

Northeast Fisheries Science Center Reference Document 11-22

Summary of Findings by the Center for Independent Experts Regarding Setting Excessive Share Limits for ITQ Fisheries

by John Walden

October 2011

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Summary of Findings by the Center for Independent Experts Regarding Setting Excessive Share Limits for ITQ Fisheries

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Part I: Preface

by

John Walden

EXECUTIVE SUMMARY

The Center for Independent Experts (CIE) provided three individuals to evaluate a report (the Excessive Shares Report) commissioned by the National Marine Fisheries Service (NMFS) for setting an excessive share limit in catch share fisheries, and more specifically, the Surfclam and Ocean Quahog ITQ fishery. The CIE provides scientific expertise to conduct independent scientific peer reviews for NMFS based on specific Terms of Reference (TOR's) provided to the reviewers. Both the CIE and the NMFS Office of Science and Technology consider the purpose of the CIE review to be to examine the scientific merit of reports, and not to make policy recommendations. The three CIE reviewers chosen for this study were Dr. Ani Katchova, University of Kentucky, Dr. Ragnar Arnason, University of Iceland, and Dr. Rigeberto Lopez, University of Connecticut. Dr. James Wilen, University of California-Davis was the Mid-Atlantic Council Scientific and Statistical (SSC) Committee representative who chaired the meeting. The panel met June 21-23, 2011 in Falmouth and Woods Hole, MA to conduct a public review of the report, to accept public comment, and to question the consultants who prepared the report.

The CIE review of the excessive shares report presented unanticipated challenges. The topic of excessive shares in an ITQ fishery is relatively new in NMFS, and the economics needed to fully understand the issue are quite complex. Therefore, the discussion at the public meeting was highly technical and covered a great deal of territory. Additionally, the CIE reviewers were given a large amount of information during the meeting that they would need time to fully review outside of the meeting. Near the conclusion of the meeting it became apparent that the reviewers would have a difficult time reaching a consensus on a number of points before the meeting ended. The panelists agreed that they should end the meeting so they could individually review the material which was presented to them, and prepare their reports. The CIE reviewers also agreed that they would send a copy of their individual reports to the Chair, who would then prepare a summary report based on their individual reports. However, the following week it was learned that the CIE Directorate would not allow the CIE panelists' individual reports to be sent directly to the Chair which put the Chair in the position of being unable to produce a summary report.

In lieu of a formal summary report by the Chair, therefore, this Executive Summary simply lists the findings of the individual reports that were submitted by the CIE reviewers for each Term of Reference (TOR). Each CIE report is then included as a separate chapter in this document. This summary makes no value judgments on the findings of the CIE reviewers, and does not attempt to endorse or reject any of their findings.

Each CIE panel member presented their own findings and did not necessarily agree with one another on their responses to each individual term of reference. However, there were four areas that all three reviewers seemed to agree with in their individual reports. They were:

1. The method proposed by the Technical Group is based on the HHI, which means that evaluation of potential market power is consistent with what is done in other industries.
2. The Technical group appropriately modified the application of the HHI to consider competition from non-SCOQ clams as well as the aggregate share held by fringe holders. Within the framework given, the method proposed did not contain any errors. However, in order to apply the method, more data are needed along with a better understanding of the industry.

3. More transparency is needed for quota prices. An auction mechanism would be one method that could be used to reveal quota prices.
4. The Technical Group should have paid more attention to the monopsony problem, which is the ability of processors to exert market power on the harvesting sector. This may be of greater concern than the monopoly problem.

TERMS OF REFERENCE (TOR):

1. Describe the Method or Process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining Market power.

Note: There is no disagreement on this TOR as it merely asks the reviewers to provide a description of the methodology used by each reviewer.

Arneson:

Technical group applied the standard theory of competition and market power to the problem, using Horizontal Merger Guidelines.

Katchova:

Described six part process recommended for determining excessive share limit.

Lopez:

Described the seven part process used to determine an excessive share cap, and also described the corollary rule that there should be at least three firms.

“As with any excessive-share cap, the process requires information on ITQ ownership and control, substitutability of products, and definition of relevant markets or size of the market in order to compute the correct market shares.”

“In the business literature, there is a widely accepted notion that a Rule of Three structure is optimal because three big and efficient companies (e.g., with more than 10% market share) act as a tripod to ensure that neither destructive competition nor collusion prevails (see Sheth, J.N. and S. Sisodia, *The Rule of Three: Surviving and Thriving in Competitive Markets*. New York: Free Press, 2002)

2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFs Technical Group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.

Arnason:

Strengths:

1. It is based on the standard theory of monopolistic competition.
2. It is based on the Horizontal Merger Guidelines. This has the advantage of guaranteeing symmetrical treatment with other industries.
3. It is fairly clear and systematic
4. Within its own framework, it does not contain any serious errors.

Weaknesses:

1. Does not deal with the issues in sufficient depth.
2. Does not systematically cover all the key economic factors necessary for deciding a sensible counter-monopoly policy.
3. Puts too much emphasis on the HHI Index.
4. Contains no formal analysis of the fundamental factors affecting monopolistic behavior in the fisheries.
5. Does not consider the monopsony problem.

“In summary: to set the appropriate ‘excessive size’ limit in any given fishery a great amount of empirical information and investigation is needed”

Katchova:

Strengths:

1. Follows horizontal Merger guidelines.
2. Technical group appropriately modified the application of the HHI index to consider competition from non-SCOQ clams as well as the aggregate share held by fringe holders.
3. Additional “three firm” rule has support in the literature, but it is unclear if the rule should still be applied if there is a conflict between the two rules.

Weaknesses: (note that Dr. Katchova did not explicitly list weaknesses. This is my interpretation of her text).

1. In order to determine the boundaries of the relevant market, reliable data on prices and quantities are needed, which are not available. In the absence of reliable data, there needs to be an in-depth understanding of the industry, major players, and products.

2. Excessive Share cap will need to be updated over time.
3. HHI is applicable to homogenous products, and not differentiated products, and qualitative data needs to be available whether processors produce differentiated products.
4. Report did not explore monopsony problem, which may be just as important as monopoly power.
5. Reliable data on quota prices are needed.
6. Costs associated with implementation of an excessive share caps as well as monitoring and enforcement are likely to be substantial.

Lopez:

Strengths:

1. Used the Horizontal Merger Guidelines, and a HHI threshold of 2,500, which is deemed the "Gold Standard" for analyzing competition in the United States and abroad. It brings the problem into a class of more generalizable situations for which ready comparisons can be made across fisheries and non-fishery cases.
2. Inclusion of state fisheries, imports and fringe firms in calculation of the HHI. The larger the relevant market or degree of demand substitution from outside the fisheries area, the greater the allowable excessive-share cap.
3. Requiring three "efficient" processors under the suggested HHI will encourage economies of size as well as ensuring a minimum degree of competition in the geographic region of the fisheries, regardless of the size of the relevant market for processed fishery products.

Weaknesses:

1. Focus exclusively on monopoly power at the expense of monopsony power. A fishery is more likely to face monopsony power than monopoly power.
2. Lack of explicit consideration of harvesting and processing efficiency, which may give room to improve performance of the fishery, particularly if market power effects are weak. Cost reductions may reduce or even reverse a firm's incentive to elevate price in the monopoly case.
3. Numerator of Market Shares. The current definition of an excessive-share cap separates ownership and control and can yield a situation where a single processor processes 2/3 of the harvest but only officially controls 1/3 of the quota without owning any. In the standard literature, 2/3 purchase of the total volume would be of concern.
4. The relevant product and geographic markets are not defined, although market shares are computed as the ratio of the quota or cap shares divided by the relevant market.

Implementation of the Method Proposed by the Technical group requires at least the following data:

1. Quota ownership and control
2. Processing volumes and capacity.
3. Size of the relevant market.

3. Evaluate applicability of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.

Arnason:

1. Method is superficial; Does not go into sufficient depth.
2. It offers little data about the structure of the industry.
3. Ignores possible costs of monopolistic behavior, the benefits of returns to scale, and the cost of imposing and operating “excessive size” limits.
4. Ignores the monopsony problem.
5. Recommended Excessive Share Cap seems “ad-hoc”.
6. Concludes that there is insufficient data to set any cap at this stage, so the prudent course of action is to refrain from doing so.

Katchova:

1. The NMFS have done the best possible analysis given the substantial problems related to data limitations and availability.
2. More transparency is needed for quota prices.
3. There is considerable uncertainty with regards to the size of the market (imports, fringe holders) and market share of participants.
4. The correct determination of post-transfer quota ownership and control is extremely important in the implementation, monitoring and enforcing of the excessive-share cap.
5. Viewed recommendations as general guidelines (perhaps even as lower bounds) for setting an excessive share cap.

Lopez:

1. The approach used by the Technical Group is generic and is applicable to just about any fisheries, provided accurate information is obtained on quota rights and control, boundaries and the relevant market, and efficiency effects of the scale of operation.
2. Although a 30-40% cap may be restrictive if the market is defined too narrowly or if efficiency effects of concentration are ignored, it is likely to be appropriate if there are buying power or monopsony concerns since, for the latter, the relevant market is geographically confined to the fishery in question.
3. Besides the monopsony and efficiency concerns pointed out, the main room for improvement is collecting accurate information about the fishery, the market, and performance indicators such as quota price.
4. The key number emerging from the report is a 40% excessive share cap, which automatically ensures independent harvest supply to sustain at least three processors in the market.
5. There is no constitutional basis to interpret “excessive” solely based on market power, or in this case, monopoly power.

6. In conclusion, an excessive share cap of 30-40 or the two-part cap counterpart might be rather conservative estimates, and that it might not be surprising that, considering efficiency impacts, an excessive share cap of $2/3$ of TAC or eventually a natural monopoly or monopsony might be preferable.

4. Evaluate whether the approach outlined by the NMFS Technical Group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical Group.

Arnason:

1. The Approach Outlined is inadequate as a general framework for setting excessive share limits in fisheries in general.

Katchova:

1. The approach outlined by the NMFS technical group is generally applicable to other fisheries managed through catch shares.
2. Several factors are very important to take into consideration when applying these methods to other fisheries. These factors include: whether or not the TAC is binding, whether or not quota prices are transparent and are of significant value, the determination of relevant markets and substitutability with other products, whether ITQ are assigned to vessel owners or not, etc.

Lopez:

1. The approach used by the Technical Group is generic and is applicable to just about any fishery, provided accurate information is obtained on quota rights and control, boundaries of the relevant markets, and efficiency effects of scale of operation.
2. The main constraint remains access to the accurate information needed to appropriately implement the approach. As in any market, full and accurate information is needed for markets to work smoothly. Asymmetric information will generate advantages to those who have access to it and will make the regulator's job more imprecise and difficult.

5) Provide any recommendations for further improvements.

Arnason:

1. To be usable as guidance for setting excessive share limits in the SCOQ fishery and other ITQ fisheries, the procedures need to be complemented by the following:
 - a. A careful general theoretical (discussion) of the factors that influence monopolistic behavior in ITQ fisheries in general
 - b. A clear and well-developed prescription as to how to estimate and update the key relationships that are identified by the theoretical study.
 - c. Additional steps having to do with the assessment of "deadweight loss" of monopolistic behavior, the possible loss of scale efficiencies that might result from "excessive share" limits and the costs of implementing and operating a

system of “excessive share” limits.

“To carry out these additions and improvements requires considerable amounts of high level expertise and will inevitably be quite time consuming and costly.”

Katchova:

1. An open auction or other mechanism to reveal quota prices and make the market for quota transfers liquid and transparent needs to be established.
2. More information can be collected from industry participants regarding market shares, major buyers of processed output, prices paid and received for clam inputs and outputs. There needs to be a general description of all players from crew members to distributors.
3. Further studies need to be done on the cost efficiencies of operating as large processors.
4. Further studies are needed on the monopsonization of the input markets. Monopsonization of the input markets is a larger concern than monopolization of the output markets.
5. Other instruments for controlling market power beyond an excessive share cap should be considered.
6. Monitoring and Enforcement of the excessive share cap will need to be studied and implemented.

“The main challenge is with regards to the application of the proposed methods because of the lack of appropriate data on the size of the market, the major participants and market shares, relevant markets, substitutability of products, and transparency of quota ownership and prices.” (Conclusion)

“Overall, the NMFS technical group’s study is well executed and provided a good starting point in establishing an excessive-share cap in the Surfclam and Ocean Quahog Fishery.” (Conclusion)

Lopez:

1. Focus more on the potential monopsony power effects rather than just the monopoly power, explicitly considering alternative vertical coordination arrangements.
2. Focus more on potential price effects rather than just the HHI, explicitly considering harvesting and processing efficiency effects.
3. Collecting information on the price of the quota, either through creating an auction mechanism to reveal prices or by soliciting this information explicitly from quota holders.

Part II: Peer Review Report

by

Ragnar Arnason

External Independent Peer Review by the Center for Independent Experts

**Evaluation of excessive shares study in the Mid-Atlantic
surfclam and ocean quahog ITQ fishery**

Prepared by

Independent Reviewer: Ragnar Arnason

July 7 2011

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Acronyms

NFMS	National Marine Fisheries Service
MAFMC	Mid-Atlantic Fishery Management Council
SCOQ	Surfclam and ocean quahog
CIE	Center for Independent Experts
ITQ	Individual transferable quotas
TAC	Total allowable catch
SOW	Statement of Work*
TOR	Terms of reference
HH	Herfindahl-Hirschman index
HMG	Horizontal merger guidelines

Executive Summary

1. The surfclam and ocean quahog (SCOQ) fishery was subjected to ITQs (individual transferable quotas) in 1988. Since then industrial concentration in the fishery has increased substantially [Chapter 3, p. 7]
2. In competition theory, market power is defined as the ability of companies to profitably manipulate output (or input) prices. This activity, while profitable for the companies, usually corresponds to an overall economic loss for society. [Chapter 3, p. 8]
3. Increased concentration in ITQ fisheries is a matter of social concern. Accumulation of quota-share holdings may provide companies with market power and enable them to influence prices in input and output markets. [Chapter 1, p. 5]
4. The Magnuson-Stevens Act states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. The National Standard 4 of the Magnuson Act imposes a similar requirement. [Chapter 1, p. 5]
5. Measures of industrial concentration in the SCOQ fishery (the Herfindahl-Hirschman index) suggests that marketing power may exist in the fishery, particularly in its harvesting and processing sectors, but less so in quota holdings. [Chapter 3, pp.7-8]
6. These concentration measures are only indicative of the possibility of market power. They do not establish that it actually exists. In fact, the report by the NMFS Technical Group does not provide evidence of actual market power in the SCOQ fishery. [Chapter 3, pp. 8-9]
7. It should be noted that even when market power exists it may not be exercised for a number of reasons. In fact, the report by the NMFS Technical Group does not find any evidence of the actual exercise of market power in the SCOQ fishery [Chapter 3, p. 8]
8. Due to the inherent complexity of ITQ fisheries, the determination of market power is more complicated than in more standard industries. It follows that to determine “excessive shares” in the sense of generating market power requires deeper analysis and more complicated expressions [Chapter 3, pp. 8-10, Addendum 2.]
9. In an ITQ fishery the main tool for manipulating prices and, thus, exercising market power is to withhold quotas from fishing. Quotas may be held by fishers, fish processors, quota-holders which are neither and any combination of the three. Clearly the commercial interests of these types of players are not identical and, in some respects, they may be contrary. It follows that the distribution of quota holdings or quota control among these three types of players in the fishery is a major factor in the possible exercise of market power. [Chapter 3, pp. 9-10]
10. A limited theoretical analysis to account for some of the complex aspects of market power and monopolistic behavior in ITQ fisheries suggests that what constitutes excessive shares (in the sense of generating market power) is a function of a number of empirical variables in the fishery including various elasticities, the market price of quota, the output price of fish and other variables. In a comparatively simple framework this function may be expressed as:

$$\alpha_{crit} = \Lambda(E(p, H), E(w, H), E(s, H), s/p, \beta),$$

where α_{crit} is the critical share of the company before it becomes excessive. The first three terms of the function Λ denote the elasticities of output price, input price and

quota price with respect to harvest. s represents the market price of quota and p the price of landed catch. Finally, β is the ratio of costs to revenues for the company.

Obviously, to determine “excessive share” in a sensible manner requires an empirical estimate of all of the variables entering the function Λ . More realistic situations will undoubtedly involve more variables [Chapter 3, pp. 9-10 and Addendum 2]

11. The fundamental economic justification for controlling market power and, more generally, curtailing monopolistic behavior is to avoid the “deadweight loss of monopolies” which is the economic cost resulting from altering quantities to influence prices. [Chapter 3, p. 10 and Addendum 1]
12. However, in order to form a socially beneficial policy regarding market power, this cost must be balanced against (i) the possible gains in economic efficiency due to scale economies that may be captured by large companies and (ii) the cost of implementing and enforcing the regulations to curtail market power. [Chapter 3, p. 11]
13. Limitations of company share of quotas or relative size in general are a particularly blunt tool to curtail the exercise of market power. It may well be preferable to ignore company size but focus instead on methods to counteract monopolistic behavior more directly. [Chapter 3, p 11. and Addendum 1]
14. As a procedure to determine “excessive share” limits in the SCOQ fishery, the method proposed by the Technical Group is unsatisfactory. Among other things:
 - (1) It does not go into sufficient depth in analyzing this particular industry and the role of ITQs in possible monopolistic behavior by the companies.
 - (2) It offers little data about the structure of the industry and the operations of the key markets and virtually none on the relationships that determine what constitutes an “excessive share”.
 - (3) It totally ignores certain key aspects of the economic situation such as the cost of possible monopolistic behavior, the possible benefits of returns to scale and the cost of imposing and operating “excessive share” limits.

As a result, the recommended “excessive share cap” for the SCOQ fishery has little if any foundation in either solid theory or empirical data. [Chapter 3, pp.13-14]
15. My conclusion is that the evidence provided in the Technical Group report is insufficient to set any particular share cap on the companies in this fishery. Given the possible costs of an erroneous cap, the prudent course of action seems to be to set no cap at the current time. [Chapter 3, p. 14]
16. It is further my conclusion that the approach outlined in the Technical Group Report, although a helpful step in the right direction, is inadequate as a general framework for setting excessive share limits in fisheries in general. [Chapter 3, p. 14]
17. Given the high economic value of fisheries already under ITQs in the US, the legal requirement to set excessive share limits and the potential economic costs of setting such shares inappropriately, it is urgent to develop a theoretically consistent and empirically robust procedure to assess what constitutes “excessive share”. It is strongly recommended that concerted research and development work of this nature be initiated as soon as possible. [Chapter 3, p. 15]

1. Background

On May 12, 2011, I agreed to serve, on behalf of the Center for Independent Experts (CIE), as an independent external reviewer of the “Evaluation of excessive shares study in the Mid-Atlantic surfclam and ocean quahog ITQ fishery” that had been prepared for the National Marine Fisheries Service (NMFS) and the Mid-Atlantic Fishery Management Council (MAFMC) by a Technical Group of Experts.

The surfclam and ocean quahog (SCOQ) fishery was subjected to an ITQ (individual transferable quota) system in 1988. Under the ITQ system, economic efficiency of the fishery seems to have improved substantially (Mitchell et al. 2011, MAFMC and NMFS 2010). Presumably related to this, industrial concentration in the fishery has increased, especially when measured by the number and size distribution of active companies and fishing vessels (Mitchell et al. 2011, MAFMC and NMFS 2010). Apparently there has also been some, although smaller, increase in the concentration in quota holdings but the extent of this is less clear (Mitchell et al. 2011, Social Sciences Branch 2009).

Increased concentration in ITQ fisheries is a matter of social concern. Accumulation of quota-share holdings may provide companies with market power and enable them to influence prices in input and output markets. The reauthorized Magnuson-Stevens Act (2006) states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. The National Standard 4 of the Magnuson Act requires that fishing privilege allocations be carried out so that “no particular individual, corporation, or other entity acquires an excessive share of such privileges” (SOW, appendix 2). It is, however, not clear what constitutes an “excessive share” in this context.

To deal with the issue of “excessive share”, a Technical Group of Experts (referred to in the TOR as the NMFS Technical Group) was created. This technical Group, whose membership was provided by the consultancy company Compass Lexecon, submitted a report titled “Recommendations for Excessive-Share Limits in the Surfclam and Ocean Quahog Fisheries” (Mitchell et al. 2011). This report (i) outlines a procedure for determining an “excessive share” in any fishery and (ii) suggests an excess share limit for the SCOQ fishery.

Given this context, I was specifically requested to address the following issues:

1. Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.
2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.
3. Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.
4. Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of

this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.

5. Provide any recommendations for further improvement

Further details of my obligations under this contract are set out in the Statement of Work a copy of which is found in Appendix 2 of this report.

My work on this review was primarily carried out during the period June 15 to July 7 2011. The first part of the period was used to collect background information and study the material on this issue provided by the CIE. A Panel Review meeting took place in Falmouth and Woods Hole on June 21-23. The period after that was used to assess the information and findings at this meeting to undertake further analysis of the issues and to prepare this report.

2. Description of Reviewer's role in Review Activities

The review work was for the most part carried out during the period June 15 to July 7, 2011. It is primarily based on (i) two reports supplied to me by the CIE (Mitchell et al. 2011 and MAFMC and NMFS 2010, see bibliography), (ii) a number of background articles and reports that I located (see bibliography), (iii) the background presentation given by the MAFMC representative (vice chairman Lee Anderson) and the presentation given by Technical Group representatives (S. Peterson and G. Mitchell) at the Peer Review Meeting on June 21-23 and questions and discussions during that meeting, (iv) further information about the SCOQ fishery provided by the staff at the Northeast Fisheries Science Center (especially J. Walden) and (v) my own general knowledge on the subject. Much of the written material used in this review is listed in the bibliography.

During the Peer Review Meeting June 21-23, I had the opportunity to ask questions for clarification and discuss the various aspects of the report by the Technical Group and the competitive situation in general. During that meeting I received honest and clear answers to all my questions. The general discussion was also, in my opinion, extremely informative and useful to all participants.

During the Peer Review Meeting I inevitably became privy to views and comments made by my fellow reviewers. This report, however, contains exclusively my own assessments and evaluations.

In further detail my review activities proceeded as follows:

- June 15-20. Collect and study background material including the documentation supplied by the CIE.
- June 20-June 24. Travel to and attend the panel meeting at NEFSC in Woods Hole.
- June 25-July 7. Study of material, further analysis and the preparation of my draft review report.

3. Summary of findings

The Surf Clam and Ocean Quahog (SCOQ) fishery off the Atlantic coast of the US has a considerable history going back to at least to the 1960s (FAO 2011). This is not a particularly large fishery. In recent years the harvest in federal waters has been just over 6 million bushels (MAFMC and NMFS 2010) with an approximate landed value of between \$50 and 60 million.¹ Landings have been quite stable over time and so, apparently, have unit prices of landings.

From the 1970s until 1988, this fishery was regulated by a number of technical measures including restrictions on vessel entry, fishing effort, seasons and fishing gear (Adelaja et al. 1998, MAFMC and NMFS 2010). These policies led to an increasingly over-capitalized and inefficient fishery (Marvin, 1992; Adelaja et al. 1998). Following amendment 8 to the Fishery Management Plan for this fishery set by the MAFMC in 1988, the SCOQ fishery was subjected to an ITQ system leading to a substantially improved economic efficiency (MAFMC and NFMS 2010).

Concentration

Since the adoption of the ITQ system in 1988, there has been substantially increased concentration in the fishery with respect to the number of active fishing vessels and the number of processing companies. There also seems to have been certain concentration in quota ownership although, apparently, to a lesser degree (Social Science Branch 2009, Mitchell et al. 2011).

The current level of concentration in the industry is to a certain extent measured by the so-called Herfindahl-Hirschmann (HH) index (Hirschman 1945, Herfindahl 1950).² According to the Technical Group Report (Mitchell et al 2011), the number of processing plants has been reduced from 44 in 1979 to 12 in 2011. In terms of purchases the HH-index for surfclams grew from 2068 in 2003 to 3134 in 2008 and that for ocean quahogs from 3431 to 4369 (Mitchell et al. 2011). Similar statistics for the development of concentration in quota-holdings and harvesting are not available. However, in 2009, the combined (both species) HH-index for quota holdings was 993 and for the harvesting activity 2890 (Mitchell et al. 2011).

These values of the HH index may be compared to the thresholds defined in the US government Horizontal Merger Guidelines (anonymous 2010) according to which industries with an HH index below 1500 are considered unconcentrated and those with an HH index value above 2500 highly concentrated.

Market power

In competition theory, market power refers to the ability of companies to profitably manipulate output (or input) prices. More formally, market power may be defined to exist

¹ This estimate assumes a landings price of \$12 for a bushel of surfclams and \$6 for a bushel of ocean quahog.

² The HH-index is just one of many possible single-number-measures of concentration. As all single-number-measures of complicated phenomena, this measure suffers from severe limitations one of which is the lack of uniqueness, i.e. the same index number generally corresponds to many different combinations of company sizes and number. It is worth noting that as pointed out by Hirschman (1964), his initial definition and use of this index preceded that of Herfindahl by five years.

when a firm (or a group of firms, acting jointly) are able to raise output price above the competitive level without losing sufficient sales to make the price increase unprofitable (Landes and Posner 1981, Tirole 1989). Given this definition, some degree of market concentration is obviously necessary to provide market power to one or more companies. It is, however, not by any means sufficient. To see this, one only has to note that a single company (therefore having an HH-index of 10000) operating in a market with perfectly elastic supply and demand curves has no market power.

According to the concentration thresholds set by the Horizontal Merger Guidelines mentioned above, there are indications of market power in the harvesting and processing activity but much less so for quota holdings. It should be stressed, however, that due to the imperfectness of the HH-index and the gap between HH-concentration measures and market power, these are only indications of possible market power. The HH-index measures obtained by no means establish that there actually exists market power in these sectors of the SCOQ fishing industry. By the same token, the low HH-index measure of quota holdings can not be taken to show that there is no market power in this sector of the SCOQ fishery. Indeed, there are indications that the real control of quotas may well be more concentrated than the formal ownership.

Exercise of market power

It is important to realize that the existence of market power (in the sense defined above) does not imply that it will be exercised. There can be several reasons for this including the following:

- (1) The company having market power does not realize this and acts as if it had none.
- (2) The company simply prefers to accept normal (rather than monopoly) profits possibly for reasons of maintaining its reputation or because of perceived social responsibility.
- (3) The company is deterred by the illegality of and possible sanctions for exercising market power.
- (4) The exercise of market power requires co-ordination with other companies which is too difficult (or costly) to arrange and maintain.

It follows that even if it can be shown that market power exists, it has not been established that this power is actually being exercised.

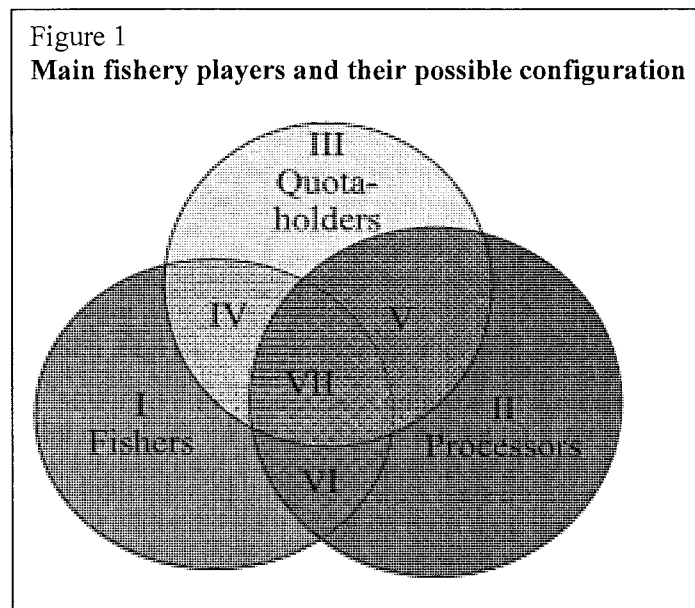
Market power in an ITQ fishery

Due to the complexity of ITQ fisheries (caused by the quota constraint, quota trading and the inherently dynamic nature of the fishery and quota holdings), the determination of market power in an ITQ fishery is much more involved than for standard (textbook) industries. It follows that the relevant relationships must be carefully analyzed and examined in order to determine the existence of market power. Certain aspects of possibly major importance are listed below:

- (1) In an ITQ fishery, to the effect that monopolistic behavior depends on constraining quantity, market power resides largely with quota holders. Quota use determines catches and subsequent outputs in the production chain. All other quantities entering

the production chain depend functionally (via production functions) on the volume of catches with, generally, relatively little scope for substitutions.

- (2) The ITQ system alters opportunities for monopolistic behavior in fisheries in two somewhat opposite ways:
 - (i) The imposition of an upper level quantity constraint (the TAC) reduces the scope for quantity adjustments in the fishery (and downstream activities). In fact, the TAC may easily be less than the monopoly point for the companies.
 - (ii) The system erects certain barriers to entry into the fishery — newcomers need to buy quotas to become active in the fishery. This barrier is similar or the situation in the retail business where the competitors control the available sites for setting up business.
- (3) It follows from the previous two points that in an ITQ fishery the main instrument for exercising market power is to withhold quotas from being fished. This does not mean of course that there are no opportunities for other types of monopolistic activity. The point is simply that in an ITQ fishery, this is the most important quantity for monopolistic manipulation and, moreover, the one that is made available to the companies by the establishment of the ITQ system.
- (4) As in any other situation of possible monopolistic behavior, the structure of the industry is of major importance. In the SCOQ fishery, the main players appear to be (i) quota holders, (ii) fishing companies and (iii) processing companies. Further, processors and wholesale distributors may also play a role but that is ignored here. Some companies may be involved as one or more of these basic players. The combination possibilities are summarized in the following figure



As shown in the figure, there can be various types of companies in this industry. These include (i) pure quota-holders, (ii) pure fishermen and (iii) pure processors. But there can also be any combination of these three. All in all there are seven possible

configurations of companies. From the data supplied (MAFMC and NMFS 2010 and Mitchell et al. 2011) as well as other information (see Appendix 1), it appears that most or all of the possible configurations actually exist in the fishery.

It can be shown that the possible monopolistic profit maximizing behavior differs in general from one configuration of companies to the other.³ It immediately follows that the appropriate policy response depends on the type of company in question and, consequently, on the overall configuration of companies in the industry.

A limited attempt to account for some of these aspects of an ITQ fishery in the analysis of market power points is presented in an Addendum 2 to this report. This analysis, limited as it is, suggests that in an ITQ fishery market power and monopolistic behavior on that basis is quite complex. A basic condition for the existence of market power derived in Addendum 2 is:

$$(1) \quad \alpha(i) > \frac{1}{1 + E(s, H) + (\beta(i) \cdot E(w, H) - E(p, H)) \cdot \frac{p}{s}}$$

This expression gives the relative size of company i (share of fishery or quotas) denoted by $\alpha(i)$, that is necessary for market power. This may be referred to as the critical size. On the right-hand side of the inequality; p/s is the output price to quota price ratio, $\beta(i)$ is the cost to revenue ratio of the company and $E(s, H)$, $E(w, H)$, $E(p, H)$ are the respective elasticities of quota price, input prices and output price with respect to total harvest volume. Needless to say, this expression accounts for market power in the output market, input market (monopsony) and the market for quotas.

From expression (1), we immediately derive a set of important conclusions of general validity:

- (1) The determination of the critical company size (before market power is gained) is a complicated matter involving a number of variables.
- (2) It immediately follows that an extensive empirical investigation is needed before the appropriate size limit is determined.
- (3) A limited analysis considering e.g. only the market power in the output market and the elasticity of price w.r.t. harvests is inadequate in the sense that it can easily lead to erroneous conclusions. (Note for instance that the $E(s, H)$ works in an opposite way to the other elasticities).
- (4) For seemingly reasonable values of the variables on the right-hand-side of (1), the critical relative size of a company (before market power is gained) appears to be quite substantial. This is discussed at some length in Addendum 2.⁴

³ This is touched upon but not really explored in Addendum 2.

⁴ In Addendum 2, based on reasonable guestimates of the values of the arguments in (1), was calculated to be about 83%.

Controlling market power

The fundamental economic justification for controlling market power and, generally, curtailing monopolistic behavior is to avoid the economic “deadweight loss of monopolies” (Varian 1984, Tirole 1989. See Addendum 1). However, it must be realized that there may be costs involved. The most obvious ones are:

- (1) Losses in the efficiency of the economic activity in question
- (2) Costs of imposing and enforcing the controls on market power.

Clearly, for sensible policy, these costs have to be balanced against the potential gains from reducing the “deadweight loss” of monopolistic behavior.

There are many ways to control or counteract market power (Tirole 1989). The method under consideration in this study is to set an upper limit on the share of quotas, the so-called “excessive share” limit that may be held (or controlled) by any one entity. This corresponds to a limitation on company size.

It should be noted that the “excessive size” limit is an extremely imprecise tool. It may for instance hit companies that have not exercised market power or it may be bypassed by coordination between companies. A superior method, although much more complicated to implement, is not to restrict company size but to counteract monopolistic behavior directly (see Addendum 1 to this report).

It is important to realize that relatively large companies are often the result of economic returns to scale. In other words, relatively large companies are simply economically more efficient than smaller companies. This often applies in fisheries, especially comparatively small ones as the SCOQ fishery. It follows that limiting the size of companies in such fisheries may forgo the social gains that can be had by reaping the economic benefits of returns to scale. This is discussed in Addendum 1 to this report, where it is shown that the loss in efficiency due to a size limit on companies can easily outweigh the gains from reduced market power.

Imposing and enforcing constraints on monopolistic behavior is inevitably costly. In some cases this cost can be very high. Additional costs are borne by companies which, inevitably try to find ways to adjust to and even circumvent any binding restrictions. These costs must also be set against the potential gains of less monopolistic behavior.

Responses to the specific items in the TOR

1. *Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power*

The technical group (Mitchell et al. 2011) applies the standard theory of competition and market power to the problem. The method is in accordance with the procedure suggested in the US government *Horizontal Merger Guidelines* (anonymous 2010). This is to a certain, but limited, extent complemented by an interpretation of some aspects attributed to the ITQ system in the SCOQ fishery.

In essence the method applied to the SCOQ fishery specifically is as follows:

- (1) The HH-index is applied to measure concentration in the various sectors of the industry. The Technical Group finds a rather low concentration of quota ownership, but high concentration of quota use (harvesting) and in processing.
- (2) The HH-index outcomes are compared with the thresholds in the *Horizontal Merger Guidelines* (anonymous 2010) apparently suggesting that sectors exceeding these thresholds warrant particular consideration.
- (3) Certain factors that limit market power (e.g. elasticities) are identified and their values speculated about. On this basis, apparently, the Technical Group is particularly concerned about output markets (monopoly) but pays comparatively little attention to input markets (monoposony).
- (4) The industry structure, market attributes and possible monopolistic behavior under the ITQ system are discussed in fairly general terms without formal analysis or much empirical data.
- (5) On this basis, conclusions are drawn about the need for imposing excessive share limits in terms of quota holdings in the fishery
- (6) Finally, on this basis of the above, “reasonable” excessive size limits in the SCOQ fishery are proposed without, however, providing good arguments for the proposals.

In addition to this, the Technical Group specifies a more general approach to setting excessive share limits in ITQ fisheries in general. This approach and its data and research requirements are summarized in Table ES-1. The procedure proposed is in broad terms in accordance with the one described for the SCOQ fishery above. It is in many respects a sensible and useful one.

2. *Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.*

B. Strengths

The approach described in the Technical Group Report (Mitchell et al. 2011) has certain important strengths:

- (1) It is based on the standard theory of monopolistic competition.
- (2) It is based on Horizontal Merger Guidelines (HMG), This has the advantage of guaranteeing symmetrical treatment with other industries.
- (3) It is fairly clear and systematic.
- (4) Within its own framework, it does not contain any serious errors as far as I could see.

B. Weaknesses

The approach proposed, however, also suffers from significant weaknesses.

- (1) It is fairly superficial in the sense that it does not deal with the issues in sufficient depth. This applies in particular to the analysis of the ITQ system and its role in the creation and exercise of market power.
- (2) It does not systematically cover all the key economic factors necessary for deciding a sensible counter-monopoly policy. In particular, it does not discuss (i) the deadweight loss of monopoly, (ii) the loss of economic efficiency that may result from counter-monopoly policies and (iii) the cost of imposing, enforcing and adjusting to such policies.
- (3) It puts too much emphasis on the HH-index. This, as already discussed, suffers from severe limitations. It is also more appropriate to markets for homogenous goods which may be the case for quotas but is certainly not the case in the SCOQ product market and hardly in the market for landings.
- (4) It contains no formal analysis of the fundamental factors affecting monopolistic behavior in the fisheries operating under ITQs. Addendum 2 to this report demonstrates that such an analysis is crucial.
- (5) It hardly considers the monopsony problem (distributors vs. processors, processors vs. fishers) which may be of major importance in many fisheries including the SCOQ one.

C. Data requirements.

The needs for data to determine sensible “excessive share” limits are inadequately specified in the Technical Group Report. This, presumably, is primarily because the analysis needed to specify these data is missing in the report. The analysis in Addendum 2 suggests some of the data that are needed. These include (i) various price elasticities with respect to total harvest (output price, input prices and quota prices), (ii) the ratio of costs to revenues and (iii) the quota price to output price ratio. A more complete analysis would undoubtedly add more variables. To calculate the elasticities basically requires the estimation of demand and supply curves, which is equivalent to estimates of the production (or profit) functions at the various levels of the industry. In addition to this, data on the industry structure, level of quota holdings in each segment, possible company co-operation and collusion need to be obtained and investigated. Since all of these relationships and variables may alter over time, these data, moreover, need to be continuously updated. In summary: to set the appropriate “excessive size” limit in any given fishery a great amount of empirical information and investigation is needed.

3. *Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.*

As already stated above, as a method to determine “excessive share” limits in the SCOQ fishery, the method proposed by the Technical Group suffers from serious weaknesses.

- (1) It is quite superficial; it does not go into sufficient depth in analyzing this particular industry and the role of ITQs in any possible monopolistic behavior by the companies.
- (2) It offers little data about the structure of the industry and market operation and virtually none about the crucial relationships including the key elasticities.
- (3) It totally ignores important aspects of the situation such as the possible cost of monopolistic behavior, the benefits of returns to scale and the cost of imposing and operating “excessive size” limits.
- (4) It for the most part ignores the monopsony problem.
- (5) Its recommendation for an “excessive size” limit in this fishery seems rather ‘ad hoc’ and apparently not based on a solid theoretical or empirical foundation even within their rather limited frame of analysis.

I disagree with the Technical Group’s recommendation about an excessive share cap in the SCOQ fishery. My disagreement is not that the proposed cap is necessarily wrong or that the two part cap is inappropriate. My disagreement is that I don’t see any reasonable basis in the report or in the other data about this fishery that I have collected (see Appendix 1) to set this cap. If anything my own investigations, partly presented in Addendum 2 and the first part of this report, suggest that to the extent that a cap should be set, it should be substantially higher.

My basic conclusion is that there are insufficient data to set any cap at this stage and, therefore, especially given the possible costs involved, the prudent course of action is to refrain from doing so.

4. *Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.*

As already discussed above, the approach outlined in the *Technical Group Report* suffers from serious weaknesses of depth and omission. In particular:

- (1) It lacks analysis of the role and effect of ITQs in monopolistic behavior. One consequence is that it does not identify the key relationships and variables that need to be empirically estimated. Another is that it does not explicitly relate the critical share to the empirical facts of the fishery situation.
- (2) It omits dealing with key elements of the monopoly situation including (i) the deadweight loss of monopolistic behavior, (ii) the potential efficiency gains from exploiting returns to scale and (iii) the cost of implementing and operating “excessive share” limits.

