist test. However, overly broad markets (i.e., markets that contain more products than are necessary to satisfy the hypothetical monopolist test) are not useful for competition analysis, because they are likely to include distant substitutes for the primary products of interest. These distant substitutes do not impose a meaningful constraint on the prices charged for the products of interest. To avoid including distant substitutes, the product dimension of the relevant market is typically defined to be the smallest set of products that passes the hypothetical monopolist test.[28]

2. Market Concentration Thresholds and the Analysis of Competitive Effects

The standard measure of concentration used in competition analysis, and identified in the Terms of Reference, is the Herfindahl-Hirschman Index ("HHI"). The HHI is calculated by squaring the market share of each firm and adding up the squared market shares. In a market with three firms with market shares of 50%, 30%, and 20%, the HHI is 3800 ($50^2 + 30^2 + 20^2 = 2500 + 900 + 400 = 3800$).

[26] *Horizontal Merger Guidelines* at §4.2.

[27] *Horizontal Merger Guidelines* at §4.1.1.

[28] *Horizontal Merger Guidelines,* §4.1.1.

The *Horizontal Merger Guidelines* classifies markets into three categories based on their HHIs. If a market's HHI is below 1500, the market is "unconcentrated." If a market's HHI is between 1500 and 2500, the market is considered "moderately concentrated." Finally, if a market's HHI is above 2500, the market is considered "highly concentrated."[29] When calculating an HHI, it is necessary that the shares be calculated based on sales (or other relevant measure) from a properly defined relevant market.

The Agencies will not typically oppose a merger if the HHI in the market is under 1500 and the increase in the HHI from the merger is small. This reflects that fact that if the HHI is under 1500, the market is populated by a relatively large number of small firms that can be expected be behave competitively. With an HHI less than 1500, the market could contain about seven or more roughly equal size firms, each with less than 15 percent share. Therefore a merger is unlikely to be motivated by an effort to acquire market power. The small competitive firms in the market will restrain any such efforts.

Many proposed mergers result in concentration levels well above the *moderately concentrated* or *highly concentrated* thresholds found in the *Horizontal Merger Guidelines*, but remain unopposed and are ultimately consummated. In these cases, the Agencies engage in more detailed competitive analysis to determine whether a proposed merger will threaten competition. Thus, the *unconcentrated* range is considered "safe", but higher ranges may also be safe when more detailed analysis shows that sufficient competition will continue to constrain pricing. This often depends on the nature of competition in the industry among other factors. The Agencies may also approve mergers if the merging firms agree to "remedies," such as the divestiture of some assets as a condition of approving the merger.

The *Horizontal Merger Guidelines* demonstrates that the context in which consolidation takes place matters. High market shares and high concentration may not be threats to competition under some circumstances. Therefore, simply applying the safe-harbor thresholds for concentration found in the *Guidelines* to the ownership of PSC or ACE may serve as a guideline for establishing an excessive-share cap. However, the regulation need not rigidly conform to the safe-harbor thresholds and could quite reasonably allow for modification as conditions change.

The *Horizontal Merger Guidelines* does describe the economic methods that should be used to evaluate at what level accumulations of PSC or ACE are likely to begin to threaten competition. It is a relatively simple exercise to determine how an excessive-share cap can keep markets within the *unconcentrated* range of HHI. This is "safe", in that there is little or no concern about the exercise of market power, and efficient

[29] *Horizontal Merger Guidelines*, §5.3.

(provided the excessive-share cap does not over-regulate the market by prevent pro-competitive behavior).

IV. Analysis of the Potential Exercise of Market Power in the Northeast Multispecies Fishery

The competitively relevant participants in the Northeast Multispecies Fishery are permit owners, which receive ACE through their sector memberships and vessel owners. Often vessel owners also own permits that give them access to the fishery. However, some permit owners do not fish actively and lease their ACE to others who are actively engaged in fishing operations. This includes permit banks, which own permits and control the PSC and ACE that they confer. Permit banks are organizations that hold permits and acquire ACE to use for a particular purpose, such as supporting a particular fishing community. State-operated permit banks do not have to join groundfish sectors, but private permit banks do.

Below, we address certain aspects of the structure of the Northeast Multispecies Fishery that will be useful when assessing the level of the excessive-share cap.

A. The Market(s) for Fish

It is only possible to raise the price of a species of fish from the fishery if buyers are unwilling to substitute their consumption either to other species or to fish sourced from outside the fishery. When consumers are willing to substitute to alternative species or sources of supply, efforts to raise the price of a species of fish by withholding its ACE and reducing its supply from the fishery will fail. In other words, a firm can exercise market power only if it controls a substantial amount of the substitute products and sources of supply that consumers would turn to when the price of a good is raised.

To see why this is the case, assume that consumers will switch their consumption from species X to species Y when the price of species X rises a bit above that for species Y. Efforts to withhold the supply of species X will fail because as the price rises, consumers will buy less of it and switch their consumption to species Y, which is not subject to withholding. In this case, the relevant product market for species X includes species Y as well. Because species Y is competitively supplied, it is not possible to profitably exercise market power over species X.

Now assume that there are no good substitutes for species X and that consumers will pay more for species X rather than switch to other species of fish if the price of species X rises. In this case, a hypothetical monopolist of species X (*i.e.*, one firm that controls the entire supply) could raise the price to consumers. However, if supply from the Northeast Multispecies Fishery were reduced through an attempt to exercise market

power, processors may be able to obtain species X from another fishery in the United States or elsewhere. If this is the case, then efforts to raise the price of species X by reducing supply from the Northeast Multispecies Fishery will fail because "replacement" supply will be forthcoming from other fisheries. In this case, the product market is limited to species X, but the geographic market includes other fisheries as well.

At a high level, the markets for fish from the Northeast Multispecies Fishery appear highly competitive. Data on imports and exports show that the fishery is a small share of total U.S. fish consumption, and stakeholders consistently report that many species are traded globally. Thus, the relevant geographic market (*i.e.* the sources of supply to U.S. consumers) is larger than the fishery for *at least some* major species, such as cod. There is also anecdotal evidence of substitution between different species of fish (e.g. cod and haddock). Moreover, while some prices have increased with the recent reduction in the output of the fishery, the price increases have been much smaller than the quantity reduction. This is consistent with the data (and stakeholder reports) that increased imports have increased to compensate for the reduction in the fishery's supply of at least some species.[30]

To fully assess the potential for the exercise of market power in the markets for fish, however, it would be necessary to determine comprehensively what species of fish compete with one another and who can supply competing species. The determination of the levels of substitution between species of fish and sources of fish is beyond the scope of this report. However, it is worth noting that some stakeholders report that fish prices depend on the supply of individual species, indicating that cod competes with cod and flounder competes with flounder. There is also some anecdotal evidence that prices for the highest quality fish have increased with decreased fishery output, which could indicate that there is a separate relevant market for the highest quality fish for restaurants, for example.

Some consumers may choose to source fish from a particular area to support a particular fishing community. However, the analysis of the relevant market turns on how a marginal consumer, or a consumer who is on the cusp of purchasing a different species of fish or an entirely different product, such as shrimp or poultry, chooses what to purchase. Given the success of imported fish products in the United States, the marginal consumer appears places little or no value on whether a cod filet was originally caught in the Gulf of Maine or on Georges Bank. Moreover, it is presumably not possible for a

[30] Some stakeholders noted that certain consumers may have preferences for locally caught fresh fish. This type of "differentiated" demand is completely consistent with broad markets that do not account for the specific preferences, because the size of the relevant economic market depends on the *marginal* consumer – those that would choose not to purchase the product if the price were slightly higher.

typical consumer to determine where a cod filet came from without expending substantial effort. Georges Bank cod and Gulf of Maine cod are indistinguishable to consumers. This means that the relevant markets for fish are no smaller than a species harvested from the fishery (i.e. not differentiated by stock). The success of imports indicates that the relevant markets are likely larger, possibly much larger, for some species.