Therefore, in my opinion, the approach as outlined in the *Technical Group Report* is inadequate as a general framework for setting excessive share limits in fisheries in general.

5. *Provide recommendations for further improvements*

The procedure in the Technical Group Report as outlined e.g. in Table ES-1 and discussed in further detail in chapter VI of the report is, in my opinion, quite helpful. However, to be usable as guidance for setting excessive share limits in the SCOQ fishery and other ITQ fisheries it needs to be complemented by the following.

- (i) A careful general theoretical of the factors that influence monopolistic behavior in ITQ fisheries in general.
- (ii) A clear and well-developed prescription as to how to estimate and update the key relationships that are indentified by the theoretical study.
- (iii) Additional steps having to do with the assessment of the “deadweight loss” of monopolistic behavior, the possible loss of scale efficiencies that might results from “excessive share” limits and the costs of implementing and operating a system of “excessive share” limits.

To carry out these additions and improvements requires considerable amounts of high level expertise and will inevitably be quite time-consuming and costly. However, given the number and economic value of fisheries already and potentially under ITQs in the US, the legal requirement to set excessive share limits, and the potential economic costs of setting such shares inappropriately, making this investment seems like a sensible way to proceed.

4. Conclusions and recommendations

What constitutes an excessive share in an ITQ fishery is a complicated issue. Because of the complications of ITQs and the dynamic nature of fisheries and ITQ-holdings, it is probably substantially more complicated than problems of limited competition in general.

The report submitted by the NMFS Technical Group (Mitchell et al. 2011) represent, a useful step toward understanding these issues. However, it is just one a step. It is, in my opinion, too lacking in the depth of its analysis and too narrow in scope to be acceptable to set sensible “excessive share” limits in both the SCOQ fishery and ITQ fisheries in general. More detailed reasons for this conclusion are provided in the main text of this report, especially chapter 3 and its addenda.

It is recommended that the work begun by the Technical Group Report be continued by further investigation into the conditions for monopolistic behavior in ITQ fisheries and the socially appropriate methods to deal with the problem. As in the Technical Group Report, this work should aim at developing theoretically consistent and empirically feasible procedures for judging the appropriate excessive share limits in ITQ fisheries in general.

Addendum 1

Monopolistic behavior: Basic theory

A general profit function for a company may be written as:

$$\pi(q, p(q)),$$

where q represents the production quantity and $p(q)$ the input and output prices faced by this company. These may in general depend on the quantity produced by the company with the first derivative of p being negative (more generally non-positive) for output prices and positive (more generally non-negative) for input prices. The profit function itself should be dome shaped in its first argument and monotonically increasing in output prices and decreasing in input prices.

For illustrative purposes, it is useful to write this profit function more explicitly as:

$$\pi(q, p(q)) = v(q) \cdot q - C(q, w(q)),$$

where v refers to output and w to input prices and $C(.,.)$ is the company's cost function.

In this context, market power exists if the company is large enough relative to the market to detect a change in market prices if it alters the quantity, q , or, alternatively, if it can alter the price without the quantity dropping to zero.⁵

The socially optimal output level takes prices as exogenous and is defined by the condition:

$$\pi_1(q, p(q)) = 0,$$

where π_1 denotes the first derivative of the profit function w.r.t. the first argument. Let us refer to the socially optimal output level by q^* .

Firms with market power can affect prices by altering output and therefore do not generally take prices as exogenous. Their profit maximizing production level consequently is defined by:

$$\pi_1(q, p(q)) + \pi_2(q, p(q)) \cdot p_q = 0.$$

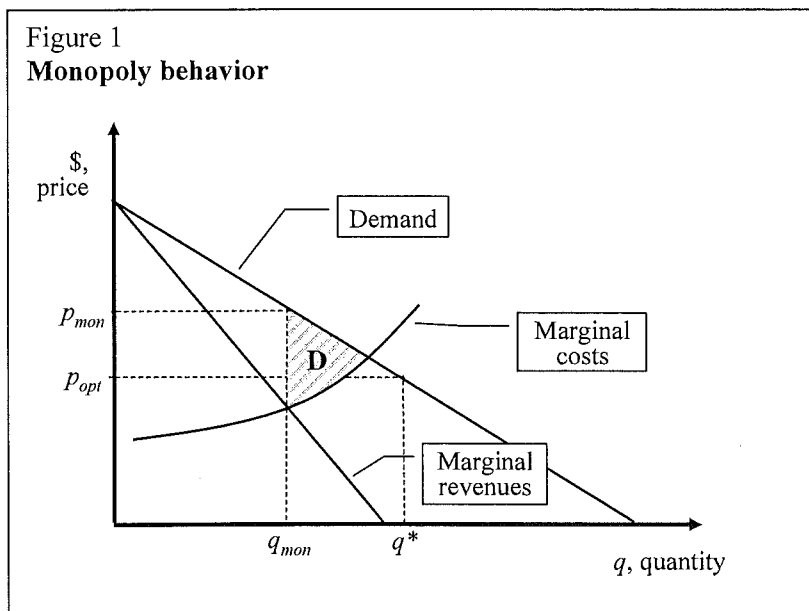
For both input and output prices the 2nd term would be negative provided $p_q \neq 0$.⁶ It follows from the usual shape of the profit function that the monopoly production level, q_{mon} , say, is less than the socially optimal one, i.e., $q_{mon} \leq q^*$.

The monopoly situation is often illustrated as in Figure 1. In this figure, the monopolist is faced with a downward sloping demand curve, so he perceives $p_q < 0$. Therefore, rather than setting the quantity at the socially optimal level, q_{opt} , where the marginal profits

⁵ In more technical language, the requirement for the existence of market power is that the elasticity of the output demand function and the input supply functions, as seen by the firm, be less than infinite.

⁶ Note that $p_q = 0$ corresponds to perfectly elastic demand and supply functions.

are zero and the market price will be p_{opt} , he maximizes his profits by setting the quantity at q_{mon} , corresponding to a higher price p_{mon} . So, under the monopoly, the quantity is less and the market clearing price is higher than for the socially optimal behavior.



Monopolistic behavior results in a social loss, a limited measure of which is often referred to as the deadweight loss of monopoly (Varian 1984).⁷ This loss is illustrated as the striped area in Figure 1.

The deadweight loss of monopoly represents reduced economic efficiency and is the main economic reason for combating monopolistic

behavior. However it is important to realize that this deadweight loss is often not very great and must, whatever it is, be set against any possible social benefits the monopoly (or oligopoly) may confer.

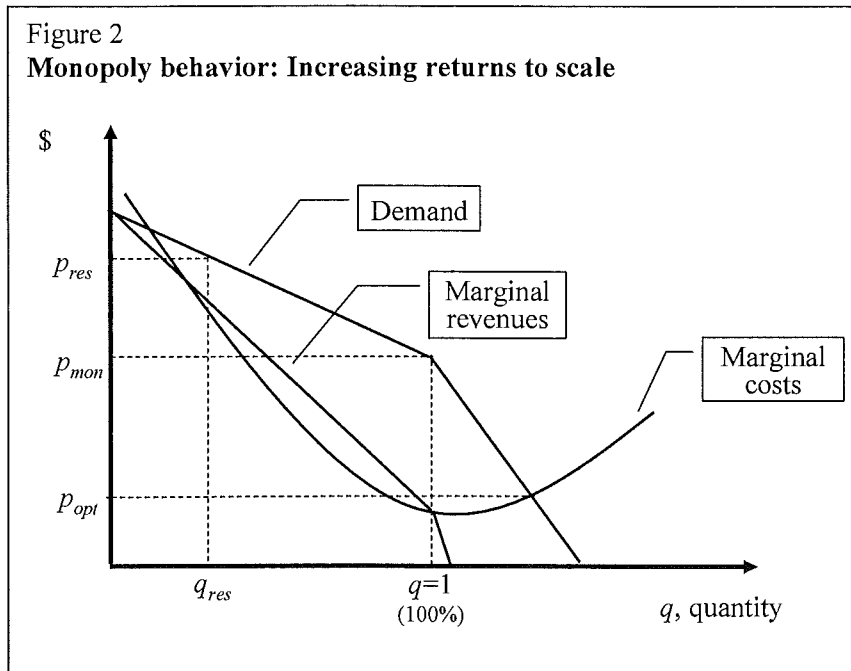
An important possible gain stemming from large companies relative to the total market (or industry) is that they may be able to reap returns to scale. This happens when the marginal cost function in Figure 1 is falling rather than rising and it corresponds to a situation when the marginal profit function is increasing rather than falling (non-concave) over some interval. If this is the case, forcing the large company to be reduced in order to curtail monopoly power may actually reduce overall social benefits. This is because the deadweight losses of monopoly behavior are less the gains from the scale economies realized by the large company.

A possible situation of this kind is illustrated in Figure 2. In this figure, strong increasing returns to scale result in a decreasing marginal cost function over a wide range of output. The demand function is illustrated as seen by the company. This is kinked at its 100% share of the market because the elasticity of demand (the elasticity of the demand curve) increases when the company gets competitors. The company maximizes its profits by producing at $q=1$ where it has 100% of the market. The price it receives at this quantity is p_{mon} , while the socially optimal price is p_{opt} which is much lower and at which price the total quantity would be higher. Consequently, this monopoly behavior results in a monopoly deadweight loss, i.e. a social loss.

⁷ The deadweight loss of monopoly is a limited measure of the actual social loss because it doesn't involve general equilibrium considerations or consider the dynamic or economic growth impacts of the monopolistic behavior.

Let us now assume that in an attempt to rectify this situation the maximum relative size of the company is restricted to some fraction of the total market indicated by q_{res} in Figure 2. But at this quantity most of the returns to scale are lost and the actual market price, p_{res} , is higher than under the unrestricted monopoly. It is easy to check that the total consumer and producer surplus under the restricted company size situation is less than in the monopoly situation. In other words, the deadweight loss of monopoly in the initial situation is less than

the loss in returns to scale in the restricted situation.



The situation depicted in Figure 2 is often referred to as natural monopoly. This is because the marginal cost function is still declining at the size of the market (albeit not at the optimal size of the market as the figure is drawn). Since the situation is one of natural monopoly, it is

not a good idea to restrict the size of the company.

Note that this does not suggest that the initial situation of monopoly is ideal. There is a significant deadweight loss in that situation as we have seen. The point is that dealing with that situation by restricting company size is counterproductive — it results in more losses than gains. A more appropriate policy is to permit the natural monopolist to persist but find ways to reduce the price he is charging.

Addendum 2

Monopolistic behavior in an ITQ fishery: Analysis

In an ITQ fishery, the harvest volume (the basic quantity in the fishery) is bounded above by the TAC (total allowable catch). If the TAC is binding, there is limited room for monopolistic behavior by the fishing firms.⁸ However, in ITQ fisheries, fishing firms may withhold quotas from fishing, thus controlling the effective TAC. This may, among other things, increase output prices (monopoly) and reduce input prices (monopsony) and thus potentially increase the firms' profits. The conditions under which this would be profitable for firms are not immediately obvious.

The following examines the conditions under which this kind of monopolistic (monopoly, oligopoly and monopsony) behavior would be profitable for individual firms or a cartel of firms. Unfortunately, it turns out that the relationships involved are somewhat complicated and some of the results are not totally obvious, even when contemplated ex post. Therefore, I have felt it necessary to spell out some of the less obvious aspects of the analysis at considerable length. To compensate for this increase in length, an attempt will be made to summarize the most pertinent results of the analysis toward the end of this chapter.

The fishery

Consider a fishery composed of a number of firms $I, I > 0$. Let the profit function of any firm i be:

$$\pi(p; q, x; i),$$

where p refers to input and output prices, q the volume of harvest and x biomass. The profit function is assumed to have the usual properties, i.e., to be (i) differentiable in all variables, (ii) concave in both q and x , (iii) monotonically increasing in biomass and output prices, (iv) having a maximum in q and (v) monotonically decreasing in input prices.

Note 1: The variable (or vector) p is included in this profit function to allow for possible monopolistic behavior. At a later stage this variable will be decomposed into output and input prices to allow for monopsony as well as monopoly.

Note 2: As it is specified the profit functions may differ from one firm to another.

Fisheries management

Let this fishery be managed by ITQs. The fisheries manager sets the TAC (hereafter referred to as Q) so as to maximize the present value of the sum of consumer and producer surplus flowing from the fishery. This is the standard fisheries problem (see e.g. Clark 1975). In the ITQ-context the fisheries management problem may be expressed as (Arnason 1990):

⁸ Monopolistic behavior ultimately consists of manipulating quantities to affect prices or, equivalently, setting the prices and accepting the resulting quantities.

$$(I) \quad \text{Max}_Q \int_0^{\infty} \left(\sum_{i=1}^I \pi(p, q(i), x; i) \right) \cdot e^{-r \cdot t} dt$$

$$s.t. \quad \dot{x} = G(x) - Q$$

$$q(i) = \Psi(Q; p, x; i)$$

$$\sum_{i=1}^I q(i) = Q$$

Note 3: The second constraint expresses the individual harvesting response to the management control, Q .

Note 4: Profit maximization taking prices as constant implies the maximization of the sum of consumer and producer benefits (Varian 1984).

Note 5: Setting Q so as to solve problem (I) leads to the socially optimal Q , Q^* , say.

Note 6: Corresponding to Q^* , there will be the socially optimal shadow value of biomass, λ^* , say.

Note 7: The ITQ system leads to the socially optimal rental price of ITQs (per volume), s^* , say.

Note 8: If the TAC is set optimally, $Q=Q^*$, then $s^* = \lambda^*$ (Arnason 1990).⁹

Fishing firm behavior

Under the ITQ system, firms hold quota-shares (possibly zero). They may alter these quota share holdings by trading. They may also buy and sell (rent in or out) annual (seasonal) quantity quotas (non-permanent) at the market price s . By withholding quantity quotas from fishing they reduce the total catch below the TAC level, which may affect:

- (1) Fishery input and output prices, p .
- (2) The rental price of quotas, s .
- (3) The evolution of the biomass, x .
- (4) The price of quota shares.

Note 9. The price of quota shares is an asset price and is not going to affect monopolistic behavior at any given point of time. Therefore, share quotas and share quota prices can apparently be ignored in this analysis. Moreover, since rental prices of quotas and quota share prices are functionally dependent on each other by trading arbitrage (Arnason 1990), it suffices to consider the former.

Note 10. The firm can only affect prices by withholding quota. This is because total supply of outputs and, therefore, the demand for inputs equals the exogenous TAC less the quantity of quota that is withheld from fishing.

Note 11. Since withholding quota means that the effective TAC is reduced, the rental price of quota will generally be positively affected by quota withholding.

⁹ This actually follows immediately from socially optimal fishing which implies $\pi_{q(i)} = \lambda^*$ all active i and actual fishing under ITQs which implies $\pi_{q(i)} = s$ all active i .

Given this, the following summarizes the relevant profit maximization problem for firm i .¹⁰

$$(II) \quad \begin{aligned} & \text{Max}_{q,\Delta} \int_0^{\infty} (\pi(p(Q-\Delta), q-\Delta, x; i) - s(Q-\Delta) \cdot q) \cdot e^{-r't} dt \\ & \text{s.t. } \dot{x} = G(x) - Q - \Delta \\ & \quad q - \Delta \geq 0, \Delta \geq 0, \end{aligned}$$

where q and Δ denote the quota held by the firm and quota withheld from fishing, respectively. The functions $p(Q-\Delta)$ and $s(Q-\Delta)$ represent the input/output price equations and quota rental price equations respectively.

Note 12. $q-\Delta$ represents the harvest by the firm. It is convenient to refer this by $h(i) \equiv q-\Delta$.

Note 13. $Q-\Delta$ represents total harvest. Let us refer to this as $H = Q-\Delta$.

A Hamiltonian function for problem (II) may be written as:

$$H = \pi(p(Q-\Delta), q-\Delta, x; i) - s(Q-\Delta) \cdot q + \sigma \cdot (G(x) - Q + \Delta),$$

where σ is the firm's private evaluation of the shadow value of biomass.

Necessary conditions for solving (II) include:

$$(II.1) \quad \pi_{h(i)} = s, \text{ for active firms.}$$

$$(II.2) \quad -\pi_p \cdot p_H - \pi_{h(i)} + s_H \cdot q + \sigma \leq 0, \Delta \geq 0, (-\pi_p \cdot p_H - \pi_{h(i)} + s_H \cdot q + \sigma) \cdot \Delta = 0$$

Expression (II.2) is the key to understanding monopolistic behavior in an ITQ fishery. Therefore, in what follows, we will focus on this expression.

(II.2) is designed for a fishing or an integrated fishing fish processing firm. It does not directly cover the case of a quota holder who does neither but just rents out his quota. Without going into detail, a corresponding expression for that situation may be expressed as:

$$(II.2') \quad s_H \cdot (\Delta - \bar{q}) - s + \sigma \leq 0, \Delta \geq 0, (s_H \cdot (\Delta - \bar{q}) - s + \sigma) \cdot \Delta = 0,$$

where \bar{q} is the quota holdings of the agent.

Monopolistic behavior

As stated above, in an ITQ fishery a fishing firm can exert market power by withholding quota from fishing. In fact, since this is the only way to alter quantities, this or the threat of this may be regarded as the only way to exert market power. For instance, trying to get

¹⁰ It may be noticed that there are no quota shares. This is because quota shares only relate to the dynamic asset side of the problem and to study the fishery monopoly problem as stated above, it is sufficient to consider an ITQ fishery without permanent quota shares.

suppliers to accept a lower input price and buyers a higher output price requires at least a credible threat of reduced quantities. Similar arguments apply to cartels of firms.

Expression (II.2) shows that quota will be withheld only if the marginal benefits of quota withholding, $\partial H/\partial \Delta$, evaluated at $\Delta=0$ is positive. This, of course, is highly intuitive.

Formally we express this as.

$$(1) \quad \left. \frac{\partial H}{\partial \Delta} \right|_{\Delta=0} = -\pi_p \cdot p_H - \pi_{h(i)} + s_H \cdot q + \sigma > 0.$$

This expression is the fundamental condition for it to be profitable for a fishing firm (or a cartel of such firms) to withhold quota from fishing. Careful examination of this equation will elicit the conditions under which this can happen. Among other things, (1) involves a number of price elasticities as well as the size of the firm relative to the total size of the fishery. Therefore, (1) will indicate the relative size of the firm as a function of elasticities at which monopolistic behavior could become a possibility. Of course (1) represents a basic theoretical relationship. For actual fisheries, it needs to be supplied with the empirical structure of the fishery and the numerical estimates of the parameters.

In order to bring out more clearly the main message of expression (1), it may be useful to seek to simplify it.

S-1. For an output price, $\pi_p = h(i)$, [Hotelling's lemma, Varian (1984)].

For an input price, $\pi_p = -z(i)$, where $z(i)$ represents the quantity of inputs,

[Hotelling's lemma, Varian (1984)].

S-2. By (II.1), $\pi_{h(i)} = s$, provided firm i is active in the fishery. (Note that if this is not the case $\pi_{h(i)} < s$).

S-3. Clearly, $p_H \equiv E(p, H) \cdot \frac{p}{H}$, $w_H \equiv E(w, H) \cdot \frac{w}{H}$, $s_H \equiv E(s, H) \cdot \frac{s}{H}$, where $E(a, b)$ denotes the elasticity of a with respect to b .

S-4. In (1), $q \equiv q(i) = h(i)$ since the expression is evaluated at $\Delta=0$.

S-5. In (1), $\sigma \equiv \sigma(i) \approx \left(\frac{h(i)}{H}\right) \cdot \lambda^* = \left(\frac{h(i)}{H}\right) \cdot s$. [The approximately equal sign, " \approx ", is shown in Arnason (1990), the last equality sign follows from Note 7 above.

Adopting simplifications S-1 to S-5 and representing input prices by w and output prices by p modifies (1) to:

$$(2) \quad \left. \frac{\partial H}{\partial \Delta} \right|_{\Delta=0} = -\frac{h(i) \cdot p}{H} \cdot E(p, H) + \frac{z(i) \cdot w}{H} \cdot E(w, H) - s + \frac{h(i) \cdot s}{H} E(s, H) + \frac{h(i)}{H} \cdot s > 0.$$

Now, let the relative size of the firm be defined by $\alpha(i) \equiv \frac{h(i)}{H}$.

Note 14. Evaluated at $\Delta=0$, $\alpha(i) \equiv h(i)/H \equiv q(i)/Q$, i.e. the quota holding of company i .

Inserting this in (2) and simplifying we find:

$$(3) \quad \left. \frac{\partial H}{\partial \Delta} \right|_{\Delta=0} = -\alpha(i) \cdot E(p, H) + \alpha(i) \cdot \frac{z(i) \cdot w}{p \cdot h(i)} \cdot E(w, H) - \frac{s}{p} + \alpha(i) \cdot \frac{s}{p} \cdot E(s, H) + \alpha(i) \cdot \frac{s}{p} > 0.$$

The expression $\frac{z(i) \cdot w}{p \cdot h(i)}$ represents the cost-revenue ratio for the firm. Let us denote this ratio by $\beta(i)$, i.e. $\beta(i) \equiv z(i) \cdot w / p \cdot h(i)$. With that inserted expression (3) becomes

$$\left. \frac{\partial H}{\partial \Delta} \right|_{\Delta=0} = -\alpha(i) \cdot E(p, H) + \alpha(i) \cdot \beta(i) \cdot E(w, H) - \frac{s}{p} + \alpha(i) \cdot \frac{s}{p} \cdot E(s, H) + \alpha(i) \cdot \frac{s}{p} > 0$$

Rearranging yields the following boundary expression for the size of the firm, $\alpha(i)$ ¹¹:

$$(4) \quad \alpha(i) > \frac{1}{1 + E(s, H) + (\beta(i) \cdot E(w, H) - E(p, H)) \cdot \frac{p}{s}}.$$

Expression (4) gives the relative size of the company, i.e. $\alpha(i)$ for which it is profitable for it to withhold quota from fishing. The largest relative size before this becomes profitable is given by

$$(5) \quad \alpha_{crit} = 1 / \left(1 + E(s, H) + (\beta(i) \cdot E(w, H) - E(p, H)) \cdot \frac{p}{s} \right)$$

We refer to this α_{crit} as the critical size of the firm. For any size less or equal to the critical size, it will not be profitable for the firm to withhold quota from fishing-, even if it has market power. For any relative size greater than the critical size, withholding quota will be profitable.

It is convenient to summarize the content of (5) in the following general expression:

$$\alpha_{crit} = \Lambda(E(p, H), E(w, H), E(s, H), s/p, \beta).$$

So, the critical size of the company depends on (i) the elasticity of output price with respect to total harvest, $E(p, H)$, (ii) the elasticity of input price with respect to total harvest, $E(w, H)$. (this represents the monopsony aspects of the situation), (iii) the elasticity of the quota rental price with respect to total harvest, $E(s, H)$, (iv) the output price/quota price ration, p/s , and (v) the cost/revenue ratio, $\beta(i)$.

From (5) it is easy to see that

- The (numerically) higher the elasticity of output and input prices with respect to harvests the lower is the critical size of the firm.

¹¹ Provided the denominator is positive.

- The higher (numerically) is the elasticity of the quota rental price with respect to harvests the larger is the critical size of the firm.
- The higher the p/s ratio, i.e. the lower the marginal profits of fishing, the lower is the critical size of the firm.
- The higher is the cost to revenue ratio, $\beta(i)$, the lower is the critical firm size.

All these results seem in accordance with a priori economic reasoning. The result that monopoly behavior becomes more profitable with increasing elasticity of price with respect to quantity (less elastic supply and demand curves) is well known (Varian 1984, Tirole 1989). The result for the quota rental price is somewhat novel. However, recognizing that the cost of withholding quota from fishing is equivalent to the quota rental price and that this price increases with the quantity of quota withheld, the result is readily understandable. This also explains the role of the quota rental price in the output price/quota price ratio. Clearly the benefits of quota withholding increase with the price of fish, but they decrease with the rental price of quota as discussed. Finally the cost to revenue ratio is merely a weight on the elasticity of input price with respect to harvest and therefore has exactly the same effect.

The critical firm size: Numerical calculations

Inserting empirical estimates for the arguments (independent variables) in (5) makes it possible to calculate the critical firm size. In the absence of such estimates plausible guesstimates may be used. Such plausible values are listed in Table 1. Since below we will conduct tests of the sensitivity of the critical firm size to these specifications, we refer to them as the base levels.

Table 1 Assumed base values for the arguments in (5)		
Argument	Assumed values	Comments
$E(p,H)$	-0.5	This is equivalent to the more commonly used $E(H,p)=-2$
$E(w,H)$	0.2	This is equivalent to the more commonly used $E(H,w)=5$
$E(s,H)$	-1	
s/p	0.5	
β	0.5	Note that $1-\beta = \text{profits/revenues}$

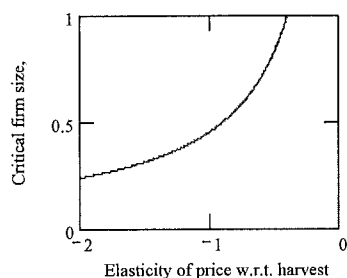
Many empirical studies of the elasticity of fish price to supply suggest low elasticities (highly elastic demand curves, see e.g. Asche and Bjondal 1999). Presumably, this is because of the ready availability of substitutes. Accordingly a demand elasticity of -2 is assumed. The elasticity of input prices in fisheries (labor, capital and materials) is usually very low, especially in well developed market economies. This is because of highly elastic supply. The supply elasticity of 5 is assumed suggesting that when the use of inputs is doubled the price increases by 20%. Little is known about the elasticity of quota price with respect to harvest quantity. This reflects the elasticity of the marginal profit function (demand function for quotas. Assuming unitary elasticity for this seems reasonable.

At the base levels listed in Table 1, the critical firm size is 0.83, i.e. a firm needs to have 83% of the industry before it becomes profitable to withhold quotas. It should be emphasized, however, that this outcome depends on the base level assumptions listed in the table. Thus, it should be regarded as an example rather than an empirical result.

Rather than calculating specific values, it may be more informative to examine how the critical firm size depends on the arguments of (5). Doing that essentially defines a sub-space in the space of relative firm sizes and the functional arguments in (5) where monopolistic behavior becomes profitable. Depicting this subspace, however, is not easy. Therefore, in what follows we resort to a simpler device.

First consider the dependence of the critical firm size on each of the three elasticities in expression (5) keeping the other arguments in (5) constant. This is done in the following sets of diagrams (Figures 1-3).

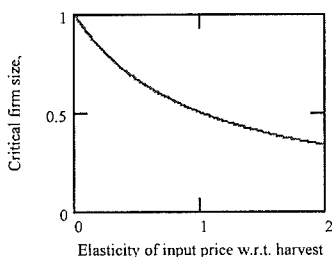
Figure 1
Critical firm size as a function of elasticity of output price w.r.t. total harvest



The schedule of the critical firm size as a function of the elasticity of output price with respect to harvest volume is drawn in Figure 1. When the size of the firm is above the schedule, it is profitable to withhold quotas. As indicated in the diagram, with $E(p,H)=-0.1$, the critical firm size is above 100%. It is about 83% for $E(p,H)=-0.5$ and 45% for $E(p,H)=-1$. With $E(p,H)=-2$, the critical firm size drops to about 24%.

The schedule of the critical firm size as a function of the elasticity of output price with respect to harvesting quantity is drawn in Figure 2. Note that this schedule measures the profitability of monopsonistic rather than

Figure 2
Critical firm size as a function of elasticity of input price w.r.t. total harvest



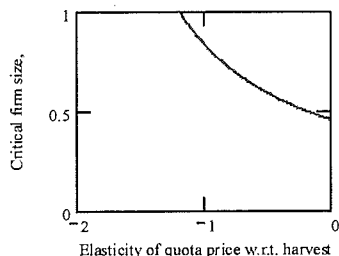
monopolistic behavior. As before the firm sizes for which it is profitable to withhold quota are located above the schedule. As shown in the diagram, when the $E(w,H)=0$, the critical firm size is 100%. So, for this elasticity of input price and the base level assumptions for the other arguments of (4), there is no tendency for monopolistic behavior even at 100% firm size. This, of course, is a coincidence of the numerical specifications. With $E(w,H)=0.2$, the base-level assumption, the critical firm size is about 83% as before. With $E(w,H)=0.5$, the base-level assumption, the critical firm size is about 67%. Finally with $E(w,H)=1$, the

base-level assumption, the critical firm size is about 50%.

The schedule of the critical firm size as a function of the elasticity of quota price with respect to harvest is drawn in Figure 3. The interpretation of this schedule is the same as before. Note that the higher the numerical value of this elasticity, the larger is the critical firm size. Thus,

for any elasticity less than -1.2, other arguments of (4) at their base levels, the critical firm size is above 100%.

Figure 3
Critical firm size as a function of elasticity of quota price w.r.t. total harvest



The sensitivity of the critical firm size to deviations in the base level assumptions is illustrated in Figure 4. In this diagram, the base level assumptions of Table 1 are altered from -50% to +50% and the resulting critical firm size calculated. (Note that a -50% reduction in negative elasticities results in a numerical increase in their values).

Figure 4
Sensitivity of the critical firm size to base level assumptions

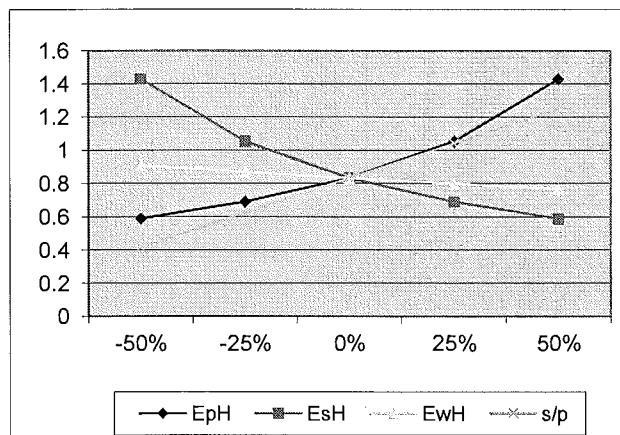


Figure 4 illustrates that the critical firm size is most sensitive to changes in the elasticities of output price and quota price to harvests and the s/p ratio. As the elasticity of output price with respect to harvests gets greater (becomes more negative) the smaller the critical firm size and vice versa for the elasticity of quota price. Compared to these impacts the effect of the input price elasticity is smaller. The higher the s/p ratio the larger the critical firm size. This makes full sense. One of the costs of withholding quotas is the price of quota. The higher this is relative to the output price the greater this cost.

Conclusions

The above analysis suggests certain seemingly robust results of a general nature:

- Expressions (1), (4) and (5) show that the critical size of firms, i.e. the size before monopolistic behavior becomes profitable, is in general a complicated function involving several variables and relationships. It follows that a sensible analysis of possible monopolistic behavior under ITQ systems must take account of these complexities.
- The expressions for the critical firm size show that even when market power exists (in the sense that withdrawal of quota will affect prices), it is often not profitable for the firms to exercise this power. It follows that a mere study of market power is insufficient to set a sensible limit on fishing firm size.
- The critical firm size depends on several empirical aspects of the fishery. Many of these aspects are highly variable over time. Moreover, it appears that the critical firm size may be quite sensitive to the numerical values of these empirical aspects. It follows that to set the critical firm size sensibly requires a careful, frequently updated empirical studies.

It is important to realize that the above analysis is subject to considerable limitations. Most importantly, it is limited to studying when it would be profitable for fishing firms to exercise whatever market power they have. It does not even attempt to answer the broader question as to when it would be socially beneficial to impose relative size limitations on fishing firms. Clearly, this would only be beneficial when the following apply.

- (1) It is profitable for firms to exercise market power. A necessary (but not sufficient) condition for that is that the firms have exceeded the critical size.
- (2) The social costs of larger firms (in terms of deadweight loss) is greater than the social benefits (in terms of increased efficiency (i.e., lower average cost of output)
- (3) The costs of enforcing the size constraint is less than the net benefits it generates.

In addition to this, the expressions for the critical firm size are based on certain crucial assumptions.

- The first crucial assumption is that other firms do not react (by following suit). If they do, the individual benefits will be different. Often they will be larger. However, they can be less depending on the various elasticities entering (1) and (4) and how they change with the level of harvest. The analysis of what will happen if the other firms react belongs to the field of game theory and is beyond the scope of this analysis.
- The second crucial assumption is that the firm can act without risk of negative consequences in terms of penalties for monopolistic behavior and negative reputation. If these risks exist, the critical firm size before withdrawing quotas becomes truly profitable will be larger than described above.

Appendix 1 Bibliography

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Appendix 2
Statement of Work for Dr. Ragnar Arnason

External Independent Peer Review by the Center for Independent Experts

**Evaluation of excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ 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 Technical Representative (COTR), 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 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: Recently, the Mid-Atlantic Fishery Management Council has been crafting Amendment 15 to the Surfclam and Ocean Quahog Fishery Management Plan, and as part of the Amendment, has been attempting to define an "excessive share" threshold for the Individual Transferable Quota (ITQ) portion of the fishery. Regarding share accumulation, section 303A(c)(5)(D) of the 2006 reauthorized Magnuson-Stevens Act states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. In addition, National Standard 4 of the Magnuson Act (16 U.S.C. 1851(a)(4)) requires 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 on the market power excessive share issue, it was decided that additional expertise was needed to examine the economic rationale behind the excessive share determination, and to recommend an excessive share level, if needed. In order to provide this expertise, a Technical Group of Experts (not the CIE) is being assembled to give advice on the appropriate excessive share threshold for the surfclam and ocean quahog ITQ system. This Technical Group will assess available models for evaluating the presence of market power, and make recommendations with regard to their appropriateness for setting excessive catch share limits.

The work being performed by this Technical Group could be controversial. It will establish methods for determining excessive shares which might be applied in other fisheries (besides surfclams and ocean quahogs). With the movement by NMFS to catch share systems, determining what constitutes an excessive share and whether limits need to be put in place is extremely important because excessive share may lead to market power. Market power can lead to the ability to influence price in either the final product market or for factors of

production (i.e. the fish resource). Examination of market share has never been formally investigated in this fishery. Thus the study by the Technical Group will be innovative and significant.

After the Technical Group has delivered its recommendations, a peer review (by the CIE) needs to take place to either endorse or reject the findings from the Technical Group. This two-step process was agreed to by the Northeast Fisheries Science Center (NEFSC) and the Mid-Atlantic Fishery Management Council (MAFMC).

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 like ITQ's in fisheries 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 14 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 14 days (i.e., several days prior to the meeting for document review; the CIE panel meeting in Woods Hole; several days following the open meeting for SARC Summary Report preparation).

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Woods Hole, Massachusetts during 21-23 June 2011.

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 Open 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 COTR 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 Mid-Atlantic Management Council 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 NMFS by the Technical Group of Experts regarding excessive shares in the surfclam and ocean quahog 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.

During the question and answer period, a representative of the NMFS expert panel will be available to answer questions about the report. The CIE members can provide feedback to the expert panel member at that time.

Other Panel Members

A representative from the Mid-Atlantic Fishery Management Council staff, and the Northeast Fisheries Science Center Social Sciences Branch will be available during the meeting to provide any additional information requested by the CIE reviewers. Other panel members may assist the Chair prepare the summary report, if requested.

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.

Part II. Peer Review Report: Ragnar Arnason

- 2) Participate during the panel review meeting at the Northeast Fisheries Science Center, Woods Hole, MA laboratory during 21-23 June, 2011 as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
- 3) No later than 7 July, 2011, 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.

17 May 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
7 June 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
21-23 June 2011	Each reviewer participates and conducts an independent peer review during the panel review meeting
7 July 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
14 July 2011	Draft of Summary Report, reviewed by all CIE reviewers, due to panel Chair *
21 July 2011	Panel Chair send final Summary Report, approved by CIE reviewers, to NEFSC contact
21 July 2011	CIE submits CIE reports to the COTR
28 July 2011	The COTR 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 COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR 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 COTR 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 COTR (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 be 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 COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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Key Personnel:

NMFS Project Contact:

John B. Walden
Northeast Fisheries Science Center
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John.Walden@noaa.gov

Phone: 508-495-2355

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 excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ fishery**

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

1. Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.
2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.
3. Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.
4. Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.
5. Provide any recommendations for further improvement

Annex 3: Tentative Agenda

**Evaluation of excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ fishery**

Falmouth and Woods Hole, Massachusetts during 21-23 June 2011

Tuesday, June 21. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:15 AM

Opening

Welcome

Introduction

SSC Chair

Agenda

Conduct of Meeting

9:15 – 9:30 Background and Need for Expert Panel Report – Lee Anderson

9:30-11 Report of the NMFS Expert Panel - NMFS Expert Panel Rep.

11-11:15 Break

11:15 -Noon Review Terms of Reference – CIE Panel

Noon – 1:15 Lunch

1:15 – 3:00 CIE Panel Discussion – Terms of Reference #1.

3:00-3:15 Break

3:15-4:00 Public Comments

4:00-4:45 CIE Panel Discussion – Terms of Reference #2

4:45-5:00 Questions for following day

Wednesday, June 22. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:30 Review any outstanding questions from previous day

9:30-10:30 CIE Panel Discussion – Terms of Reference #3

10:30-10:45 Break

10:45-Noon CIE Panel Discussion – Terms of Reference #4

Noon-1:30 Lunch

1:30 – 3:00 CIE Panel Discussion – Terms of Reference #5

3:00-3:15 Break

3:15-5:00 CIE Panel Discussion – Outstanding Issues

Thursday June 23 Location: Clark Conference Room, Northeast Fisheries Science Center.

9:00 – 5:00 Report writing (Meeting Closed to Public)

Appendix 3
Peer Reviewer Panel

Ani Katchova. Assistant Professor, Department of Agricultural Economics, University of Kentucky akatchova@uky.edu

Rigoberto Lopez. **Professor**, Agricultural and Resource Economics, University of Connecticut rigoberto.lopez@uconn.edu

Ragnar Arnason. Professor, Department of Economics, University of Iceland. ragnara@hi.is

Chair

James E. Wilen. Professor, Agricultural and Resource Economics, University of California Davis. wilen@primal.ucdavis.edu

Part III: Peer Review Report

by

Ani Katchova

CIE Independent Peer Review Report

On

Recommendations for Excessive-Share Limits in the Surfclam and Ocean Quahog Fisheries, prepared by Glenn Mitchell, Steven Peterson, and Robert Willig

By

Ani Katchova

Assistant Professor

Department of Agricultural Economics

University of Kentucky

E-mail: akatchova@uky.edu

July 1, 2011

Executive Summary

A National Marines Fisheries Service Technical Group of Experts was assembled to give advice on the appropriate excessive share threshold for the Surfclam and Ocean Quahog (SCOQ) ITQ system. The report prepared by Mitchell, Peterson, and Willig provides background information on the SCOQ industry and recommendations on 1) the rule or process that can be used to set an excessive-share limit in terms of the maximum percentage of quota that can be owned or otherwise controlled by a single individual or entity; and 2) the application of this rule or process using available data to determine an appropriate excessive-share limit in the SCOQ ITQ system.

The NMFS technical group argues that the evidence they analyzed does not support a conclusion that market power is currently being exercised through withholding of quota in the SCOQ fisheries. Using the Herfindahl-Hirschman index which is recommended for use in the Horizontal Merger Guidelines, it is found that the levels of concentration vary in the different sectors of the SCOQ industry: quota ownership, harvesting, and processing. The ownership of quota in the SCOQ fisheries is unconcentrated, but the use of quota is highly concentrated, both for harvesting and processing.

The excessive-share proposal is laid out as a series of seven steps. They consider the HHI index using non-SCOQ clams and fringe holders, and the rule of three-firms to ensure adequate competition. At the end, they propose a two-part cap at 30% for long-term quota holdings and 40-60% for short-term quota holdings. They also recommend that there be a mechanism for revealing information on quota prices, such an open auction process.

The proposed method developed by the NMFS technical group has several key strengths and weaknesses. One of the major strengths of the proposed method is that it follows the Horizontal Merger Guidelines for determining concentration and market power. Using the HHI for measuring market concentration strengthens the study as it makes the methods and results comparable across industries. The application of this method presents a problem if there is an uncertainty about the market size (imports, other relevant markets) due to lack of available data. An additional rule was suggested that at least three firms must be present to ensure sufficient competition. There is support in the literature for this rule, although it is somewhat arbitrary how this three-firm rule was introduced to their study.

The proposed excessive share cap percentages include a rather wide range (i.e. 40-60%) of acceptable excessive-share caps that a regulator will have to determine which specific number to use and enforce as an excessive-share cap. The cost associated with the implementation of an excessive-share cap as well as the cost of monitoring and enforcement will likely be substantial, which will also need to be explored.

The boundaries of relevant markets are set based on the ability of consumers to switch products when faced with a small but relevant price increase (the hypothetical monopolist test). In absence of reliable quantitative data, there needs to be an in-depth understanding of the industry,

major players, products, etc. Therefore, in order to apply an excessive-share cap correctly over time, the cap needs to be dynamically updated based on new information about substitutability and structural changes in the industry.

The analysis of the NMFS technical group is mostly focused on the output markets as opposed to the input markets. Since this approach is applied to a vertically-integrated industry with a small number of processors and vessels predominantly controlled by the processors, the exercise of monopsony power is of primary interest.

One of the major challenges for this approach is the instrument used to address the potential exercise of market power. The only instrument considered in their study is setting excessive-share cap for the ITQ holdings. More transparency and reliable data are needed for the ownership, transfers, and contracts for quotas.

The approach outlined by the NMFS technical group is generally applicable to other fisheries managed through catch shares. The 7 steps as described by the NMFS technical group are relevant for the establishment of ITQs with excessive-share cap in other fisheries, but it may not apply to fisheries without ITQs. It is necessary to analyze all available information and data about the new fishery to assess the similarity and differences with the SCOQ industry before applying this approach. Similar data constraints may be present for other industries as well.

The NMFS technical group study provides a good starting point in considering an excessive-share cap in the SCOQ clam industry. In my opinion, because of data limitations there is still not sufficient understanding of the market structure for this industry and the recommendations apply in a general sense. I would recommend several actions:

1. An open auction or other mechanisms to reveal quota prices and make the market for quota transfers liquid and transparent needs to be established.
2. More information can be collected from industry participants regarding market shares, major buyers of processed output, prices paid and received for claim inputs and outputs, etc.
3. Merger guidelines focus on market shares and price considerations but not on production cost efficiencies. Further studies can be done on the cost efficiencies of operating as large processors.
4. Further studies are needed on the monopsonization of the input markets. Monopsonization of the input market is a larger concern than monopolization of the output market.
5. The study only considered policies regarding excessive share of the ownership quota. Other instruments beyond excessive share cap should be investigated.
6. Monitoring and enforcement of the excessive share cap will need to be studied and implemented.

I. Background

A. Project Description

The Mid-Atlantic Fishery Management Council has been crafting Amendment 15 to the Surfclam and Ocean Quahog (SCOQ) Fishery Management Plan, and as part of the Amendment, has been attempting to define an "excessive share" threshold for the Individual Transferable Quota (ITQ) portion of the fishery. Regarding share accumulation, the 2006 reauthorized Magnuson-Stevens Act states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. In addition, National Standard 4 of the Magnuson Act requires that fishing privilege allocations be carried out so that "no particular individual, corporation, or other entity acquires an excessive share of such privileges."

In order to provide this expertise, a NMFS Technical Group of Experts was assembled to give advice on the appropriate excessive share threshold for the Surfclam and Ocean Quahog ITQ system. This Technical Group assessed available models for evaluating the presence of market power, and made recommendations with regard to their appropriateness for setting excessive catch share limits.

After the Technical Group delivered its recommendations, a peer review (by the CIE) was conducted to either endorse or reject the findings from the Technical Group. This two-step process was agreed to by the Northeast Fisheries Science Center (NEFSC) and the Mid-Atlantic Fishery Management Council (MAFMC).

B. Brief Summary of Findings, of the Science, Conclusions and Recommendations of the Excessive-Share report by Mitchell, Peterson, and Willig.

The report prepared by Mitchell, Peterson, and Willig provides background information on the SCOQ industry as well as recommendations on 1) the rule or process that can be used to set an excessive-share limit in terms of the maximum percentage of quota that can be owned or otherwise controlled by a single individual or entity; and 2) the application of this rule or process using available data to determine an appropriate excessive-share limit in the SCOQ ITQ system.

In 1990, the SCOQ fisheries adopted an ITQ system under which the fishery regulator sets a total allowable catch ("TAC") separately for each of the two species to prevent over-exploitation of the resource, and allocated ITQs permitting harvest of a share of the TAC. ITQs are transferable, which allows shifts in production to industry participants that may be more efficient.

Currently, there are eight processing firms that purchase catch from the SCOQ fisheries. Some processors have developed quota ownership through either the acquisition of vessels and

accompanying quota or the acquisition of quota directly, and it is common for processors to enter into long-term contracts to lease quota from quota holders. Virtually all clams are sold under contract between processors and harvesters, or are harvested by processor-affiliated vessels.

The Mitchell, Peterson, and Willig report addresses the question of whether market power can be exercised through the ownership and withholding of quota in the SCOQ fisheries. The exercise of market power in an ITQ-regulated fishery can occur when a quota owner has the ability and the incentive to affect the price of the regulated harvest or of the quota through its use or suppression of use of quota.

The authors argue that the evidence they analyzed does not support a conclusion that market power is currently being exercised through withholding of quota in the SCOQ fisheries. In particular, processors report that once it is clear that there will be excess quota available in a season (well before the end of the season, leaving sufficient opportunity to continue to harvest if harvesters and processors deem there to be sufficient demand), the price of quota is very low.

There are a number of factors that may constrain the exercise of market power throughout the various levels of activity in the SCOQ fisheries, including cases where the demand were highly elastic and substitutes were amply available.

Using the Herfindahl-Hirschman index which is recommended for use in the Horizontal Merger Guidelines, it is found that the levels of concentration vary in the different sectors of the SCOQ industry: quota ownership, harvesting, and processing. The ownership of quota in the SCOQ fisheries is unconcentrated, but the use of quota is highly concentrated, both for harvesting and processing.

The excessive-share proposal is laid out as a series of seven steps. They consider the HHI index using non-SCOQ clams and fringe holders, and the rule of three-firms to ensure adequate competition. At the end, they propose a two-part cap at 30% for long-term quota holdings and 40-60% for short-term quota holdings.

They also recommend that there be a mechanism for revealing information on quota prices, such as through an open auction process.

II. Description of the Individual Reviewer's Role in the Review Activities

This report was prepared and written by Dr. Ani Katchova. Before the panel meeting, I carefully read the "Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013" prepared by the Mid-Atlantic Fishery Management Council with the cooperation of National Marine Fisheries Service and the "Recommendations for Excessive-Share Limits in the Surfclam and Ocean Quahog Industries" prepared by Mitchell, Peterson, and Willig. Additional preparation included reading relevant publications on competition, market

power, and fisheries. During the panel meeting in Woods Hole, Massachusetts, June 21-23, 2011, I listened to the information presented and asked questions to clarify my understanding of the report and the fisheries industry. Following the review panel meeting, I prepared this report, according to the Terms of Reference and Statement of Work.

III. Summary of Findings for Each Term of Reference with Description of Strengths and Weaknesses

In this section, the five terms of reference are listed with a summary of findings for each of them. In the discussion, strengths and weaknesses are also discussed.

1. Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.

The NMFS Technical Group utilized a 7-step process to determine the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power. The following steps were proposed and implemented: step 1, determine what constitutes relevant quota ownership and control; step 2, assess the relevant markets, including substitutability of products and product heterogeneity, the relative bargaining power of buyers and sellers, and other competitive information; step 3, establish whether a threshold condition requiring no calculation of cap applies; step 4; establish the appropriate concentration thresholds using the Horizontal Merger Guidelines (to prevent the HHI from exceeding 2500 or have at least three processing firms); step 5, determine the relationship between the excessive share cap and market concentration, using the HHI index and information on substitute products and the size of competitive fringe; step 6, identify regulatory and practical constraints with regards to setting a fixed cap or two-part cap; and step 7, set the excessive-share cap with fixed cap at 30-40% or two-part cap of 30% for long-term and 40-60% for short-term.

2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFS technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.

The proposed method developed by the NMFS technical group has several key strengths and weaknesses.

One of the major strengths of the proposed method is that it follows the Horizontal Merger Guidelines for determining concentration and market power. The standard measure of concentration is the Herfindahl-Hirschman Index (HHI), where markets with an HHI below 1500 are considered unconcentrated; between 1500 and 2500, moderately concentrated; and above 2500, highly concentrated. Using the HHI for measuring market concentration strengthens the

study as it makes the methods and results comparable across industries. The NMFS technical group has appropriately modified the application of the HHI index to consider competition from non-SCOQ clams as well as the aggregate share held by fringe holders. To properly calculate HHI, the necessary data requirements include the market size of the relevant markets (imports, non-SCOQ clams, etc.) and the market shares of the players (for quota ownership, harvesting, and processing). Therefore, the application of this method presents a problem if there is an uncertainty about the market size (imports, state fisheries, other relevant markets) due to lack of available data. An additional rule was suggested that at least 3 firms must be present to ensure sufficient competition. There is support in the literature for this rule (Kwoka; Bresnahan and Reiss), although it is somewhat arbitrary how this three-firm rule was introduced to this study. The NMFS technical group argues that if the excessive share cap is set at 40% that will ensure that at least three firms are present in the industry. It is not clear which rule should be followed (HHI index below 2500 or the three-firm rule) if they reach different conclusions. Finally, the proposed excessive share cap percentages include a rather wide range (i.e. 40-60%) of acceptable excessive-share caps from which a regulator will have to determine which specific number to use and enforce as an excessive-share cap.

The boundaries of relevant markets are set based on the ability of consumers to switch products when faced with a small but relevant price increase (the hypothetical monopolist test). In order to apply the hypothetical monopolist test, there needs to be reliable data on quantities and prices demanded, which are not available for this application. In the absence of reliable quantitative data, there needs to be an in-depth understanding of the industry, major players, products, etc. Moreover, the substitutability of products is generally increasing over time, the demand for products is getting more elastic, and there are substantial income effects. Therefore, in order to apply an excessive-share cap correctly over time, it needs to be dynamically updated based on new information about substitutability and structural changes in the industry. In addition, the HHI is applicable for homogenous products as opposed to differentiated products, and there needs to be qualitative data available regarding whether the processors produce homogenous products or their products are differentiated. While the theoretical considerations are solid, these methods will be hard to apply if appropriate data are not available.

The analysis of the NMFS technical group is focused mostly on the output markets as opposed to the input markets. While their study directly follows the Horizontal Merger Guidelines and provides comparison with other industries, the analysis in this industry must focus on monopsonizing of the input markets. Since this approach is applied to a vertically-integrated industry with a small number of processors and vessels predominantly controlled by the processors, the exercise of monopsony power is of primary interest. Ideally, the hypothetical monopolist test should be modified and used for the input markets. For example, if prices of SCOQ clams go down, can a harvester deliver the clams to another processor? The condition of TAC not binding and quota prices of zero are also consistent with a monopsony scenario which

is not explored by the NMFS technical group. The question is if the pre-conditions for monopsony exist in this market, does the introduction of ITQs facilitate this process?

One of the major challenges for this approach is the instrument used to address the potential exercise of market power. The only instrument considered in their study is by setting an excessive-share cap for the ITQ holdings. Ultimately, the regulator should be concerned about the market shares of actual processed output by the processors. The real challenge is that quota holdings are only an approximation for the market concentration for the processors, as quota holdings may be owned or controlled by entities other than the processors. In general, and in this market in particular, it is very hard to determine control as opposed to ownership of the quota based on affiliations of entities. More transparency and reliable data are needed for the ownership, transfers, and contracts for quotas.

The proposed methods are applicable to a wide-range of industries, but additional considerations are needed on how ITQs affect the market concentration and power so that this method can be generally applied to this and other fisheries. For example, how will the proposed method be modified if the quota prices are of significant value, perhaps indicating the exercise of market power when TAC is not binding? What if the TAC were binding?

In addition, reliable data on quota prices are needed to implement the proposed method, and such data are currently not available or reliable. The establishment of an auction or other mechanism of revealing quota prices and providing volume and liquidity to the market is needed. Further studies will need to be conducted to determine the appropriate mechanism for revealing quota prices in this fishery.

One of the key arguments of the NMFS technical group is that because the quota price is currently close to zero and there are quotas available for trading at this price, there is no market power. However, this scenario is also consistent with a situation where the input market (harvesting) is monopsonized, as processors have constrained their output by exercising monopsony power.

There are other measurements that can be used to measure market power, such as examining the profit margins. For these measurements, detailed data on output prices and input costs will need to be available, which will likely not be the case. When data are available, such as the SCOQ price data used in the report, these data are aggregated and comingled, which makes them unreliable.

The social costs and benefits of market power, including efficiencies in processing, are mentioned but due to lack of data, they are not considered in detail. The cost associated with the implementation of an excessive-share cap as well as monitoring and enforcement will likely be substantial, which will also need to be explored.

3. Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.

The application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery includes several steps. One of the steps includes analyzing the HHI index for quota ownership, harvesting, and processing. The results show that quota ownership is unconcentrated, while harvesting and processing are highly concentrated. The HHI index and the three-firm rule are used to recommend the two-part excessive-share cap for quota ownership. The NMFS have done the best possible analysis given the substantial problems related to data limitations and availability.

The application needs to take into account the specific structure of the industry. This industry has been in existence for a number of years and a market structure already exists. The use of HHI is a rather general approach for determining market concentration that might not be specific enough for markets with ITQs. The NMFS technical group relies heavily on the fact that quota prices are currently close to zero. More transparency is needed for the quota prices. The report does not explain how different quota prices may affect the recommendations.

The study uses well-established methods to determine market concentrations based on HHI and make recommendations regarding an excessive-share cap. The lack of adequate data is a major problem when applying the proposed methods. There is a considerable uncertainty with regards to the size of the market (imports, fringe holders) and market shares of the participants. To the extent that the recommendations are based on general guidelines (such as having at least three firms in the industry and the HHI index is below 2500), the specific numbers recommended for the excessive-share cap may change significantly based on the continuously updated information about market size, market share of participants, etc.

Determining the relevant markets is another challenge in the application of the proposed methods. The information on substitutability of products and the elasticity of demand is limited and therefore the recommendations are largely based on anecdotal data. The ability to exercise market power is significantly influenced by these factors, yet because of lack of data, this analysis was not performed.

The HHI index of the quota owners/holders shows that the market is unconcentrated, but data are not available on quota ownership and control following quota transfers and the ownership relations among final quota holders. Therefore, the results that quota ownership and control are unconcentrated are not very reliable (better reporting of quota transfer data and contracting is needed). The correct determination of post-transfer quota ownership and control is extremely important in the implementation, monitoring, and enforcing of the excessive-share cap.

There is a rather wide range (i.e. 40-60% for short-term holdings) of acceptable excessive-share caps that are recommended. A regulator will have to determine which specific number to use

and enforce as an excessive-share cap. Given the data limitations on market size, substitutability of products, quota ownership, I view these recommendations as general guidelines (perhaps even as lower bounds) for setting an excessive-share cap.

4. Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.

The approach outlined by the NMFS technical group is generally applicable to other fisheries managed through catch shares. The 7 steps as described by the NMFS technical group are relevant for the establishment of ITQs with excessive-share cap in other fisheries, but it may not apply to fisheries without ITQs. One of the constraints in the application of their methods is that every fishery has a path-dependent history, with the size of market, major players, and the structure of industry already being historically determined. This approach can be applied to fisheries to set ITQs and simultaneously determine an excessive-share cap.

It is necessary to analyze all available information and data about the new fishery to assess the similarity and differences with the SCOQ industry before applying this approach. Several factors are very important to take into consideration when applying these methods to other fisheries. These factors include: whether or not the TAC is binding, whether or not the quota prices are transparent and are of significant value, the determination of relevant markets and substitutability with other products, whether ITQ are assigned to vessel owners or not, etc.

Similar data constraints may be available for other industries as well. These include: the transparency of quota prices, the determination of quota ownership and control, the determination of the market size, the determination of relevant markets, etc.

5. Provide any recommendations for further improvement (of methods).

The NMFS technical group study provides a good starting point in considering an excessive-share cap in the SCOQ clam industry. In my opinion, because of data limitations there is still not sufficient understanding of the market structure for this industry and the recommendations apply in a general sense. I would recommend several actions:

1. An open auction or other mechanisms to reveal quota prices and make the market for quota transfers liquid and transparent needs to be established.
2. More information can be collected from industry participants regarding market shares, major buyers of processed output, prices paid and received for claim inputs and outputs, etc. There needs to be a general description of all players from crew members to distributors.

3. Merger guidelines focus on market shares and price considerations but not on production cost efficiencies. Further studies can be done on the cost efficiencies of operating as large processors. Currently there are both large and small processors still operating in the industry but there are claims that processors need to be of certain size to achieve efficiency.
4. Further studies are needed on the monopsonization of the input markets. Monopsonization of the input markets is a larger concern than monopolization of the output market.
5. The study only considered policies regarding excessive share of the ownership quota. Other instruments beyond excessive share cap should be investigated.
6. Monitoring and enforcement of the excessive share cap will need to be studied and implemented.

IV. Conclusions and Recommendations in Accordance with the Terms of Reference

The NMFS Technical Group of Experts 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 excessive-share proposal is laid out as a series of seven steps. They consider the HHI index using non-SCOQ clams and fringe holders, and the rule of three-firms to ensure adequate competition. At the end, they propose a two-part cap at 30% for long-term quota holdings and 40-60% for short-term quota holdings. They also recommend that there should be a mechanism for revealing information on quota prices, such as through an open auction process.

The NMFS technical group's proposed methods seem well grounded in the Horizontal Merger Guidelines, which ensures comparability with other industries. Their approach is also applicable to other fisheries with ITQs. The main challenge is with regards to the application of the proposed methods because of the lack of appropriate data on the size of the market, major participants and market shares, relevant markets, substitutability of products, and transparency of quota ownership and prices.

I have made several recommendations, including 1) facilitating an open auction or other mechanisms to reveal quota prices, 2) collecting more information from industry participants regarding market shares, major buyers of processed output, prices paid and received for claim inputs and outputs, etc., 3) studying production cost efficiencies for large processors, 4) studying the monopsonization of the input markets, 5) exploring other instruments to control market power in addition to an excessive-share cap of ownership quota, and 6) studying and implementation of the monitoring and enforcement of the excessive share cap.

Overall, the NMFS technical group's study is well executed and provided a good starting point in establishing an excessive-share cap in the Surfclam and Ocean Quahog fishery. The NMFS

Part III. Peer Review Report: Ani Katchova

should make any efforts to collect more detailed data in the future to aid to the understanding of this industry and the implication of the proposed methods.

Appendix 1: Bibliography of materials provided for review

Mid-Atlantic Fishery Management Council with the cooperation of National Marine Fisheries Service. "Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013."

Glenn Mitchell, Steven Peterson, and Robert Willig. "Recommendations for Excessive-Share Limits in the Surfclam and Ocean Quahog Industries." 2011.

Other documents discussed during the panel meeting:

Bresnahan, Timothy F. and Peter C. Reiss "Entry and Competition in Concentrated Markets" *The Journal of Political Economy*, Vol. 99, No. 5 (Oct., 1991), pp. 977-1009.

Kwoka, John E. Jr. "The Effect of Market Share Distribution on Industry Performance" *The Review of Economics and Statistics*, Vol. 61, No. 1 (Feb., 1979), pp. 101-109.

Appendix 2: A copy of the CIE Statement of Work

Attachment A: Statement of Work for Dr. Ani Katchova

External Independent Peer Review by the Center for Independent Experts

**Evaluation of excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ 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 Technical Representative (COTR), 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 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: Recently, the Mid-Atlantic Fishery Management Council has been crafting Amendment 15 to the Surfclam and Ocean Quahog Fishery Management Plan, and as part of the Amendment, has been attempting to define an "excessive share" threshold for the Individual Transferable Quota (ITQ) portion of the fishery. Regarding share accumulation, section 303A(c)(5)(D) of the 2006 reauthorized Magnuson-Stevens Act states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. In addition, National Standard 4 of the Magnuson Act (16 U.S.C. 1851(a)(4)) requires 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 on the market power excessive share issue, it was decided that additional expertise was needed to examine the economic rationale behind the excessive share determination, and to recommend an excessive share level, if needed. In order to provide this expertise, a Technical Group of Experts (not the CIE) is being assembled to give advice on the appropriate excessive share threshold for the surfclam and ocean quahog ITQ system. This Technical Group will assess available models for evaluating the presence of market power, and make recommendations with regard to their appropriateness for setting excessive catch share limits.

The work being performed by this Technical Group could be controversial. It will establish methods for determining excessive shares which might be applied in other fisheries (besides surfclams and ocean quahogs). With the movement by NMFS to catch share systems, determining what constitutes an excessive share and whether limits need to be put in place is

extremely important because excessive share may lead to market power. Market power can lead to the ability to influence price in either the final product market or for factors of production (i.e. the fish resource). Examination of market share has never been formally investigated in this fishery. Thus the study by the Technical Group will be innovative and significant.

After the Technical Group has delivered its recommendations, a peer review (by the CIE) needs to take place to either endorse or reject the findings from the Technical Group. This two-step process was agreed to by the Northeast Fisheries Science Center (NEFSC) and the Mid-Atlantic Fishery Management Council (MAFMC).

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 like ITQ's in fisheries 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 14 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 14 days (i.e., several days prior to the meeting for document review; the CIE panel meeting in Woods Hole; several days following the open meeting for SARC Summary Report preparation).

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Woods Hole, Massachusetts during 21-23 June 2011.

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 Open 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 COTR 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 Mid-Atlantic Management Council 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 NMFS by the Technical Group of Experts regarding excessive shares in the surfclam and ocean quahog 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.

During the question and answer period, a representative of the NMFS expert panel will be available to answer questions about the report. The CIE members can provide feedback to the expert panel member at that time.

(Other Panel Members)

A representative from the Mid-Atlantic Fishery Management Council staff, and the Northeast Fisheries Science Center Social Sciences Branch will be available during the meeting to provide any additional information requested by the CIE reviewers. Other panel members may assist the Chair prepare the summary report, if requested.

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 at the Northeast Fisheries Science Center, Woods Hole, MA laboratory during 21-23 June, 2011 as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
- 3) No later than 7 July, 2011, 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.

17 May 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
7 June 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
21-23 June 2011	Each reviewer participates and conducts an independent peer review during the panel review meeting
7 July 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
14 July 2011	Draft of Summary Report, reviewed by all CIE reviewers, due to panel Chair *
21 July 2011	Panel Chair send final Summary Report, approved by CIE reviewers, to NEFSC contact
21 July 2011	CIE submits CIE reports to the COTR
28 July 2011	The COTR 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.

Part III. Peer Review Report: Ani Katchova

The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR 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 COTR 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 COTR (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 be 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 COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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Key Personnel:

NMFS Project Contact:

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John.Walden@noaa.gov

Phone: 508-495-2355

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 excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ fishery**

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

1. Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.
2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.
3. Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.
4. Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.
5. Provide any recommendations for further improvement

Annex 3: Tentative Agenda
Evaluation of excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ fishery

Falmouth and Woods Hole, Massachusetts during 21-23 June 2011

Tuesday, June 21. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:15 AM

Opening
Welcome
Introduction SSC Chair
Agenda
Conduct of Meeting

9:15 – 9:30 Background and Need for Expert Panel Report – Lee Anderson

9:30-11 Report of the NMFS Expert Panel - NMFS Expert Panel Rep.

11-11:15 Break

11:15 -Noon Review Terms of Reference – CIE Panel

Noon – 1:15 Lunch

1:15 – 3:00 CIE Panel Discussion – Terms of Reference #1.

3:00-3:15 Break

3:15-4:00 Public Comments

4:00-4:45 CIE Panel Discussion – Terms of Reference #2

4:45-5:00 Questions for following day

Wednesday, June 22. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:30 Review any outstanding questions from previous day

9:30-10:30 CIE Panel Discussion – Terms of Reference #3

10:30-10:45 Break

10:45-Noon CIE Panel Discussion – Terms of Reference #4

Part III. Peer Review Report: Ani Katchova

Noon-1:30 Lunch

1:30 – 3:00 CIE Panel Discussion – Terms of Reference #5

3:00-3:15 Break

3:15-5:00 CIE Panel Discussion – Outstanding Issues

Thursday June 23 Location: Clark Conference Room, Northeast Fisheries Science Center.

9:00 – 5:00 Report writing (Meeting Closed to Public)

Appendix 3: Panel Membership or other pertinent information from the panel review meeting

The panel consisted of James Wilen (University of California at Davis), and three reviewers selected by the CIE: Rigoberto Lopez (University of Connecticut), Ragnar Arnanson (University of Iceland), and Ani Katchova (University of Kentucky). Glenn Mitchell and Steven Peterson were present for most of the panel meeting presenting information and answering questions. John Walden and Dale Squires were present at the panel review as well as panel discussion session to help with the review process and offer additional information when needed. Participants from the industry and various organizations were also present and offered comments/feedback.

Part IV: Peer Review Report

by

Rigoberto A. Lopez

Center for Independent Experts

**CIE Independent Review of the Technical Report
on Recommendations for Excessive-Share Limits
in the Surfclam and Ocean Quahog Fisheries**

By

Rigoberto A. Lopez

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July 4, 2011

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Executive Summary

Background and Objective

Since 1990, surfclam and ocean quahog (SCOQ) fisheries are each managed through setting a total allowable catch and individual transferable quotas. Over the last 20 years, and in the last five in particular, this sector has experienced:

- significant increases in market concentration in both processing and harvesting, resulting in fewer firms either buying or selling SCOQ products; and
- a significant increase in vertical coordination between processors and harvesters.

These trends have raised concerns about market power impacts and also raised awareness of how an excessive-share limit might be implemented in this and any other fishery facing increasing concentration.

At the request of the Center for Independent Experts, the objective of this report is to independently evaluate a report by the Technical Group of Experts (Mitchell, Peterson, and Willig, 2011) containing recommendations for excessive-share limits in the SCOQ and other U.S. fisheries.

Major Findings

Methodology Used by the Technical Group

The primary tool used by the Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent market power is the 2010 *Horizontal Merger Guidelines* by the U.S. Department of Justice and the Federal Trade Commission, particularly the sections pertaining to market concentration. The steps may be summarized as:

- Determine the ownership and control of quotas in the fishery
- Determine the relevant market, particularly in reference to competition from outside the fishery, such as state fisheries and imports.
- Compute market shares based on the previous steps
- Compute the Herfindhal-Hirshmann index based on a hypothetical maximum share cap and ensure that the share cap does not lead to an HHI that exceeds 2500, which is the

threshold determined by the *Horizontal Merger Guidelines* for an industry to be deemed “highly concentrated.”

A corollary tool is to ensure that there are three efficient processors in the fishery.

Strengths and Weaknesses of the Technical Group Report

The following are deemed strengths of the report:

- Use of the most universal guidelines for assessing competition: the *Horizontal Merger Guidelines*, particularly a threshold HHI of 2500, which is the gold standard.
- Inclusion of outside competitors that determine the relevant output market, particularly imports and state fisheries as well as fringe firms in the fisheries, which are bound to behave competitively regardless of the excessive share cap.

The following are deemed issues that require further attention:

- Focusing exclusively on monopoly power at the expense of a focus on monopsony power, which is likely to be the prevailing case in fisheries.
- Lack of explicit consideration of harvesting and processing efficiency, which may give room to improve performance of the fishery, particularly if market power effects are weak. Cost reductions may reduce or even reverse a firm’s incentive to elevate price in the monopoly case.

Crucial information to implement the approach requires careful definition of quota ownership and control and of the relevant market.

Applicability to the SCOQ and Other Fisheries

The approach used by the Technical Group is generic and is applicable to just about any fisheries, provided accurate information is obtained on quota rights and control, boundaries of the relevant market, and efficiency effects of the scale of operation. For the case of the SCOQ fisheries, given current conditions, it is recommended to set a fixed excessive-share cap of 30-40%, or a more flexible two-part cap of 30% long term, 40-60% short term.

Although a 30-40% cap may be restrictive if the market is defined too narrowly or if efficiency effects of concentration are ignored, it is likely to be appropriate if there are buying power or

monopsony concerns since, for the latter, the relevant market is geographically confined to the fishery in question.

Besides the monopsony and efficiency concerns pointed out, the main room for improvement is collecting accurate information about the fishery, the market, and performance indicators such as quota prices.

Public policy to restrain excessive market concentration via excessive-share caps or by other means is commonplace in non-fish U.S. markets and has been the focus of antitrust and competition policy for many years. When evaluating excessive-share caps, the ultimate issue is not only whether adverse competitive effects have resulted from ongoing concentration, but whether such effects are likely to arise in the future and if excessive-share caps can deter such trends without harming market performance and competitiveness.

Background

Federal fisheries are commonly managed under annual catch limits and some type of limited access programs to address both economic and environmental sustainability. Since 1990, surfclam and ocean quahog (SCOQ) fisheries are each managed through setting a total allowable catch (TAC) and individual transferable quotas (ITQs).

Over the last 20 years, there have been two significant changes in market structure leading to concerns over competition, or lack thereof, with regard to the current ITQ system:

- a significant increase in market concentration of firms at both the harvesting and processing stages resulting in fewer firms either buying or selling SCOQ products; and
- a significant increase in vertical coordination between processors and harvesters, specifically the use of contracts and, in the clam subsector in particular, processor control of ITQs.

Given these changes, a central concern is the potential market power effects from market concentration of SCOQ quota ownership and control. One instrument available to regulators, and the focus of this report, is to set an excessive catch share, i.e., the maximum catch share allowable to a harvester or to an entity such as a processor who may also control part of the harvest in order to mitigate or prevent market power.

The golden rule of market concentration regulation is provided by the Department of Justice and the Federal Trade Commission's *Horizontal Merger Guidelines* (HMG).¹ Accordingly, the threshold for an industry to be deemed "highly concentrated" is determined by an excessive share of the quota calculated by the Herfindahl-Hirschman Index (HHI), which measures the size distribution of firms by summing their squared market shares (thus ranging from 0 to 10,000), with H=2,500 being a cause of concern, as based on past experience by U.S. antitrust authorities.

By this standard, the HHI of surfclam and ocean quahog processing purchases have already surpassed this threshold, raising concern about the exercise of market power, particularly if the current trend in processing concentration continues, which is likely to be the case if left unchecked.

¹ U.S. Department of Justice and the Federal Trade Commission. *Horizontal Merger Guidelines*. Washington, D.C., August 19, 2010. Available at: <http://www.justice.gov/atr/public/guidelines/hmg-2010.html>

With regard to pending Amendment 15 to the SCOQ Fishery Management Plan, administered by the Mid-Atlantic Fishery Management Council (MAFMC), the goal is to define an “excessive share” threshold for the ITQ to prevent limited access holders from acquiring an excessive share of the TAC privileges, in compliance with the Magnuson-Stevens Act. The issue of market power effects of excessive shares is an overriding concern. At the request of the MAFMC and the National Marine Fisheries Service (NMFS), a group of technical experts (Mitchell, Peterson and Willig, 2011, Appendix A) provided recommendations for excessive-share limits for SCOQ fisheries.

Reviewer’s Role in the Review Process

At the request of the Center for Independent Experts (CIE), I was asked to provide an impartial and independent peer review, without conflicts of interest, of a report by the Technical Group of Experts (Mitchell, Peterson, and Willig, 2011, Appendix A) containing recommendations for excessive-share limits in the SCOQ fisheries. The Statement of Work (tasks and deliverables), the Terms of Reference and the agenda for the CIE panel review are in Appendix B. This report follows the content requirement as specified in Annex 1 of Appendix B. The period of review spanned from May 17 through July 21, 2011, and included an open, in-person meeting on June 21-23, 2011 at Falmouth/Woods Hole, Massachusetts, and a pre-meeting review of the background documents received as well as the post-meeting writing of this report.

Dr. Rigoberto A. Lopez is a professor and Head of the Department of Agricultural and Resource Economics and Director of the Charles J. Zwick Center for Food and Resource Policy at the University of Connecticut. He has extensive expertise in food policy and industrial organization and has published on the effects of industrial concentration on market power and cost efficiency as well as econometric analyses of market power in the food industries. He has also published on the analysis of quantitative trade barriers and their impact on welfare participants.² This report summarizes his evaluation of the Mitchell, Peterson and Willig (2011) recommendations, both independently and collectively as a CIE panel member.

² Lopez, R.A., A. Azzam, and C. Lirón-España. “Market Power and/or Efficiency: A Structural Approach.” *Rev. Ind. Org.* 20(2002): 115-126. Bhuyan, S. and R.A. Lopez. “Oligopoly Power in the Food and Tobacco Industries.” *Amer. J. Agric. Econ.* 79(1997): 1035-1043. Bonanno, A. and R.A. Lopez. “Competition Effects of Supermarket Services.” *Amer. J. Agric. Econ.* 91(2009): 555-568. Lopez, R.A. and E. Lopez. “The Impact of Imports on Price Cost Margins: An Empirical Illustration.” *Emp. Econ.* 28(2003): 403-416. Lopez, R.A. and Z. You. “Determinants of Oligopsony Power: The Haitian Coffee Case.” *J. Dev. Econ.* 35(1993): 465-473.

Summary of Findings for Terms of Reference

Terms of Reference 1: Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.

An excessive-share cap limits the amount of quota of any harvesting quota holder. The primary method used by the NMFS Technical Group is to set the excessive-share cap so that the HHI does not exceed 2500, based on the Federal Trade Commission's 2010 *Horizontal Merger Guidelines*, in order to ensure that there are at least three efficient processors, based on a common (Kwoka, 1979), albeit not universal, principle that a third firm imposes a crucial pro-competitive effect, as reflected by price-cost margins.³ As with any excessive-share cap, the process requires information on ITQ ownership and control, economies of scale, substitutability of products, and definition of relevant markets or size of the market in order to compute the correct market shares.

To determine *a priori* whether or not an excessive share cap is necessary, the Technical Report compares TAC relative to the monopoly equilibrium. If TAC is below the monopoly output, TAC would be binding and force the market to operate at an output more constraining than one being controlled by a single monopolist. In this case, an excessive-share cap is not necessary because there would be no incentive to withhold quota (meaning withholding harvesting through not using all the ITQs) in order to raise price. An interesting point is that, at the margin, a unit of an ITQ is worth the difference between the demand price and the marginal cost of harvesting. Thus, the "price" of the quota is positive if there is monopoly power or if there is competitive behavior; but TAC is binding, creating a wedge between price and marginal cost. If there is perfectly competitive behavior and TAC is non-binding (there is unused, surplus quota in the market), then the price of the quota is zero. Thus, the price of the quota conveys relevant information as to the pre-existing competitive conditions in a fishery.

In terms of the relevant market, the technical group focuses on two elements and how they affect market shares and, therefore, the determination of an excessive-share cap:

- the share of non-SCOQ fisheries (state fisheries and imports) as their increasing presence defines a larger market, provided they are significant substitutes for the fishery product and geography in question, and

³ Kwoka, J.E. Jr. "The Effect of Market Share Distribution on Industry Performance." *Rev. Econ. Stat.* 61(1979): 101-109. In the business literature, there is a widely accepted notion that a Rule of Three structure is optimal because three big and efficient companies (e.g., with more than 10% market share) act as a tripod to ensure that neither destructive competition nor collusion prevails (see Sheth, J.N. and S. Sisodia. *The Rule of Three: Surviving and Thriving in Competitive Markets*. New York: Free Press, 2002).

- the share of fringe firms as their increasing presence reduces the market subject to excessive-share caps and, by nature of behaving competitively, exerts a disciplining effect.

The Technical Group's determination of market shares is as follows. First, participants are classified into (1) regular quota holders or controllers who can be affected by the excessive-share caps (e.g., TAC shares of more than 10%) and (2) fringe firms holding small market shares or serving niche markets. Let TAC_i denote the quota allocated to the i^{th} quota holder, where TAC is simply the sum over *all* ITQs as set by the fishery authority. Let M denote the size of the market which is composed of TAC (effective or binding) plus "outside" (O) fisheries to account for imports and state fisheries that may be substitutes for SCOQ fisheries. Thus, $M=TAC+O$ denotes the size of the market. Thus, a relevant or "effective" market share is defined as TAC_i/M . By squaring these market shares and adding up one obtains the 'relevant' HHI. The sum of the squared shares of the fringe firms is excluded from the summation for computational convenience, as small shares' squares have little impact on the HHI. However, their aggregate share limits the portion of TAC subject to the excessive-share cap.

The Technical Group relies on four alternative scenarios corresponding to different levels of non-SCOQ fisheries (0, 10, 20 and 40% of TAC), where 0% denotes the case where there are no substitutes from outside fisheries. The Technical Report then presents a table for each scenario with computed HHIs resulting from combinations of alternative levels of excessive-share caps (20-70%) and aggregate shares of fringe firms (0-30%) in the SCOQ fisheries. As the market expands beyond the product and/or geographic boundaries of the SCOQ fisheries, or as the aggregate share of fringe firms increases, the excessive-share cap corresponding to an HHI of 2500 increases.

For example, scenario 1 assumes a market with zero non-SCOQ fisheries. In this case, a 20% excessive-share cap (i.e., 20% of TAC) with no fringe firms results in an HHI of 2000. Scenario 2 assumes a market with non-SCOQ fisheries equivalent to 10% of TAC. The same share cap of 20% of TAC as in scenario 1 would now result in an effective HHI of 1653 as the market is defined more broadly. In other words, in scenario 2, a 20% share cap corresponds to an 18.182% market share since the market is 10% larger ($M=1.10$ TAC, and $18.182\%=20\%/1.10$), thus reducing the HHI.

Generation of effective HHIs over four scenarios depicting shares of fringe firms of up to 30% of TAC and state fisheries and imports with volumes of up to 40% of TAC lead to a range of acceptable combinations of excessive-share caps to ensure an effective HHI of 2500 and three non-fringe firms operating in the market. In other words, any level of excessive-share cap with combinations of non-SCOQ fisheries and aggregate shares of fringe firms resulting in HHIs over

2500 are deemed undesirable as they would result in a highly-concentrated market by the *Horizontal Merger Guidelines*.

The above scenarios lead the Technical Group to recommend setting the excessive-share caps at either (a) a fixed cap at 30-40%, or (b) a two-part cap at 30% for the long-term and a 40-60% for the short term (which could lead to an HHI over 2500 in the short term).