We evaluate the HHIs in relevant markets defined by individual species. If these narrow markets are unconcentrated, markets that are more broadly defined would be still less concentrated. Therefore, we can conclude that the potential for the exercise of market power over the price of fish is quite small based on markets defined by individual species. In fact, doing so is conservative in that it is more rather than less likely to identify high levels of concentration, which is indirect evidence of market power.

To measure concentration, we rely on data of landings by permit.[31] Multiple individuals may own interests in vessels and in permits. It is possible to determine who holds the ownership shares, but there is not information showing each owner's interest in a permit or who owns the controlling interest. We address this issue by using a broad definition of ownership, the "GroupID." Group ID combines all individuals with overlapping interests. For example if individual A and B own permit 1, individuals B and C own permit 2, and individuals C and D own permit 3, all three permits will be assigned to the same GroupID. This ownership definition combines permits that may not, in fact, be under common control into a single GroupID. To the extent the GroupID definition of ownership combines permits that are, in fact, independently controlled into a single ownership group, the measures of concentration associated with GroupID will overstate actual concentration. Thus, if we find that the risk that market power will be exercised is small using GroupID, we would find a still lower risk if we had greater detail on the ownership of each permit.

We examine the landings of fish by species. Table 1 shows the HHIs for the landings of the allocated species harvested in the fishery. Most of the HHIs are below 1500, indicating that they are *unconcentrated*, and just one species is at the low end of the *moderately concentrated* range. Table 2 shows the number of different GroupIDs that accounted for all of the landings that went into the concentration measures (GroupIDs with no landings are not reported on Table 2, and have no impact on the concentration measures in Table 1).

[31] It is not possible to track each trade of ACE within a fishing year to determine the concentration of fishing privileges after trading. NMFS allocates ACE to sectors, which further distribute fishing rights to individual sector members according to the terms of the sector agreements. These trades are generally not reported. Movements of ACE between sectors are approved by NMFS. However, ACE trades within a sector are simply a reallocation of ACE within the sector that was allocated the ACE and are not generally available. As a result, it is not possible to track precisely who comes to control ACE through all of the trades that may occur.

Table 1: Landings Concentrations for GroupIDs, by Species and Fishing Year

Species	Landings HHI (by GroupID) 2010	2011	2012
American Plaice	435	511	479
Cod	188	225	280
Haddock	1,018	876	934
Pollock	369	326	367
Redfish	1,018	1,123	1,352
White Hake	424	382	338
Winter Flounder	1,357	1,680	1,600
Witch Flounder	333	389	353
Yellowtail Flounder	531	930	309

Table 2: Number of GroupID with Landings, by Species and Year

Species	Number of GroupIDs 2010	2011	2012
American Plaice	206	186	164
Cod	301	275	257
Haddock	233	204	183
Pollock	228	225	199
Redfish	160	166	155
White Hake	201	191	171
Winter Flounder	201	179	158
Witch Flounder	213	202	193
Yellowtail Flounder	230	204	199

The HHIs shown in Table 1 overstate the degree of concentration for many species. At noted, the GroupID definition of permit ownership leads to an overstatement of concentration. In addition, some species face competition from imports and other fisheries. Moreover, different species of fish compete with each other to some degree. These factors indicate that the HHI's for the harvest of the allocated species from the

Northeast Multispecies Fishery overstate the concentration for purposes of assessing the likelihood of market power.

That some species (such as winter flounder or redfish) have relatively higher HHIs in Table 1 does not necessarily indicate that the ACE for the species became relatively more concentrated during the fishing year. In some years, the species with the relatively higher concentrations have significant amounts of unused ACE. For example between 2010 and 2012, landings of redfish reached a high of only about 50% of available ACE. Where there is significant unused ACE for a species, the relatively higher concentrations of landings need not indicate that control of ACE became concentrated, only that relatively few firms targeted the species. This is particularly the case where the initial allocation of ACE for the species was allocated at a still lower level of concentration, as was the case for redfish.

The low concentration of harvest shares indicates that there is not currently a meaningful risk of the exercise of market power in the markets for fish harvested from the Northeast Multispecies Fishery. Production shares show a low level of concentration or a high degree of dispersion, which indicates that the entities harvesting are largely quite small from a competition perspective. Small firms have very little potential to influence prices to their advantage by withholding output.

It is also notable that there has been no consistent pattern of increasing concentration in landings across all species during the three-year period measured here. Some HHIs have increased (but only one species, winter flounder has moved from *unconcentrated* to *moderately concentrated*), while others have decreased. As Table 2 shows, there have been declines in the number of active participants (GroupIDs with landings) for every species in every year, but over 150 active suppliers remain in every category. In addition, we reviewed the data to determine whether there were substantial changes over time for the GroupIDs with the largest share of landings. We cannot report the specific results due to confidentiality issues, but we can say that the data do not show an economically meaningful increase in the shares of landings by the largest GroupID for each species. Furthermore, while some species have one or more GroupIDs with a substantial share of landings, those situations do not correspond with an equally high share of access rights, which we discuss next.

B. The Market(s) for ACE

The analysis above shows that participants in the fishery are quite unlikely to be able to profitably exercise market power in the markets for fish. The question remains whether control over a significant accumulation of PSC and the resulting ACE could be a source of market power in transactions for ACE in the annual lease market. This issue is of greatest concern if the substantial accumulation of PSC or ACE is for a choke stock.

As described above, different fishermen have different abilities to selectively target species while avoiding catching a limiting stock based on gear type, home port, target species, and so forth. This means that, collectively, there will be a downward sloping demand curve for the choke stock's ACE. In this circumstance a fisherman with a high cost of avoiding the choke stock would face the prospect of paying monopolistic prices for choke stock ACE if an entity with a sufficiently large accumulation were to withhold supply. Other fishermen would unnecessarily go without additional ACE covering the choke stock because the price of the ACE is elevated by market power.

The relevant issue is to determine the circumstances where an entity controlling a large share of a choke stock's ACE could exercise market power. In particular, could groups of multiple permit owners be used for this purpose by sectors? Alternatively, could a large individual permit owner that came to control a substantial accumulation of ACE for a choke stock through the PSC associated with its permits exercise market power in the markets for ACE? We address these questions in turn.

1. The Potential for Sectors to Exercise Market Power

Sectors are voluntary groups of permit owners who have contractually joined together to form a sector so that they can convert the PSC associated with their permits into ACE, or catch entitlements. In principle, it would be possible for sectors to behave anticompetitively. For example, the members of a sector could instruct their sector manager to combine their ACE and to market their ACE jointly. If a sector had a large share of a species that other fishermen were willing to pay for, the joint marketing of the members' ACE for this stock could allow the sector to exercise market power. Table 3 shows the concentration of ACE holdings by sectors. The table shows that ACE is *moderately concentrated (1,500 < HHI < 2,500)* for several species and also *highly concentrated (HHI > 2,500)* for two species, white hake and redfish. Table 4 shows the concentration of sectors' ACE holdings for individual stocks, which are also *moderately concentrated* and *highly concentrated*. Finally, Table 5 shows the number of different sectors that accounted for the ACE holdings that went into the calculation for each of the concentration measures for Table 4 (sectors with no ACE holdings for a specific stock are not reported on Table 5, and have no impact on the concentration measures in Table 4).