Terms of Reference 2: *Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical Group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.*

Among the strengths of the Technical Group's proposed method for fisheries in general are:

- *Merger Guidelines:* Uses 2010 DOJ-FTC *Horizontal Merger Guidelines*, particularly a threshold Herfindahl-Hirshmann Index of 2500, which is the gold standard for analyzing competition in the United States and abroad. Thus, it brings the problem into a class of more generalizable situations for which ready comparison can be made across fisheries and non-fishery cases.
- *Inclusion of non-SCOQ Fisheries:* Considers the effect of a competitive fringe as well as the effects of state fisheries and imports in determining the relevant market and, therefore, the relevant market shares which are bounded from below by the TAC shares. The larger the relevant market or degree of demand substitution from outside the fisheries area, the greater the allowable excessive-share cap.
- *Efficiency Consideration:* Recognizes, although not explicitly incorporating, the importance of potential processing and harvesting efficiency effects from increased concentration. Requiring three 'efficient' processors under the suggested HHI will encourage economies of size as well as ensuring a minimum degree of competition in the geographic region of the fisheries, regardless of the size of the relevant market for processed fishery products.

Among the weaknesses of the methodology are:

- *Monopsony Power:* Focusing on monopoly power sidesteps the possibility of monopsony or buying power, which seems to be more relevant in many fisheries. Harvesters and processors tend to face an elastic demand for their products as wholesale output markets are often much larger than the fisheries. The relevant market for monopsony power is bound to be more geographically localized than the output market. Thus, a fishery is more likely to face monopsony power than it does monopoly power.

- *Efficiency Effects:* Underlying many of the analyses regarding industrial concentration, and the HHI in particular, is an overriding concern with market power, particularly if it results in significant increases in the price of output through restriction of the use of ITQs, but recent literature and even the *Horizontal Merger Guidelines* consider the possibilities of factoring in efficiencies that result from mergers or increases in concentration.⁴ This issue is not addressed although, in a unilateral context, cost reductions resulting from concentration or expansion that may be limited by a cap may reduce or even reverse a firm's incentive to elevate price.⁵
- *Numerator of Market Shares:* Quota control and ownership are disjoined from volume processed in the definition of market shares. Normally, the Herfindahl Index is defined based on market shares in the output or input market based on transactions (revenues or expenditures on the input in question). The current definition of an excessive-share cap separates ownership and control and can yield a situation where a single processor processes 2/3 of the harvest but only officially controls 1/3 without owning any. In the standard literature a 2/3 purchase of the total volume would be of concern.
- *Denominator of Market Shares:* The relevant product and geographic markets are not defined, although market shares are computed as the ratio of the quota or cap shares divided by the size of the 'relevant' market. In other words, the denominator of the share expression becomes crucial information as the allowable excessive-share cap increases with the size of the relevant market.

Implementation of the method proposed by the Technical Group requires at least the following data:

- *Quota ownership and control:* Clear records of the number of independent entities that own the quota and who controls it through long term contracts or through vertical arrangements (e.g., quota owners who also own shares of processing firms). This is crucial to compute the numerator of market shares used in the HHI.
- *Processing volumes and capacity:* It is standard also to base HHI on actual market transactions (revenues or expenses). Processing capacity also indicates the possibility of fast entry that may threaten anti-competitive behavior.
- *Size of the Relevant Market:* Data on substitutability of products at the level of demand facing the fisheries (primary processing), through customer surveys or through evidence

⁴ Azzam, A. M. "Measuring Market Power and Cost-Efficiency Effects of Industrial Concentration." *J. Ind. Econ.* 45 (1997): 377-386. Focarelli, D. and F. Panetta. "Are Mergers Beneficial to Consumers? Evidence from the Market for Bank Deposits." *Amer. Econ. Rev.* 93 (2003): 1152-1172. Bian, L. and D.G. McFetridge. "The Efficiencies Defense in Merger Cases: Implications of Alternative Standards." *Can. J. Econ.* 33 (2000):297-318.

⁵ DOJ-FTC, *Horizontal Merger Guidelines*, p. 29.

from econometric studies on cross-price elasticities and sensitivity of demand to imports and the volume produced at other fisheries of species relevant to the market in question, is also necessary.

Other necessary data on market structure, conditions of entry, behavior of market participants, and economies of size are mentioned in the report but are not essential in the determination of the excessive-share methodology proposed. Rather, they are supportive evidence for the methodology proposed.

Terms of Reference 3: *Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.*

The economic entities in the SCOQ fisheries are clearly three groups: harvesters, primary processors, and quota owners who can be harvesters, processors, corporations, or other economic agents. Demand facing processors seems to be fairly price elastic, reflecting the fact that upstream buyers can obtain substitutes for SCOQ fisheries, at least in the long run, and substitution from other clam species to other forms of ingredients. In addition, there seems to be a large degree of backward integration of processing into harvesting which would to a certain degree obviate the potential monopsony power issue.

An important aspect for the applicability of the proposed method to the SCOQ fishery is that currently fringe firms can be safely assumed to hold approximately 10% of the fishery and that net imports (imports less exports) that compete domestically are in the vicinity of 20-25%. Thus, the scenarios presented by the Technical Group apply to the case of SCOQ fisheries provided that non-SCOQ fisheries directly compete with SCOQ fisheries in the relevant market.⁶

Given the foregoing, the Technical Group recommends a fixed excessive-share cap of 30-40 % or, alternatively, a flexible cap of 30% long term and 40-60% short term. The key number emerging in the report is a 40% excessive-share cap, which automatically ensures independent harvest supply to sustain at least three processors in the market.

First, there is no constitutional basis to interpret “excessive” solely based on market power, or in this case, monopoly power. If efficiency effects are strong (e.g., strong economies of scale) and processors face a much larger market than the SCOQ fisheries, then efficiency considerations may be more significant than faltering market power. As concentration affects harvesting and particularly processing costs, costs may be bound to be affected more than wholesale price paid to processors. In other words, profit margins of processors, as determined

⁶ In 2008, the SCOQ fisheries supplied approximately 83 million pounds, imports from Canada and other countries additionally supplied approximately 33 million pounds, and exports accounted for 13 million pounds, according to personal communication with Dr. Jose Montanez, Fishery Management Specialist at MAFMC.

by price received minus cost, might be importantly determined more by cost than by their influence on the price they receive. Ultimately, given a potential trade-off between price set and production cost from the excessive-share cap in SCOQ, what matters more from an antitrust perspective is the level of the price set which will also depend on the passthrough of any potential cost savings. It might be the case that consolidation is necessary for survival, in which case a higher excessive-share cap might be recommended.

What might be more useful for incorporating efficiencies is the relationship between output price and the HHI induced by the excessive-share cap, where the market power test might be a 5% increase in output price (or a 5% reduction in the price paid to harvesters) rather than relying solely on an effective HHI of 2500. As the *Horizontal Merger Guidelines* suggest, market shares may not fully reflect the competitive significance of firms in the market and should be used in conjunction with other evidence of competitive effects.⁷

In conclusion, I reckon that an excessive-share cap for the SCOQ fisheries of 30-40% or the two-part cap counterpart might be rather conservative estimates and that it might not be surprising that, considering efficiency impacts, an excessive-share cap of 2/3 of TAC or eventually a natural monopoly or monopsony might be preferable.

Terms of Reference 4: *Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical Group.*

The approach used by the Technical Group is generic and is applicable to just about any fisheries, provided accurate information is obtained on quota rights and control, boundaries of the relevant markets, and efficiency effects of scale of operation. The first two are essential to compute the correct market shares from which to compute the HHI and impute the appropriate excessive-share cap to induce a relevant HHI of 2500 in a fishery.

The main constraints remain access to the accurate information needed to appropriately implement the approach. Some of this information may be considered proprietary and it may not be in the best interest of dominant producers, for instance, to reveal all necessary information. As in any market, full and accurate information is needed for markets to work smoothly. Asymmetric information will generate advantages to those who have access to it and will make the regulator's job more imprecise and difficult. It may also lead to suboptimal policies from the perspective of a social planner.

⁷ DOJ-FTC, *Op cit.*

Terms of Reference 5: *Provide any recommendations for further improvement.*

The report relies on the legal foundation of protecting against market power under any conceivable market condition and also relies on a “blunt” instrument, i.e. an excessive- share cap. This is accomplished by tying share caps to market shares, and hence, to market structure, which is bound to affect market conduct and performance. However, the same market structure can lead to a variety of performance outcomes, i.e., price levels, price-cost margins, cost efficiency, and social welfare.

Further recommendations fall into two areas: (1) consideration of monopsony power, particularly if monopoly power seems weak; and (2) consideration of efficiency effects of excessive-share caps that may correspond to high HHI levels, possibly beyond 2500.

In considering the lack of focus on monopsony power case, and in view of the intended application of the methodology, consider a fishery-processing industry consisting of N firms converting raw fish into fish products for the wholesale market. For simplicity, assume fixed proportions between the fish input and the output and that each firm sells output in a competitive market and buys non-fish inputs also in a competitive market. Let q_i denote the raw fish bought by the i^{th} processor and let the total amount bought by all processors be given by $Q = \sum q_i (i=1, \dots, N)$. A processor's profit maximization problem is given by $Max \Pi_i = [P_w - c - P] q_i$, where P_w is the wholesale price of the processed fish product, c is the per unit processing cost, and P is the price paid to fish harvesters. To maximize profits, the processors set a price for fish so that their net value of marginal product, $NVMP = P_w - c$, equals their marginal input cost, $MIG = P(1 + \theta_i / \eta)$, where $\theta_i = S_i(1 + \lambda_i)$ is a measure of perceived coordination across processors, market share is $S_i = q_i / Q$; the reaction of other firms is given by $\lambda_i = \sum \partial q_j / \partial Q$; and $\eta = -(\partial Q / \partial P)(P / Q)$ is the price elasticity of harvesters' supply. At equilibrium, given our assumptions, $\theta_i = \theta$ since all processors are assumed to face the same $NVMP$ and pay P to the harvesters. One point here is that not only market shares collectively determine the price paid to harvesters but also processing efficiency and the degree of coordination among processors.⁸

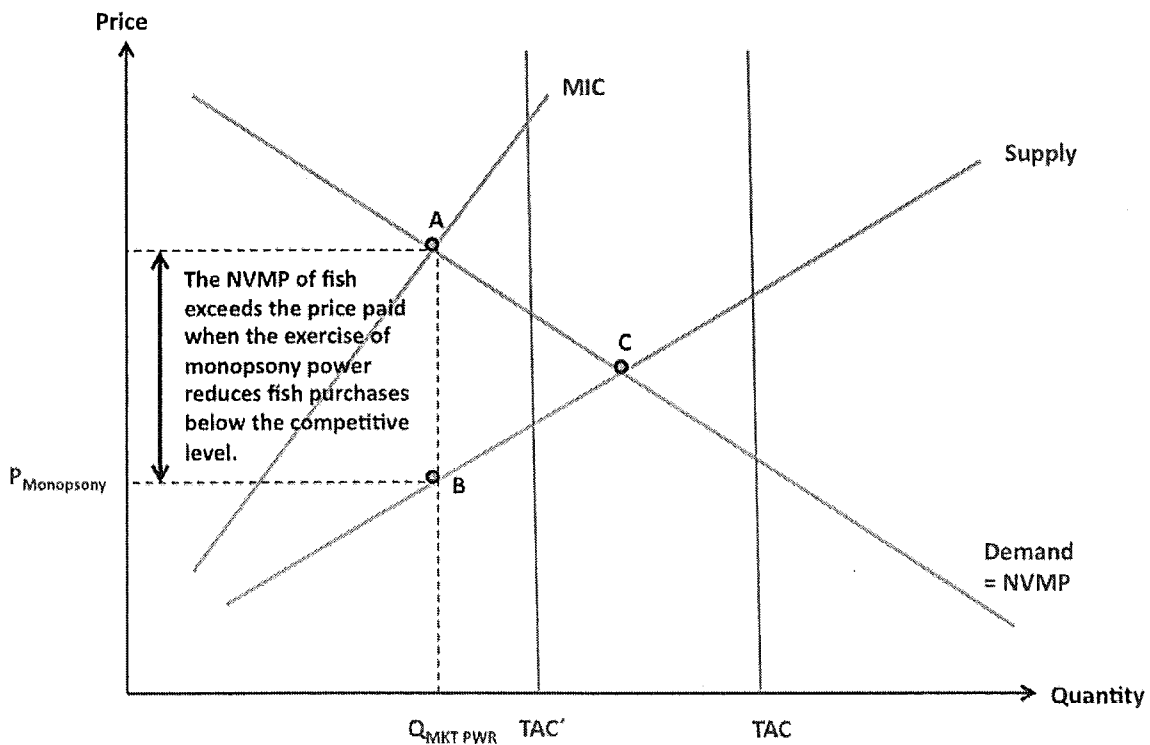
The Technical Report relates the price of the quota as *prima facie* evidence of market power. It argues that a competitive market equilibrium with a non-binding TAC results essentially in a zero quota price as the competitive market, not TAC, determines market equilibrium and therefore the price of fish equals the marginal cost of harvesting. Alternatively, a monopoly equilibrium or a competitive market with a binding TAC (below market equilibrium) results in a positive quota price because the price of fish exceeds the cost of harvesting. Currently and in the last few years, TAC has not been binding as there has been surplus quota and the price of the quota has been negligible. An alternative explanation is given to those in the report.

⁸ For similar models, see Azzam (1997) and Lopez and You (1993), *Op. Cit.*

Figure 1 illustrates the case of monopsony equilibrium instead of a competitive equilibrium (point C) where there is a non-binding TAC (TAC or a more constraining TAC'). If, as stated before, the 'free' market equilibrium is not a competitive equilibrium but a monopsonistic one where buyers have market power over harvesters or independent quota holders, then it is possible that a non-binding quota is partially the result of constraining the *use* of quotas rather than withholding quota from the supply side; however, the surplus quota may in this case have a negligible price, not necessarily a positive price as stated in the case presented in the report. This equilibrium occurs, as shown above, where the net value of marginal product equals the marginal input cost at point A in Figure 1, resulting in a non-competitive margin that accrues to processors, depressing the price of fish to the harvester and resulting in a zero quota price at the margin. In the case that quota holders exercise *monopoly* power, as in the report (e.g., Figure 5), then equilibrium occurs at point B but the quota would have a *positive* price reflected by the difference between the higher price at point A and the harvesting cost at point B, also constraining volume below the competitive level. Thus, the price of the quota depends on the type of market power considered, structure of quota rights and vertical integration. In the case of a monopsony, where quota owners also own processing facilities, transactions will give priority to those vertically integrated or who will enter into a vertical agreement with a non-compete clause. This would be disadvantageous to independent quota owners who would be likely to be the ones left out with a zero quota price if TAC is non-binding.

Figure 1

Monopsony Equilibrium in an ITQ-Regulated Fishery with Non-Binding TAC



Given the foregoing, the following is recommended:

- Focus more on the potential monopsony power effects rather than just monopoly power, explicitly considering alternative vertical coordination arrangements.

Contrary to traditional thinking, which only considered market power effects from increased market concentration, concentration can also lead to significant efficiency gains through redistribution of output toward more efficient (e.g., lower cost) firms, resulting in a potential trade-off between market power and efficiency.

In considering the lack of focus on efficiency effects, consider that The *Horizontal Merger Guidelines*, in addition to prescribing an HHI of 2500, also provide a performance outcome: the resulting increase (decrease in a monopsonistic situation) in price should be less than 5% relative to a benchmark such as the competitive outcome. A suggestion for further improvement is to focus more broadly on the balance of market power and efficiency. The problem with market power is price. If all one wants to avoid is market power, there is a danger of overlooking efficiency effects that may be crucial for the survival of the industry, particularly when demand is depressed due to economic or competitive conditions brought about from outside the fishery area. Why should two fisheries, one with strong economies of scale and one without, have the same HHI prescription?

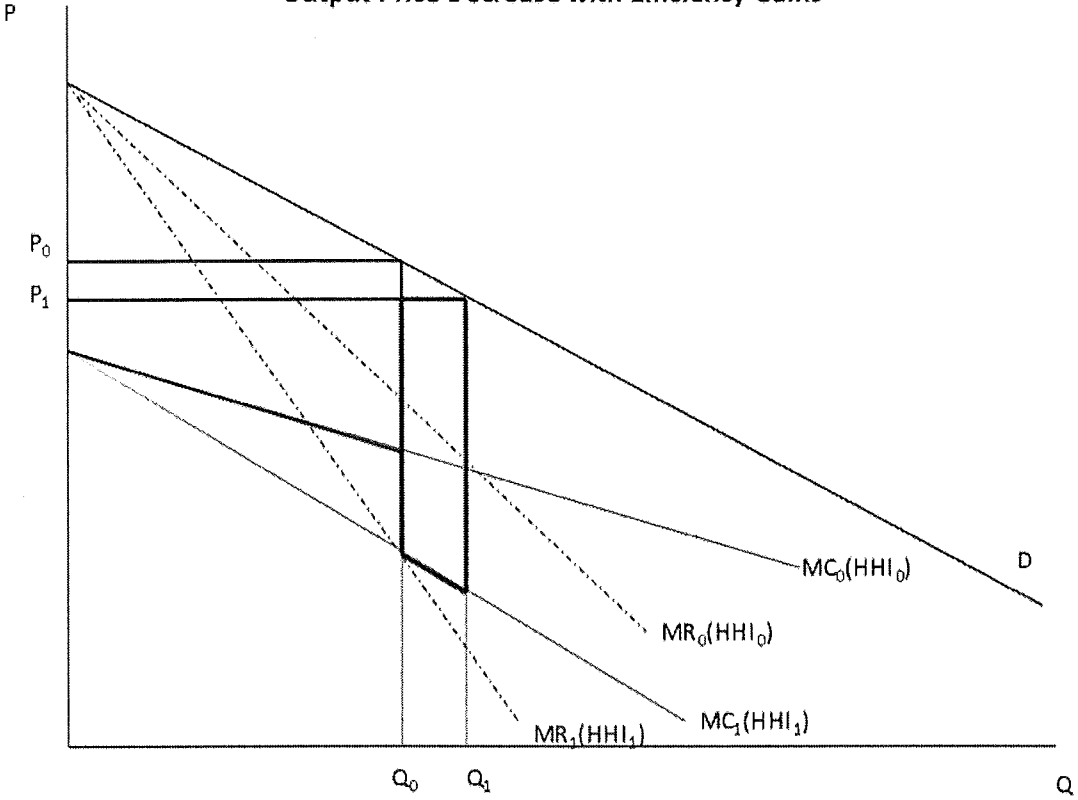
Given the foregoing, the following is recommended:

- Focus more on potential price effects rather than just HHI, explicitly considering harvesting and processing efficiency effects.

To illustrate, Figure 2 shows an industry equilibrium in which market power increases and industry marginal cost decreases with an increase in HHI (from HHI_0 to HHI_1). Market equilibrium occurs when marginal revenue MR equals marginal cost MC at a given level of HHI.⁹ At industry equilibrium, the increase in concentration causes an increase in market power that is more than offset by an increase in efficiency by redistributing output to the most efficient firms, thus resulting in a lower output price P and an expansion of output from Q_0 to Q_1 , which would be beneficial to consumers. The point is that the report seems to imply that at the moment market power is either non-existent or very limited (near-zero price for the quota). If that is the case then, efficiency considerations might be given greater weight as long as they can be substantiated.

⁹ See Lopez, R.A. and C. Lirón-España. "Social Welfare and the Oligopoly-Efficiency Tradeoff in U.S. Food Processing: A Note." *J. Agric. Food Ind. Org.* 1(2003): Article 5 (10 pages). Available from <http://www.bepress.com/jafio/vol1/iss1/art5>.

Figure 2
Output Price Decrease with Efficiency Gains



Another improvement, mentioned in the report, is collecting information on the shadow price of the quota, either through creating an auction mechanism to reveal prices or by soliciting this information explicitly from quota holders.

To conclude, public policy to restrain excessive market concentration via excessive-share caps or by other means is commonplace in non-fish U.S. markets and has been the focus of antitrust and competition policy for many years particularly focused on market concentration. When evaluating excessive-share caps, the ultimate issue is not only whether adverse competitive effects have resulted from ongoing concentration, but whether such effects are likely to arise in the future and if excessive-share caps can deter such trends without harming market performance and competitiveness.

Appendix 1: Bibliography of Materials Provided

Mitchell, Glenn, Steven Peterson, and Robert Willig. *Recommendations for Excessive-Share Limits in the Surfclam and Ocean Quahog Fisheries*. Compass Lexecon, May 3, 2011.

Mid-Atlantic Fishery Management Council in cooperation with National Marine Fisheries Service. *Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2011, 2012, and 2013*. Dover, Delaware, April 2010.

Appendix 2: Statement of Work for Dr. Rigoberto Lopez

External Independent Peer Review by the Center for Independent Experts

Evaluation of excessive shares study in the

Mid-Atlantic surfclam and ocean quahog ITQ 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 Technical Representative (COTR), 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 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: Recently, the Mid-Atlantic Fishery Management Council has been crafting Amendment 15 to the Surfclam and Ocean Quahog Fishery Management Plan, and as part of the Amendment, has been attempting to define an "excessive share" threshold for the Individual Transferable Quota (ITQ) portion of the fishery. Regarding share accumulation, section 303A(c)(5)(D) of the 2006 reauthorized Magnuson-Stevens Act states that ITQ privilege programs should ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program. In addition, National Standard 4 of the Magnuson Act (16 U.S.C. 1851(a)(4)) requires 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 on the market power excessive share issue, it was decided that additional expertise was needed to examine the economic rationale behind the excessive share determination, and to recommend an excessive share level, if needed. In order to provide this expertise, a Technical Group of Experts (not the CIE) is being assembled to give advice on the appropriate excessive share threshold for the surfclam and ocean quahog ITQ system. This Technical Group will assess available models for evaluating the presence of market power, and make recommendations with regard to their appropriateness for setting excessive catch share limits.

The work being performed by this Technical Group could be controversial. It will establish methods for determining excessive shares which might be applied in other fisheries (besides surfclams and ocean quahogs). With the movement by NMFS to catch share systems, determining what constitutes an excessive share and whether limits need to be put in place is extremely important because excessive

share may lead to market power. Market power can lead to the ability to influence price in either the final product market or for factors of production (i.e. the fish resource). Examination of market share has never been formally investigated in this fishery. Thus the study by the Technical Group will be innovative and significant.

After the Technical Group has delivered its recommendations, a peer review (by the CIE) needs to take place to either endorse or reject the findings from the Technical Group. This two-step process was agreed to by the Northeast Fisheries Science Center (NEFSC) and the Mid-Atlantic Fishery Management Council (MAFMC).

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 like ITQ's in fisheries 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 14 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 14 days (i.e., several days prior to the meeting for document review; the CIE panel meeting in Woods Hole; several days following the open meeting for SARC Summary Report preparation).

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Woods Hole, Massachusetts during 21-23 June 2011.

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 Open 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 COTR 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 Mid-Atlantic Management Council 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 NMFS by the Technical Group of Experts regarding excessive shares in the surfclam and ocean quahog 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.

During the question and answer period, a representative of the NMFS expert panel will be available to answer questions about the report. The CIE members can provide feedback to the expert panel member at that time.

(Other Panel Members)

A representative from the Mid-Atlantic Fishery Management Council staff, and the Northeast Fisheries Science Center Social Sciences Branch will be available during the meeting to provide any additional information requested by the CIE reviewers. Other panel members may assist the Chair prepare the summary report, if requested.

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 at the Northeast Fisheries Science Center, Woods Hole, MA laboratory during 21-23 June, 2011 as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
- 3) No later than 7 July, 2011, 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.

17 May 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
7 June 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
21-23 June 2011	Each reviewer participates and conducts an independent peer review during the panel review meeting
7 July 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
14 July 2011	Draft of Summary Report, reviewed by all CIE reviewers, due to panel Chair *
21 July 2011	Panel Chair send final Summary Report, approved by CIE reviewers, to NEFSC contact
21 July 2011	CIE submits CIE reports to the COTR
28 July 2011	The COTR 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 COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR 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 COTR 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 COTR (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 be 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 COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
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Roger W. Peretti, Executive Vice President
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Key Personnel:

NMFS Project Contact:

John B. Walden

Northeast Fisheries Science Center

166 Water Street, Woods Hole, MA 02536

John.Walden@noaa.gov

Phone: 508-495-2355

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 excessive shares study in the Mid-Atlantic surfclam and ocean quahog ITQ fishery

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

1. Describe the method or process used by the NMFS Technical Group for determining the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power.
2. Evaluate the strengths and weaknesses of the proposed method developed by the NMFS Technical group for determining maximum possible allowable percentage share of quota ownership. Review and comment on the data requirements necessary for applying the proposed methods.
3. Evaluate application of the proposed methods to the Surfclam/Ocean Quahog ITQ fishery. If there is disagreement with what the NMFS Technical Group recommended, clearly state that and your reason why.
4. Evaluate whether the approach outlined by the NMFS Technical group is reasonable for setting excessive share limits in fisheries managed through catch shares? As part of this TOR, comment on any constraints that may hinder application of the methods proposed by the NMFS Technical group.
5. Provide any recommendations for further improvement

Appendix 2-Annex 3: Tentative Agenda

**Evaluation of excessive shares study in the
Mid-Atlantic surfclam and ocean quahog ITQ fishery**

Falmouth and Woods Hole, Massachusetts during 21-23 June 2011

Tuesday, June 21. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:15 AM

Opening

Welcome

Introduction SSC Chair

Agenda

Conduct of Meeting

9:15 – 9:30 Background and Need for Expert Panel Report – Lee Anderson

9:30-11 Report of the NMFS Expert Panel - NMFS Expert Panel Rep.

11-11:15 Break

11:15 -Noon Review Terms of Reference – CIE Panel

Noon – 1:15 Lunch

1:15 – 3:00 CIE Panel Discussion – Terms of Reference #1.

3:00-3:15 Break

3:15-4:00 Public Comments

4:00-4:45 CIE Panel Discussion – Terms of Reference #2

4:45-5:00 Questions for following day

Wednesday, June 22. Holiday Inn, Lighthouse Room, Jones Road, Falmouth, MA

9:00-9:30 Review any outstanding questions from previous day

9:30-10:30 CIE Panel Discussion – Terms of Reference #3

10:30-10:45 **Break**

10:45-Noon **CIE Panel Discussion – Terms of Reference #4**

Noon-1:30 **Lunch**

1:30 – 3:00 **CIE Panel Discussion – Terms of Reference #5**

3:00-3:15 **Break**

3:15-5:00 **CIE Panel Discussion – Outstanding Issues**

Thursday June 23 Location: Clark Conference Room, Northeast Fisheries Science Center.

9:00 – 5:00 Report writing (Meeting Closed to Public)

Appendix 3: Panel Membership

Panel Chair:

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

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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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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 is obligated to conform with the style contained in the current edition of the United States Government Printing Office Style Manual. That style manual is silent on many aspects of scientific manuscripts. The CRD series relies more on the CSE Style Manual. Manuscripts should be prepared to conform with these style manuals.

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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Once your document has cleared the review process, the Editorial Office will contact you with publication needs – for example, revised text (if necessary) and separate digital figures and tables if they are embedded in the document. Materials may be submitted to the Editorial Office as files on zip disks or CDs, email attachments, or intranet downloads. Text files should be in Microsoft Word, tables may be in Word or Excel, and graphics files may be in a variety of formats (JPG, GIF, Excel, PowerPoint, etc.).

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Research Communications Branch
Northeast Fisheries Science Center
National Marine Fisheries Service, NOAA
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Publications and Reports of the Northeast Fisheries Science Center

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "conducting ecosystem-based research and assessments of living marine resources, with a focus on the Northeast Shelf, to promote the recovery and long-term sustainability of these resources and to generate social and economic opportunities and benefits from their use." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Currently, there are three such media:

NOAA Technical Memorandum NMFS-NE -- This series is issued irregularly. The series typically includes: data reports of long-term field or lab studies of important species or habitats; synthesis reports for important species or habitats; annual reports of overall assessment or monitoring programs; manuals describing program-wide surveying or experimental techniques; literature surveys of important species or habitat topics; proceedings and collected papers of scientific meetings; and indexed and/or annotated bibliographies. All issues receive internal scientific review and most issues receive technical and copy editing.

Northeast Fisheries Science Center Reference Document -- This series is issued irregularly. The series typically includes: data reports on field and lab studies; progress reports on experiments, monitoring, and assessments; background papers for, collected abstracts of, and/or summary reports of scientific meetings; and simple bibliographies. Issues receive internal scientific review and most issues receive copy editing.

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**CIE Review of Excessive Share Study for SCOQ
Falmouth, Massachusetts
June 21-23**

Chair's Report

This Chair's Report is supposed to summarize the CIE review panel findings, identifying points of agreement and disagreement over whether the Technical Group (TG) met the Excessive Shares Study Terms of Reference (ToR). As discussed below, I am unable to write a Summary Report because I am not allowed to see the individual reports I am supposed to summarize. Since I have no means to summarize the substance of the reviews themselves, I instead offer some impressions of the process that was used to conduct the CIE review of the report submitted by Compass-Lexecon on excessive shares.

Background-----Communication

The communication between conveners of the workshop and me before the meeting was inadequate, in hindsight. My impression is that the 3 CIE review panelists had adequate communication before the meeting with CIE and NMFS personnel, but that communication with me fell through the cracks. It is not clear to me why that is the case. A chronological summary of the pre-meeting communication I had from all parties is as follows:

- In October 2010, Lee Anderson informed me that the contract was awarded to Compass-Lexicon, that there would be a CIE review committee meeting, and that I would be proposed to Chair the review panel meeting.
- Shortly thereafter, I received a letter from the MAFMC, informing me that I had been appointed to the SSC of the MAFMC, a precondition to be appointed Chair of the review committee meeting. I never received (and have not yet received) an official communication informing me that I was to chair the review meeting.
- January 2011-----follow up emails by Lee Anderson, informing me of progress of the process and pending review committee meeting date options.
- March 8/9-----received emails from MAFMC with attachments of notes and the PowerPoint presentation from the Webinar by TG

- April 5 -----recipient of a blanket email from NMFS Project Contact sent to a large number of interested parties, announcing that the CIE meeting would be held June 21-23 in Woods Hole, together with hotel information.
- April 6-----corrections to previous email
- May 25-----received an email addressed to me from NMFS Project Contact, containing as attachments: 1) the report done by the TG; 2) a Specs Document with information about the fishery
- June 6-----received an Agenda from NMFS Project Contact
- June 8-----financial disclosure request from MAFMC
- June 16-----received another Agenda plus information on Holiday Inn meeting venue from NMFS Project Contact.
- June 20-----Upon arrival at Woods Hole, I realized through conversations with other committee members that there was a Statement of Work (SoW) for the review panel that I had not been sent. Upon my request, Lee Anderson forwarded an email, attaching the Terms of Reference (ToR) for the TG study, as well as the SoW for the review panel.

The Woods Hole Review Panel Meeting

My first inkling of what was expected of me as Chair was thus received the evening before the meeting was to begin. At that point, I had no contract, no stipulation that my costs would be reimbursed, no list of tasks expected of me (other than those embedded in the SoW for the CIE panelists) and no information about protocol for conducting a meeting that was open to the broad public.

I thus began serving as Chair of the review panel meeting with only the limited understanding of my tasks as obliquely outlined in the review panel SoW. My tasks in that SoW included:

“A member of the Mid-Atlantic Management Council 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.” (page 3, CIE Panel SoW)

The meeting was conducted to the best of my ability according to these instructions, and according to my judgment about how to most satisfactorily cover the issues associated with excessive shares that were brought up in the TG report. My expectation before the meeting started was that the experience would be unique in several ways, including:

- This meeting was the first time that any intensive discussion of a number of conceptual, empirical, and policy issues surrounding excessive shares had been held, anywhere.
- The topic was contentious among stakeholders and members of the audience would have potentially strong opinions about issues raised by the TG and the manner in which those were addressed.
- It was important to explore issues raised in the TG report not only for their specific applicability to the SCOQ fishery, but also for their general applicability to other fisheries contemplating addressing excessive shares.
- Many of the issues to be discussed would be complicated, technical, and difficult to articulate, necessitating opportunities to review, summarize, and re-express thoughts as the meeting unfolded.

For these reasons, I essentially chose to run the meeting almost as a graduate seminar might be conducted. I attempted to establish a tone that involved formal interchange guided by the agenda, but that also encouraged informal and comfortable give and take between the TG and the panelists. We covered a very wide swath of topics, many for the first time. The discussion was technical and challenging, drawing together conceptual ideas from economic theory, legal concepts from anti-trust law, empirical regularities and stylized facts about the SCOQ fishery, and other information about fisheries management and fisheries markets in general. Since some of the discussion hinged on understanding facts about the SCOQ fishery, I made an effort to allow additional opportunities for the informed public to weigh in at various points, over and above the time built into the formal agenda.

Post Meeting-----Wrap Up

The day after the formal public meeting adjourned (June 23), a wrap up meeting of the CIE review panel was held at a Woods Hole lab. The meeting also included the NMFS Project Contact, Dale Squires, and Lee Anderson. At that meeting, there was the first hint that the protocol developed for CIE reviews of biological management reports might be deficient as protocol for the excessive shares Peer Review Summary Report. Previous CIE reviews of biologically-based fisheries management

reports appear to be much more focused and confined to a smaller number of review points, mostly over issues that are well understood by all parties involved. In contrast, the SCOQ excessive shares review involved covering, for the first time, a very large number of complicated questions and interpretations that had not been addressed prior to the gathering. The issues addressed were conceptual, empirical, legal and policy questions.

As a result, at the wrap up meeting the individual panelists were not prepared or willing to come to final conclusions about points of agreement and disagreement and/or about whether the TG report had satisfactorily addressed all of the Terms of Reference. Review panel members agreed to adjourn, go back to their home offices, review their notes, collect thoughts, and write their independent reports. We thus did not, as normally happens with CIE reports, reach consensus during the last day over points of agreement and disagreement, or what the Peer Review Summary Report would say. We left the meeting under the understanding that panelists would return home, write their reports, forward them to me, and that I would write a summary report that synthesized their views, to be returned to each panel member for a final review. It was noted at this wrap up meeting that the Milestones and Deliverables chart in the SoW contained deadlines for individual reports to be delivered to the CIE Lead and Regional Coordinators, but no deadline for them to be delivered to me. The panelists decided that the reports would be emailed to me by no later than July 7.

Peer Review Summary Report

By Friday, July 8, I had not received the review panel reports. I emailed the NMFS Project Contact about that fact, with the reminder that the deadline for my Draft Summary Report (after review by panelists) was the following Friday. I was informed that the NMFS Project Contact had contacted COTR, and that the COTR informed him that under CIE "rules", the reviewers were not allowed to send me their reports. My first reaction was disbelief that this kind of SNAFU could arise at this late date. After repeated entreaties to the Project Contact, it became clear that we were going to stick to the rules regardless of how illogical they were in this setting. I also note that I searched for, but did not find, any mention in the SoW or any other documents that the Panel Chair would be denied access to panel member reports.

I have thus been placed in a classic "Catch 22" situation since my tasks, as outlined in the SoW include:

"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.” (page 4, CIE Panel SoW)

It is obviously impossible for me to prepare a report that summarizes the conclusions of the review panel if I am not able to actually see their individual reports that outline their conclusions. I thus cannot carry out the terms expected of me to prepare a summary report.

One last point is that it is unclear from the CIE panel SoW what purpose is supposed to be served by the Chair's Summary Report. I can find no instructions about what is to be done with the Summary Report, if it were possible for me to write one. The Deliverables and Timetable specify conditions for the independent CIE reports, but the only reference to the Summary Report is the July 21 Timeline entry that states “Panel Chair send final Summary Report, approved by CIE reviewers, to NEFSC contact.” It is not clear to me who the NEFSC contact is, nor is it clear what that person is supposed to do with such a report, were it possible to deliver it.

Some Lessons

The first problem here is obvious on reflection, namely that the protocol that has been developed for biological reviews that are relatively confined and focused is not adequate in the current setting of investigating excessive shares, which is more complicated, novel, and expansive. The second problem is the decision to blindly adhere to a set of rules and protocols, just because that is the way things have been done in the past in other biological assessments.

It is my understanding that the CIE review process is to be used in other settings where economics and policy analysis methods will be under assessment. One of these is a pending review of data collection methods used to assess and compare pre- and post-rationalization measures of economic impacts on the industry. I have first-hand knowledge of some of these other settings, and they are every bit as complicated, technical, and novel as the SCOQ excessive shares case. I am certain that the same problems will arise in the new settings that arose here, namely an

inability to arrive at a quick consensus that can be simply and neatly synthesized in a one-day wrap up meeting. Hopefully the experience gained here provides some lessons about the importance of adaptability. If the CIE process is to be used in the future in settings outside the confines of biological reviews, some decisions are going to have to be made about whether different protocols are appropriate, and if so, what those new protocols ought to look like.

**Recommendations for
Excessive-Share Limits in the
Surfclam and Ocean Quahog Fisheries**

Glenn Mitchell

Steven Peterson

Robert Willig

May 3, 2011

About Compass Lexecon

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Founded in 1977, Compass Lexecon's Chicago office pioneered the application of economics to legal and regulatory matters. We currently have a professional staff of more than 200 individuals, including 60 highly skilled Ph.D. economists and econometricians and more than 60 other individuals with advanced degrees located in seven offices.

Our practices are led by some of the most recognized and respected economic thinkers in the world including six former chief economists of the Department of Justice Antitrust Division. We maintain relationships with numerous high-profile academic affiliates, including Nobel Prize winners.

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Executive Summary

A. Assignment

We have been asked to give independent advice to the National Marine Fisheries Service (“NMFS”) and the Mid-Atlantic Fishery Management Council (“Council” or “MAFMC”) on determining how, in order to protect against market power without constraining the workings of competition, to set an excessive-share limit in individual transferable quota (“ITQ”) systems in general, and in the Surfclam and Ocean Quahog (“SCOQ”) fisheries in particular. This draft report provides our recommendations on: 1) an operational rule or process that could be used to set such an excessive-share limit in terms of the maximum percentage of quota that can be owned or otherwise controlled by a single individual or entity; and 2) application of this rule or process using available data to determine an appropriate excessive-share limit in the SCOQ ITQ system.

B. The Surfclam and Ocean Quahog Fisheries

Surfclams and Ocean Quahogs are bottom-dwelling species of clams that are harvested off of the East Coast of the United States using vessels equipped with hydraulic dredges. The harvest supports processing of Surfclams and Ocean Quahogs in a number of states.

Fisheries are a well known example of a common-pool renewable resource. Regulation of fisheries limits access and fishing effort (e.g., by limiting vessel size or regulating the design of other equipment). In 1990, the SCOQ fisheries adopted an ITQ system under which the fishery regulator sets a total allowable catch (“TAC”) separately for each of the two species to prevent over-exploitation of the resource, and allocated ITQs permitting harvest of a share of the TAC (the body of this report provides details about how the program is administered). ITQs are transferable, which allows shifts in production to industry participants that may be more efficient and, consequently, that value the quota more highly than the original owner. Participants in the fishery report that there are various types of transactions involving ITQs that commonly occur, including permanent ITQ transfers, long-term ITQ leases (e.g., five years), and transfers of bushel tags.¹

Currently, there are eight processing firms that purchase catch from the SCOQ fisheries. Some processors have developed quota ownership through either the acquisition of vessels and accompanying quota or the acquisition of quota directly, and it is common for processors to enter into long-term contracts (e.g., five years or more) to lease quota from quota holders. Processors also enter into exclusive contracts with vessel owners to harvest clams. Processors aim to meet the schedules set by their customers, many of which are large consumer goods companies, such as Progresso or Campbell’s, or large food service companies, such as Sysco. A consequence of the need to harvest and process clams to meet a schedule is that virtually all clams are sold under contract between processors and harvesters, or are harvested by processor-affiliated vessels.

¹ Excessive Share Technical Meeting, October 22, 2010.