Table 3: ACE Holdings Concentrations of Sectors, by Species and Year

Species	ACE HHI (by Sector Name) 2010	2011	2012
American Plaice	1,917	1,895	1,901
Cod	967	984	1,034
Haddock	1,498	1,476	1,648
Pollock	1,893	1,907	1,853
Redfish	2,820	2,741	2,880
White Hake	2,800	2,838	2,743
Winter Flounder	1,802	1,909	1,842
Witch Flounder	1,590	1,578	1,608
Yellowtail Flounder	860	903	817

Table 4: ACE Holdings Concentrations for Sectors, by Species – Stock and Year

Species & Stock	ACE HHI (by Sector Name) 2010	2011	2012
American Plaice – All	1,917	1,895	1,901
Cod – Georges Bank (East)	1,444	1,473	1,536
Cod – Georges Bank (West)	1,444	1,473	1,536
Cod – Gulf of Maine	1,285	1,315	1,222
Haddock – Georges Bank (East)	1,495	1,475	1,646
Haddock – Georges Bank (West)	1,495	1,475	1,646
Haddock – Gulf of Maine	2,243	2,194	2,279
Pollock – All	1,893	1,907	1,853
Redfish – All	2,820	2,741	2,880
White Hake – All	2,800	2,838	2,743
Winter Flounder – Georges Bank	2,053	2,451	2,467
Winter Flounder – Gulf of Maine	1,162	1,457	1,491
Winter Flounder – S. New England/Mid-Atlantic Bight	none	none	none
Witch Flounder – All	1,590	1,578	1,608
Yellowtail Flounder – Cape Cod/Gulf of ME	978	1,062	1,052
Yellowtail Flounder – Georges Bank	1,338	1,515	1,528
Yellowtail Flounder – S. New England	1,631	1,450	1,399

Table 5: Number of Sector "Firms" by Species - Stock and Year

Species & Stock	Number of Sectors 2010	2011	2012
American Plaice – All	18	20	21
Cod – Georges Bank (East)	19	20	21
Cod – Georges Bank (West)	18	20	21
Cod – Gulf of Maine	18	20	21
Haddock – Georges Bank (East)	18	20	21
Haddock – Georges Bank (West)	18	20	21
Haddock – Gulf of Maine	18	20	21
Pollock – All	18	20	21
Redfish – All	18	20	21
White Hake – All	18	20	21
Winter Flounder – Georges Bank	18	20	21
Winter Flounder – Gulf of Maine	18	20	21
Winter Flounder – S. New England/Mid-Atlantic Bight	None	None	None
Witch Flounder – All	18	20	21
Yellowtail Flounder – Cape Cod/Gulf of Maine	18	20	21
Yellowtail Flounder – Georges Bank	18	20	21
Yellowtail Flounder – S. New England	18	20	21

If sectors were to combine members' ACE holdings and market them jointly, there would be concerns regarding the effect of this conduct on competition (and it may also raise potential legal concerns for which sectors should seek counsel). However, discussions with sector managers and others indicate, without exception, that sectors do *not*, in fact, operate to maximize the joint value of the ACE allocated to the sector. No stakeholder reported that sector members allow sector managers to control members' individual holdings. Instead, sectors allocate ACE to individual members who manage their ACE independently. The incentives of individual sector members lead strongly to this result. If a sector did not contractually agree to allocate ACE in proportion to a member's PSC contribution, the member would have an incentive to join another sector that offered a better deal. If sectors later changed their treatment of individual members'

ACE adversely, a member would have an incentive to go to another sector to get a better deal when the opportunity arose. Sectors have responded to these incentives by allowing individual members control over the ACE they effectively bring to the sector.

Sector managers also developed a system for sharing information on offers to buy and sell ACE with their sector members. They must also make the inter-sector trades for their members. However, the individual sector members manage the ACE that the sector allocates to them independently. No sector manager we interviewed indicated that he makes decisions regarding the disposition of members' ACE, except possibly that a member will instruct a manager to sell ACE that the member will not use at the best available price.[32] In other instances, sector managers take on more of a broker role and will advise sector members on the prices at which ACE are trading and options for maximizing the value of the individual's ACE holdings. However, the individual sector member retains decision-making control over the disposition of his ACE.

The institutional structure of sectors allows the individual sector members to control the ACE their sectors allocate to them. This means that large concentrations of quota in a sector are not likely to be a threat to competition. Furthermore, none of the stakeholders communicated any instances of sectors acting to withhold ACE from being utilized by vessel operators, or otherwise exercise inordinate control. If the institutional structure of the sectors were to change, then the potential for sectors to be a source of coordination among their member's catch entitlements should be reevaluated.[33]

2. Large Individual Accumulations of ACE Acquired within a Season through the Lease Market

If individual permit owners make decisions regarding the ACE they come to control through the PSC they contribute to their sectors, it is necessary to determine the conditions under which individuals could exercise market power in the markets for ACE. The economic issue is whether individuals could exercise market power in ACE markets by acquiring ACE within the fishing year. For this analysis, we assume that the initial

[32] For example, a sector member operating in Maine may have no use for ACE allowing the harvest of southern New England stocks.

[33] For example, the existence of an organized sector can provide a mechanism for individual sector members to coordinate their activity. Explicit collusion would violate antitrust laws. Implicit coordinated behavior among competing harvesters in a sector to withhold output (of fish or ACE) may be ineffective without some sort of enforcement mechanism (since each member has an incentive to "cheat" and increase output), and the current institutional structure does not allow sectors to enforce long-term compliance – members can switch sectors (or start new ones) after any fishing season.

allocations of ACE to permit owners are unconcentrated.[34] We address competitive issues surrounding the initial allocation in Section 3 below.

Exercising market power through the acquisition of ACE within a season faces a number of impediments. The first is that a permit owner attempting to "corner" the market on a species' ACE would have to expend significant resources to create a large position. Once the position is created, demand for the ACE would have to remain sufficiently high that it could be sold back into the market at a profit. Of course, if there were significant demand for the ACE in the fishery, the permit holder creating the large position would be competing with others to buy the ACE as he created his position. This would be difficult to do anonymously and would drive up the price of ACE during the period of acquisition. Of course, the strategy is to acquire the ACE at a low price and to sell it at a high price. Driving up the price of ACE in the course of establishing a position that may confer market power works against the strategy. In short, basic supply and demand analysis and mathematics indicate that such a strategy is not logically impossible, but it is unlikely to be pursued profitably.

This strategy for exercising market power is also subject to substantial uncertainty because conditions in the fishery regularly change. Fishermen clearly have expectations each fishing year regarding which species' ACE will be in short supply. However, there is also substantial uncertainty regarding what species will be available in the fishery. Moreover, sometimes the catch of a particular species picks up in the middle of the fishing year, which influences the value of the species' ACE. There can also be within-season adjustments to ACLs that negatively influence the value of ACE.

The likelihood of successfully exercising market power by acquiring a large position in one or more stocks' ACE during the fishing year is quite low and would likely be detected if it were attempted. The strategy requires that the acquirer "guess right" at the beginning of the fishing year about which stock's ACE will become valuable during the year. In addition, the strategy requires that most other permit owners fail to "guess right" about which stock's ACE will be valuable while the large position is accumulated. Thus, the exercise of market power in the within-season market for ACE is a risky strategy that requires some measure of luck.[35] Therefore, is unlikely to be persistently repeated as would be necessary for it to be a meaningful competitive concern.

[34] The initial allocation was based on catch history, and our calculation of HHIs indicates that the resulting allocation was unconcentrated.

[35] If the permit owner accumulating the large position is acting on the basis of superior knowledge of the fishery, the "investment" in ACE reflects this knowledge and is not properly referred to as an exercise of market power as long as the buyer ultimately sells or uses the ACE it acquired.

3. The Potential for Individual Permit Owners to Exercise Market Power

Sectors effectively grant back ACE to their members in proportion to the PSC that members contribute to the sector. Thus, the sector system would allow an entity with a large share of the PSC for a stock or stocks to control a large ACE position if the entity owned permits that provided a large PSC position. Control of ACE that comes about through a permanent ownership position creates a greater risk of the exercise of market power than in-season accumulation through leasing because the position does not need to be acquired within the fishing year. Therefore, the cost of acquiring the position does not provide a disincentive to the attempt to engage in the exercise of market power.

The analysis of the exercise of market power based on a large permanent ownership position in permits that provides control of a large share of one or several stocks' ACE begins with the presumption that the large position is in place. As described above, the willingness to pay for a particular stock's ACE will vary among fisherman depending on their own holdings of ACE for the stock and their ability to avoid the stock while targeting other stocks. This means that an entity with a large position in the ACE for a stock that is in demand would be able to withhold some of that ACE and raise the price in the market for ACE.

There is currently no entity operating in the fishery that would be at all likely to succeed a successfully raising the price of ACE by withholding it from others in the fishery. The ownership of PSC contributed to sectors is highly dispersed. Table 6 shows the concentrations of ownership of PSC (*i.e.*, HHIs) for the species with ACE allocations in the fishery; Table 7 shows the concentrations by specific stocks; and Table 8 shows the number of GroupIDs with positive holdings that went into the calculation of concentration measures in Table 7 (GroupIDs with no landings are not reported on Table 2, and have no impact on the concentration measures in Table 1).

These tables show that the HHIs for each species and for specific stocks are in the unconcentrated range. The highest level of concentration for an individual species is 668, and the highest level for a specific stock is 789. These low levels of concentration mean that there cannot be any particularly large holders of any individual stock's PSC, relative to the size that would be a competitive concern. Evaluation of the shares of the largest holders of PSC for each stock show this is the case, with the largest ownership share of any stock's PSC being about 12 percent (only a small portion of the entire market. Ownership shares of this magnitude are not a threat to competition (for the Agencies, monopolization concerns do not arise shares of this magnitude) and are consistent with low measures of concentration. In addition, these relatively small top ownership shares exist in an environment where there are also tens or hundreds of smaller owners of the PSC for each stock. These smaller owners will not have the incentive or ability to behave anticompetitively because they have no prospect of profitably raising prices.

Table 6: ACE Holdings Concentrations for GroupIDs, by Species and Year

Species	ACE HHI (by GroupID) 2010	2011	2012
American Plaice	228	199	201
Cod	127	133	149
Haddock	442	429	452
Pollock	201	198	200
Redfish	362	353	352
White Hake	281	236	223
Winter Flounder	668	524	568
Witch Flounder	214	193	196
Yellowtail Flounder	193	159	132

Table 7: ACE Concentrations for GroupIDs, by Species – Stock and Year

Species & Stock	ACE HHI (by GroupID) 2010	2011	2012
American Plaice – All	228	199	201
Cod – Georges Bank (East)	268	247	267
Cod – Georges Bank (West)	268	247	267
Cod – Gulf of Maine	127	141	135
Haddock – Georges Bank (East)	450	439	463
Haddock – Georges Bank (West)	450	439	463
Haddock – Gulf of Maine	254	246	226
Pollock – All	201	198	200
Redfish – All	362	353	352
White Hake – All	281	236	223
Winter Flounder – Georges Bank	773	677	789
Winter Flounder – Gulf of Maine	164	190	188
Winter Flounder – Southern New England/Mid-Atlantic Bight	None	None	None
Witch Flounder – All	214	193	196
Yellowtail Flounder – Cape Cod/Gulf of Maine	180	147	141
Yellowtail Flounder – Georges Bank	348	290	333
Yellowtail Flounder – Southern New England	137	139	158

Table 8: Number of GroupID "Firms," by Species - Stock and Year

Species & Stock	Number of GroupID "Firms" 2010	2011	2012
American Plaice – All	483	432	425
Cod – Georges Bank (East)	620	556	556
Cod – Georges Bank (West)	620	556	556
Cod – Gulf of Maine	595	523	522
Haddock – Georges Bank (East)	447	415	405
Haddock – Georges Bank (West)	447	415	405
Haddock – Gulf of Maine	458	406	408
Pollock – All	635	570	562
Redfish – All	424	375	373
White Hake – All	549	494	485
Winter Flounder – Georges Bank	428	391	381
Winter Flounder – Gulf of Maine	500	445	445
Winter Flounder – Southern New England/Mid-Atlantic Bight	None	None	None
Witch Flounder – All	531	475	466
Yellowtail Flounder – Cape Cod/Gulf of Maine	466	416	411
Yellowtail Flounder – Georges Bank	372	337	331
Yellowtail Flounder – Southern New England	449	396	388

As with landings, for ACE there is no time trend in the level of concentration across all stocks. Also, the number of GroupIDs with positive ACE holdings in each stock is much higher (and has declined less) than the number of GroupIDs with positive Landings (from Table 2).

As noted in Section IV.A, this broad definition of ownership leads to an overstatement of the shares of PSC held and controlled by individual entities. Overstating individual shares will *increase* the measured level of concentration of permit ownership in the fishery relative to an ownership definition that better reflects who has decision-making authority regarding the ACE that flows from a permit. Thus, the analyses of concentration that we obtain using this ownership definition will overstate the level of concentration of ownership and tend to understate the degree of competition in the fishery.

Finally, we also identified substantial underutilization of the 15 groundfish stocks with groundfish fishery allocations. In FY10, FY11, and FY12, there were four, six, and eight stocks, respectively, where less than 50% of the groundfish sub-ACL was caught. The less used stocks include Georges Bank haddock, redfish, pollock, plaice, and the winter flounder stocks.[36] The fact that ACE went unused accounts in part for the difference between concentration for ACE holdings and concentration for landings (and the remainder of the difference in concentration comes from ACE trading during the season).

V. Analysis of Excessive-Share Caps

We are now at the point where we can establish a process for evaluating the necessity of or appropriate levels of excessive-share caps for the Northeast Multispecies Fishery. In this section, we apply the economic analysis in Section IV to provide a recommendation regarding "the maximum possible allowable percentage share of the market for the fishery" that is consistent with the control of market power.

As noted previously in Section II.B., we (along with Robert Willig) previously conducted a similar analysis for the National Marine Fishery Service ("NMFS") and the Mid-Atlantic Fishery Management Council regarding accumulation limits for Surfclams and Ocean Quahogs, culminating in a published report similar to this one ("SCOQ Report").[37] Although many details of the Surfclam and Ocean Quahog Fishery are substantially different from the Northeast Multispecies Fishery, our work here has been guided, in part, by a general framework developed for the SCOQ Report. The peer-review panel for the SCOQ Report determined that this general framework was an appropriate approach to use for analyzing excessive share limits for catch share fisheries.

The recommendation is presented in a series of steps that address information requirements and other considerations that affect the level of the excessive-share cap and its administration.

[36] No stock has had its entire groundfish sub-ACL caught within a given fishing year, but if that were to occur, then the entire fishery would close. On a sector level, if a sector catches its entire ACE for a stock, then the sector must cease all groundfish fishing until it leases more ACE from another sector. In sum, there are many factors that drive the use of available catch.

[37] Mitchell, G., Peterson, S., and Willig, R. "Recommendations for Excessive Share Limits in the Surfclam and Ocean Quahog Fisheries," May 3, 2011; Compass Lexecon, Boston.

A. Step 1: Assess the Availability of Information on Permit Ownership and Control

To implement and manage an excessive-share cap or regulation to control the level of concentration of fishery access rights, the regulator must be able to accurately calculate existing ownership shares and levels of concentration. To do this, the regulator must be able to clearly define what constitutes ownership and control of the permits that give rise to the control of PSC and ACE. This requires being able to identify permit owners and the affiliations among owners.

The relevant owner(s) of a permit for the purposes of regulating ownership shares are the parties that make decisions about how the PSC and ACE associated with the permit will be used or sold. These parties have the ability and incentive to make the decision to withhold ACE from the market and are the parties who would reap the benefits of doing so. These parties would benefit from changes in the price of ACE.

The economic analysis above was performed using the GroupID definition of ownership. GroupID does not reliably define owners that actually control permits or reflect the ownership shares of separate entities included in the GroupID. Individuals included in a GroupID may not have an ownership interest in each permit included in the GroupID. Excessive-share caps should be applied to entities that actually have ownership and control of permits and their associated PSC and ACE.

Where there is substantial overlap in the ownership of permits involved in a transaction, determining who the owners with control over permits and the shares of ownership of permits would require that additional details about ownership terms be made available to NMFS (e.g. NMFS doesn't have data on individual's ownership shares of permits). In practice, these information requirements are not likely to be important to the vast majority of transactions. If a transaction will raise the ownership share of a particular GroupID, but the post-transaction share is not near the excessive-share cap, there is no need for additional information. Only when a transaction would lead to a particular GroupID's share of access rights exceeding the cap would it be necessary to request additional information to determine whether the excessive-share cap would, in fact, be surpassed by any independent entity that is included in the GroupID.