C. Market Power and Competition in ITQ-Regulated Fisheries

This report addresses the question of whether market power can be exercised through the ownership and withholding of quota in the SCOQ fisheries. The exercise of market power in an ITQ-regulated fishery can occur when a quota owner has the ability and the incentive to affect the price of the regulated harvest or of the quota through its use or suppression of use of quota. When the incremental quota transactions of a harvest seller affect the price the quota owner receives for its entire quota holdings, the quota owner may have the incentive to withhold quota to increase the market price. When incremental quota transactions of a harvest buyer affect the harvest price, the quota owner may have the incentive to withhold quota to decrease the harvest price. Furthermore, firms may have an incentive to withhold quota in order to foreclose competitors from the market.

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 SCOQ fisheries, an overly restrictive cap could limit the growth of an efficient firm 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. Thus, a share cap established at an appropriate level could over time become inefficiently high or low.

The U.S. Department of Justice and the Federal Trade Commission (“Agencies”) have responsibility in the United States for determining if a proposed merger would threaten competition. The *Horizontal Merger Guidelines* helps firms know whether their merger is likely to be opposed by the Agencies. The *Horizontal Merger Guidelines* describes market concentration thresholds (for sets of products or services determined to be together in a relevant market) 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.² Based on thresholds described in the *Horizontal Merger Guidelines*, 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.³ The *Guidelines* also describes the methods the Agencies use to evaluate the competitive impact of proposed mergers.

Levels of concentration vary in the different sectors of the SCOQ industry: quota ownership, harvesting, and processing. Since the initiation of the ITQ system and quota allocation to the vessel owners participating in the SCOQ fisheries, a number of quota owners have sold their quota permanently and left the fisheries. Despite the exit of some

² 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 ($3800 = 50^2 + 30^2 + 20^2 = 2500 + 900 + 400 = 3800$).

³ See U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, August 19, 2010, p. 19.

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quota owners from the fisheries, the ownership of quota in the SCOQ fisheries is unconcentrated, but the use of quota is highly concentrated. An NMFS study found that the HHI of ownership of Surfclam quota in 2009 was 1167, and the HHI of ownership of Ocean Quahog quota was 993.⁴ NMFS has also conducted an analysis of quota usage by examining records showing the harvest amounts for vessels in the SCOQ fisheries and tracing their ownership. The HHI of harvesting activity for Surfclams in 2008 was 4080 and the HHI of harvesting activity for Ocean Quahogs was 2653. The HHI of harvesting activity for SCOQ combined was 2890.⁵

NMFS data also show that the concentration of harvesting has risen substantially in the last decade, largely as the result of the backward integration of clam processors into harvesting. The processing sector itself has also changed. In 1979, there were 44 plants that processed either Surfclams or Ocean Quahogs.⁶ Today, there are 12 plants.⁷ The HHI of purchases by processors grew between 2003 and 2008 from 2068 to 3134 for Surfclams and from 3431 to 4369 for Ocean Quahogs.⁸

It is possible for market power to be created or exercised at any of these stages of activity through a variety of means. Our analysis here, however, is targeted at the possibilities for the creation or exercise of market power specifically through the ownership or contractual control of quota. Large holdings of quota, whether amassed through permanent transfers of quota allocation, long-term leases of quota, or annual purchases of bushel tags, raise the risk that large quota holders will be able profitably to withhold quota and raise the price of clams and of quota. However, different types of ownership and control have different implications for the likelihood that a large quota holder could profitably exercise market power.

There are a number of factors that may constrain the exercise of market power throughout the various levels of activity in the SCOQ fisheries. For example, if it were the case that demand were highly elastic and substitutes were amply available, then small changes in price would lead to large changes in the quantity demanded. The demand for quota is ultimately derived from the demand for clam products and, therefore, demand for quota would then be elastic as well. Then, large reductions in output caused by price

⁴ Social Sciences Branch of the Northeast Fisheries Science Center, "Excessive Share Issues in the Surfclam and Ocean Quahog ITQ Fishery," Report to the Surfclam and Ocean Quahog FMAT, August 12, 2009, p. 12. As discussed in detail in this report, the available data may not always clarify ownership sufficiently to determine shares correctly.

⁵ NMFS Data.

⁶ The available data do not report the number of firms operating these plants ("Amendment #3 to the Fishery Management Plan for the Surf Clam and Ocean Quahog Fisheries and Supplemental Environmental Impact Statement," April 1981).

⁷ Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service, "Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2010," May 2009.

⁸ NMFS Data.

increases would generally limit the potential for the significant exercise of market power (because moving the market price substantially would require withholding, without revenue, a large quantity). Also, processors sell to large buyers, whose possible options to switch supply sources would constrain price increases for clam meat from the SCOQ harvest (and, consequently, would constrain prices for the SCOQ ITQ). Additional important factors may include the existence of excess unused quota (held in small accumulations) and excess harvesting and processing capacity.

D. Conclusions Regarding Market Power in the Fisheries

The evidence we analyzed does not support a conclusion that market power is currently being exercised through withholding of quota in the SCOQ fisheries.⁹ In particular, processors report that once it is clear that there will be excess quota available in a season (well before the end of the season, leaving sufficient opportunity to continue to harvest if harvesters and processors deem there to be sufficient demand), the price of quota is very low. This is inconsistent with the exercise of market power based on quota holdings.

E. Excessive-Share Guidelines

The excessive-share proposal is laid out as a series of steps in Table ES-1. These steps allow for the possibility that, under some circumstances that can be objectively assessed, the appropriate excessive-share cap is 100 percent. If it can be shown that ownership of all of the quota were to pose no risk for the exercise of market power, then the appropriate regulations would be no regulation at all. This does not appear to be the case for the SCOQ ITQ system under current conditions, but it is a valid theoretical possibility for ITQ programs in general.

F. Issues for Additional Consideration: Open Auction(s) for ITQ Sponsored by the Regulators

Our recommendations depend on conclusions and assumptions that are in some instances guided by the limited body of information provided to us by industry participants. Additional information could be useful for optimal administration of the fisheries. For example, information on the value of quota expressed in short-term ("spot") ITQ transaction prices in an efficient, liquid market would be an excellent source of objective evidence that would aid in managing the fisheries. In the current circumstances, such evidence could validate claims that quota have low value and are not being withheld from the market despite harvests below the TAC. It also happens to be the case that spot ITQ transaction prices could be beneficial to industry participants in general, and in particular to small quota holders that likely have less information on the value of quota than larger holders engaged in many quota transactions. One way to provide accurate price signals to the market and to the regulators is for the regulators to sponsor an open auction during each season for a modest portion of the rights to harvest

⁹ We do not analyze whether market power is exercised through the withholding of harvesting or processing, or through exclusionary conduct other than conduct involving quota ownership.

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TAC from each fishery. Details for the design and implementation of such an auction would require additional economic analysis not covered in the scope of this report.¹⁰

¹⁰

See U.S. Department of Commerce, *The Design and Use of Limited Access Privilege Programs*, Lee G. Anderson and Mark C. Holliday, eds., NOAA TM NMFS-F/SPO-86, pp. 124-135.

Table ES-1:

Step 1: Assess availability of requisite information on quota ownership and control	The regulator must be able to define clearly what constitutes relevant ownership and control of ITQ shares, accurately calculate existing levels of quota holdings and concentration, and be able to identify the quota owners and their affiliations that create aligning interests.	The Council must be able to determine which entities are affiliated and then accurately assess quota holdings and transactions.
Step 2: Assess availability of requisite competitive information	The relevant information to be collected includes the scope and quantity of substitute products, the level of excess capacity, the degree of product heterogeneity, the relative bargaining power of buyers and sellers, the ability to price discriminate, ease of entry, and efficiencies (or economies of scale).	The Council must determine the relevant markets and have access to other information about competitive constraints.
Step 3: Establish whether threshold condition requiring no calculation of cap applies	A TAC sufficiently restrictive to remove any incentive to withhold quota would obviate the need for an excessive-share cap. The relevant “sufficiently restrictive” level is the quantity that would be produced if there were only a single entity producing in the industry – the “monopoly” output.	The TAC in each of the SCOQ fisheries does not restrict output in a competitive market, so TAC is not below the monopoly output.
Step 4: Establish appropriate concentration thresholds	Use the information on competitive constraints to determine an appropriate concentration condition under the analytical framework of the <i>Horizontal Merger Guidelines</i> , and to guard against the possibility of the foreclosure of competitors.	Prevent a relevant product market HHI from exceeding 2500 and ensure independent harvest supply sufficient to support at least three efficient processors.
Step 5: Determine relationship between the excessive-share cap and market concentration	Assess concentration of substitute products and size of competitive fringe; calculate maximum number of quota allocations that can exist at the cap; include one additional quota holding that captures remainder; and calculate the HHI for the resulting set of relevant market shares. It may be possible to meet the concentration conditions set in Step 4 even when share ownership is very highly concentrated or 100 percent, depending on the breadth of the market, the size of the fringe, and the sources of supply to processors.	To apply these calculations first requires the determination of relevant markets. Figure 13 illustrates calculations under various assumptions.
Step 6: Identify regulatory and practical constraints	An appropriate cap for one set of market conditions may be too high or too low under other conditions – how to address this depends on legal and practical constraints.	Two options: fixed cap or two-part cap with flexible short-term holdings.
Step 7: Set the excessive-share cap	Identify the excessive-share cap based on the first six steps; exempt current large holdings, but do not allow them to grow further.	Fixed cap at 30-40%; two-part cap at 30% for long-term and 40-60% for short-term.

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I. Introduction

A. Statement of Work/Terms of Reference

We have been asked to give independent advice to the National Marine Fisheries Service (“NMFS”) and the Mid-Atlantic Fishery Management Council (“Council” or “MAFMC”) on determining how, in order to protect against market power without constraining the workings of competition, to set an excessive-share limit in individual transferable quota (“ITQ”) systems in general, and in the Surfclam and Ocean Quahog (“SCOQ”) fisheries in particular. Specifically, the NMFS has requested the following:

Using the rule prescribed under the "U.S. Department of Justice Horizontal Merger Guidelines" or another accepted rule if appropriate for determining market power, describe a process or rule that will allow for a theoretically sound procedure to specify the maximum possible allowable percentage share of quota ownership that will prevent an entity from obtaining market power. This can include market power (monopoly/oligopoly) in the final product market, the input market (monopsony/oligopsony) for the fishery resource, or the quota share market. If market power already exists in any of these markets, describe a process or rule that will allow for a theoretically sound procedure to prevent market power from increasing.¹¹

This report provides our recommendations on: 1) an operational rule or process that could be used to set an excessive-share limit in terms of the maximum percentage of quota that can be owned or otherwise controlled by a single individual or entity; and 2) application of this rule or process using available data to determine an appropriate excessive-share limit in the SCOQ ITQ system.

The recommendations presented in this report are based on the economic analysis of the SCOQ fisheries. The underlying economic principles regarding market power are the same for other fisheries, but the application of the principles may need to be modified to address different circumstances or additional market power issues that may arise.¹² Our recommendations allow for the possibility that, under some circumstances that can be objectively assessed, the appropriate excessive-share cap is 100 percent. If it can be shown that ownership of all of the quota were to pose no risk for the exercise of market power, then the appropriate regulations would be no regulation at all. This does not appear to be the case for the SCOQ ITQ system under current conditions, but it is a valid theoretical possibility for ITQ programs in general.

¹¹ Statement of Work for Independent Experts to Provide Advice on Setting of an Excessive Share Limit in the Surfclam/Ocean Quahog ITQ Fishery.

¹² For example, different species harvested from a multi-species fishery might face substantially different levels of competition from competing species and fisheries. The establishment of an appropriate excessive-share rule would have to take the competitive circumstances for the different species into account.

B. Consultant Roles and Biographies

The report was prepared and written under the direction of Professor Robert Willig. Dr. Steven Peterson and Dr. Glenn Mitchell drafted the report and performed the economic analyses underlying the report and its conclusions.

Dr. Robert Willig is Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University. Earlier, he was Supervisor in the Economics Research Department of Bell Laboratories. His teaching and research have specialized in the fields of industrial organization, government-business relations, and welfare theory. From 1989 to 1991, Dr. Willig served as Deputy Assistant Attorney General for Economics in the Antitrust Division of the U.S. Department of Justice, where he led the development of the 1992 *Horizontal Merger Guidelines*. Dr. Willig is the author of *Welfare Analysis of Policies Affecting Prices and Products*, *Contestable Markets and the Theory of Industry Structure* (with William Baumol and John Panzar), and numerous articles on subjects including merger analysis, IO theory, and merger guidelines. Dr. Willig is also co-editor of *The Handbook of Industrial Organization*, *Can Privatization Deliver? Infrastructure for Latin America*, and *Second Generation Reforms in Infrastructure Services*, and has served on the editorial boards of *The American Economic Review*, *The Journal of Industrial Economics* and the MIT Press Series on regulation. He is also an elected Fellow of the Econometric Society and an Associate of The Center for International Studies. Dr. Willig has served as a consultant and advisor for the Federal Trade Commission and the Department of Justice on antitrust policy; for OECD, the Inter-American Development Bank, and the World Bank on global trade, competition, regulatory and privatization policy; and for governments of diverse nations on microeconomic reforms. He has advised many corporations on antitrust and regulatory issues, and on pricing, costing, and business organization.

Dr. Steven Peterson is a Senior Vice President with Compass Lexecon and is based in Boston, Massachusetts. He specializes in the economics of antitrust and competition, estimation of damages, and regulation and public policy. In his antitrust work, Dr. Peterson has consulted with clients engaged in negotiations with the U.S. Department of Justice and customers to resolve allegations of price-fixing in both the United States and Europe, and he has evaluated the competitive impact of proposed mergers. Dr. Peterson has consulted extensively in regulated industries, including regulation of common-pool resources. Dr. Peterson consulted extensively with British Petroleum addressing the Prudhoe Bay Unit operating agreement and whether the unit interest owners' interests were sufficiently aligned under the agreement to avoid waste in the production of oil and gas from the unit. Dr. Peterson has also consulted on competition issues related to the transfer of slots (landing rights) between Delta Air Lines and U.S. Airways at LaGuardia Airport and Reagan National Airport. This work addressed the competitive effects of the proposed transaction and the liquidity of the market for slots at slot-controlled airports in the United States. Dr. Peterson has a Ph.D. in economics from Harvard University and a B.A. with highest honors in economics from the University of California, Davis.

Dr. Glenn Mitchell is an expert in the application of microeconomics and statistics to the analysis of competition, regulation, asset valuation, and transfer pricing. He has provided testimony for regulatory review of environmental and transportation matters, and for civil action relating to allegations of securities fraud. In the area of competition analysis, Dr. Mitchell has provided consulting services for matters involving allegations of restraint of trade, including monopolization, vertical restraints (in the United States, Europe, and Asia), tying, exclusive dealing, collusion, and predatory pricing; and he has extensive experience with regulatory review of mergers and joint ventures in the United States and Europe. Additionally, he has conducted transfer pricing studies; analyzed the regulation of greenhouse gas emissions; calculated of lost profits and reasonable royalties related to allegations of patent infringement; and prepared valuations of non-traded goods and services, as well as intangible assets. Dr. Mitchell holds a Ph.D. and an M.A. in economics from the University of California at Santa Barbara (where he received a Jacob Javitz Fellowship from the Department of Education, and a Transportation Economics Award from the Western States Coal Association), and he has a B.A. in economics with highest honors from the University of California at Davis. He has a research background in applied microeconomics, environmental and natural resource economics, econometrics, industrial organization, and finance. Specific research topics include energy and technological development, resource valuation, and markets for tradable pollution allowances. He has also taught economics as an Adjunct Professor at the University of Southern California Marshall School of Business.

C. Overview

Section II provides a brief summary of relevant facts about fisheries in general and the SCOQ fisheries in particular. We then discuss the concept of market power in Section III, along with the economics of regulating the exercise of market power. In Section IV, we provide some detailed analysis of industry structure of the SCOQ fisheries, and in Section V we analyze the ways that market power might be exercised in the SCOQ fisheries as well as existing competitive constraints that currently serve to prevent or limit the exercise of market power. We then conclude in Section VI with our proposed guidelines for defining an excessive-share cap and the application of those guidelines to the SCOQ ITQ system.

II. Background on the Surfclam and Ocean Quahog Fisheries and on the Clam Processing Industry

A. The Fisheries

Surfclams and Ocean Quahogs are bottom-dwelling species of clams that are harvested off the eastern coast of the United States. The Surfclam fishery has been active for longer than the Ocean Quahog fishery, which has been developed more recently in part to encourage an alternative to Surfclams and ease potential pressure from over-harvesting.¹³ Ocean Quahogs differ from Surfclams in that their habitat lies further from shore and the harvested clams tend to be smaller.

¹³ Communication with NMFS personnel.

Both species are harvested using boats equipped with hydraulic dredges that pump water to disturb the seabed and uncover the clams. Surfclam and Ocean Quahog harvesting areas cover a broad area off the East Coast of the United States, from the Mid-Atlantic states up into New England. The range of clam population areas is wide enough to support processing activities in several states. In recent years, harvesting activity has shifted northward following changes in clam population densities, which has resulted in some shifts in the location of processing plants.

Some vessels operate in both the Surfclam and the Ocean Quahog fisheries. This indicates that vessels will harvest in the fishery that offers the higher return to time and effort. Surfclams yield more meat per bushel of clams than do Ocean Quahogs. As a result, the per-bushel price of Ocean Quahogs is lower than the per-bushel price of Surfclams. The prices are more comparable, however, if they are adjusted for the meat yielded by each bushel.

Ocean Quahogs provide a substitute product for Surfclams for some, but not all, post-processing uses. Imports of other clam species also provide a substitute for some uses (and a small portion of the domestic Surfclam and Ocean Quahog harvest is exported). Processors report competition from imported clams from a number of countries, including Canada, Thailand, Chile, and others.¹⁴

For both of these species, population growth is relatively unrelated to existing population. Because of this, federal regulation is targeted to limit harvesting to the level where each species could be expected to continue to be harvested at a constant rate for a given number of years. There are also state-regulated clam fisheries that are closer to shore than the federally regulated fisheries. Fluctuations in environmental conditions can depress clam spawning and inhibit population growth and replenishment. When conditions cause populations to become substantially depressed, regulators tighten regulations or close the clam fisheries until the population can stabilize.

B. Regulation of the Surfclam and Ocean Quahog Fisheries

Fisheries are a well known example of a common-pool resource. This is a resource, such as a fishery or a commonly grazed field, where there is no limitation on who may use the resource or on the intensity of use. The likely result of free entry into the exploitation of the resource, however, is that the resource will be overexploited, which, in economic terms, will be inefficient.¹⁵ Each party using the resource considers only the benefit it will receive and the private cost of obtaining that benefit. The resource

¹⁴ Excessive Share Technical Meeting, October 22, 2010; written responses from processors. Imported processed meat provides competition for the products supplied by processors to end use customers, but not for the supply of clams harvesters supply as input to processors.

¹⁵ The term “efficiency” has a specific economic meaning. When goods and services are allocated efficiently, it is not possible to re-allocate them so that at least one party is better off without making anyone else worse off. An equivalent definition is that the marginal benefit of output (the value to society of an incremental increase in output) is equal to the full marginal cost of producing the output (including costs borne by all participants, not just the producer).

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users do not consider the negative effect of their use on other users of the resource. Obviously, a fish caught by one fisher cannot be caught by another. Therefore, each user has a negative effect on the productivity of the efforts of other users.¹⁶

A fishery is also a renewable resource. When there is no fishing activity, the fish stock will grow to the point where there is insufficient food or resources for the stock to grow further. The growth rate of the stock each year at such a state would be zero. When fishing activity removes part of the stock of fish each season, the stock of fish may decline, depending on how quickly the remaining stock can grow and replenish itself. Equilibrium occurs when the harvest rate each season is equal to the rate at which the stock replenishes itself.

Open access creates incentives for fishers to expend too much effort individually than the effort that would (in the aggregate) maximize the economic return on the fishery. This can lead to overfishing, meaning that the fish stock has been reduced to a level where the annual catch is lower than could be achieved (with the same or less effort) were stocks allowed to rise.¹⁷

To address the oversupply of fishing effort in open-access fisheries, it is common to regulate them by limiting entry or regulating fishing effort. This was the case for the SCOQ fisheries. Heavy fishing pressure in the 1960s and 1970s led to depleted stocks.¹⁸ The regulatory response was to declare a moratorium on new entrants into the fisheries in 1977. The moratorium kept the number of boats operating in the fisheries roughly constant, but did allow vessel owners to replace boats with newer vessels having greater fishing capacity (thereby allowing fishing effort to continue to rise).¹⁹ In 1990, regulators replaced the moratorium with an ITQ program to cap the SCOQ harvest.

Under the ITQ program, regulators set the total allowable catch (“TAC”) separately for Surfclams and for Ocean Quahogs. The program allocated quota to vessel owners that had permitted vessels operating in the fisheries between 1970 and 1988, allowing each to harvest a share of the TAC. Different formulas were used in different regions and for Surfclams and Ocean Quahogs, but the primary factor used to determine the initial allocations of quota was the average catch of each vessel during eligible

¹⁶ 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.

¹⁷ 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.

¹⁸ *Sharing the Fish*, p. 60.

¹⁹ *Sharing the Fish*, p. 61.

years.²⁰ The quota are transferable; shares of TAC may be sold or leased to other fishers (or to anyone, although only licensed vessel owners can harvest in the SCOQ fishery).

Quota holders each have control over a share of the fishery's TAC (under the regulations, ITQ is not an actual property right and can be revoked by changes in the regulations). The fishery is no longer open access, and harvesting rights for those active in the fishery are strictly limited. Under these circumstances, each vessel owner has the incentive to harvest its share of the TAC as efficiently as possible. This means that if one vessel owner has a larger, more efficient vessel than another ("more efficient" means lower cost per unit of harvest), the more efficient vessel owner may value quota more highly than the other. Under these circumstances, both parties can gain by temporarily or permanently transferring quota to the more efficient vessel owner.

To the extent that there is economic rent for the SCOQ resource ("economic rent" is the social value in a scarce fishery resource above and beyond the production cost of harvesting the resource), under the ITQ program such rents flow to the owners of the quota. In an economically efficient ITQ fishery, harvesting capital, vessels, and labor (the "factors of production") should earn competitive returns and competitive wages, and quota holders should receive the additional benefit of economic rents. The *distribution* of wages and economic rents among the industry participants, which can be of interest to social planners and industry participants (and the focus of economic research), is not analyzed in this report. To assess the risk of market power and the use of an excessive-share rule to control quota-based market power in the SCOQ fisheries, it is only relevant that the factors of production make competitive returns and that quota holders receive no more than the competitive economic rents from the resource.

The use of quota in the SCOQ fisheries is administered as follows. The regulator has a list of ITQ owners along with the share of harvest allocated to each. This list is updated as ITQ owners transfer their shares (transfer reporting is mandatory). Each season, the regulator calculates the actual harvest associated with each share by multiplying the share by the TAC that has been set for the season. The regulator then issues to each quota owner numbered bushel tags in accordance with the owner's share of the allowed harvest. When the vessel operators bring harvested clams to shore, they must provide sufficient tags to cover the bushels of clams harvested. Participants in the fishery report that there are various types of transactions involving ITQ that commonly occur, including permanent ITQ transfers, relatively long-term ITQ leases (i.e., five or more years), and transfers of bushel tags.²¹

²⁰ In some regions, vessel capacity was also used to establish initial quota holdings (Sharing the Fish, p. 63).

²¹ Excessive Share Technical Meeting, October 22, 2010.

C. The Processing Sector

Currently, there are eight processors that purchase catch from the SCOQ fisheries. All of them process Surfclams, but only four process Ocean Quahogs.²²

Processors were not directly incorporated into the initial allocation of quota, although processors owning licensed vessels did receive the allocations associated with those vessels. Over time, some processors or processor affiliates have developed quota ownership through either the acquisition of vessels and accompanying quota or the acquisition of quota directly, and it is common for processors to enter into long-term contracts (five years or more) to lease quota from quota holders. Processors also enter into exclusive contracts with vessel owners to harvest clams. In these cases, either the vessel owner or the processor may be responsible for supplying quota for the catch.²³

Processors aim to meet the schedules set by their customers, many of which are large consumer goods companies, such as Progresso or Campbell's, or large food service companies, such as Sysco. This means that processors must be able to direct vessels to harvest at certain times, weather permitting. These scheduling requirements mean that it is not generally possible for a vessel to harvest for more than one processor and still meet the scheduling needs of the processors.²⁴ Vessels must have quota at the time they harvest clams. Therefore, processors or fishers must arrange for the quota that the vessels require prior to leaving port.

A consequence of the need to harvest on a schedule is that virtually all clams are sold under contract between processors and harvesters or are harvested by processor affiliates. Therefore, processors do not "post" a price that they are willing to pay for clams at unloading points. There is no "spot" market for Surfclams or Ocean Quahogs.²⁵

III. The Economics of Market Power

A. What Is Market Power?

In perfectly competitive markets, participants act as if their levels of purchases or sales in the market do not influence the equilibrium market price. The result of competition in such a market is that sellers will expand their output (driving prices down) until the market price no longer covers the cost of further expansion. Similarly, consumers will increase their purchases (driving prices up) until the market price exceeds the benefit of further purchases. The price that brings supply and demand into balance in these circumstances is the competitive price and there are no further gains from trade – the purchasers' costs to expand output further would exceed the consumers' benefit from additional supply.

²² NMFS Data.

²³ Excessive Share Technical Meeting, October 22, 2010.

²⁴ Excessive Share Technical Meeting, October 22, 2010.

²⁵ Processors buy unprocessed clams from one another when there are equipment breakdowns or other unusual events, but such purchases are rare.

Figure 1 shows the market equilibrium in a perfectly competitive market. The downward sloping demand curve indicates the amount that consumers are willing to pay for the good for each output level. Similarly, the upward sloping supply curve shows the cost that competitive suppliers must be paid to bring the indicated quantity to market. Equilibrium occurs at the price, P_C , where the amount supplied equals the quantity demanded, Q_C .

In less competitive markets, some market participants may recognize that the level of their sales or purchases influence market price. Sellers large enough for their increased output to lower the price of their entire market output each have a unilateral incentive to withhold supply from the market (and elevate price above the competitive level). Figure 2 shows a market where a firm has withheld supply from the market. The market price, $P_{MKT\ PWR}$, is above the competitive level, and output, $Q_{MKT\ PWR}$, is below the competitive level. This is inefficient because buyers would be willing to pay more than enough to cover the cost of increased output: consumers' willingness to pay (as indicated by the height of the demand curve) exceeds the cost for producers to expand output (as indicated by the height of the supply curve). The exercise of market power restricts the gains from trade to less than would be realized in a competitive market.

For sellers in a market to have market power, it must be the case that the sellers can withhold supply without that supply being replaced by other firms in the market or by entry of new firms into the market. Under normal circumstances the high prices that could be generated by withholding supply would attract new firms to the market. This is relevant to the market for quota because regulators fix the amount of quota available (by setting the TAC). Therefore, if a firm (or firms) were to withhold quota, additional quota might be forthcoming from small, unconsolidated quota owners, but industry participants cannot "produce" additional quota – there can be no entry or expansion into the market for quota to offset the effects of withholding.²⁶

It is also possible for buyers to exercise market power. Just as a large seller may recognize the effect of its purchases on the market price of its product, a large buyer may recognize the elevating effect of its purchases on market price. In this case, the buyer will recognize its effect on price and will, therefore, have the unilateral incentive to reduce its purchases of the input in order to reduce the market price of the input *below* the competitive level.

The creation or exercise of market power can involve conduct more complex than withholding supply from the market. Certain types of "exclusionary" or "predatory" conduct might create barriers to entry or foreclose competitors from a market. Such conduct may not provide an immediate benefit and is likely to be costly, but may eventually pay off if firms reasonably expect to benefit from consequently reduced competition in the long run. Since ITQ holdings are by their nature exclusionary (there is a fixed supply, so a market participant holding one unit of quota prevents any other participants from relying on that unit for production), assessment of market power must

²⁶ There may, however, be entry or expansion in the market for clam meats or clam products.

include a long-term assessment of the potential for exclusionary conduct through the withholding or manipulation of ITQ supply.

B. Market Power in an ITQ-Controlled Fishery

A fishery regulated by an ITQ program presents some unique issues for the analysis of market power. As described above, the exercise of market power requires withholding supply from the market in order to raise prices (and, in some cases, other conduct that will eventually lead to the ability to affect price by withholding supply). If the total supply for a market comes from an ITQ-regulated fishery, the regulation of the fishery itself may limit supply. This is illustrated in Figure 3. The figure shows the demand for fish from a fishery and the supply of fish from the fishery. The vertical line represents the maximum harvest, or TAC, established by the regulators of the fishery. In this case the TAC is below the competitive market output level. Therefore, the TAC is a “binding” constraint on output. The market price is equal to P_{TAC} , 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 TAC, or C_{TAC} .

The regulated outcome for the market as a whole is similar to the outcome that results from the exercise of market power – lower quantity and higher price than the competitive equilibrium. In this case, however, the restriction on output comes from the regulation of the fishery rather than from the exercise of market power by fishers or quota holders. The exercise of market power can involve an economically inefficient withholding of supply, but regulation limiting the fishery’s harvest can actually increase efficiency by limiting excessive fishing effort. In the market outcome illustrated in Figure 3, the right to fish is valuable. The value to a small harvester of additional quota to bring one more unit of fish to market as shown on the graph is the difference between the market price of fish and the cost of bringing more fish to market. This is the difference between P_{TAC} and C_{TAC} .²⁷

The output of a fishery could be below the TAC, with or without the exercise of market power. If demand for the output of a particular fishery is low, the TAC may exceed the competitive catch. In this case, competitive forces limit the output of the fishery rather than regulation. Under these circumstances, the regulation is not “binding” because it does not limit the harvest from the fishery. This result is illustrated in Figure 4. The figure shows that the equilibrium price of fish, P_C , and the cost of

²⁷ A large harvester would recognize the negative effect of the additional catch on the price it received for its entire harvest and would place a lower value on the quota. Note that a firm may have market power in the fishery illustrated in Figure 3. The outcome shown will occur whenever the TAC is below the equilibrium output, whether it would reflect market power or not. See Anderson, Lee G., “The Control of Market Power in ITQ Fisheries,” *Marine Resource Economics*, Vol. 23 (hereinafter “Anderson”), pp. 25-35.

harvesting additional fish (as indicated by the height of the supply curve at the equilibrium quantity) are the same, so the value of quota in this example would be zero.²⁸

Alternatively, it could be the case that the TAC does not bind and that participants in the fishery (which could be quota holders in the case of an ITQ-regulated fishery) are withholding supply to raise prices. This outcome is illustrated in Figure 5.²⁹ One difference from the competitive equilibrium situation described above in Figure 4, however, is that in the situation illustrated in Figure 5, the unused quota has value to a small harvester (because the market price for each unit harvested still exceeds the cost of harvesting an additional unit). The value of quota to a small harvester is the difference between the price of fish and the cost of harvesting additional fish and is labeled in the figure.

Comparison of these cases illustrates a possible effective metric for identifying market power in the SCOQ fisheries. When the harvest in a season will clearly fall below the TAC (but while there is still time to harvest additional clams), then the price of quota sold for a single season is a good indicator of market power. If the harvest is below the TAC in a season because of low demand for the output of the fishery, quota do not restrict the catch, and the value of quota for the season should be essentially zero.³⁰ Alternatively, if the harvest is low as the result of the withholding of quota, the price of quota will be positive.

C. Regulating Market Power in ITQ-Regulated Fisheries Using an Excessive-Share Cap

Having access to a fishery with output limited by regulation is valuable when the regulation restricts competition from expanding output and eroding profits or rents from harvesting. Access to an ITQ fishery is controlled by access to tradable quota, so rents would be expected to flow not to vessel owners but to quota owners. In an ITQ-regulated fishery, the stream of rents attributable to access to the fishery have been severed from

²⁸ The price of quota may be greater than zero in a real-world fishery with excess quota because there may be uncertainty at the beginning of the season as to whether there will, in fact, be excess quota at the end of the season. Moreover, harvesters must purchase quota. In a real-world fishery, no quota holder has any incentive to sell quota to a harvester for a price so low as to not even cover transactions costs and the time involved in the sale. These considerations indicate that when harvests are generally below the TAC, the price of quota may be positive, but should be quite low.

²⁹ Figure 5 shows the TAC set at a level greater than the competitive equilibrium. It could also be the case that the TAC is below the competitive equilibrium but greater than the equilibrium output with market power.

³⁰ The price of quota will be essentially zero for all quota that are available for lease in the market. However, the price of quota traded under previously struck, long-term contracts may be quite different (because the price in a long-term contract may be based on expectations about the value of quota at the time the contract is struck). Prices may also vary throughout the season. If there is an expectation at the beginning of the season that demand will exceed the available quota, prices at the beginning of the season may be high and later fall when it becomes clear that quota will, in fact, exceed demand.

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the actual harvesting of fish. The incentive for quota owners (which can include parties otherwise not participating in the fishery other than through quota control) is to maximize the stream of income they can earn from their quota holdings.

Two incentives could induce quota owners to withhold quota from the market to increase the value of their quota. First, by withholding quota, the output of the fishery will be decreased, raising the price of fish, and all else equal, increasing the value of quota. This is standard seller market power: withholding the supply of quota raises the price of fish and of quota. However, a quota owner may also be a buyer of harvesting services. If a large quota owner were to contract with vessel owners to harvest fish, the quota owner may recognize that its purchases of harvesting services increase their price. In such an instance, the quota owner would reduce its purchases of harvesting services to avoid running up their price, and withhold quota from the market to prevent other processors from competing to purchase those services. Of course, both of these effects (withholding to increase the value of the resource vs. withholding to decrease the demand for harvesting) may occur at the same time.³¹

Another concern is that a large quota owner could withhold quota from a processor and foreclose competition from that harvester by making it impossible or too expensive for the harvester to obtain clams to process (withholding to decrease competition in processed fish). Such a strategy is more complicated than the straightforward exercise of market power described above and may not be profitable in the short run. However, a strategy to withhold quota to foreclose competition from other processors (or harvesters) can be profitable if prices can be raised once the competition has been eliminated.

An excessive-share cap operates by limiting the amount of quota that any quota owner can hold. Small quota owners cannot effectively raise the price of quota through withholding because if a small quota owner were to engage in costly withholding of even a large share its quota, the effect on the market price would be small, and the withholding would be unprofitable for the small quota owner. A similar argument holds for attempts by quota owners to exercise monopsony power over harvesters. An excessive-share cap can also limit the ability of a quota holder to foreclose competition because a sufficiently low cap will guarantee that a minimum number of quota holders will exist.³²

1. The Regulation of Market Power

The justification for regulating market power is that the exercise of market power hurts consumers and causes economic inefficiency. Some industries are subject to direct regulation and all are subject to the scrutiny of the antitrust laws, which forbid anticompetitive conduct that creates or perpetuates significant monopoly (market) power. Antitrust laws also forbid mergers that will significantly weaken competition and increase the market power of the merging parties. An ITQ excessive-share rule would be

³¹ See Anderson.

³² For example, an excessive-share cap of 40 percent guarantees there will be at least three quota holders.

related to this category of regulation because it would restrict some purchases or control transactions of quota by large quota holders.

The government has an interest in controlling the exercise of market power through control of quota. In the SCOQ fisheries, the government created fishing rights to regulate and improve the efficiency of the fisheries. The government, therefore, has an interest in seeing that the ownership of rights that it created does not become the mechanism through which participants in the fisheries consolidate market power to the detriment of consumers and to the detriment of the efficiency of the fishery. The exercise of market power through ownership of quota is directly counter to the goal of creating quota to enhance the efficiency of the fisheries.

2. A Share Cap Is Potentially a Blunt Instrument

Regulating market power, however, is not without its own hazards, because it imposes limits on what firms can do. These limits may be inefficient in their own right if they proscribe efficiency-enhancing activities or transactions. Regulation may require a trade-off between potentially increasing efficiency by controlling market power and potentially reducing efficiency by over-regulating market transactions.

An excessive-share cap may limit the growth of firms in the SCOQ fisheries.³³ Regulations that limit the size of firms may also limit the growth of efficient firms, which may lower the overall efficiency of the harvesting and processing activities in the SCOQ fisheries. An overly restrictive cap could limit the growth of an efficient firm when there is no material threat of the exercise of market power. This is just one example of how an efficient rule must balance the costs of the regulation with the potential benefits.

Restricting the regulatory consideration to an excessive-share rule precludes many options for achieving an efficient balance of regulation. It is possible for regulators to permit an efficient firm to grow while controlling the exercise of market power by limiting other aspects of the firm's conduct: for example, conduct that might raise a competitor's costs or preclude a competitor from expanding. Regulation of market power based on a portfolio of administrative and regulatory tools may also be able to better balance the need to control market power with the goal of enhancing efficiency as economic conditions change.

This is relevant to the determination of an appropriate level for the excessive-share cap. Conditions in the fisheries have changed over time and will change in the future. Thus, a share cap established at an appropriate level could over time become inefficiently high (offering too little constraint on the exercise of market power) or low (offering too much constraint on efficient competitive activity in the industry). This problem may be best addressed through periodic review of the excessive-share cap, with reviews being accelerated when changing economic conditions in the fisheries warrant.

³³ The precise effects will depend on the definition of contractual control of quota, the level of the cap, the contracting practices typical in the fisheries, and the administrative rules for associating quota with industry participants for purposes of assessing shares.

Alternatively, it may be possible to design an excessive-share rule that permits a high degree of quota ownership while preserving the incentive for quota holders to compete.

D. The Horizontal Merger Guidelines

The U.S. Department of Justice and the Federal Trade Commission (“Agencies”) have responsibility for investigating mergers in the United States and determining if a proposed merger would threaten competition should the merger be consummated. When the Agencies find that a merger would significantly weaken competition and create market power, they are able to file litigation opposing the merger. A court ultimately decides whether the merger may proceed or not.

Of course, firms that may seek to merge have an interest in knowing whether their merger is likely to be opposed by the U.S. Department of Justice or the Federal Trade Commission. The *Horizontal Merger Guidelines* is a means to that end. The *Horizontal Merger Guidelines* accomplishes two things. The *Horizontal Merger Guidelines* describes the methods used to define relevant markets for competitive analysis and calculation of market concentration thresholds. The *Guidelines* also describes the methods the Agencies use to evaluate the competitive impact of proposed mergers.

1. Relevant Market Definition

In competition analysis, the concept of the market used is the “relevant market.” 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 encompasses the locations of the sources of supply that buyers view as close substitutes.³⁴ The standard approach to defining the boundaries of the relevant product and geographic markets is the hypothetical monopolist test. This test identifies products and sources of supply that are reasonably interchangeable with one another.

The hypothetical monopolist test evaluates whether a profit-maximizing firm that is not subject to regulation and that is the only present and future seller of a group of products could profitably raise the price of those products by a small but significant non-transitory increase in price (a “SSNIP”).³⁵ To implement the test, a SSNIP is typically taken to be a five percent increase in price. To begin, one or more products are selected as the members of the candidate market.³⁶ If a hypothetical monopolist could profitably raise prices of *at least one* of the products by about five percent, this group of products is accepted as constituting a relevant product market.³⁷ If a hypothetical monopolist cannot profitably raise the price of the products by about five percent because customers would

³⁴ U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, August 19, 2010 (hereinafter “*Horizontal Merger Guidelines*”), pp. 8-9 and p. 13.

³⁵ *Horizontal Merger Guidelines*, p. 9.

³⁶ In merger analysis the price increase is determined based on prices prior to the merger. For the analysis of competition more generally, it is appropriate to assess whether the price increase would be profitable relative to the competitive price level.

³⁷ *Horizontal Merger Guidelines*, p. 9.