Long-term leases can provide the lessee with effective ownership and control of the access rights for the term of the lease. In all of our discussions with industry participants, no one claimed to know of any long-term lease agreements currently in existence, and we understand they are not currently permitted. However, any effective measurement of ownership and control would require reporting of the terms of any long-term lease agreements if they existed.

B. Step 2: Assess the Availability of Competitive Information

A regulator relying on the framework provided in the *Horizontal Merger Guidelines* must have the information necessary to evaluate the state and nature of competition in marketplace in a manner consistent with the *Guidelines*. As noted, the competitive context in which a consolidating transaction takes place matters. In some markets, high concentration is consistent with vigorous competition, while in others concentration threatens the competitive process.

We leave open the question of determining the relevant market for the output of the fishery. While there is substantial evidence of a broad market for each species that includes fish (and, in some cases, fish products) from outside the fishery, and there is some evidence of substitution across species, we have not identified sufficient information or data to rule out the possibility that more narrow relevant markets exist for specific species or sources of fish, or for specific time periods or geographic locations. Nevertheless, there is no evidence that any stakeholder in the fishery has the ability to exercise market power in the markets for fish.

We have also determined that the exercise of market power in the markets for in-season ACE sales through the accumulation of ACE within a season is economically untenable. As such, market power issues for the purchase and sale of ACE can be addressed based on control of access rights that persists across multiple seasons – and this depends on ownership and control of permits and the associated PSCs.

Furthermore, an excessive-share cap related to the permanent control of access rights across multiple seasons will not only address market power concerns in the markets for ACE, but will also address market power concerns (to the extent there are any) in the markets for fish. A rule that limits permit acquisitions based on the share of PSC held by the full portfolio of permits owned will limit the growth of ACE ownership and limit the growth of shares in the output market that could lead to the exercise of market power.

ACE is an input required for catching regulated species in the groundfish fishery. Vessel operators may be able to avoid catching some species some of the time, depending on their gear and fishing location, but as a general rule harvesting fish in the groundfish fishery requires that vessel operators obtain corresponding ACE. Furthermore, ACE that is withheld in the market cannot be replaced by expanding the supply of ACE because that supply is set to predetermined levels based on scientific analysis of the resource. Because vessel operators may need ACE for a particular stock to make use of the ACE they control for other stocks, there are no direct substitutes for a particular stock's ACE. Therefore, the relevant markets for analyzing market power in ACE transactions are the individual markets for each stock's ACE. Although there is some substitution across fishing seasons, these markets are primarily based on the annual ACE allocations, conferred by an owner's PSC.

Finally, permits themselves, with diffuse ownership are only a factor in the exercise of market power through the PSC associated with the permit. Therefore, for the remainder of our analysis, we focus only on an excessive-share cap for PSC (and resulting ACE) under common ownership and control.

C. Step 3: Assess Whether a Cap Is Required

The exercise of market power requires that large owners of PSC or ACE withhold some from the market in order to raise the price of fish or ACE. Of course, when a fishery is output-regulated the regulation of the fishery may restrict output.[38] That is, if the output cap binds, all that can be harvested has been harvested and there is no withholding of output by fishery participants to raise prices. The exercise of market power entails the withholding of output below the regulated level. If the output regulation determines the output of the fishery, then there is no withholding.

If the harvest in a fishery regularly reaches the catch limit, concerns regarding the exercise of market power are reduced because output is at the competitive level, given the regulations in place. This condition is not satisfied in the Northeast Multispecies Fishery, however, which has most species with harvests well below ACL in most years. Harvest levels below the ACL are not evidence of market power. Competitive forces, such as high costs or few fish, can readily lead to catch levels below the ACL. When catch levels are below the ACL, however, we cannot conclude immediately that market power is not a concern. We must determine whether it is competition or market power that is leading to output below the allowed levels. This means that we cannot forego analysis of excessive-share caps.

D. Step 4: Establish Appropriate Concentration Thresholds

The *Horizontal Merger Guidelines* offers little direct guidance on the size at which individual firms become a threat to competition. Previous versions of the *Guidelines* have noted that a firm with a 35% market share could possibly have unilateral market power.[39] The current version of the *Guidelines* offers no such guidance.

Our analysis addresses the maximum excessive-share cap that will limit the exercise of market power or other forms of influence over markets consistent with

[38] Harvesting may stop in the fishery when the output limit is reached for only one stock. If the stock cannot be entirely avoided, no vessel without rights to harvest that stock can fish. Thus, the output regulation may be binding on the harvesting of all species even if the harvest of only one species reaches is catch limit.

[39] U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, Revised April 8, 1997, p. 25.

inordinate control. On this basis, we propose to define an excessive-share cap that ensures that the concentration of the fishery remains at levels that make the exercise of market power unlikely. Given that a cap treats all firms symmetrically, the cap will be set so that if all remaining firms were to grow to reach the cap, the HHI in the fishery would remain below a certain target level. In developing a cap recommendation, we also evaluate whether the implied size of the firms at the cap is likely to be too small to be efficient.

As a starting point, a low level of concentration within the framework presented in the Merger Guidelines (HHI under 1500), would be consistent with absence of substantial market power. It is also the current state of the markets related to the Northeast Multispecies Fishery. For landings, the HHI at the GroupID level has been lower than 1500 for all but one species (Table 1). Given that many of the species face competition from other sources of product outside the fishery, the HHI for the relevant product markets may be substantially lower. For ACE, the HHI at the GroupID level has also been lower than 1500 (Tables 6 and 7).

It is also important, however, to consider whether a specific target level of concentration may create efficiency concerns by being too low. The most likely concern would be whether there are efficiency gains from scale that would be prevented if the fishery had to remain in the low concentration range. As noted above, the Agencies often allow mergers that result in moderate levels of concentration and may also allow mergers that result in high levels of concentration – provided there are sufficient efficiency gains to offset the concentration increase.

The existence of some larger fleets indicate there are opportunities for economies of scale within the Northeast Multispecies Fishery or at least that efficiency concerns do not preclude larger fleets. However, our analysis indicates that these economies can be reached at relatively low levels of industry concentration. First, there has been little or no increase in concentration during the three years that we analyzed, despite the fact that no cap on share accumulation has been in place. Moreover, the distribution of small and large operators active in the fishery has remained fairly stable, according to the data on landings. There are relatively few owners with more than 10 percent of an individual stock's ACE, and the largest owners have no shown substantial movement to increase their ownership shares. Thus, when presented with the opportunity to grow, there is no market evidence that operators chose to grow above the largest levels we see today.

Note that the issue here is not whether there are incentives for consolidation in the fishery as the result of the change in regulation to output regulation rather than input regulation. In all likelihood, input regulation offered protections to some inefficient operators. Moreover, the determination of the PSC associated with certain permits undoubtedly has left some permit owners at a disadvantage relative to the earlier regulations, and some of these may find they have no choice but to leave the fishery. The issue here is whether there is any efficiency reason to allow for the ownership of access

privileges by a single entity above about 15 percent of all privileges for a stock. We do not find any reason based on increasing efficiency as the result of increasing size to recommend a target level of concentration for shares to rise above about 15 percent or for the concentration of ownership for a stock to rise above 1500.

E. Step 5: Determine the Share Limit Associated with the Target Concentration Level

The share cap required to ensure a target concentration in the low range (HHI below 1500) depends on the portion of the relevant market served by suppliers outside the regulated fishery, and also depends on the size of a "competitive fringe" of small suppliers. A competitive fringe is made up of small firms with, say, ownership shares of about 1 to 2 percent. These firms are too small to influence prices and will behave competitively in response to attempts to exercise market power. For the output markets (where fish are sold), outside sources of supply and the total size of the competitive fringe are large, which means that a large excessive-share cap could still ensure low concentration in the relevant output market. For ACE, however, there are no outside suppliers. So the determination of the excessive-share cap should be based on ACE concentration, which reflects the presence of the competitive fringe but not outside sources of supply.

Currently for several species, much of the ACE is distributed among entities with very small holdings. For cod in 2012, for example, over 40 percent of the ACE was distributed among GroupIDs with less than 1 percent share, and over 60 percent of the ACE was distributed among GroupIDs with less than 2 percent share. For some species, however, there is only a small amount held by a "competitive fringe" – for Redfish in 2012, for example, only 5 percent of ACE was distributed to GroupIDs with less than 1 percent share, and only 15 percent among GroupIDs with less than 2 percent share.

If small operators (*i.e.*, those owning at most about 1 to 2 percent of a stock) are efficient, then they are likely to remain in the fishery and help preserve a competitive market structure. A couple of examples help illustrate how the competitive fringe can affect the determination of an excessive-share cap.

1. When 38 percent of the owners hold less than 2% share, a cap of 25 percent will prevent the HHI from exceeding 1500. With such a cap, the most concentrated the market can be is to have two suppliers at 25 percent, one at 14 percent, and the remaining competitive fringe accounting for the balance. The HHI would be 1470 ($25^2 + 25^2 + 12^2 + 76 = 1470$).[40]

[40] The calculation is as follows: $25^2 = 625$; $12^2 = 144$; and $19*2^2 = 19*4 = 76$. 625+625+144+76=1470.

2. When there is no competitive fringe, a cap of about 15.5 percent would be required to prevent the HHI from exceeding 1500. With such a cap, the most concentrated the market can be is to have six suppliers at 15.5 percent and one at 7.0 percent. The HHI would be 15.5*15.5*6= 1441.5, plus 7*7=49, which sums to 1490.5.

In summary, an excessive-share cap of about 15 percent would be sufficient to ensure low concentration for ACE regardless of the level of the competitive fringe. The large competitive fringe for some species could allow for a higher share cap, should the NEFMC choose to recommend separate caps for different species.

F. Step 6: Identify Regulatory and Practical Constraints

As discussed above, the NMFS is able to track ownership of permits with reasonable detail and to track the PSC associated with each permit. Specifically, NMFS knows the names of the owners of each permit, but not their ownership shares. There is no reasonable likelihood that permit owners, starting from a competitive initial permanent allocation of PSC could acquire sufficient ACE to gain market power within a season. Thus, it is only necessary for the NMFS to track permanent ownership of ACE.

The primary shortcoming of the current regulatory data management is the inability to identify controlling ownership when permits have multiple owners. Our analysis has been conducted based on GroupIDs, which assign common group ownership among all permits for which at least one other permit shares a common owner, regardless of whether that common owner has controlling interest. Under an accumulation limit based on GroupIDs, an owner seeking to expand could come up against an accumulation limit because of minority interest in other permits or as the result of the GroupID containing permits in which the owner has no interest. For example, suppose Permit 1 is owned by A and B and has 10 percent share of PSC for a stock, and Permit 2 is owned by B and C and has 5 percent share of PSC for the same stock. If C wants to acquire Permit 3, with a 5 percent share of PSC for the same stock, then the total share for the GroupID would rise from 15 to 20 percent. Permits 1 and 2 are grouped into the same GroupID, even though C has no ownership share in Permit 1 and no control over how the PSC allocated to Permit 1 (and the associated ACE) gets used. Using the share of access privileged held by the GroupID that includes this owner is not consistent with the goals for establishing accumulation limits. Such an owner, in fact, owns and controls a share of privileges well below the assumed cap and allowing the owner to purchase additional access privileges will not threaten competition.

It seems likely, however, that this shortcoming could be addressed on a case-by-case basis by seeking out additional information on ownership shares within a permit only as needed. First, there are relatively few GroupIDs with large ownership shares, and it would be an unnecessary burden to require every single permit holder to specify ownership details. It is also unnecessary. If a permit transaction does not indicate that a

GroupID would rise above the excessive-share cap, then there is no risk that an individual operator would rise above the cap.

In the event that a proposed permit transaction would lead to a PSC share for a GroupID that exceeds the determined excessive-share limit, the owner(s) of the permits could provide to NMFS detailed breakdowns of ownership within each permit (*i.e.,* for Permit 1 owner A has 90 percent and Owner B has 10, for Permit 2 owner A has 10 percent and Owner B has 90 percent, etc.). NMFS could recalculate the PSC based on the detailed breakdown of ownership, assigning to each owner only a share of PSC for each permit. If the resulting calculation leads to a PSC below the accumulation limit with the proposed permit transfer, then the transfer could be permitted to proceed. Ownership information that is more detailed than that which NMFS already collects would only be needed rarely. Moreover, it would be in the interests of permit buyer to provide the detailed information that would allow a transaction flagged by a high post-transaction GroupID share to demonstrate its ownership share will remain below the excessive-share cap.

Finally, there appears to be no regulatory requirement that a share cap be established at the same level for each species and geographic delineation for which ACLs are determined. In the course of our analysis, we identified no major issues related to market power that would lead to differentiated share caps across different species (or geographic delineations), but it is possible that other goals of Amendment 18 could be addressed through different excessive-share caps on different stocks. For our analysis, we focus on a single excessive-share cap recommendation for each species and geographic delineation, but in the concluding section we discuss reasons that the NEFMC may wish to recommend some variation in the level of the excessive-share cap.

G. Step 7: Set the Excessive-Share Cap

We showed above that an excessive-share cap of 15.5 percent on an individual permit owner's share of PSC for a stock would be sufficient to ensure low concentration for ACE regardless of the level of the competitive fringe. By establishing the excessive-share cap at the level of a stock, the rule will limit ownership share below the cap for most stocks. For example, if a permit owner acquired 15.5 percent of the PSC for Gulf of Maine cod and held lower PSC shares for other stocks, the permit owner would only be able to acquire an additional permit if it conferred no PSC for Gulf of Maine cod. Thus, a 15.5 percent excessive-share cap on each stock would effectively keep permit owners from permanently acquiring an amount equal to the cap for more than one stock. If such an operator needed additional privileges for another stock, it could sell one permit and buy another that conferred a higher relative share of PSC for the desired stock relative to the stock for which the cap had been reached.

Limiting the ownership of PSC for each stock is the appropriate way to measure the permanent fishery access privileges permits confer. It is not sensible to limit the

number of permits that an individual can own. Many permits confer very low shares of the PSC for any stock. What matters economically is the share of a stock that a single entity has rights to harvest, not the number of permits that have been combined to assemble that bundle of access rights.

We find no evidence that a cap on the share of privileges held by a single sector should be subject to a cap for the purpose of controlling market power or avoiding inordinate control over market outcomes. If it becomes apparent that a sector is combining the ACE conferred by its members' PSC to influence markets to the advantage of its members, this conclusion would change. However, all reports are that individual permit owners control the ACE that they are allocated by their sectors. Thus, sectors are the official parties to any ACE trade, but the sectors will adjust their members' ACE holdings as if the trade were between individuals. Thus, the individual permit holder is the correct economic entity to which to apply the excessive-share limit. By extension, this reasoning indicates that sectors associated with an organizing body, such as the Northeast Seafood Coalition, do not pose a threat to competition as well.

Finally, we do not recommend limits on the accumulation of ACE within a season or other limits on ACE trading. Market power is the persistent ability of a firm or firms to increase prices above the competitive level. As long as the initial allocations of ACE are competitive, as they currently are, there is a very low likelihood that an individual permit holder could *profitably* establish a position in a stock's ACE within a season that would allow the exercise of market power. The likelihood that such an event could occur persistently over multiple fishing years is lower still.

Clearly, with no limit on ACE trading within a fishing year, we find no evidence that a limit on landings would protect competition. Moreover, such a limit has the potential to harm efficiency. It should also be recognized that NMFS has little control over the concentration of landings in the fishery because NMFS has no control over which operators will target a particular stock. If only a few operators were to find it in their interest to target a particular stock, landings will be concentrated even if the PSC or ACE holdings for the stock are highly dispersed.