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shift their purchases to products outside of the candidate market, the candidate market is too small.³⁸ When a candidate market is found to be too small to serve as a relevant market, it is expanded by adding the next best substitute product into the candidate market and the test is performed again. A similar process is used to determine the boundaries of the relevant geographic market.³⁹

The relevant market is usually taken to be the smallest market (smallest set of products and geographic areas) that satisfies the hypothetical monopolist test.⁴⁰

One consideration when assessing the boundaries of a relevant market is the ability of suppliers to price discriminate (i.e., charge different customers different prices that are not related to cost). When a hypothetical monopolist is able to target a group of customers with specific prices, it is necessary to examine the competitive options facing those customers specifically. The reason certain customers may be targeted is that sellers may recognize that the customers have fewer competitive options, or less ability to shift their purchases away from some of the products in the candidate relevant market, than other consumers. Assessing the relevant market for customers that face a shorter list of competitive options is appropriate when there is the prospect that some customers will be subjected to differential treatment with adverse competitive consequences.⁴¹

2. Market Concentration Thresholds and Further Analysis of Competitive Effects

The standard measure of concentration used in competition analysis is the Herfindahl-Hirschman Index (“HHI”). The HHI is calculated by squaring the market share of each firm in the industry and adding up the squared market shares. Thus, a market with three firms with market shares of 50 percent, 30 percent, and 20 percent has an HHI of 3800 ($50^2 + 30^2 + 20^2 = 2500 + 900 + 400 = 3800$). The *Horizontal Merger Guidelines* classifies markets into three categories based on HHIs. Markets with an HHI below 1500 are considered unconcentrated; markets with an HHI between 1500 and 2500 are considered moderately concentrated; and markets with an HHI greater than 2500 are considered highly concentrated. It is important to note that these concentration calculations are intended to be applied *after* first determining the full set of relevant products constraining the prices of the merging firms, what the *Horizontal Merger Guidelines* calls the relevant market. With regard to merger enforcement, the Agencies

³⁸ The boundaries of the relevant market are determined by demand substitution or the willingness and ability of customers to switch their purchases to other products when the prices of the products in the candidate market rise.

³⁹ *Horizontal Merger Guidelines*, pp.13-14.

⁴⁰ *Horizontal Merger Guidelines*, p. 10.

⁴¹ If prices are individually negotiated with customers, the hypothetical monopolist test may indicate that relevant markets may be as small as a single customer. *Horizontal Merger Guidelines*, pp. 12-13.

are unlikely to oppose a merger that results in an unconcentrated market or where the change in HHI is small (e.g., less than 100).⁴²

There are many mergers that do not fall within the “safe harbor” concentration thresholds of the *Horizontal Merger Guidelines*, but remain unopposed by the Agencies because the transactions appear unlikely to create market power. When the safe harbor concentrations are exceeded, further analysis of other considerations is often necessary to determine whether a proposed merger will threaten competition and, if so, what remedies may be available. The *Horizontal Merger Guidelines* describes the additional methods the Agencies use to evaluate transactions that would exceed the safe harbor concentration thresholds.

A clear implication of the *Horizontal Merger Guidelines* is that context matters. Large market shares or high levels of concentration are sometimes acceptable and are at other times a threat to competition, depending on circumstances. Thus, applying only the safe harbor thresholds in the *Horizontal Merger Guidelines* to quota ownership would not be an appropriate method to determine the level of an excessive-share cap in the SCOQ fisheries. The *Horizontal Merger Guidelines* does, however, describe the appropriate economic methods to use to assess what size of share would likely allow a firm to exercise market power under a given set of economic circumstances. A combination of the safe-harbor concentration thresholds and the economic methods described elsewhere in the *Horizontal Merger Guidelines* underpins our analysis of the appropriate level for the excessive-share cap.

IV. The Structure of the Clam Harvesting and Processing Industry

The Surfclam and Ocean Quahog harvesting and processing industry has three segments:

- Quota owners or holders: the firms and individuals that own or control the quota rights to harvest clams;
- Harvesters: fishers and the capital (fishing vessels) they use;
- Processors: specialized firms that process harvested clams into shucked clam meat or other products for their customers.

To the extent harvesters or processors own quota or control it through contracts, an excessive-share rule may affect their ability to accumulate quota. Therefore, an excessive-share rule may affect competition and concentration in the harvesting and processing sectors, and the effect of the rule may enhance or diminish economic efficiency, depending, in part, on whether there is market power in the harvesting or processing sectors. However, a cap on the amount of quota any single entity can own or control will not directly limit the exercise of market power by harvesters or processors if that market power is based on factors other than quota ownership or control. The analysis here is targeted at the possibilities for the creation or exercise of market power

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Horizontal Merger Guidelines, p. 19.

specifically through the ownership or contractual control of quota. We do not address the control of market power founded on industry characteristics other than quota holdings.

A. Quota

We will first discuss the concentration of current SCOQ quota holdings and usage. Throughout this section, we calculate HHI values and compare them to thresholds discussed in the *Horizontal Merger Guidelines*. Concentration measures provide a helpful index, but are pertinent to the analysis of market power only when based on shares in a relevant market containing all close substitutes of the products of interest. Thus, concentration measures of quota ownership do not necessarily provide evidence of market power, even if they are high, to the extent SCOQ clams compete with other clam products.

When the Surfclam and Ocean Quahog fisheries implemented the ITQ system, the initial allocations of quota were allocated to the vessel owners that had harvested Surfclams and Ocean Quahogs between 1970 and 1988.⁴³ This led to highly diffuse quota ownership.⁴⁴ Since that time, many of the initial quota owners have sold their quota and left the fisheries. Increased concentration of quota ownership is a natural consequence of the elimination of excessive fishing effort and underutilized capital from the fisheries.⁴⁵ Despite the exit of quota owners from the fisheries and the resulting increases in the concentration of ownership, the existing allocation of the quotas to harvest Surfclams and Ocean Quahogs remains unconcentrated.

A single entity or firm can own more than one individual quota allocation, and evaluating concentration requires determining who owns each quota allocation and the relationships among owners. In 2009, NMFS found there were 56 individual Surfclam quota allocations that were owned by 49 independent entities. The HHI of initial Surfclam quota ownership in 2009 was 1167. The concentration of Ocean Quahog quota ownership was similarly low. NMFS identified 45 individual Ocean Quahog quota allocations in 2009 that were owned by 37 independent entities. The HHI of the initial Ocean Quahog ownership in 2009 was 993.⁴⁶ Examination of the quota transfers in 2009 showed no permanent transfers that would have changed these HHIs for 2010.⁴⁷

⁴³ Sharing the Fish, p. 63.

⁴⁴ Social Sciences Branch of the Northeast Fisheries Science Center, "Excessive Share Issues in the Surfclam and Ocean Quahog Fishery: Report to the Surfclam and Ocean Quahog FMAT," August 12, 2009 (hereinafter "Excessive Share Issues"), p. 12.

⁴⁵ See, e.g., Stanley Wang, "The Surfclam ITQ Management: An Evaluation," *Marine Resources Journal*, Vol. 10, No. 1, 1995, pp 95-96.

⁴⁶ One of the goals of the ITQ system was to eliminate excessive fishing effort, and by that measure, the system has largely been a success (Excessive Share Issues, p. 12).

⁴⁷ Bank of America permanently transferred its full Ocean Quahog quota to Bumble Bee Foods. Bumble Bee Foods held no other quota. Therefore, this transfer has no effect on the HHI for Ocean Quahog quota ownership. See 2009 Ocean Quahog allocation and trading data.

The existing ownership of SCOQ quota remains unconcentrated and would not raise market power concerns even if the markets for SCOQ quota were not subject to meaningful competitive discipline from close substitutes or other factors. Based on the latest *Horizontal Merger Guidelines*, markets with HHIs below 1500 are considered to be unconcentrated.⁴⁸

Data reliably showing the ownership and control of quota following transfers in the SCOQ fisheries are not available. Information showing the parties to quota transfers does not show the ownership relationships among the final quota holders. The need for harvesters to hold quota at the time of harvesting raises further complications: some harvesters own or contract for their own quota, whereas in other cases processors obtain quota and transfer it without charge to their harvesters (which may be affiliated or independent). When the processor owns quota or contracts for quota on behalf of a harvester, the transfer data will show the quota has been transferred to a harvester, but will not show whether the processor retains control of the quota in such transactions (“control” in this context means the power to decide whether the quota will be used to harvest clams). A complete understanding of the actual ownership and control of quota requires analysis of the contracts under which quota were transferred to the final owner or holder. An additional problem arises from the reporting of quota when used. The owner of quota is supposed to report to NMFS the specific tags (quota) that are used throughout the season. However, in many instances, it is not the recorded owner but another entity that reports the quota used.⁴⁹ This is most likely a problem with related entities reporting the use of quota, which is another aspect of determining final quota ownership or control.

To circumvent these issues, NMFS calculated the shares of the reported harvest by the vessels in the fisheries and traced the ownership of the vessels.⁵⁰ This analysis of harvesting concentration provides the best available evidence on the concentration of quota ownership following transfers to processors and harvesters.⁵¹ However, this measure of concentration may misestimate the concentration of quota holdings by attributing quota to independent harvesters when the quota are, in fact, owned or controlled by a processor or other entity. The concentration of harvesting in the Surfclam and Ocean Quahog fisheries is described below.

Information on whether owners merged or there were changes in the control of firms that own quota is not available.

⁴⁸ *Horizontal Merger Guidelines*, p. 19.

⁴⁹ NMFS Data.

⁵⁰ Excessive Share Issues, pp. 12-13, and NMFS Data.

⁵¹ Processors may provide tags to independent harvesters with which they have contracted. In this case the processor is directing the use and receiving the benefits of the quota, but the harvested clams would be attributed to the independent harvester rather than to the processor.

B. Harvesting

The harvesting of Surfclams and Ocean Quahogs is substantially more concentrated than the initial ownership of quota in the fisheries. This higher concentration reflects the concentration of used quota after they have been transferred to harvesters. NMFS has compiled data showing the ownership of the vessels that reported harvesting Surfclams and Ocean Quahogs. According to these data, 32 vessels harvested Surfclams in 2008. The data also show that 14 firms owned these vessels. The same data show that 18 vessels, owned by nine firms, harvested Ocean Quahogs in 2008.⁵² A total of 17 firms harvested Surfclams and Ocean Quahogs in 2008.

Even though many firms harvest clams in the two fisheries, the measure of concentration is high because some firms harvest large shares. The HHI in 2008 was 4080 for Surfclam harvesting and 2653 for Ocean Quahog harvesting, and 2890 for combined harvesting of both species. These concentration measures are above the threshold established in the *Horizontal Merger Guidelines* for a market to be considered highly concentrated. Moreover, the concentration of harvesting in the fisheries has risen substantially over the last decade. In 1998, the HHI was 1561 for Surfclam harvesting, 1853 for Ocean Quahog harvesting, and 1016 for combined harvesting of both species.⁵³ By the standards of the *Horizontal Merger Guidelines*, the concentration of harvesting has increased from the moderately concentrated range (or the unconcentrated range for the combined harvest) in 1998 to the highly concentrated range in 2008.

Many processors are vertically integrated into vessel ownership and harvesting. In fact, processors have increasingly expanded their businesses “upstream” into the harvesting sector. Figure 6 shows the landings of Surfclams and Ocean Quahogs by processors. Between 1998 and 2008, processors never harvested less than 50 percent of the total Surfclam harvest. Since 2005, processors have harvested approximately 80 percent of the total Surfclam harvest. The processor share of the Ocean Quahog harvest grew from about 20 percent to 50 percent between 1998 and 2008. The increasing concentration of harvesting may be the result of vertical integration of the relatively concentrated processor segment into harvesting.

C. Processors

The processing segment of the clam industry has undergone significant consolidation over the last 30 years. In 1979, there were 44 plants that processed either Surfclams or Ocean Quahogs. The available data do not report the number of firms that operated these plants.⁵⁴ Today, eight firms process Surfclams and four firms process

⁵² Eight vessels harvested both Surfclams and Ocean Quahogs. Thus, 24 vessels exclusively harvested Surfclams and ten vessels exclusively harvested Ocean Quahogs. There were 42 total vessels active in the two fisheries.

⁵³ NMFS Data.

⁵⁴ Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service and the New England Fishery Management Council, “Amendment #3 to the Fishery

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 Mitchell, Peterson and Willig. May 3, 2011.

Ocean Quahogs. These processors operate a total of 12 plants.⁵⁵ There has been little change in the number of firms processing Surfclams over this period. The number of firms processing Ocean Quahogs, however, has fallen from seven to four.

NMFS data on processor purchases of Surfclams and Ocean Quahogs show that there was a modest amount of entry and exit in the processing sector between 2003 and 2008. For example, in 2006, the Truex Group and the management team of the largest processor, Sea Watch, acquired Eastern Shore Seafood.⁵⁶ Despite processor exit, processors report that they have excess capacity to process clams. These facts – the exit of processors from processing Ocean Quahogs while continuing to process Surfclams (noted in the previous paragraph) and the exit of processors from acquiring SCOQ harvests entirely – are not consistent with a finding that processors are exercising market power and earning above-competitive long-run profits.

Despite a relatively constant number of firms processing either Surfclams or Ocean Quahogs, the concentration of the processing sector grew substantially between 2003 and 2008 as relatively large firms exited or merged and the entering firms remained relatively small, allowing incumbent firms' shares to grow. The HHI of Surfclam purchases by processors grew from 2068 to 3134 between 2003 and 2008. Similarly, the HHI of Ocean Quahog purchases grew from 3437 to 4369 over the same period. Notably, concentration has fallen somewhat after peaking in the Surfclam and Ocean Quahog fisheries at 3675 and 4629, respectively, in 2007. The HHI of processor purchases for Surfclams and Ocean Quahogs combined has also grown, from 2226 in 2003 to 3479 in 2008.⁵⁷

The HHI of the Surfclam and Ocean Quahog processing sectors is in the highly concentrated range based on the thresholds in the *Horizontal Merger Guidelines*. We address only whether processors have market power that is based on their quota ownership; we do not address whether processors have market power arising from the high concentration or other characteristics of the processing sector. That participants in the highly concentrated processing sector are likely to be the large holders of quota is relevant to establishing the excessive-share cap at a level that precludes creation or increase of market power through quota holdings. As described elsewhere in this report, a processor holding a large amount of quota may be able to gain market power in the markets for specific clam products or limit competition by withholding quota from

Management Plan for the Surf Clam and Ocean Quahog Fisheries and Supplemental Environmental Impact Statement,” April 1981; see also Excessive Share Issues, p. 11.

⁵⁵ Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service, “Overview of the Surfclam and Ocean Quahog Fisheries and Quota Considerations for 2010,” May 2009 (hereinafter “Quota Considerations”), pp. 17-18.

⁵⁶ Quota Considerations, p. 5.

⁵⁷ NMFS Data.

competing processors. Today, however, no processor reports that it is unable to purchase or lease sufficient quota for its business needs.⁵⁸

V. Potential Market Power Concerns and the Competitive Constraints on the Exercise of Market Power in the Surfclam and Ocean Quahog Industry

We begin this section by describing the kinds of market power that quota holders (through either ownership or contractual control) might exercise. We then discuss the limits on the exercise of market power imposed by a number of existing competitive constraints in the SCOQ fisheries.

A. The Exercise of Quota-Based Market Power

The exercise of quota-based market power theoretically could occur at different levels of the SCOQ industry.⁵⁹ For example, the exercise of market power theoretically could occur in the market for the leasing and sale of quota. Processors and harvesters would then pay increased prices for quota, and the withholding of quota would reduce the output of the fishery. An increase in the prices of processed SCOQ clam products would occur if a reduction in the supply of SCOQ clam products could not be readily offset by increased production from state fisheries, by increased imports of substitute clam products, or by other substitutes. However, if these possible offsets were ample, the quota owners would be unlikely to be able to raise the price of quota unless the reduction in the demand for harvesting and processing services led to a reduction in the prices of those services, in which case quota owners could raise the price of quota without a material increase in the cost of SCOQ clam products. Harvesters and processors would suffer from the exercise of market power while consumers would largely be protected by their ability to substitute to other products.

Another theoretical alternative for the exercise of market power is that the harvesters or processors buy or lease the quota from the allocation owners under long-term contracts and accumulate sufficient quota to exercise market power during the term of the contracts. If the long-term contracts were to have fixed prices, it is the lessees that would benefit from any increased pricing during the term of the contracts. Thus, contractual holders of quota might have the incentive to withhold quota that they control through contracts. However, different types of ownership and control have different implications for the likelihood that a large quota holder could profitably exercise market power. For example, leases with market-driven flexible pricing pose less of a risk that the lessee would withhold quota in that it is the lessor that would capture much of the benefit of price increases (diluting any incentive for the lessee to withhold quota).⁶⁰

⁵⁸ Excessive Share Technical Meeting, October 22, 2010.

⁵⁹ As described above, the exercise of market power occurs when quota holders are able to withhold quota to reduce the output of the fisheries, raising the price of clams and/or clam products. This requires that the harvest fall not only below the competitive harvest level but also below the TAC.

⁶⁰ It is possible for a large quota holder to purchase quota on an annual basis or through a lease with annual price redeterminations and withhold some of that quota to drive up prices within a season. Profitably doing so, however, would require that the demand for clams and for quota be relatively

Harvesters holding or controlling large accumulations of quota could “withhold quota” from the market by restricting their harvesting of clams. To the extent that state fisheries could not expand their output, the result of reducing the clam harvest would be higher clam prices to processors. The processors would buy fewer clams and would lower their output of SCOQ products. As above, if the reduced output of SCOQ products could not be replaced by substitute clams or other substitutes, the price of SCOQ products customers pay will rise.

Processors holding or controlling large accumulations of quota (which may occur through the typical contracting practices in the SCOQ fisheries, through either quota held by processors themselves or quota held by harvesters that are affiliated with processors) theoretically might be the beneficiaries of increases in the price of SCOQ clam products, increases in the price of quota, or decreases in the price of harvested clams (which might be achieved through monopsony power).

High levels of concentration in the processing sector may mean that large quota accumulations do not lead to any *increase* in market power in the processing sector. Even if there were just one processor that had no long-term quota ownership or control, that processor could still determine how much output to produce and the amount of harvesting services to buy. Negative effects of market power (above-competitive prices for SCOQ products and below-competitive prices for quota and harvesting) could theoretically occur regardless of whether a monopoly processor controls any quota.

In the above example, the processor’s market power does depend on barriers to entry that prevent additional competition. Because quota is necessary to harvest Surfclams and Ocean Quahogs, processors holding large accumulations of quota could theoretically keep other processors from expanding or keep new processors from successfully entering the SCOQ processing industry by withholding unused quota. Thus, a key theoretical threat from large processor accumulations of quota is that they could be a means to foreclose competing processors. In fact, accumulation of SCOQ quota ownership could be used as a means to commit to the exclusion of other processors over a long enough period of time to drive other processors from the market.

As one final example of the exercise of market power, it is possible (in theory) for a large quota holder to abstain from harvesting in the beginning of the season, allowing other quota holders to use their quota. When other quota holders were out of quota, the large quota holder would be in the position of a quota monopolist at the end of the season. We do not address dynamic, intra-season quota accumulations in our analysis, in part because we assume that the regulator would not have the resources to continually monitor and enforce an excessive-share cap other than on a seasonal basis. In addition, however, consumer demand for a regular flow of clam products and the ability for other

inelastic. The evidence for the SCOQ fisheries is that the demand for clams and quota is quite elastic. Below we address the proper method of associating quota for purposes of assessing shares. The general rule is that the party that controls the use of the quota and would obtain the benefit of the price increase from withholding quota should be associated with the quota for share calculations.

quota holders to observe and adjust to the intra-season withholding could constrain the effectiveness of such a strategy.⁶¹

We now turn to a broader discussion of some of the factors that may constrain the ability of quota holders to exercise market power in the SCOQ fisheries.

B. Competitive Quota Ownership

As described above, the initial ownership structure of Surfclam and Ocean Quahog quota ownership is quite competitive. Moreover, there appears to be quota available from unconsolidated quota holders, even after temporary transfers of quota. For example, there are allocations of quota that are unused.⁶² This unconsolidated ownership or control of unused quota can be a check on the exercise of market power by quota holders, by providing a source of additional quota should large quota holders attempt to withhold quota.

C. The Relevant Market(s) for SCOQ Clams and Clam Products

The breadth of the relevant market makes a significant difference in the assessment of a reasonable level of an excessive-share cap. Consumer demand drives a definition of relevant markets that hinges on whether a hypothetical monopolist could profitably raise price. When demand is highly elastic and substitutes are amply available, small changes in price lead to large changes in the quantity demanded. The large reductions in output caused by price increases generally limit the potential for the significant exercise of market power (because moving the market price substantially requires withholding, without revenue, a large quantity). The demand for quota is ultimately derived from the demand for clam products. If demand for clam products is elastic, then demand for quota will be elastic as well. Thus, determining an excessive-share cap for the SCOQ ITQ requires a clear definition of relevant markets for products from the SCOQ fisheries.

We do not make a final assessment of the relevant markets for clams and clam products. Instead, we provide some direction that will help the Council determine whether or not the relevant market is limited to clams or includes other seafood products or if the relevant markets are smaller and should be defined to be particular clam products. These assessments should be able to be made based on the Council's

⁶¹ Similarly, we have not addressed other possible strategies that involve developing and exercising market power over time. For example, we do not evaluate whether it would be possible to import sufficient clams to drive down the value of quota for the purpose of accumulating quota at a low price. Such a strategy would not seem to be necessary given the current excess supply of quota, despite import levels that have been relatively constant during the last decade.

⁶² NMFS Data. This has occurred while quota owners are actively seeking to lease or sell their quota holdings. Excessive Share Technical Meeting, October 22, 2010, and personal communications with NMFS personnel.

experience with the SCOQ industry and interviews of purchasers of SCOQ clam products.⁶³

Surfclams and Ocean Quahogs are processed into a variety of different demanded products. Some parts of the Surfclam are desirable for fried seafood platters or strip products. Other parts of the Surfclam may be chopped up for use in chowder. Ocean Quahogs have a somewhat less desirable color and flavor and are processed for use in lower-quality chowder products.⁶⁴ SCOQ processors may sell fresh, frozen, or canned clam products (intermediate products) to companies that make final products, like seafood platters or chowder, or processors may make final products themselves.

It is possible that all of the differentiated products compete vigorously with one another and/or with imported clam products as discussed in the next section. In fact, many SCOQ processors assert that they face broad actual and potential competition for their processed clam products from imports. However, if there were particular clam products without good substitutes, they could possibly allow a hypothetical monopolist to profitably raise prices just for those products, which might imply a relevant market definition excluding imports or other substitutes. At least one processor has presented evidence that imported clams and other proteins are not important sources of competitive discipline on the domestic clam industry.⁶⁵

The following examples outline how an analysis of relevant markets could proceed:

Example 1: If it were the case that the foot of the Surfclam is valued for a particular use, buyers of the Surfclam foot might have more limited options to use other parts of the clam or other species of clam than buyers of other parts of the clam. This would suggest that the foot of the Surfclam should be evaluated to determine whether it belongs in its own relevant product market (could a hypothetical monopolist controlling 100 percent of the available supply of the Surfclam foot profitably increase the price above the competitive level?). If buyers of the foot could readily switch their purchases to products made from other parts of Surfclams, Ocean Quahog clam meat or to products made from imported clam meat, rendering any attempted price increase unprofitable, then the candidate relevant product market would have to be broader.

Example 2: If buyers like Campbell's and Progresso purchase large amounts of fresh or fresh-frozen clam meat of a certain type for their chowder products, it is appropriate to examine their ability to substitute to other products. If a hypothetical monopolist controlling all supply of the kind and grade of SCOQ clam meat Campbell's and Progresso purchase could profitably raise the price above the competitive level, then this type of clam meat would constitute its own relevant product market. If, however,

⁶³ See *Horizontal Merger Guidelines*, pp. 11-12, for a discussion of the kinds of information that are generally informative about the boundaries of relevant markets.

⁶⁴ Quota Considerations, p. 13.

⁶⁵ Letter from Michael LaVecchia, LaMonica Fine Foods, March 31, 2011.

buyers like Campbell's and Progresso would shift their purchases to a different kind or grade of SCOQ meat or to imported clam meat, rendering the attempted price increase unprofitable, then the relevant product market would have to be broader.

Example 3: Ocean Quahogs are processed into chopped clam meat, which is canned and sold for use in chowder. Perhaps it is the case that buyers of canned clam meat and Ocean Quahog meat for chowder could readily switch to imported clams and to certain parts of Surfclams were the price of Ocean Quahog meat to rise relative to the prices of alternatives. Then, a price increase of Ocean Quahog meat would not be profitable to a hypothetical monopolist. Therefore, the hypothetical monopolist test would indicate that the relevant market that includes Ocean Quahogs also includes imported clam products and certain portions of the Surfclam.

D. Potential Competing Sources of Supply and Substitute Products

If there were elastic sources of products that consumers would readily purchase rather than SCOQ clams (if there were an increase in the price of SCOQ clams or clam products), then the potential for profitably withholding quota would be greatly reduced.

There are a number of other sources of clams that compete with Surfclams and Ocean Quahogs harvested from the federally regulated fishery. In addition to the federally regulated fisheries, there are state-regulated Surfclam fisheries in New York and New Jersey. Figure 7 shows the landings of Surfclams from state fisheries relative to the landings from the federally regulated Surfclam fishery. Production from state-regulated Surfclam fisheries has declined over the last several years, largely as the result of reduced populations of clams.⁶⁶ In fact, no landings were reported in New Jersey in 2008 or 2009.⁶⁷ Nevertheless, the New York fishery has provided significant additional clams to the supply from the federally regulated Surfclam fishery. Moreover, as in the federally regulated fishery, the harvest has in some years fallen short of the available quota.⁶⁸

In addition to other sources of fresh, unprocessed Surfclams and Ocean Quahogs, there are substantial imports of clam meats into the United States. Figure 8 shows that in 2008, the federal Surfclam and Ocean Quahog fisheries produced approximately 83 million pounds of meats.⁶⁹ In the same year the United States imported approximately 33 million pounds of fresh or canned clam meats and exported over 13 million pounds of

⁶⁶ Quota Considerations, pp. 7-11.

⁶⁷ Quota Considerations, p. 9.

⁶⁸ There is also an Ocean Quahog fishery in Maine. It is a small-scale fishery relative to the federally regulated Ocean Quahog fishery. The fishers use smaller boats and target smaller Quahogs for sale in a fresh, half-shell market in Maine. Prices for Maine Ocean Quahogs are much higher than for clams from the federally regulated fishery. Ocean Quahogs from Maine have significantly different characteristics than those from the federal fishery. There is likely to be relatively little substitution between Maine Quahogs and Ocean Quahogs from the federal fishery. Quota Considerations, pp. 15-16.

⁶⁹ Assumes 17 pounds of meat per bushel of Surfclams and 10 pounds of meat per bushel of Ocean Quahogs.

fresh or processed clam meats. Thus, imports amounted to nearly 40 percent of the domestic production of the federally regulated clam fisheries and exports amounted to just under 16 percent of the production of the federally regulated clam fisheries.⁷⁰

Processors report that there can be limitations on the ability of their customers to substitute to imported clams. Specifically, processors report that imported clams can have a different taste and texture than domestic clams, but that the processors' food service company customers could use food-science technology to switch from domestic to foreign supplies if prices warranted. This description indicates that the potential for substitution may be present, but investigation would be required to demonstrate that it would occur in response to a relatively small but significant price increase for SCOQ clam products.

The significant amounts of clam products imported into the United States, the reported large number of sources of competition and potential competition from imported clams, and the fact that incremental sales of processed (shucked) clams are exported onto the world market indicate that the domestic clam processors face elastic demand for at least some significant portion of their products. Processors argue that these factors keep them from raising prices for fear of losing these customers' business over the longer term.⁷¹

E. Large Buyers

The processors that source clams from the federal SCOQ fisheries report that they sell a large proportion of their output to large food service companies. Campbell's and Progresso produce clam chowder and are reported to be the largest buyers of clam meat. In addition, the processors sell to other food service companies such as Sysco and others. The processors report that these large sophisticated buyers are able to exert significant pricing power because of their large purchases and because they have the capability to substitute imported clams for domestic clams in their products if prices warrant. The threat of entry created by the ability of major customers to use other sources of clams has the potential to limit any efforts by processors to raise prices above competitive levels, and processors report feeling the effects of this pressure from their large customers.⁷²

F. Vertical Integration of Processors into Harvesting

Processors' backward integration into harvesting over the last five to seven years has corresponded to an increase in concentration in harvesting. The backward integration

⁷⁰ Processors report that imported clams are available from a relatively large number of countries, including Canada, Thailand, Vietnam, China, and Chile. Excessive Share Technical Meeting, October 22, 2010, and processor responses to written questions.

⁷¹ It is possible that clam meat competes with other proteins in some uses. Data are not available to rigorously evaluate whether other proteins, such as chicken or shrimp, compete with clam meat sufficiently that the prices of these substitute proteins substantially constrain the price of clam meat. See Letter from Michael LaVecchia, LaMonica Fine Foods, March 31, 2011.

⁷² It is also relevant that downstream clam meat purchasers could, if they desired, acquire quota, which would help guarantee sufficient supply and prevent processors from raising prices.

into harvesting, however, may actually improve the economic performance of the fisheries and their harvesting and processing sectors. One theoretical concern that arises from the existence of a concentrated processing sector is that it would exercise monopsony power over harvesters.⁷³ To exercise monopsony power, processors would reduce their demand for harvesting services, lowering the market price of harvesting services and increasing profits to the processing sector. Of course, if a processor owns a harvester, that firm would not benefit by underutilizing its owned harvesting assets in order to depress the price of harvesting services.⁷⁴ The processor will be motivated to use its own harvesting capacity if the incremental value of the harvest to the processor exceeds the incremental cost of harvesting, without regard for the effect of the additional harvesting on the market price of harvesting services. As a result, vertically integrated processors will increase harvest levels over those non-vertically integrated processors would choose were they to have influence over the market price of harvesting services.

G. Excess Supply of Harvesting Capacity

Processors report that there is excess harvesting capacity in the Surfclam and Ocean Quahog fisheries. This excess capacity is the result of vessels that are available to harvest clams, but are not currently contracted to do so, and the ability of vessels actively harvesting in the fisheries to harvest additional clams.⁷⁵ Analysis of landings by vessel shows that most vessels landed fewer bushels of clams in 2008 than the maximum number of bushels that they harvested over the period 1998-2008.⁷⁶ This finding supports the processors' assertion that the vessels currently operating in the fisheries could expand output if demand warranted.⁷⁷ Harvesters with excess capacity will have strong incentives to use their vessels intensively in order to maximize the return on their primary capital asset. Moreover, the excess supply of harvesting capacity implies that harvesting services will be supplied quite elastically. A highly elastic supply of harvesting services indicates that withholding of quota in an effort to exercise monopsony market power against harvesters is unlikely to be profitable.

H. Conclusions Regarding the Presence of Market Power in the Fisheries

Given the constraints discussed above, it may not be surprising that the evidence we analyzed does not support a conclusion that market power is currently being exercised through the withholding of quota (or, apparently, through other means as well).

⁷³ As described below, the evidence does not support the conclusion that the processing sector has exercised market power in the Surfclam or Ocean Quahog fisheries.

⁷⁴ See, e.g., Perry, Martin K., "Vertical Integration: The Monopsony Case," *The American Economic Review*, Vol. 68, No. 4, September 1978, pp. 561-570.

⁷⁵ Excessive Share Technical Meeting, October 22, 2010.

⁷⁶ NMFS Data.

⁷⁷ Landings per unit effort, i.e., bushels harvested per hour of fishing, have fallen quite dramatically for Surfclams. This indicates that the current stock of vessels may not be able to harvest as many clams as it did in earlier years.

Figure 9 shows Surfclam quota, landings, and the percent of quota landed for the period 1979 through 2008. Since the implementation of the current ITQ-based regulatory regime in 1990, the Surfclam harvest has been at or near the full quota level. The last five years, however, have seen production somewhat below quota. Figure 10 shows Ocean Quahog quota, landings, and the percent of quota landed for the years 1979 through 2008. The story for Ocean Quahogs is quite different from that for Surfclams. Since 1990, years when the full quota were utilized are the exception rather than the rule. Moreover, Ocean Quahog landings have been on a downward trend since the early 1990s, with the exception of a temporary increase during 2001-2004, which includes years in which processors report high demand and high prices (despite tension with Figure 12).⁷⁸

Figure 10 indicates that the Ocean Quahog fishery is performing today in line with historical trends, particularly if prices are now lower than in the early part of the decade. The significant underutilization of quota is, in part, the result of the TAC being set at a relatively high level compared to historical norms. Figure 9 shows Surfclam landings have fallen below quota since 2004. However, this underproduction has been accompanied by a significant decrease in the efficiency of harvesting operations. Figure 11 shows the landings per unit effort, or bushels harvested per hour of fishing, for both Surfclams and Ocean Quahogs. Surfclam landings per unit effort fell by 50 percent between 2000 and 2008. Figure 12 shows the prices processors paid to harvesters for Surfclams and Ocean Quahogs.⁷⁹ Prices for both species were quite flat, but showed some increase in 2008 and 2009. A price increase during these years is not surprising because fuel costs rose rather dramatically in 2008, and processors report levying fuel surcharges on their customers for at least some period of time to cover increased harvesting costs. Most importantly, the price increases are not associated with years where harvests fell relatively more below quota (e.g., 2005).

An important piece of evidence that supports the conclusion that quota is not being withheld from the market is the reports by processors that once it is apparent quota will be in excess supply in a season, the price of quota is quite low.⁸⁰ As described above, if quota were being withheld from the market to exercise market power, its price would be high because withholding would make quota scarce. This appears not to be the case currently as there are reports that quota owners are not able to lease their quota to harvesters or processors. Another piece of evidence is the low concentration of quota ownership before contractual transfers to processors and harvesters. These low levels of concentration are inconsistent with the exercise of any meaningful market power through the withholding of quota. However, the concentration of quota ownership and control following transfers, some of which are under long-term contracts with fixed prices, appears to be much higher than the initial concentration of quota holdings. The presence

⁷⁸ Excessive Share Technical Meeting, October 22, 2010.

⁷⁹ These prices include transactions between processors and their affiliated harvesters. Therefore, there is some question as to whether these fully reflect arm's-length prices.

⁸⁰ Prices are low early enough in the season that additional clams could be harvested if there were sufficient demand.

of these long-term contracts for quota may present a potential difficulty with respect to assessing market power.

VI. Excessive-Share Proposal

An excessive-share rule can be an effective instrument for limiting the exercise of market power through the withholding of quota. It is unlikely to be an effective rule, however, for completely preventing the creation or exercise of market power in the harvesting or processing sectors of the Surfclam and Ocean Quahog industry (through means other than withholding quota) or preventing the exercise of any market power that already exists. Given that the fishery remains under the jurisdiction of U.S. antitrust law in general, there will continue to be safeguards in place (other than the excessive-share cap) to protect against any general exercise of market power through such means as collusion on prices and output, or concerted foreclosure strategies.

As discussed in general terms above, establishing an overly restrictive regulation may not serve to increase economic efficiency. Setting a share cap that is too low could harm the economic efficiency of the fishery itself and of the processing sector. As described above, an excessive-share rule that strictly defines ownership or control of quota could limit the share of the Surfclam and/or Ocean Quahog catch a processor could purchase, which may prevent the firm from realizing efficiency-enhancing economies of scale. The excessive-share proposal described below reflects these concerns, while still providing constraints on the exercise of market power through the ownership and control of quota.

The proposal is laid out in a series of steps. For each step, we discuss the general principles that would apply to many fisheries, and then we explain the result of applying those principles to the SCOQ fisheries. At the end we introduce one additional idea for further analysis beyond the scope of the current report.

A. Step 1: Assess Availability of Requisite Information on Quota Ownership and Control

In order to apply principles like those found in the *Horizontal Merger Guidelines* and to reach informed conclusions regarding the acceptable degree of concentration of quota holdings, the regulator **must** be able to accurately calculate existing levels of concentration. The regulator must be able to define clearly what constitutes relevant ownership and control of ITQ shares, and be able to identify the quota owners and their affiliations that create aligning interests.

The guiding principle in determining the relevant “owner” of quota for the purpose of implementing an excessive-share cap is to identify who can make binding decisions about the use of the quota and who bears the risk of (or stands to benefit from) quota price changes. It is this entity that possibly has the ability and incentive to withhold quota anticompetitively and should be associated with the quota for purposes of the excessive-share rule. In the SCOQ fisheries, the regulator will need to obtain information showing who the contractual holders of quota are, and may have to require quota holders to report their affiliations to the regulator. Once an excessive-share rule has been implemented, the need for baseline information will be reduced and quota

holders may be able to report their holdings and changes in affiliation only when their holdings exceed some reasonable threshold.

As described below, the excessive-share cap is a cap on the amount of quota that any group of affiliated quota holders to which the excessive-share rule applies can accumulate, or use, during the course of a season. If that group of affiliated quota holders acquires additional quota during a season, then its total quota holdings must be tallied to ensure that they remain under the cap for the season.

Application of Step 1 for SCOQ Fisheries:

In the SCOQ fisheries, affiliations among quota holders may be based on either family ties or commercial interests. The Council must determine which entities are affiliated and then accurately assess quota holdings and transactions in order for any excessive-share cap to be meaningful.

Once the Council determines which entities buy and sell quota, it is necessary to assign holdings to each entity.⁸¹ This should be done prior to the beginning of a season. In some cases, associating quota with those controlling it prior to the season will be straightforward. For example, a quota allocation owner that has not contracted to lease out its quota for the upcoming season would be assigned the quota that it owns. Quota that has been leased under a long-term fixed-price contract would be assigned to the entity that leased the quota from the owner.⁸² In this case, it is the party that contracted for the quota (the lessee) that may have the incentive to withhold quota to raise its price. If, however, a long-term contract has prices that are set to market levels, it is the owner of the quota that retains the risk that the quota's value will change. For transfers lasting only one season, the quota should be assigned to the acquiring party if the transfer has occurred by the time of the preseason audit of quota holdings. Transfers occurring during a season must also be reported and tracked.

Similar rules should apply to contracts between processors and harvesters that involve quota. To the extent a harvester is obligated to use quota on behalf of the processor (and will not reap the benefits of price changes), the quota should be assigned to the processor. For example, if a processor offers a harvester (that owns the quota) a fixed price for clams and the harvester is obligated to reserve the quota necessary to supply these clams, the processor would be assigned the quota (the processor controls the use of the quota and would benefit from an increase in the value of clams and quota).

If, however, the supply agreement does not obligate the harvester to reserve the quota for the processor, or has the harvester bearing the risk of price changes, then the

⁸¹ No quota should be double-counted as applying to more than one party's shares (although holdings can be split: for example, associating 50 percent to each half of a joint venture between two parties with equal votes). In other words, the sum of the shares associated with all parties for the purpose of evaluating the cap should equal 100 percent of the TAC.

⁸² "Fixed-price" means the price of the quota (per bushel of harvest allowed) is set for the duration of the contract (it need not be the same price throughout the term of the contract, but the level at any point during the term is predetermined at the onset of the contract).

quota should be assigned to the harvester. This is because it is the harvester rather than the processor that benefits from an increase in the price of quota. Therefore it is only the harvester that could possibly have the incentive from this quota to contribute to price elevation. For example, if a processor contracts with a harvester (that owns quota) for 15 bushels at market price per bushel (perhaps by matching best price offered by any processor at time of delivery), then the harvester would be assigned the quota.⁸³

B. Step 2: Assess Availability of Requisite Competitive Information

There is a certain amount of information on competition that must be available to regulators for any meaningful determination and implementation of an excessive-share cap.

A regulator relying on the framework provided in the *Horizontal Merger Guidelines* must have sufficient information to evaluate the state of competition in the marketplace in a manner consistent with the *Guidelines*. As described earlier in this report, the *Horizontal Merger Guidelines* specifies thresholds for moderately concentrated and highly concentrated markets. In some markets, high concentration does not stand in the way of vigorous competition, while in others high concentration threatens the exercise of market power. The *Horizontal Merger Guidelines* also describes a number of economic conditions that influence whether markets are likely to operate competitively and whether a proposed transaction is likely to provide the capability and incentive to exercise market power under different market conditions. Under some industry conditions, a transaction resulting in moderate concentration could be deemed problematic, while under other conditions, a transaction resulting in high concentration may still be acceptable.

The relevant information the regulator must collect includes the scope, quantity, and flexibility of supply of substitute products, the level of excess capacity in harvesting and processing, the degree of product heterogeneity, the relative bargaining power of buyers and sellers, the ability to price discriminate, ease of entry, and efficiencies (or economies of scale). This information would be required for ITQ transactions as well as related industry activities including fishing (harvesting) and processing. Information on product substitution should have sufficient detail for the determination of relevant markets, as described in the *Horizontal Merger Guidelines*. The product of this inquiry will be an informed, fact-based judgment regarding the highest degree of concentration that would be consistent with a well-functioning, competitive market.⁸⁴

⁸³ We note that such contractual arrangements may not currently be present in the SCOQ fisheries.

⁸⁴ This exercise applies the principles of the *Horizontal Merger Guidelines* in a manner that is different from the typical application. When determining whether to intervene to prevent a merger, the U.S. Department of Justice and the Federal Trade Commission use the *Horizontal Merger Guidelines* to determine if the merger threatens competition, based on the characteristics of the markets where the merging firms overlap. Here, the principles underlying that type of determination are being used to assess the maximum level of competition that is consistent with a competitive market for quota, based on the characteristics of the market in which that quota is used.

Application of Step 2 for SCOQ Fisheries:

A key issue for assessing competition in the Surfclam and Ocean Quahog fisheries is the degree of competition the fisheries experience from competing clam products (and possibly other products). Industry participants note that there are several uses for which either Surfclams or Ocean Quahogs are acceptable, but there are also at least some uses for which only Surfclams may be acceptable. Similarly, some processors report that there are some uses where imported clams compete with SCOQ clams.⁸⁵ The question is whether the degree of substitution among imported and domestic clam meat is sufficiently high to place them in a single relevant market.⁸⁶ It is not necessary that two products be perfect substitutes in order to be in the same relevant market. What is necessary is that a hypothetical monopolist controlling all of one product could not profitably raise the price for that product because the monopolist would lose sales as the result of buyers' switching to other products in at least some uses, though not necessarily all uses.

Detailed data on quantities and prices would allow for a quantitative analysis to determine whether product substitution rises to the level necessary to include all products relating to Surfclams, Ocean Quahogs, and imported clam meat in the same relevant market, or various combinations into smaller relevant markets. These data, however, are not available to us. Therefore, the Council must assess whether there is sufficient information to define relevant markets and how to remedy any information insufficiency, and after appropriate analysis, determine the relevant markets.

Specifically, the questions that remain unanswered by our analysis are: 1) Would a hypothetical owner of the entire Surfclam harvest (or all processed Surfclam meat) be able to raise price profitably above the competitive level to some or to all buyers, or would there be sufficient substitution to Ocean Quahogs to constrain such a price increase? 2) Would a hypothetical owner of the entire Ocean Quahog harvest (or all processed Ocean Quahog meat) be able to raise price profitably above the competitive level to some or to all buyers, or would there be sufficient substitution to Surfclams to constrain such a price increase? If the answer to both of these questions is that a single owner could not profitably raise the price of Surfclams or Quahogs, then the relevant market may include the combination of Surfclams and Ocean Quahogs in the federally regulated fishery. Next: 3) Would a hypothetical owner of the entire SCOQ harvest (or all processed SCOQ meat) be able to raise price profitably above the competitive level to some or to all buyers, or would there be sufficient substitution to imports (and/or harvests from state-regulated fisheries) to constrain such a price increase? If increased imports of

⁸⁵ Excessive Share Technical Meeting, October 22, 2010, and processor responses to written questions. One processor has provided information indicating that imported clam meat may not be a meaningful source of competition to domestic clam meat. Letter from Michael LaVecchia, LaMonica Fine Foods, March 31, 2011.

⁸⁶ It may be the case that imported clam meat competes with some processed clam products. For example, imported canned clam meat may compete with domestic canned clam meat, but imported clam meat may not compete materially with fresh or frozen domestic clam meat.

clam meat would constrain the pricing of SCOQ clam meat to the competitive level, then the relevant market includes imports (and harvests from state-regulated fisheries).

Other information about competitive constraints also appears to be generally favorable to the hypothesis that large share accumulations may not confer market power, but again we do not have sufficient detail for rigorous quantitative analysis. For example, industry participants report that downstream buyers are large and have considerable buying power, and that demands for clam meat and clam products are highly elastic. We do not have data to confirm these reports. Given the apparent unanimity of agreement among the industry reports, however, we proceed on the assumption that there is a high degree of buyer power and that the processors face relatively elastic demand for their processed clam products.

A relevant efficiency consideration related to an excessive-share cap is whether inhibiting firm growth increases costs (by suppressing economies of scale). Restrictions on quota holdings may limit the size of processors or harvesters. Whether this is economically costly depends on whether there are economies of scale in processing.⁸⁷ We proceed on the assumption that there may be scale efficiencies in processing within the range of excessive-share caps that we consider, but not in harvesting.⁸⁸

C. Step 3: Establish Whether the Threshold Condition Requiring No Cap Applies

This step addresses a threshold condition for determining whether any excessive-share cap is required. As discussed earlier in the report, a TAC that binds the quantity of harvest below a certain level serves to eliminate the possibility of raising prices by withholding supply. A TAC sufficiently restrictive to remove any incentive to withhold quota would obviate the need for an excessive-share cap.

The relevant “sufficiently restrictive” level is the quantity that would be produced if there were only a single entity producing in the industry – the “monopoly” output. If the TAC is set below the monopoly output, the market power of quota holders is irrelevant because there would be an incentive to produce at the TAC regardless of quota concentration.

⁸⁷ We do not have access to cost information that permits us to evaluate the degree to which processors may or may not have unexploited returns to scale. The exhaustion of returns to scale depends the capacity of efficiently sized equipment used by the processors and the degree to which the processing equipment is potentially useful for processing seafood products other than clams.

⁸⁸ In other words, a processor may be able to reduce the average incremental cost of processing by securing ownership or control of additional quota in excess of the lowest range of the share caps discussed in our analysis. For harvesting, however, we proceed on the assumption that there are no scale economies available within the range of share caps discussed in our analysis – in other words, if a single harvester were to harvest an amount equal to the lowest range of the share caps we discuss, then the harvester would be experiencing constant or increasing average costs with additional harvests.

Application of Step 3 for SCOQ Fisheries:

The TAC in each of the SCOQ fisheries currently does not restrict output in a market that appears to be operating competitively, so the TAC is not below the monopoly output. Therefore, the threshold for requiring no excessive-share cap has not been met.

D. Step 4: Establish Appropriate Concentration Thresholds

The next step is to use the information on competitive constraints to determine an appropriate concentration condition under the analytical framework of the *Horizontal Merger Guidelines*. In addition, the excessive-share cap should be set to guard against the possibility of the foreclosure of competitors by denying them access to quota.

The *Horizontal Merger Guidelines* offers little direct guidance relating to size limits for individual firms. Previous versions of the *Horizontal Merger Guidelines* have noted that a firm with a 35 percent market share could possibly have unilateral market power.⁸⁹ However, the current version offers no such guidance. The *Horizontal Merger Guidelines* does, however, provide extensive discussion of market concentration.

We propose that the regulator assess, as a threshold, the highest level of concentration of quota holdings (and number of industry participants) at which, and at lower levels too, the market is likely to be free of capabilities and incentives to exercise market power or engage in predatory conduct. Then, the regulator can mathematically determine the level of the excessive-share cap that just prevents that threshold level of concentration from being exceeded.

Application of Step 4 for SCOQ Fisheries:

As we have discussed above, downstream market conditions appear to provide substantial competitive constraints on SCOQ industry participants. Downstream demand for Surfclam and Ocean Quahog products appears to be relatively elastic. Large sophisticated buyers with numerous product development options appear to have considerable bargaining power with respect to clam processors. There is no indication that either of these conditions is likely to change in the foreseeable future. Under such conditions, the *Horizontal Merger Guidelines* suggests that a moderately concentrated market for clam products would not be a cause for concern. Thus, an appropriate SCOQ excessive-share cap would be set to prevent a relevant product market that includes Surfclam and/or Ocean Quahog products from becoming highly concentrated (HHI above 2500).

The proposed limit on concentration in the market for clam products (that are in the same relevant markets as Surfclams or Ocean Quahogs) can be directly related to the appropriate restrictions on quota holdings. As shown above in Figure 2, the theoretical withholding of quota would reduce the output of clams from the federally regulated fisheries, raising the prices of clams and clam products, and possibly reducing the price

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See, e.g., U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, Revised April 8, 1997, p. 25.

of harvesting.⁹⁰ Then, quota owners would benefit from quota withholding because it would directly reduce the harvest of clams, raising the price of clams and clam products. Therefore, to assess this theoretical possibility, those who own or control quota can be treated as controlling a share of clam output that is equal to the amount of quota that they control, recognizing that the relevant share may be based on total clam output that is larger than the output of the federal fisheries – this is discussed in further detail in Step 5.

Additionally, processing is a stage of the industry where the potential for predatory conduct through quota accumulation could possibly exist because holding quota back from use could choke off input supply to competing processors. For such conduct to confer a long-run benefit on the holder of the unused quota, it would be necessary to reduce the set of effectively competing processors so that outside options are permanently restricted for harvesters and for downstream purchasers. It may be sufficient for at least two or three processor firms to be operating (given that large buyers can stimulate competitive bidding for supply agreements), although having additional smaller capacity beyond those two or three would provide an additional margin of protection. An excessive-share cap restricting long-term quota holdings to 40 percent or less of the harvest supply to processors would prevent unilateral quota accumulation from becoming a means to reduce processor participation to fewer than three firms.

The discussion above applies specifically to the SCOQ ITQ system, where processors specialize in the input from the SCOQ fishery. When the input to processors comes entirely from a regulated fishery with an ITQ system, then a given share of the quota corresponds to the same share of the input to processors. When processors receive input from multiple sources beyond the regulated fishery, however, then a given share of the quota will correspond to a smaller share of input to processors. It is possible that sources of supply from outside the regulated fishery alone could support three or more processors at an efficient scale, in which case no long-term quota holding restriction would be necessary to prevent foreclosure.

E. Step 5: Determine Relationship Between the Excessive-Share Cap and Market Concentration

The next step is to determine the relationship between possible excessive-share caps and the maximum possible level of relevant market concentration. This relies on market delineation and also on persistent structural features of the quota market, as explained below.

First, it is straightforward to find the maximum level of quota holding that is consistent with a given maximum possible level of concentration: assess concentration of substitute products (not regulated by the quota) within the same relevant market; assess the share of the market occupied by small (“fringe”) market participants; calculate the

⁹⁰ The available evidence suggests that harvesting services are supplied quite elastically and that there is little threat that quota holders could profitably exercise monopsony power to the detriment of harvesters. Moreover, processors are substantially vertically integrated into harvesting. Processors will employ their own harvesting capacity based on its incremental cost.

maximum number of independent quota allocations that can exist at the maximum holding size, include one additional quota holding that captures any remainder; and calculate the HHI for the resulting set of shares of these possible market participants.

For example, a maximum firm size of 25 percent of the market would allow for four firms at 25 percent each (no remainder) for an HHI of 2500. A maximum firm size of 30 percent would allow for three firms at 30 percent and one at 10 percent for an HHI of 2800. Additionally, the aggregate share held by quota holders with very small shares also bounds the maximum concentration possible at any given cap level. A firm with 1 percent share contributes only one point to the HHI. If 25 percent of the market is shared by a relatively large number of small firms (25 firms at 1 percent each, for example), then those firms contribute very little to the HHI in the aggregate even though they limit the scope of large holdings. Therefore, when there is a competitive fringe, the remaining quota holders can have relatively larger market shares for any given measure of concentration. If such a market had a maximum firm size of 35 percent, for example, then there could be just two large firms at 35 percent, one firm at 5 percent, and a “fringe” of 25 firms at 1 percent each. The resulting HHI would be 2500 (whereas the HHI associated with a 25 percent maximum firm size and no fringe would also be 2500).

The calculation of concentration can be done directly with ITQ shares only if the output of the fishery coincides with a *relevant* product market. If the relevant market is larger than the fishery, then a given share of quota holding would correspond to a smaller share of the relevant market.⁹¹ For example, if the fishery accounted for only one-half of the output of the relevant market, then a holding of 40 percent of the quota in the fishery would correspond to only 20 percent of the output in the relevant market.

Application of Step 5 for the SCOQ Fisheries:

We have made a number of calculations that determine the maximum excessive-share cap that is consistent with the relevant market having concentration no higher than the desired threshold. To apply these calculations first requires the determination of relevant markets, as discussed in Step 2. As already discussed, the withholding of quota might be beneficial to the quota holder because withholding quota limits the output of clams and raises the price of clams. The quota holder would capture the benefit of the increased price of clams. Therefore, it is appropriate to treat quota holders as controlling an amount of clam output equal to their quota holdings. We evaluate the quota holdings within the context of the larger market for clams and clam products for purposes of our calculations, while recognizing that we have not here delineated the relevant market with the confidence that more complete data could provide.

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If the relevant product market is smaller than a fishery (if, for example, there are distinct geographic markets with separate supply and demand, and no cross-substitution), then an excessive-share cap applied to the whole fishery may be ineffective for controlling market power. We do not believe that the relevant products market(s) here are smaller than the individual species within the SCOQ fisheries.

Figure 13 illustrates how the maximum concentration of the overall market for clams varies with different levels of the excessive-share cap and with different aggregate levels of fringe holdings of quota and for different levels of competing non-SCOQ clams.⁹² The figures shown are shares of quota, which the regulator must identify to implement any excessive-share cap. Adjustments to the SCOQ quota shares are made in the calculation to account for additional output in the larger relevant market in the calculation of the HHI. The calculations assume that the individual fringe quota holdings and suppliers of substitute products in the relevant market are all individually very small and hence contribute nothing to the HHI, even as they may in aggregate represent a significant market share. If it were the case that there were large importers, the calculation could be readily adjusted to reflect the actual sizes of the importers providing competing products.

The top panel of Figure 13 shows the levels of concentration for combinations of excessive-share cap and aggregate fringe quota holdings for Scenario 1, in which we assume the relevant market includes both Surfclams and Ocean Quahogs from the SCOQ harvests, but nothing else.⁹³ Therefore, for purposes of this discussion, the share caps and ownership shares are for the combined fisheries. In the table, HHIs less than 1500 are shaded light blue and HHIs greater than 2500 are shaded yellow. The table shows that at low levels of aggregate fringe holdings, the highest excessive-share cap consistent with a moderately competitive market is 25 percent. However, if the aggregate fringe holdings grow, the share cap could rise to 30 percent or 35 percent and still meet the recommended threshold. An excessive-share cap of 30 percent to 35 percent would guarantee that three to four fishery participants held quota, which would limit the potential for predation or foreclosure effected by withholding quota from competitors.

The second panel of Figure 13 shows the results for Scenario 2, which assumes that there are non-SCOQ clams (i.e., imported clams and clams from state fisheries) that are good substitutes for SCOQ clams and the quantity of these competing clams is equal to 10 percent of the SCOQ harvest.⁹⁴ The table shows that for even low aggregate quota holdings by the fringe, the excessive-share cap can be as high as 35 percent while maintaining a moderately concentrated market for all clams that compete with SCOQ clams. This implies at least three firms holding quota, which may provide some constraint against predation or foreclosure of competitors.

Scenario 3 shows the results under the assumption that non-SCOQ clams are available in amounts equal to 20 percent of the amount of the SCOQ TAC. In this

⁹² We do not have sufficient price and quantity information to determine whether imported clams compete with domestic clams in some or all applications. Here we limit our analysis to competition from other clams and do not consider whether clams are highly substitutable with other proteins. Non-SCOQ clams are competing Surfclams and Ocean Quahogs that are not harvested from the federal SCOQ fisheries.

⁹³ This scenario does not account for competition from state fisheries as well.

⁹⁴ In this calculation, "imports" reflects the supply of clams from outside the SCOQ fisheries that compete with SCOQ clams. These could include domestic clams from state fisheries.

scenario, a 40 percent excessive-share cap is appropriate for a wide range of competitive-fringe levels.

Scenario 4, illustrated in the fourth panel of Figure 13, shows the results if the level of imported clams that compete with clams from the SCOQ fisheries rises to 40 percent of the SCOQ harvest. In this case, the excessive-share cap can rise to 60 percent even if the aggregate fringe holding of SCOQ quota is as small as 5 percent.⁹⁵ With such a high share cap, however, two firms could control all of the holdings. An excessive-share rule that permits two firms to hold the entire quota fails to meet the desired safe target for preventing predation (i.e., foreclosure of entry or expansion by processors).

The analysis above raises the question of how to apply the results found in Figure 13. The answer depends on the degree of substitution among different clam products. For example, if it were the case that neither Ocean Quahogs nor any imported clams competed with Surfclams, it would be appropriate to apply the results of Scenario 1 to the Surfclam fishery. Similarly, if Surfclams and Ocean Quahogs are good substitutes in all uses for one another, but no imports are good substitutes for the domestic clams, then it would be appropriate to apply the results of Scenario 1 to the Surfclam and Ocean Quahog fisheries on a combined basis. If imports compete with domestic clams, then it would be appropriate to apply the results from Scenario 2 or Scenario 3 (or a scenario with an appropriate level of imports) to the domestic fisheries on a separate or combined basis, depending on the level of substitution between them.

F. Step 6: Identify Regulatory and Practical Constraints

The next step is to identify the regulatory and practical constraints on the regulator charged to implement the proposed cap. As can be seen in the examples from Step 5, the excessive-share cap necessary to limit concentration to the desired level depends on the level of sales of products (imports) that are close substitutes for clams from the federal fisheries. Of course, the level of sales of competing products and other market conditions may change over time. Therefore, an excessive-share cap on quota holdings that is appropriate under one set of market conditions may be too high or too low under different circumstances. The best way to address this variety of possibilities is dependent on the legal foundation for the regulation and the practical capabilities of the regulator.

If the legal foundation mandates that the excessive-share cap must protect the fisheries against market power under any conceivable market conditions, then it is relatively easy to identify a cap by examining the relationship between the excessive-share cap and concentration under the least-competitive conceivable market conditions. If the legal foundation requires a balance between regulating market power and allowing for efficient industry operation, then a more measured approach is necessary.

Likewise, legal and practical considerations may provide implementation options for the regulator. One such option discussed in detail for this fishery is to set a relatively

⁹⁵ Higher levels of fringe holdings are consistent with still higher excessive-share caps. Of course, the possible extent of the competitive fringe is limited by the size of the large market participants.

restrictive cap for long-term holdings, but to allow a higher excessive-share cap by allowing short-term quota accumulation at a higher level. The excessive-share cap would be adjusted from season to season to reflect changing market conditions (although the cap on long-term holdings would be fixed). This approach allows for more flexible capacity developments by industry participants without allowing any participants to obtain permanent accumulations that could be used to exclude competitors.

Application of Step 6 for SCOQ Fisheries:

We consider two options for implementation, to allow for different interpretations of the mandate for an excessive-share cap.

The first option is to establish a fixed excessive-share cap that strikes a moderate balance between protecting against market power and allowing for efficiencies of scale by selecting the highest possible cap that appears sufficient to prevent a highly concentrated relevant product market for most of the range of foreseeable market conditions. This requires some balancing of efficiencies by the regulator, but provides the market with a clear and certain rule under which to operate going forward. The downside of this option is that there may be seasons when the excessive-share cap is overly restrictive (harming productive efficiency) or overly permissive (allowing market power), depending on changing conditions in the fishery.

The second option is to establish a more stringent cap for long-term holdings (to prevent exclusionary conduct), but allow for larger accumulations in the short term so as not to constrain efficient scale and to allow for adjustments to the excessive-share cap from year to year as market conditions change (the sum of a quota holder's long-term holdings and short-term accumulations would be subject to the overall excessive-share cap). We call this a "two-part cap." The preference for short-term accumulations in the two-part cap limits the share of long-term quota controlled by any single party, which limits the ability to foreclose competitors by withholding quota on a committed multi-season basis.⁹⁶

To the extent Surfclams and Ocean Quahogs are in the same relevant market, it is appropriate to calculate a single excessive-share cap and to apply that common cap independently to both species together in the fisheries. However, applying the same share cap to each species separately would achieve the same or greater level of protection against market power with possibly little or no additional threat of efficiency loss.

Alternatively, it may be the case that a quota holder of the entire Surfclam quota might be able to profitably withhold supply or price discriminate against some buyers if there are some applications where Ocean Quahogs or imports are not a good substitute

⁹⁶ We note that throughout this discussion we refrain from assessing prospects for exercising market power through the timing of quota holding or use within a given season. For the SCOQ market, there appears to be sufficient ability to shift supply throughout the season that such intra-season conduct would not be effective. That may not be the case for other fisheries, in which case the implementation of the excessive-share cap may have to incorporate an assessment of the ownership shares of remaining unused quota during the course of a season.

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for Surfclams. If the Council determines that Surfclams and Ocean Quahogs are not in the same relevant market, then the calculations illustrated in Figure 13 can be readily adapted to each individual fishery, incorporating a separate assessment of the fringe and the level of competing products from outside of each of the federally regulated fisheries.

G. Step 7: Set the Excessive-Share Cap

The final step is to identify the excessive-share cap based on the considerations above.

We understand that the excessive-share cap is not intended to force the divestiture of quota. Therefore, to the extent that any industry participant already owns or controls a share in excess of what is determined to be the appropriate excessive-share cap, we recommend that existing shares in excess of the cap be exempted from the rule but not allowed to grow further.⁹⁷

Application of Step 7 for SCOQ Fisheries:

The correct application of the principles above requires proper determination of the relevant markets in which Surfclams and Ocean Quahogs are sold and the degree to which non-SCOQ clams and processed clam products compete with SCOQ products. Based on some processors' large contractual holdings of quota, the primary competitive risk in the SCOQ fisheries appears to be that processors will use control of large accumulations of quota to exercise market power. The uncertainty regarding the appropriate relevant markets for SCOQ clams and clam products means that our recommendations are conditional on the regulator's ultimate findings regarding the relevant markets.

Our recommendations flow from Figure 13. If there are SCOQ products that do not face meaningful competition from outside of the federal fisheries, the excessive-share threshold would have to be relatively lower than if there were competing products. For example, if there are Surfclam products that do not face competition from imported clams, processors with large accumulations of Surfclam quota would be able to limit their output of Surfclam products, and by refusing to sell their unused quota avoid entry or expansion by other processors. A potential check on this exercise of market power would be available from competing processors' ability to obtain Surfclams from state fisheries. As shown above, the harvest from New Jersey's and New York's state fisheries has been declining. If it is anticipated that the output of the New York state Surfclam fishery will be at about 10 percent of the level of the federal Surfclam fishery, the second panel of Figure 13 indicates that an excessive-share cap of 30 percent to 35 percent would be appropriate to restrain the market for Surfclam products from becoming highly concentrated, assuming a relatively low level of fringe quota ownership. If the harvest from state fisheries is expected to be higher over time, a higher excessive-share cap could

⁹⁷ If some of the holdings that exceed the excessive-share cap are term-limited contractual holdings, the Council should consider whether the contracts that lead to the excessive-share cap's being exceeded should be permitted to be renewed upon their expiration.

be implemented. A similar approach should be used to determine an appropriate excessive-share cap for Ocean Quahogs.

If SCOQ products face higher levels of competition from non-SCOQ clams and/or products, Figure 13 illustrates that higher excessive-share caps could be implemented. However, for the option of a single fixed cap, we recommend an excessive-share cap that does not exceed 40 percent for each of the Surfclam and Ocean Quahog fisheries. As shown in Figure 13 (for Scenario 3), an excessive-share cap of 40 percent would be appropriate whenever imports and state-regulated harvests exceed 20 percent of the relevant Surfclam and/or Ocean Quahog harvest and the aggregate share held by the fringe holders is small. Further, a 40 percent excessive-share cap would provide a modest level of protection against the risk that processors could foreclose entry or expansion by withholding unused quota from the market. An excessive-share cap of 40 percent assures that there would be at least three processors operating at reasonable output levels. As noted earlier, if it were the case that processors received input supply from multiple sources beyond the regulated fishery, then risk of foreclosure may be minimal or non-existent regardless of quota share ownership, in which case it may be appropriate for any restrictions on quota ownership to be guided entirely by Table 13.

For the option of a two-part cap, we recommend that long-term holdings be capped at 30 percent, and that the total excessive-share cap (i.e., long-term holdings plus short-term holdings) be selected and announced before the start of each season to meet the threshold concentration level (HHI no more than 2500) based on the relevant market determination and the size of the fringe.

For example, if the SCOQ fisheries are determined to be in a single relevant market with competition supplying an additional 40 percent of quantity from imports and harvests from state-regulated fisheries (as in Scenario 4), then the total excessive-share cap (long-term cap plus short-term cap) would 60 percent of the SCOQ TAC for the season (inclusive of the 30 percent cap on long-term holdings). A quota holder with long-term quota holdings of 20 percent would be able to buy additional quota representing 40 percent of the TAC on a seasonal basis ($60 - 20 = 40$).

If non-SCOQ clam products that are substitutes for the SCOQ harvest constitute only 20 percent of the SCOQ TAC, then the total excessive-share cap would be 40 percent of the SCOQ TAC for the season (in this case the cap on long-term holdings would still be 30 percent). The sum of the quota holder's long-term holdings and short-term accumulations would have to fall below the overall cap in any season.

The 30 percent cap on long-term accumulations prevents parties from obtaining quota share high enough to preclude competitors to a point where the total number of competitors would be fewer than four within the SCOQ fisheries. A party seeking to foreclose the entry or expansion of processors, for example, would be forced to compete each season with those potentially foreclosed processors for quota beyond the initial 30 percent cap. Although such a strategy might be successful in any given season, it is less likely to be successful for the multiple seasons it could take to drive competition from the market, and the commitment strategic value of the long-term holdings would be limited to just 30 percent.

The potential benefit of designing the excessive-share cap in this fashion depends largely on the importance of long-term contracting for efficient capital investment in vessels and processing. Suppose, for example, that securing supply for more than 30 percent of quota through long-term contracts is a necessary prerequisite to efficient investment in processing (perhaps scale benefits are significant at 40, 50, or 60 percent of the TAC, but capital investment is too risky without a solid source of supply lasting several years). In such a case, the ability to secure quota for more than 30 percent of the TAC only through seasonal contracts for bushel tags may inhibit efficient investment. In this case, however, the efficient equilibrium for processing would involve only one or two very large processors, and there could be concern that there may not be sufficient competitive pressure to ensure that such a small number of processors would pass on to customers the cost benefits of efficient production scale through lower prices. This would be a situation for which an excessive-share cap is an insufficient instrument for controlling market power and ensuring an efficient outcome.

H. Issues for Additional Consideration: Open Auction(s) for ITQ Sponsored by the Regulators

As discussed above, our recommendations depend on conclusions and assumptions that are in some instances guided by a limited body of information provided by industry participants. One important example of this is the assumption that the TAC is currently above the competitive output level because industry participants report that there is quota readily available in the market and that the price for quota is very low when all supply needs have been met during the season.

Additional information based on independent objective evidence could be useful for optimal administration of the fisheries. For example, information on the value of quota expressed in short-term (“spot”) ITQ transaction prices in an efficient, liquid market would be an excellent source of objective evidence that would aid in managing the fisheries. In the current circumstances, such evidence could validate claims that quota has very low value and is not being withheld from the market despite harvests below TAC.

It also happens to be the case that spot ITQ transaction prices could be beneficial to industry participants in general, and to small quota holders in particular, that likely have less information on the value of quota than larger holders engaged in multiple quota transactions. Thus, large quota holders with access to more information have the potential to use that information at the expense of smaller quota holders and possibly take advantage of asymmetric information in some ITQ transactions. For industry participants in general, a valid price signal for ITQ during a season provides important information that could guide vessel owners and processors in the allocation of their labor and capital resources effectively – helping them allocate resources to the more profitable fishery, for example.

One way to provide the accurate price signal to the market and to the regulators is for the regulators to sponsor an open auction during each season for a modest portion of the TAC from each fishery. We understand that there exist provisions in the regulations for the NMFS to use some quota to encourage free entry into the fisheries. Reserving a

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small portion of that quota to sell at open auction would serve exactly that purpose, and would provide yet another check on the exercise of market power through the possible withholding of quota. Details for the design and implementation of such an auction would require additional economic analysis not covered in the scope of this report.⁹⁸

⁹⁸ See U.S. Department of Commerce, *The Design and Use of Limited Access Privilege Programs*, Lee G. Anderson and Mark C. Holliday, eds., NOAA TM NMFS-F/SPO-86, pp. 124-135.

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Figure 1
Competitive Market Equilibrium