The large competitive fringe for some species could allow for a higher share cap, should the NEFMC choose to recommend different caps for different stocks to NMFS. Given the fluctuations present in the industry, however, and the lack of evidence indicating there would be any loss of efficiency with a 15.5 percent cap, our recommendation is to adopt the simple policy of a 15.5 percent excessive-share cap of the PSC held for each individual stock. This balances protection of competition and avoidance of a permit owner gaining inordinate control over access rights that would allow it to influence markets in the fishery with the need to allow for the benefits of scale to be realized where possible.

To recap, we conclude that there is no need for an excessive-share cap on sector-affiliated ACE separate from an excessive-share cap on the PSC associated with permits under common ownership. We also we conclude that there is no need for an excessive-share cap on landings (or on permits). Such additional caps would be redundant, would not provide any additional protection against the exercise of market power, and could create inefficiencies from over-regulation. Our recommendation is for an excessive-share cap only on PSC associated with permits under common ownership.

VI. Conclusion

The evidence we analyzed does not support a conclusion that market power is currently being exercised in the fishery. In particular, market power is not being exercised through the withholding of ACE in any part of the groundfish fishery.

With respect to recommending excessive-share caps:

1. The information NMFS has on permit ownership may not be sufficient, for all potential permit transactions, to reliably define ownership and control of permits and the PSC they confer.

2. There is sufficient competitive information to determine that the relevant markets for ACE trading are the markets for the trading of each stock's ACE. If an operator requires the ACE for a particular stock, there is not a good substitute available.

3. We cannot exclude the possibility of the exercise of market power as the result of the fishery's output regularly reaching the regulated level, which would indicate competitive conduct within the framework of the output regulation. Thus, examination of appropriate caps is necessary..

4. It is reasonable for the NEFMC to recommend that NMFS establish an excessive-share cap to maintain *unconcentrated* (HHI below approximately 1,500) distribution of PSC by capping individual the PSC for each stock that can be conferred to any permit owner.

5. The cap required to ensure an HHI below 1,500 would be 25 percent with a competitive fringe of 38 percent, or 15.5 percent with no competitive fringe.

6. Sectors do not own or control PSC or ACE. Therefore, capping the amount of PSC or ACE held in the aggregate by members of a particular sector would not provide protections against the exercise of market power or the development of inordinate control.

7. We suggest using the grouping of permits by common ownership (based on information already available) for an initial determination of whether a permit transfer exceeds a share cap, but allowing for an optional follow-up submission of detailed ownership information prior to final determination.

8. We recommend setting an excessive-share cap so that no permit owner owns or controls permits conferring more than 15.5 percent of the PSC for a stock.

The excessive-share caps recommended here are at a level that would allow for substantial additional consolidation in the fishery. All ACL categories currently have ACE concentration indices well below 1,500, and all have over a hundred market participants. It is possible with an excessive-share cap of 15.5 percent for an ACL category to move to an ACE concentration of 1,500 and have only seven market participants. This would be substantially more consolidated than the current situation. However, just because something is possible does not mean that it is likely to happen. There has been no common pattern within the groundfish fishery since 2010 despite there being no excessive-share cap. Nevertheless, it is possible that a great deal of consolidation could occur – but our analysis leads us to conclude that even a great deal of consolidation would not lead to the ability to exercise market power, provided no market participant controlled more than 15.5 percent of the PSC for a given stock.

Our recommendation for an excessive-share cap is based solely on Goal #4 of Amendment 18. An excessive-share cap is unlikely to promote Goals #1-3 of Amendment 18 effectively. These goals should be pursued more directly by through the use of other regulatory requirements that can function in concert with transferable ACE based on ACL and directly encourage diversity.

Our recommendation is for an excessive-share cap only on PSC or any stock in the fishery associated with permits under common ownership and control. That cap should be set at 15.5 percent. We conclude that there is no need for an excessive-share cap on sector-affiliated ACE separate from an excessive-share cap on the PSC associated with permits under common ownership. Our analysis shows that sectors are not the relevant nexus of control of how ACE is utilized. However, if sectors were to develop institutional structures that allowed them to exercise control over how vessel operators utilized ACE, it would be necessary to re-examine this conclusion. We also we conclude that there is no need for an excessive-share cap on landings or directly on permits. Such additional caps would be redundant, would not provide any additional protection against the exercise of market power, and could create inefficiencies from over-regulation.

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Useful Terms

Beneficial Owner: The owner or owners who control an asset and benefit from its use or sale

Common Property Resource: A resource that is available to all, absent regulation. With no ability to exclude potential users, the resource will frequently be over exploited.

Competitive Fringe: A group of small firms with 1 to 2 percent market shares. These small firms have no prospect of profitably influencing the prices in markets and will behave competitively. Their competitive conduct limits the potential for the successful exercise of market power by others.

Market Power: The ability to profitably raise prices in a market by withholding supply from that market. In order for the exercise of market power to be profitable, it must be the case that other firms will not replace the supplies withheld.

Relevant Market: A market that contains the products or services and sources of supply of those products or services that customers regard to be good substitutes or as being reasonably interchangeable.

Rents: The payment to a resource above the amount required to keep it in its current use.

Appendix B

T42-12 v 20 May 2014 Final

Statement of Work

External Independent Peer Review by the Center for Independent Experts

Evaluation of the study:
"Recommendations for Excessive Share Limits in the Northeast Multispecies Fishery"

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Representative (COR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance with the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee, and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: The New England Fishery Management Council (NEFMC) has been developing Amendment 18 to the Northeast Multispecies Fishery Management Plan, and as part of the Amendment, has been attempting to define an "excessive share" threshold for the fishery. All federal fishery management plans must comply with National Standard 4 of the Magnuson Act (16 *U.S.C.* 1851(a)(4)), requiring that fishing privilege allocations be carried out so that "no particular individual, corporation, or other entity acquires an excessive share of such privileges." During the course of the Council's deliberations, it was decided that additional expertise from an external contractor was needed to help determine if excessive shares exist in the fishery today and describe potential constraints that could prevent excessive shares from existing in the future. In order to provide this expertise, the economic consulting firm Compass Lexecon was contracted to give advice on an appropriate excessive share threshold for the Northeast Multispecies Fishery.

Compass Lexecon defined an "excessive share" as a share of access privileges and/or quota leasing that would allow an entity to influence the prices of fishery outputs to its advantage, or to have market power. The research involved receiving input from fishery stakeholders via surveys and interviews and analyzed NMFS fishery data. Compass Lexecon assessed available models for evaluating the presence of market power, and made recommendations with regard to their appropriateness for setting excessive catch share limits.

The work performed could be controversial. Examination of market power has never been formally investigated in this fishery. It recommended methods for determining excessive shares which might be applied in other fisheries. With the increased prevalence of catch share management systems, determining what constitutes an excessive share and whether limits need to be put in place is extremely important, because excessive shares may lead to market power. Market power can lead to the ability to influence price in either the final product market or in factors of production (i.e. the fish resource). Thus, the study by the Compass Lexecon was innovative and significant.

Compass Lexecon delivered its final report to the NEFMC on December 31, 2013, and a peer review (by the CIE) needs to take place to either endorse or reject their findings. Because Compass Lexecon was contracted by the NEFMC, the Northeast Fisheries Science Center (NEFSC) agreed to coordinate the review of the report on behalf of the NEFMC. The NEFSC has asked the CIE to formally conduct a review of the report.

The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have working knowledge and recent experience in the application of economics, with specific expertise in industrial organization. The reviewers should have theoretical and empirical expertise in the economics of market structure/conduct/performance, particularly monopoly/oligopsony, antitrust, firm strategy, and government regulation. Experience conducting studies using econometric models and/or index-based assessments of market concentration and market power would be useful. Experience with markets operating under government permits such as production permit or marketing orders in agriculture, bandwidth for TV and radio, and tradable permit systems would be desirable. Empirical studies of market structure in renewable resource industries would be desirable as would an understanding of the statutory context for antitrust regulation. Each CIE reviewer's duties shall not exceed a maximum of 16 days to complete all work tasks of the peer review described herein.

Not covered by the CIE, the CIE chair's duties should not exceed a maximum of 16 days (i.e., several days prior to the meeting for document review; the CIE panel meeting; several days following the panel meeting for Summary Report preparation).