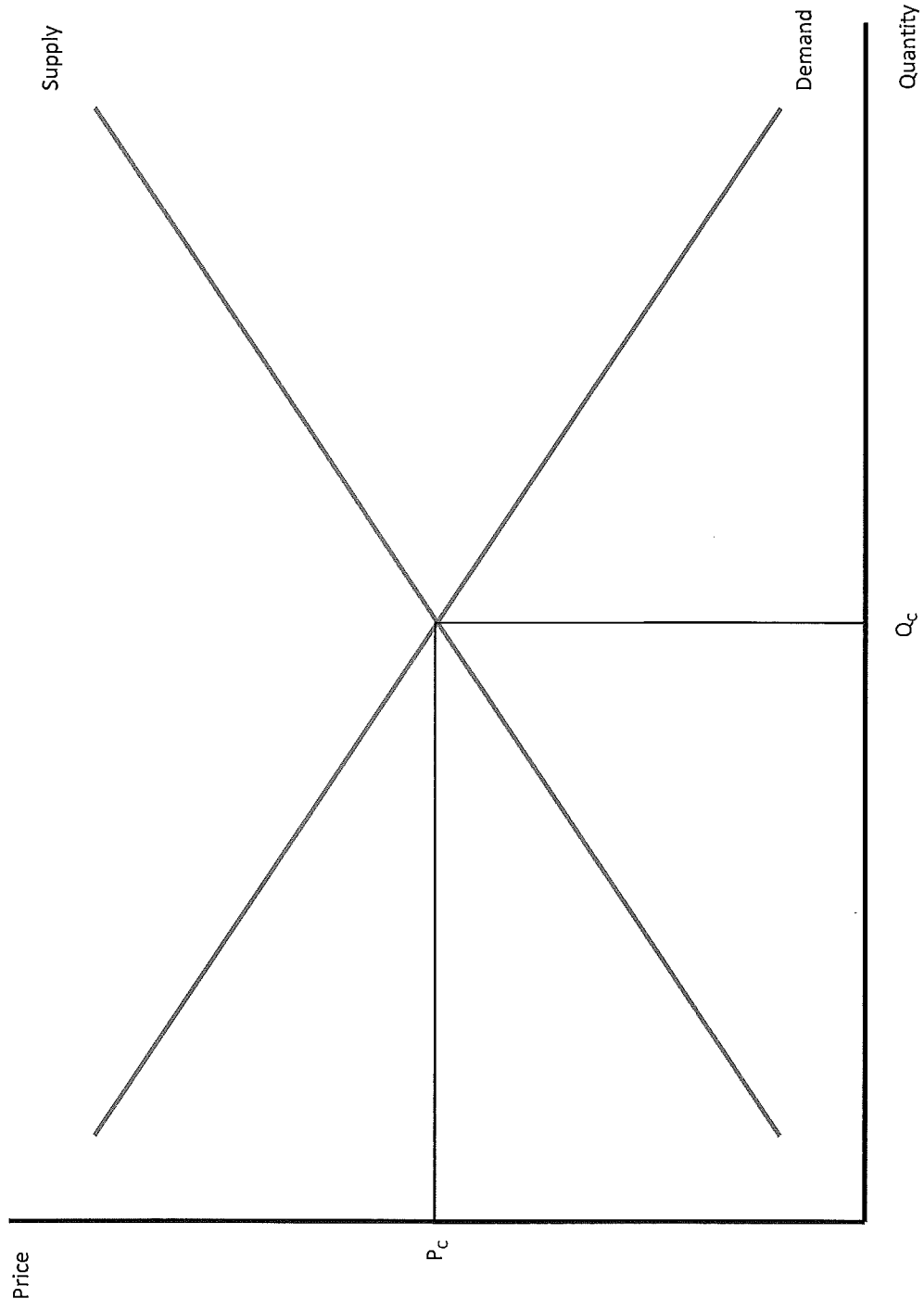


Figure 2
Equilibrium in a Market with Market Power

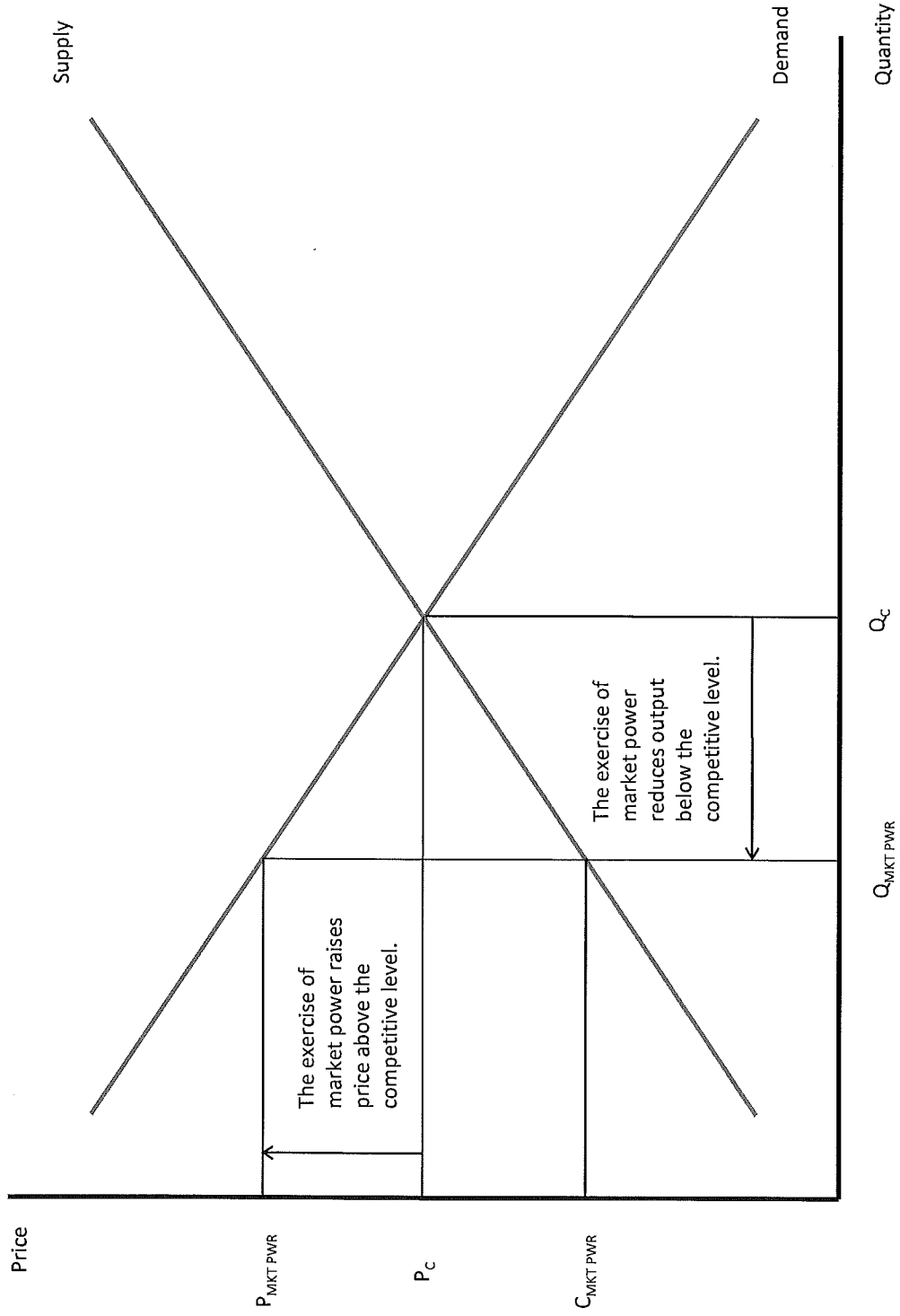


Figure 3
Competitive Equilibrium in a ITQ-Regulated Fishery with Binding TAC

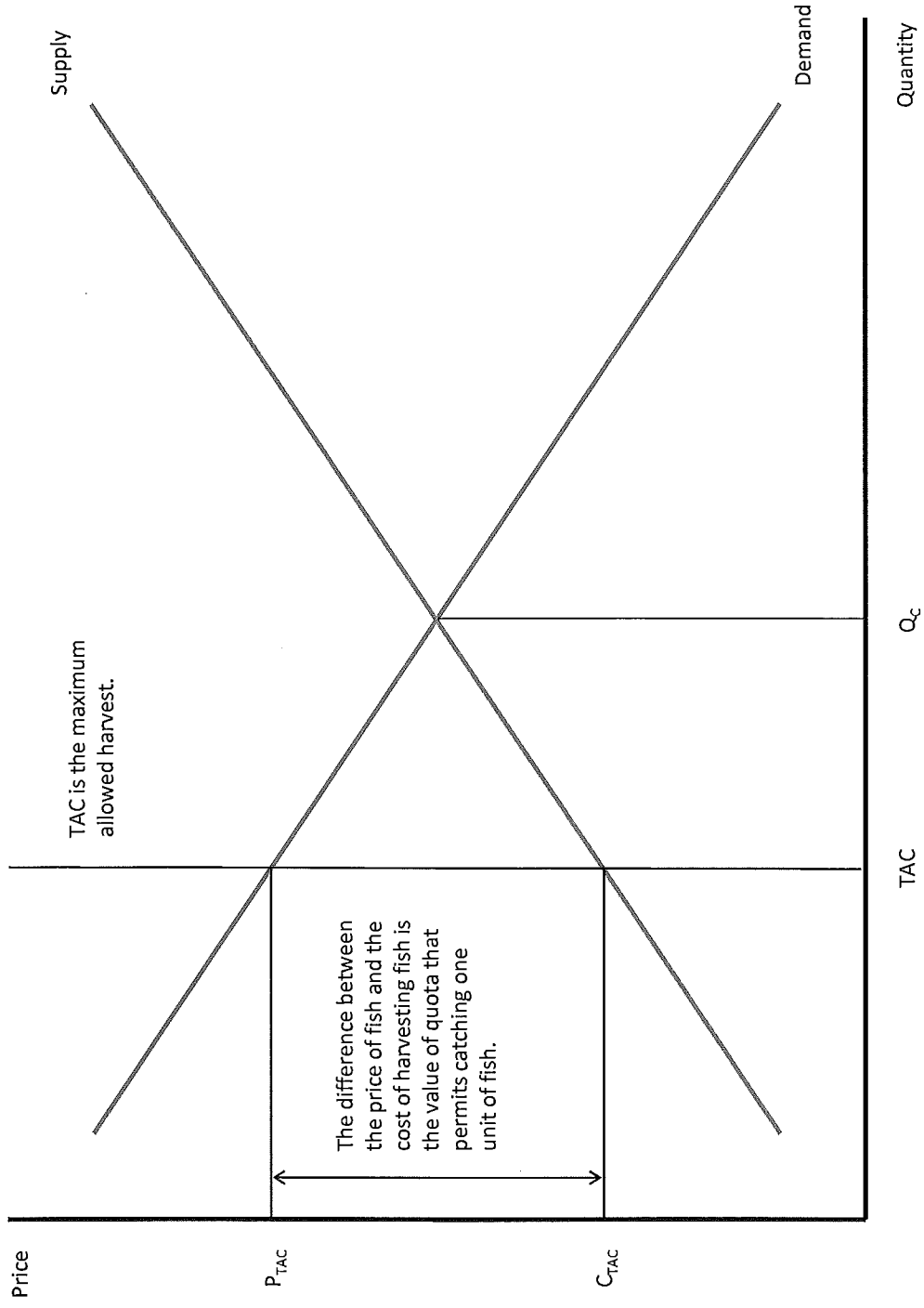


Figure 4
Competitive Equilibrium in a Fishery with Non-Binding TAC

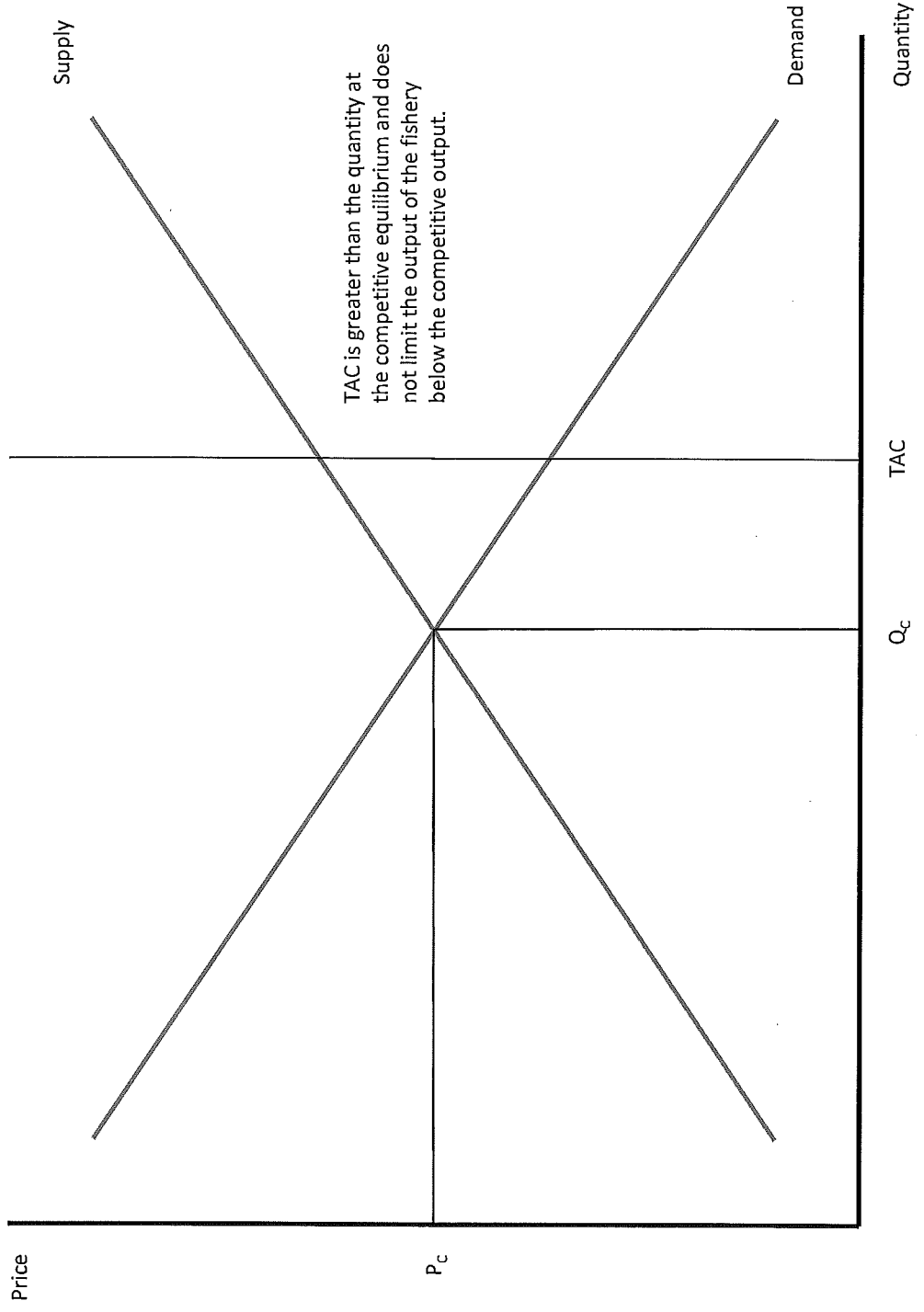


Figure 5
Competitive Equilibrium in a ITQ-Regulated Fishery with Binding TAC

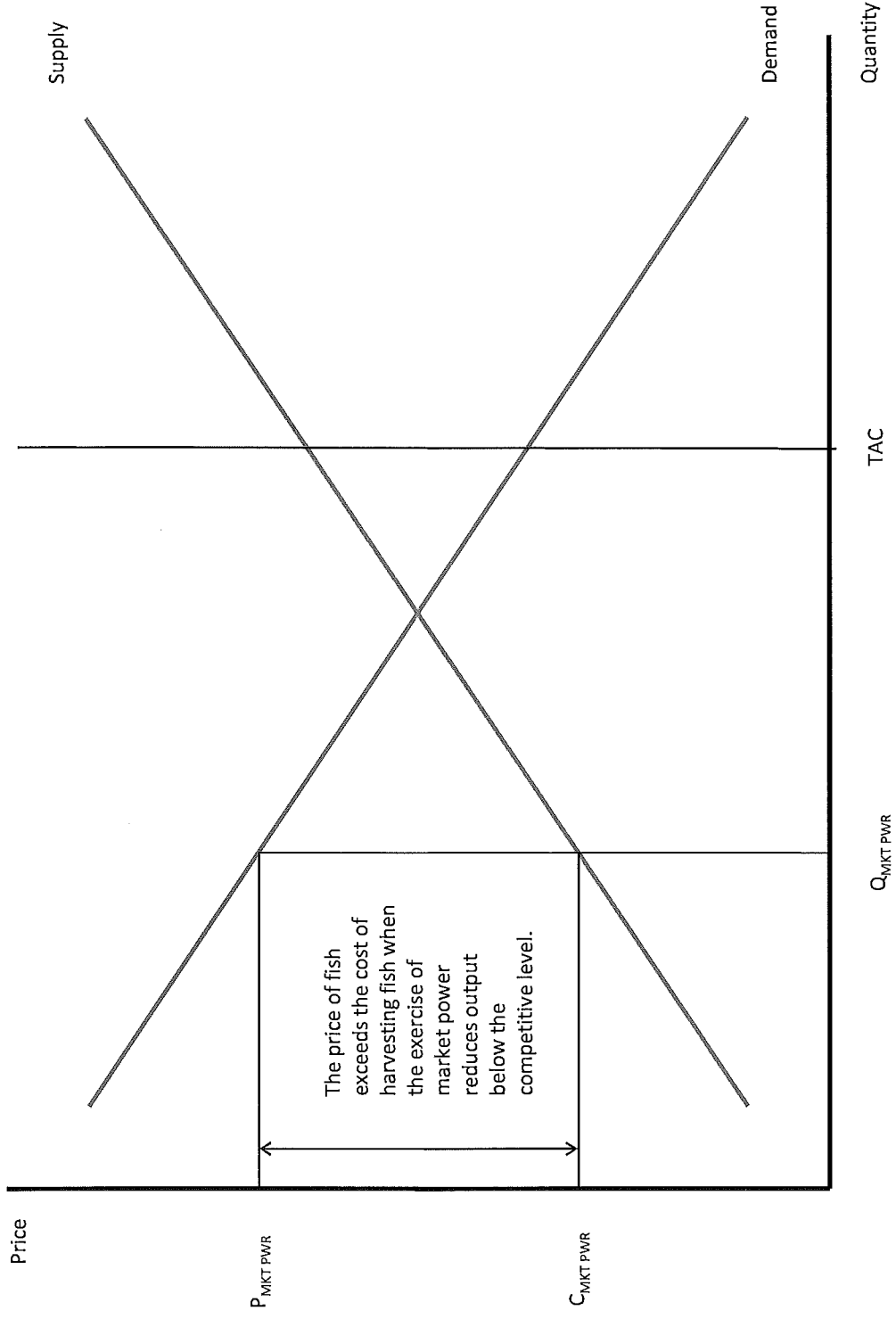


Figure 6
Share of Surfclam and Ocean Quahog Harvest by Processors

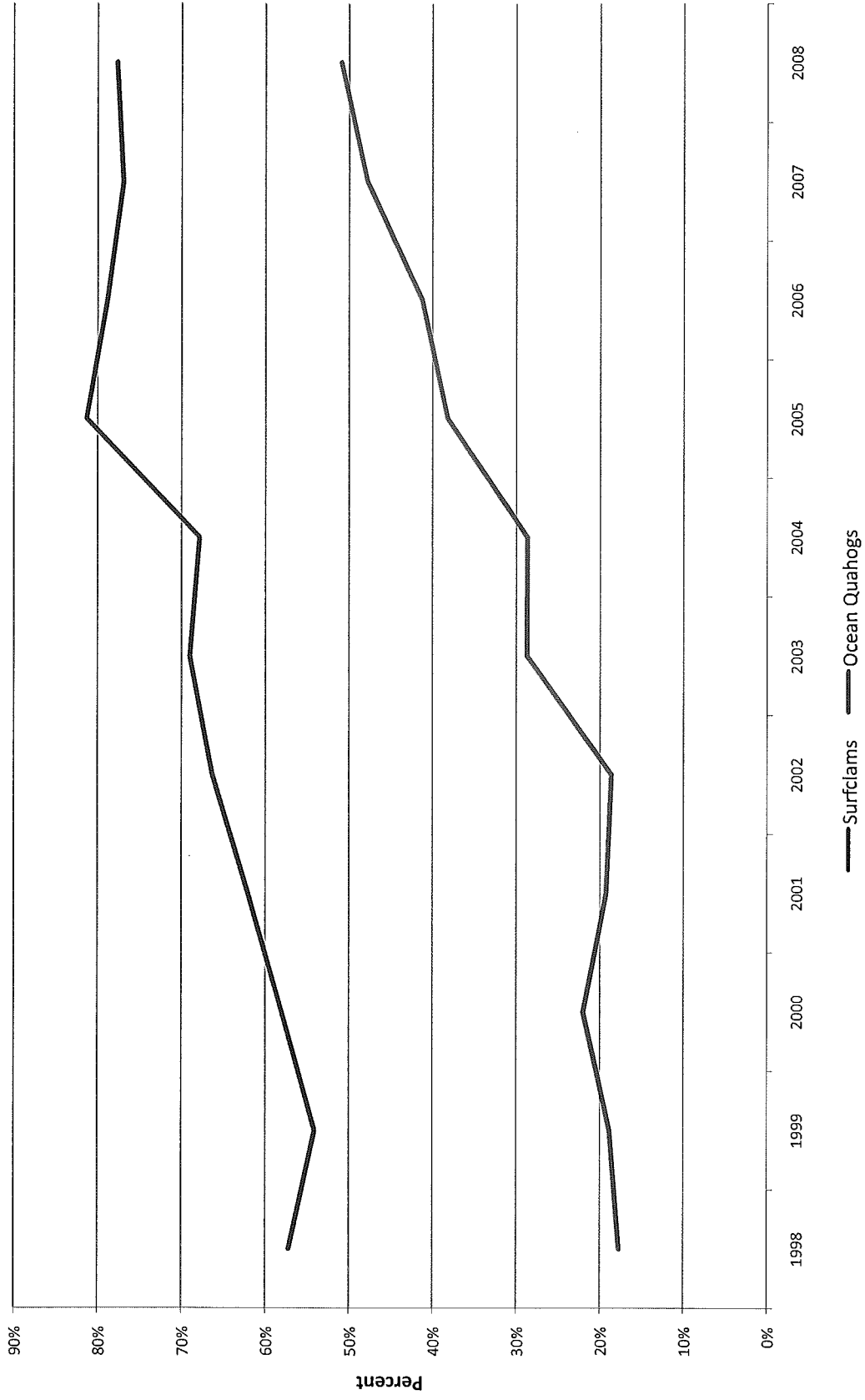


Figure 7
 New York and New Jersey Surfclam Harvest v. Federal Fishery Harvest

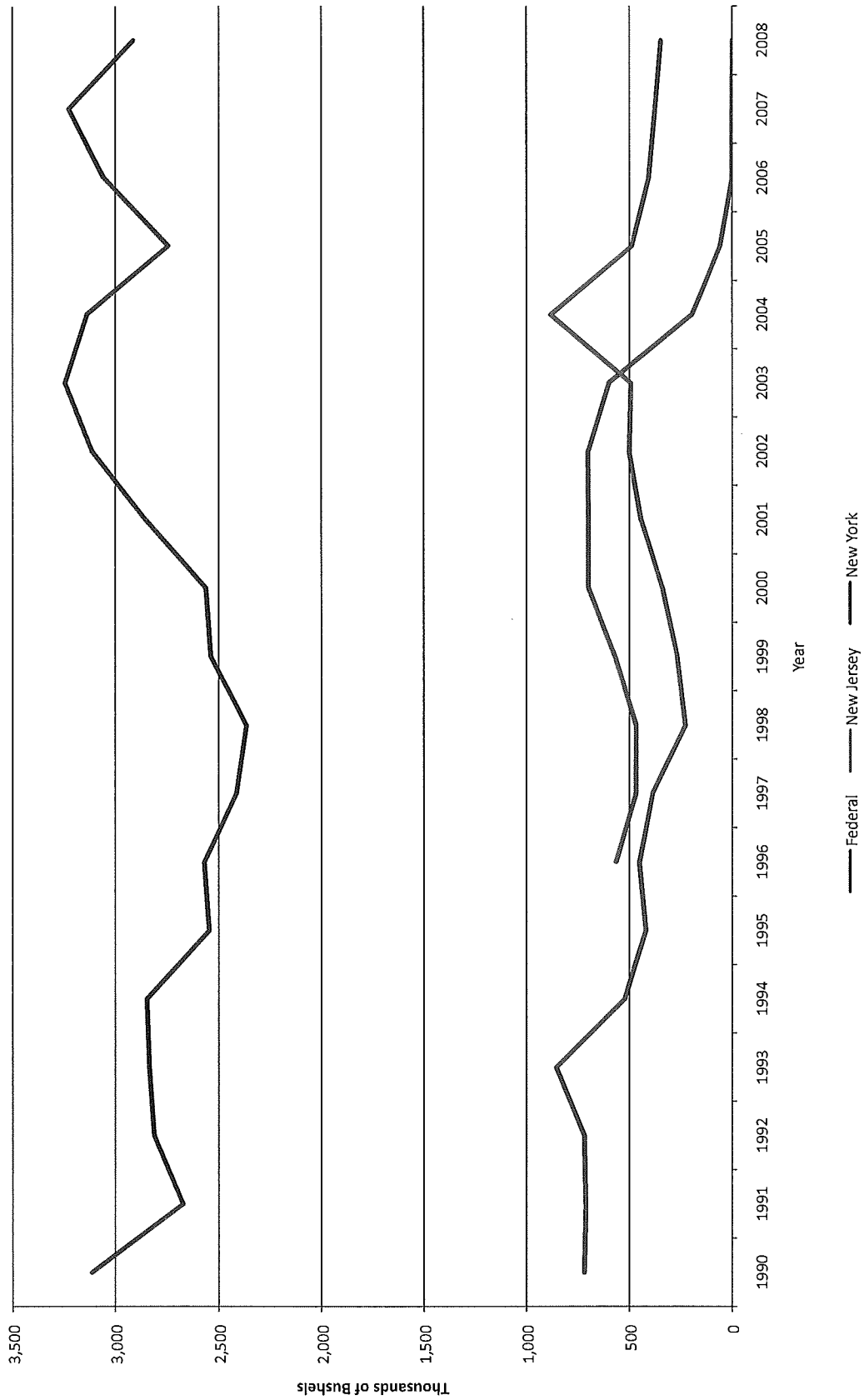


Figure 8
 Federal Surfclam and Ocean Quahog Harvest v. U.S. Clam Imports and Exports
 2008
 (Thousands of pounds)

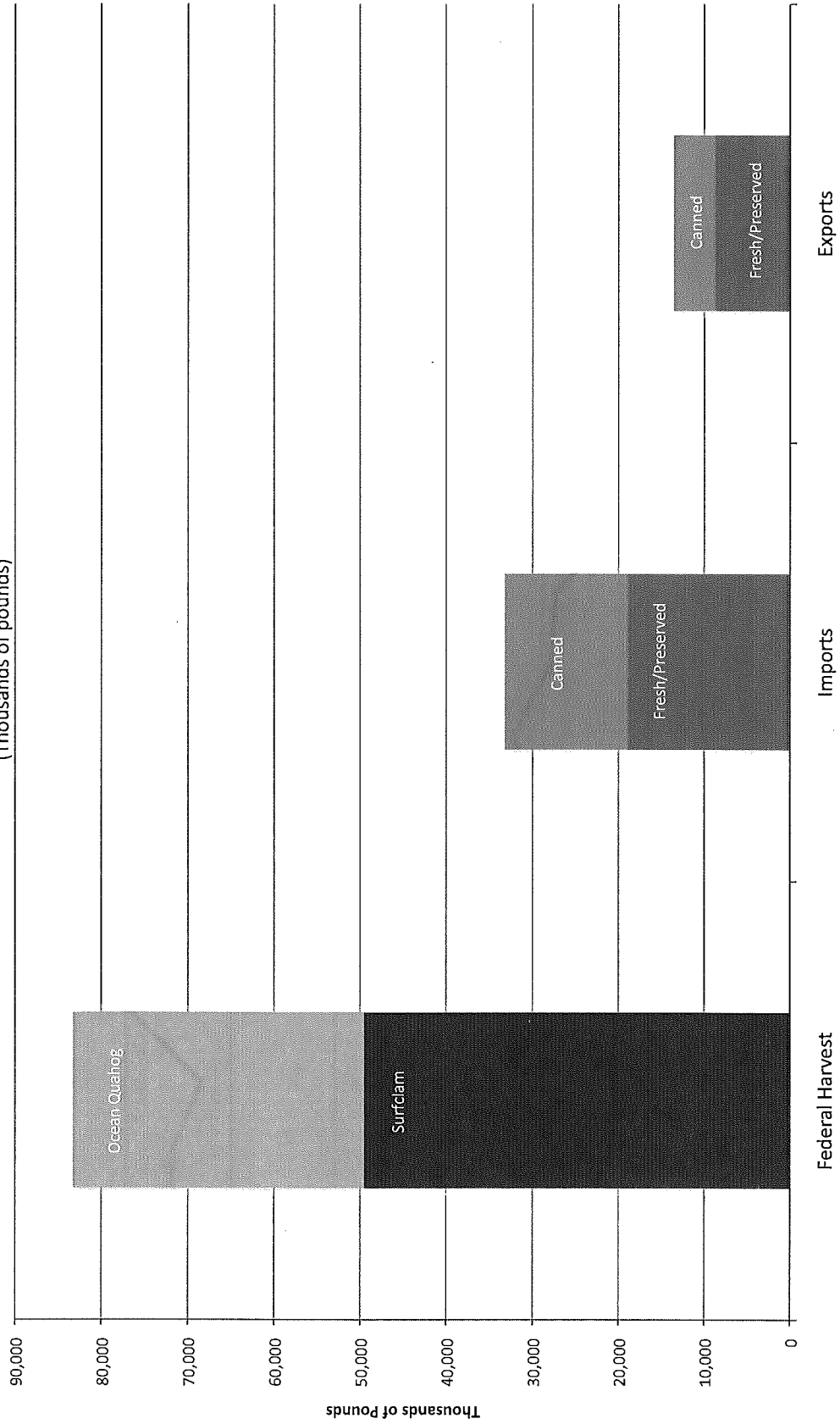


Figure 9
 Surfclam Landings, Quota and Percent of Quota Landed

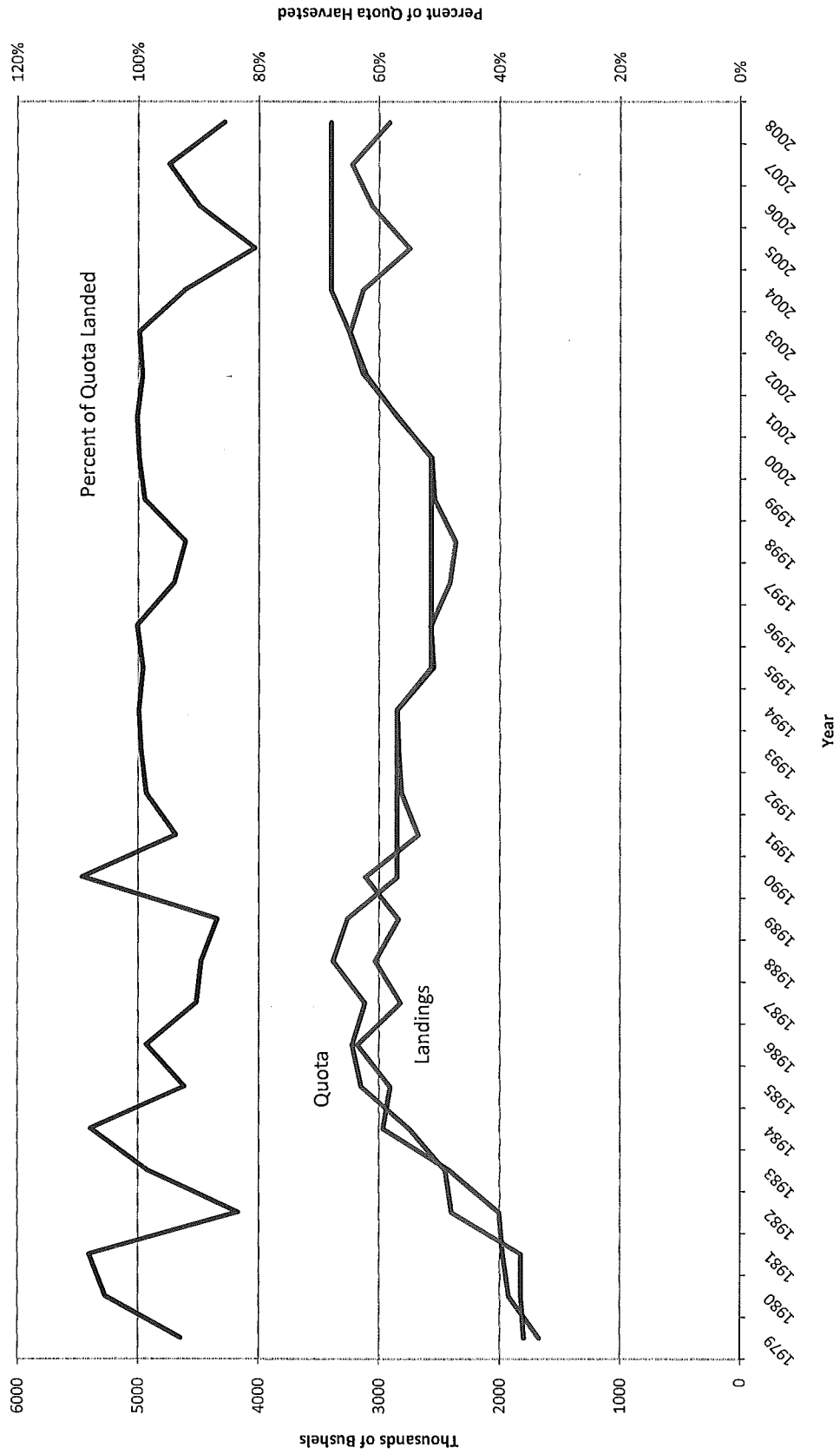


Figure 10

Ocean Quahog Quota, Landings, and Percent of Quota Landed

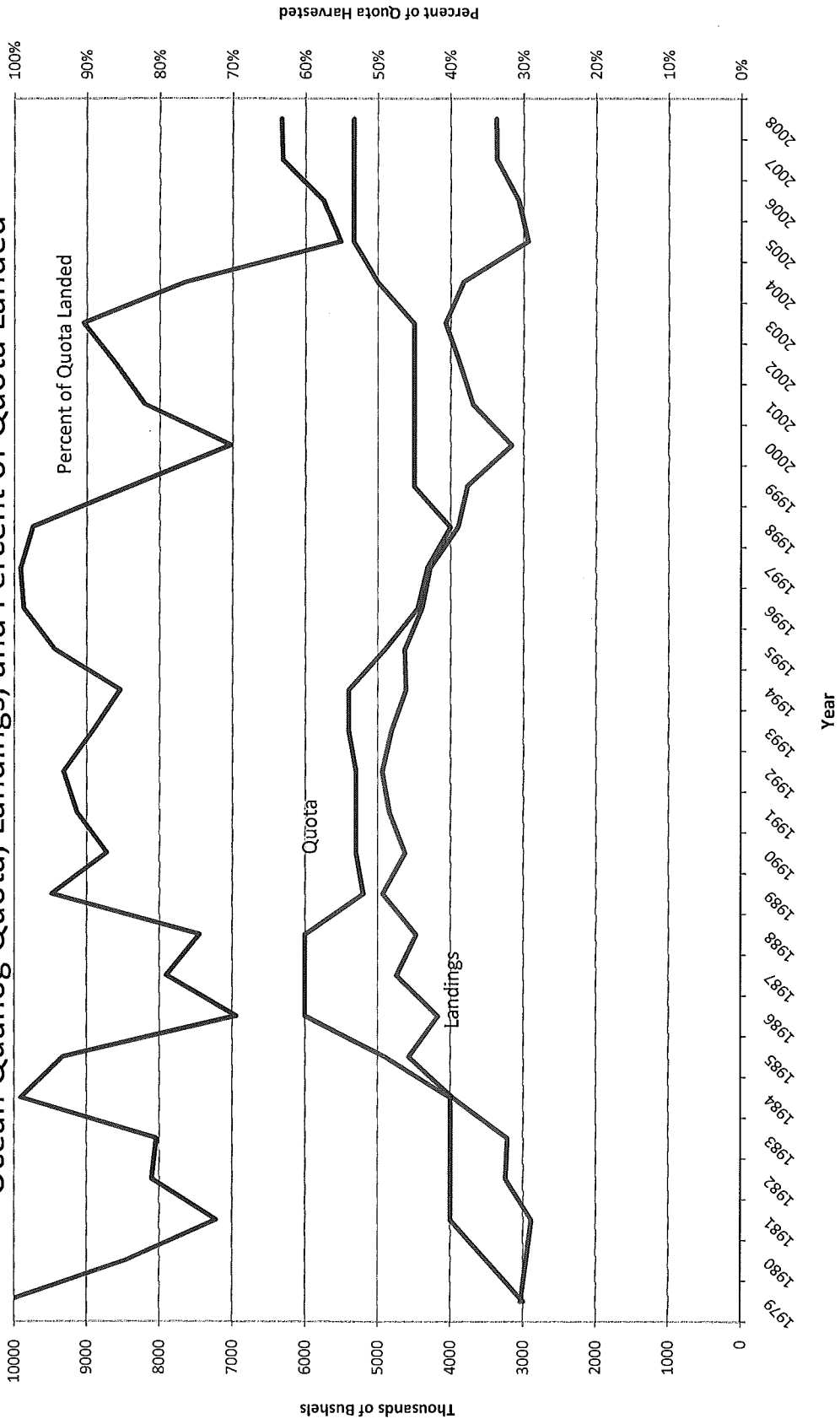


Figure 11
 Surfclam and Ocean Quahog Landings per Unit Effort
 (Bushels per Hour)

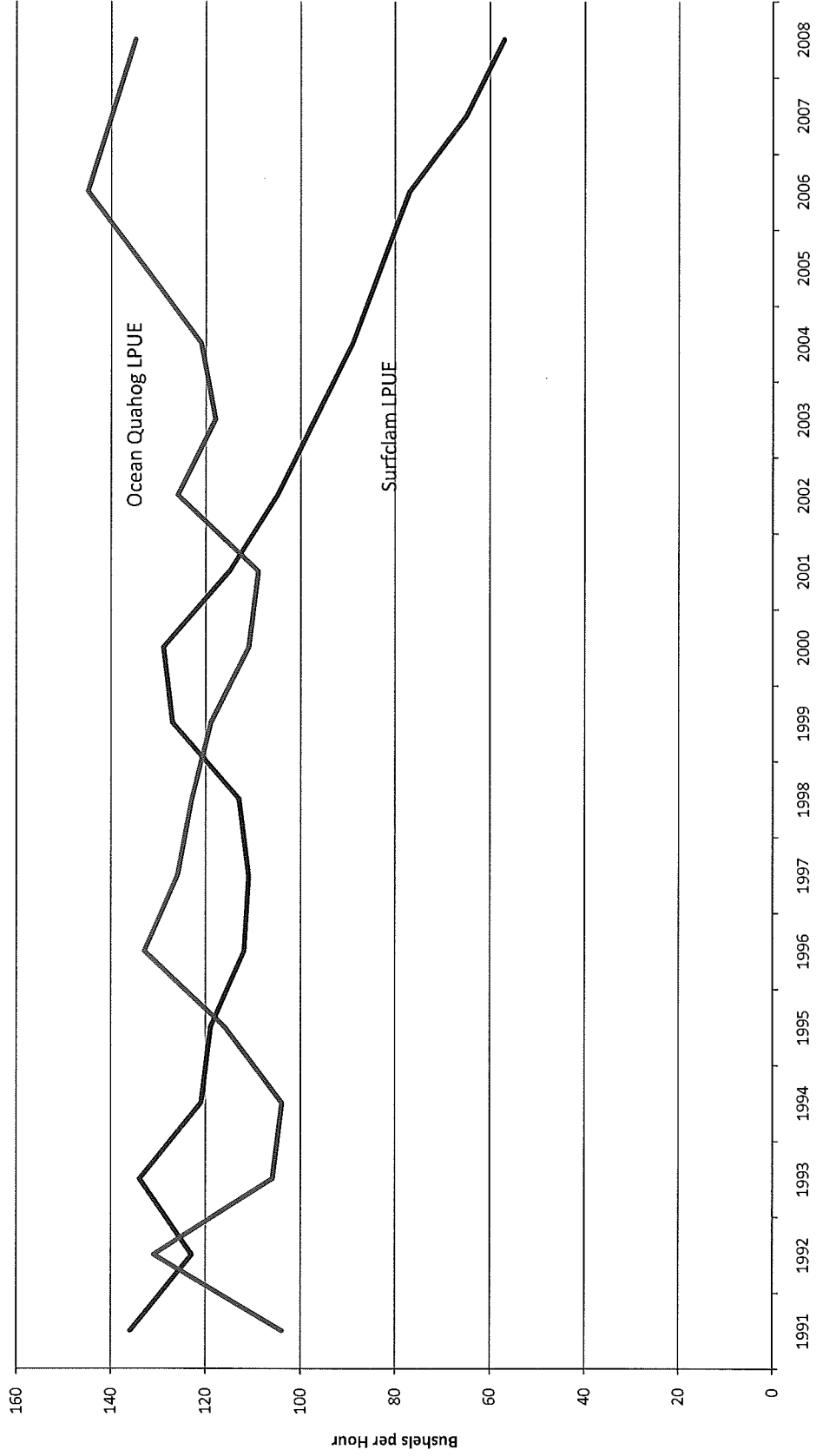
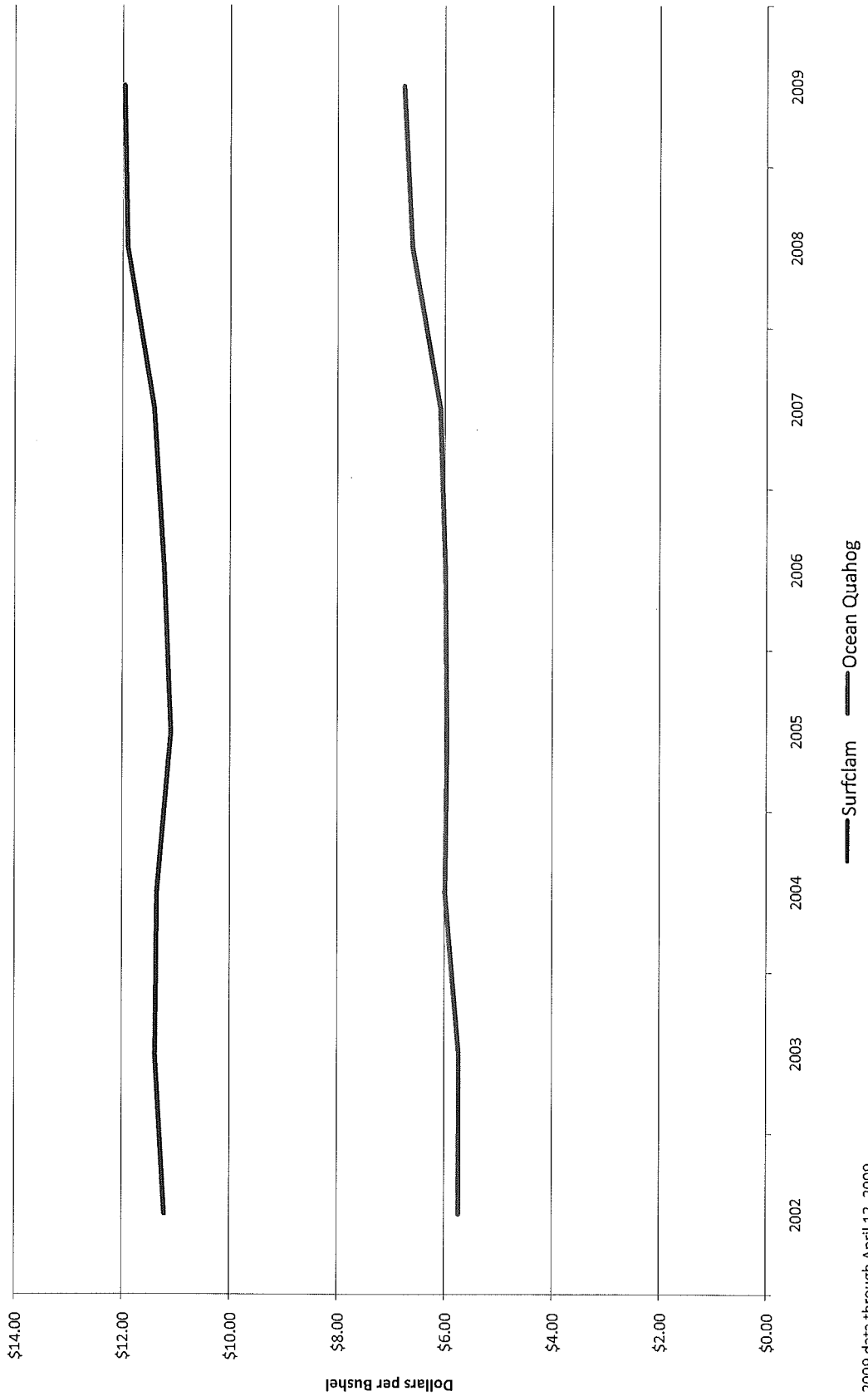


Figure 12
 Surfclam and Ocean Quahog Prices Paid by Processors



2009 data through April 12, 2009.

Figure 13

Analysis of Effective Quota Concentration by Share Cap, Size of Competitive Fringe, and Competition from Non-SCOQ Clams

Scenario 1: Non-SCOQ Clams as Percent of TAC = 0%

Share Cap	Maximum HHI by Level of Share Cap and Aggregate Share Held By Fringe Quota Holders						
	Percent Fringe						
	0%	5%	10%	15%	20%	25%	30%
20%	2000	1825	1700	1625	1600	1425	1300
25%	2500	2275	2100	1975	1900	1875	1650
30%	2800	2725	2700	2425	2200	2025	1900
35%	3350	3075	2850	2675	2550	2475	2450
40%	3600	3425	3300	3225	3200	2825	2500
45%	4150	4075	4050	3625	3250	2925	2650
50%	5000	4525	4100	3725	3400	3125	2900
55%	5050	4625	4250	3925	3650	3425	3250
60%	5200	4825	4500	4225	4000	3825	3700
65%	5450	5125	4850	4625	4450	4325	4250
70%	5800	5525	5300	5125	5000	4925	4900

Scenario 2: Non-SCOQ Clams as Percent of TAC = 10%

Share Cap	Maximum HHI by Level of Share Cap and Aggregate Share Held By Fringe Quota Holders						
	Percent Fringe						
	0%	5%	10%	15%	20%	25%	30%
20%	1653	1508	1405	1343	1322	1178	1074
25%	2066	1880	1736	1632	1570	1550	1364
30%	2314	2252	2231	2004	1818	1674	1570
35%	2769	2541	2355	2211	2107	2045	2025
40%	2975	2831	2727	2665	2645	2335	2066
45%	3430	3368	3347	2996	2686	2417	2190
50%	4132	3740	3388	3079	2810	2583	2397
55%	4174	3822	3512	3244	3017	2831	2686
60%	4298	3988	3719	3492	3306	3161	3058
65%	4504	4236	4008	3822	3678	3574	3512
70%	4793	4566	4380	4236	4132	4070	4050

Figure 13

Analysis of Effective Quota Concentration by Share Cap, Size of Competitive Fringe, and Competition from Non-SCOQ Clams

Scenario 3: Non-SCOQ Clams as Percent of TAC = 20%

Share Cap	Maximum HHI by Level of Share Cap and Aggregate Share Held By Fringe Quota Holders						
	Percent Fringe						
	0%	5%	10%	15%	20%	25%	30%
20%	1389	1267	1181	1128	1111	990	903
25%	1736	1580	1458	1372	1319	1302	1146
30%	1944	1892	1875	1684	1528	1406	1319
35%	2326	2135	1979	1858	1771	1719	1701
40%	2500	2378	2292	2240	2222	1962	1736
45%	2882	2830	2813	2517	2257	2031	1840
50%	3472	3142	2847	2587	2361	2170	2014
55%	3507	3212	2951	2726	2535	2378	2257
60%	3611	3351	3125	2934	2778	2656	2569
65%	3785	3559	3368	3212	3090	3003	2951
70%	4028	3837	3681	3559	3472	3420	3403

Scenario 4: Non-SCOQ Clams as Percent of TAC = 40%

Share Cap	Maximum HHI by Level of Share Cap and Aggregate Share Held By Fringe Quota Holders						
	Percent Fringe						
	0%	5%	10%	15%	20%	25%	30%
20%	1020	931	867	829	816	727	663
25%	1276	1161	1071	1008	969	957	842
30%	1429	1390	1378	1237	1122	1033	969
35%	1709	1569	1454	1365	1301	1263	1250
40%	1837	1747	1684	1645	1633	1441	1276
45%	2117	2079	2066	1849	1658	1492	1352
50%	2551	2309	2092	1901	1735	1594	1480
55%	2577	2360	2168	2003	1862	1747	1658
60%	2653	2462	2296	2156	2041	1952	1888
65%	2781	2615	2474	2360	2270	2207	2168
70%	2959	2819	2704	2615	2551	2513	2500