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting. A meeting room has been reserved at the Hawthorne Hotel, 18 Washington Square West, Salem, Massachusetts 01970 on June 12 and 13, 2014.

Statement of Tasks: Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

1. Prior to the Peer Review Meeting:

Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email, FAX) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair (see below) a copy of the SoW, background documents and final report in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, home country, and FAX number) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html.

Pre-review Background Documents: Approximately two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

2. During the Panel Meeting

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements).

The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

(Review Meeting Chair)

A member of the New England Fishery Management Council's Scientific and Statistical Committee will serve as Chairperson. The role of the Chair is to facilitate the meeting, which includes coordination of presentations and discussions, and making sure all Terms of Reference are reviewed. Additionally, the Chair shall prepare the summary report from the meeting. During the meeting, the Chair can ask questions or make statements to clarify discussions, and he can move the discussion along to ensure that the CIE reviewers address all of the TORs.

(CIE Reviewers)

Each CIE reviewer shall participate as a peer reviewer in a panel discussion centered on a report furnished to the NEFMC by Compass Lexecon regarding excessive shares in the Northeast Multispecies Fishery. Reviewers are to determine whether the findings of the Technical Group are valid given the Terms of Reference provided to the expert panel. If reviewers consider the recommendations of the expert panel to be inappropriate, the reviewers should recommend an alternative.

(Compass Lexecon)

A representative from Compass Lexecon shall provide a presentation of their final report. During the question and answer period, the Compass Lexecon representative will be available to answer questions about the report. The CIE members can provide feedback to Compass Lexecon at that time.

(Other Panel Members)

A staff representative from the NEFMC and from the NEFSC Social Sciences Branch will be available during the meeting to provide any additional information requested by the CIE reviewers. These other panel members may assist the Chair in preparing the summary report, if requested.

(Public)

Day 1 of the panel meeting will be open to the public to attend as observers. The agenda will allow for limited public comment.

3. After the Open Meeting

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: The Chair from the SSC and CIE reviewers will prepare the Peer Review Summary Report. Each CIE reviewer will discuss whether they hold similar views on each Term of Reference and whether their opinions can be summarized into a single conclusion for all or only for some of the Terms of Reference. For terms where a similar view can be reached, the Summary Report will contain a summary of such opinions. In cases where multiple and/or differing views exist on a given Term of Reference, the Report will note that there is no agreement and will specify - in a summary manner – what the different opinions are and the reason(s) for the difference in opinions.

The Chair's objective during this Summary Report development process will be to identify or facilitate the finding of an agreement rather than forcing the panel to reach an agreement. The Chair will take the lead in editing and completing this report. The Report (please see Annex 1 for information on contents) should address whether each Term of Reference was completed successfully. For each Term of Reference, this report should state why that Term of Reference was or was not completed successfully.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting in Salem, Massachusetts during June 12-13, 2014 as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
3) No later than 27 June, 2014, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts", and the report should be sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and Dr. David Sampson, CIE Regional Coordinator, via email to david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in **Annex 1**, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

5 May 2014	CIE sends reviewer contact information to the ST Coordinator, who then sends this to the NMFS Project Contact
26 May 2014	NMFS Project Contact sends the CIE Reviewers the pre-review documents
12-13 June 2014	Each reviewer participates and conducts an independent peer review during the two-day panel review meeting
27 June 2014	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
7 July 2014	Draft of Summary Report, reviewed by all CIE reviewers, due to panel Chair *
14 July 2014	Panel Chair send final Summary Report, approved by CIE reviewers, to NEFSC contact
14 July 2014	CIE submits CIE reports to the ST Coordinator
21 July 2014	The ST Coordinator distributes the final CIE reports to the NMFS Project Contact and regional Center Director

*The Summary report will not be submitted, reviewed, or approved by the CIE

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COR within 10 working days after receipt of all required information of the decision on substitutions. The COR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:

(1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) each CIE report shall address each ToR as specified in **Annex 2**,
(3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COR. The COR will distribute the CIE reports to the NMFS Project Contact and Center Director.

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Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations in accordance with the ToRs.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

Evaluation of the study:
"Recommendations for Excessive-Share Limits in the Northeast Multispecies Fishery"

The peer review shall be conducted based on the following Terms of Reference (ToRs):

1. Describe the method or process used by Compass Lexecon for determining the maximum possible allowable percentage share of the market for fishery access privileges and/or quota leasing that would prevent an entity from obtaining an excessive share of access privileges allocated in the Northeast Multispecies Fishery.

2. Evaluate the strengths and weaknesses of the proposed method or process developed by Compass Lexecon (e.g., whether defining excessive shares in terms of market power is appropriate and adequate). Evaluate whether the approach outlined by Compass Lexecon is reasonable for setting excessive share limits in fisheries managed through catch shares in general. As part of this TOR, comment on any constraints that may hinder application of the proposed approach.

3. Evaluate application of the proposed methods or process to the Northeast Multispecies Fishery. Are Compass Lexecon's conclusions regarding market power in both the final product (seafood) and production (quota) market valid and based on appropriate economic principles? If there is disagreement with what Compass Lexecon recommended, clearly state that and your reason why.

4. Review and comment on the data requirements necessary for applying the proposed methods or process.

5. Provide any recommendations for further improvement.

Annex 3: Tentative Agenda

Evaluation of the study:
"Recommendations for Excessive-Share Limits in the Northeast Multispecies Fishery"

Location: Hawthorne Hotel, 18 Washington Square West, Salem, MA 01970
Date: June 12-13, 2014 (two day)

Day 1: Thursday June 12

9:00 Opening, Panel Chair (SSC representative)
- Welcome
- Introduction
- Agenda overview
- Conduct of meeting

9:15 Background and Need for Compass Lexecon Report, NEFMC Staff (Rachel Feeney)
9:25 Background of Compass Lexecon Report and Introduction of Compass Lexecon, NMFS Project Contact (Chad Demarest)
9:35 Report of Compass Lexecon (Steve Peterson and/or Glenn Mitchell)

10:10 Break

10:25 Review of Terms of Reference – CIE Panel
10:45 Public Comment
11:00 CIE Panel Discussion – ToR #1

12:00 Lunch

1:00 CIE Panel Discussion – ToR #2
1:45 CIE Panel Discussion - ToR #3

3:00 Break

3:15 CIE Panel Discussion - ToR #4
3:45 CIE Panel Discussion – ToR #5
4:15 Public Comment
4:30 CIE Panel Discussion – Outstanding Issues

5:00 Adjourn

Day 2: Friday June 13

8:00 – 2:30 CIE Report Writing – (Only Panel Members, NEFMC and NEFSC staff are admitted)

Procedures for Issuing Manuscripts in the *Northeast Fisheries Science Center Reference Document* (CRD) Series

Clearance

All manuscripts submitted for issuance as CRDs must have cleared the NEFSC's manuscript/abstract/webpage review process. If any author is not a federal employee, he/she will be required to sign an "NEFSC Release-of-Copyright Form." If your manuscript includes material from another work which has been copyrighted, then you will need to work with the NEFSC's Editorial Office to arrange for permission to use that material by securing release signatures on the "NEFSC Use-of-Copyrighted-Work Permission Form."

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Organization

Manuscripts must have an abstract and table of contents, and (if applicable) lists of figures and tables. As much as possible, use traditional scientific manuscript organization for sections: "Introduction," "Study Area" and/or "Experimental Apparatus," "Methods," "Results," "Discussion," "Conclusions," "Acknowledgments," and "Literature/References Cited."

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The CRD series uses the American Fisheries Society's guides to names of fishes, mollusks, and decapod crustaceans, the Society for Marine Mammalogy's guide to names of marine mammals, the Biosciences Information Service's guide to serial title abbreviations, and the ISO's (International Standardization Organization) guide to statistical terms.

For in-text citation, use the name-date system. A special effort should be made to ensure that all necessary bibliographic information is included in the list of cited works. Personal communications must include date, full name, and full mailing address of the contact.

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