

Report of Expert Panel Review of the Project Examining Allocations in the Scup Fishery

Introduction

The Mid-Atlantic Fishery Management Council (Council) contracted with Gentner Consulting Group (GCG) in order to examine the economic efficiency of the current allocation system for scup. The allocation analysis conducted by GCG contained four modules 1) commercial valuation, 2) consumer valuation, 3) for-hire producer surplus, and 4) recreational angler surplus that were used to simulate marginal willingness to pay for scup catch in the recreational and commercial fisheries. These modules were applied to examine five recreational/commercial allocation scenarios (+6% commercial/-6% recreational, +3% commercial/-3% recreational, -3% commercial/+3% recreational, -6% commercial/+6% recreational and -9% commercial/+9% recreational) plus the status quo. The analysis was also extended to evaluate potential economic gains from changing the allocation among commercial fishing seasons (Summer, Winter I, and Winter II) and to evaluate the economic value of relaxing recreational measures.

The overall analytical framework used by GCG is innovative and has no precedent in the peer review literature or elsewhere in terms of informing regulatory actions for fisheries with both commercial and recreational components. Because of its novelty, the Council convened a panel of experts to review the analytical framework developed by GCG. The panel was selected based on expertise in analysis of the economics of commercial and recreational fisheries valuation and consumer demand. The panel included members from the MAFMC SSC (Dr. Doug Lipton, NOAA Fisheries Senior Economist), the NEFMC SSC (Dr. Eric Thunberg, NOAA Fisheries Office of Science and Technology) as well as outside experts Dr. Jorge Holzer (University of Maryland), Dr. Jenny Sun (Gulf of Marine Research Institute), and Dr. Kurt Schnier (Georgia State University).

The review panel met on August 1, 2013 in Baltimore, MD (meeting agenda attached). Review materials including a report prepared by GCG and the TOR were provided to the panel approximately one month prior to the meeting. Note that the recreational angler surplus module (module #4) was not included in the TOR because it was based on a bioeconomic model developed by the NEFSC's Social Sciences Branch to analyze the biological and economic effects of recreational measures for Gulf of Maine cod. A formal peer review of this decision support tool as well as the revealed preference survey used to estimate recreational marginal benefits for scup was conducted in September, 2012. Nevertheless since most of the panelists for the current review were not present for the 2012 peer review, additional supporting documentation on the recreational valuation module was provided upon request by the panel.

During the meeting presentation of each of the four modules was provided by Brad Gentner of GCG. The review panel commends Brad for his willingness to engage the panel throughout his presentation. The panel also expresses its gratitude to Jose Montanez for his responsiveness in providing the meeting materials and managing the meeting logistics.

The following provides comments from the review panel on each of the 7 TORs as well as some overarching comments on the use of the analytical framework as a whole as it relates to management decisions under contemporary ACLs for scup. Finally, the review panel offers some comments on potential research and data collection needs to improve future development of the analytical framework for scup or its application to other Council managed species.

The review panel recognizes the contentious nature of making allocation decisions among user groups. The review materials that were made available to the panel included a report prepared by GCG that provided a detailed technical treatment of the data, statistical models, and methods used for each of the four modules. The GCG report also included a number of analyses of allocation alternatives as well as a number of policy recommendations. The TORs for this review focus on the technical aspects of the analytical framework and not on any of the specific allocation scenarios evaluated in the GCG report. For this reason, the review panel does not endorse any of the specific allocation analyses, findings, or policy statements contained in the GCG report. Keeping this in mind, the review panel finds that the analytical framework developed by GCG is consistent with economic theory and the overall approach is reasonable and consistent with professional standards. However, the application of the analytical framework is not likely to be useful to inform commercial and recreational allocations of scup under present and expected near-future ACLs. This conclusion is driven more by the practical reality that marginal values for scup are effectively zero when quota levels are not binding than it is with the data and empirical models that underlie the valuation modules. If ACLs return to levels where quotas are likely to be binding then the model may be useful conditional on potential improvements to the modules noted below in the panel's findings for each of the TORs.

TOR 1: Were the theoretical and statistical model specifications for the commercial valuation module done in a manner consistent with professional standards?

- a. **Are the statistical methods themselves compliant with theory?**
- b. **Are the statistical methods appropriate for the problem being addressed?**
- c. **How appropriate were the data to the analysis? Are the data sufficient to estimate the model? What are the implications of the lack of cost data from the pot and trap fishery in the seasonal allocation analysis? Do missing data pose a risk of biasing the parameter estimates or the model results? Are appropriate reasons listed for not including specific data sets? Where proxy data are used and was it the most appropriate data to use?**
- d. **Were alternative model specifications investigated and tested? Were assumptions underlying the statistical analysis of the models clearly stated?**

Findings – The review panel finds that the commercial valuation module is consistent with economic theory and the empirical approach detailed in Section 3.2 of the GCG report is consistent with professional standards. The sources of data were appropriate and key assumptions and limitations were documented. Alternative data sources and model specifications were adequately investigated and tested. The review panel raised a number of concerns with including the trip cost model in the statistical model used to estimate marginal quota value that raise questions about the utility of the commercial valuation module in its present form. These concerns include

- The trip cost model is not a well behaved cost function, but rather a way of imputing costs to trips for which there is no cost data. When the cost model is inserted in the net revenue function, we are assuming that the revenue function has all the desirable properties, but in fact this might not hold.
- Trip costs are used as proxy for the quasi-fixed factor. The expectation is that revenue increases with the quasi-fixed factor yet using trip cost confounds the amount of inputs used on a trip with their prices. For example, trip costs may increase with an additional DAS or because of an increase in fuel. The impact on quasi-rent would be positive for the former but negative for the latter.

- The parameters and fit of the trip cost model reported in Table 3.1 are extraordinarily high as to raise concerns about the statistical properties of the trip cost imputations used in the model. The main concern being whether or not the fleet used to estimate trip costs is an accurate representation of the fleet studied in the GCG report. The panel recognizes that the trip cost parameters were provided by the NEFSC, but not enough information is provided to adequately evaluate either the data or the estimation procedures. Furthermore, the analysis did not address the uncertainty that exists when imputing values from a regression model.
- It is unclear whether the observer data used to estimate trip costs was drawn from observed trips that landed scup, trips where scup was 25% or more of trip revenue, or from all otter trawl trips. Ideally, the trip cost model would be matched to the selection criteria for trips used in the simulation.

The review panel recommends that the trip cost model be dropped from the empirical model (equation 3.11 in the GCG report) and substitute an effort variable such as days at sea (DAS) times vessel characteristics such as length, horsepower, or gross tons as the quasi-fixed factor K. This alternative specification would reduce the overall data demands (observer data would no longer be needed) and would remove the problem of missing trip costs for gears other than otter trawl although this would require accommodation for multiple technologies in the empirical model (fixed technology is usually assumed).

The review panel raised the following additional issues for further consideration.

- Simulation data set and methods
 - Data retained for analysis excluded trips that had missing information for one or more variables
 - The review panel recommends that alternative imputation methods be investigated to replace missing variables with imputed values. This would increase the data set available for empirical analysis.
 - Marginal quota values were estimated by randomly selecting additional trips until the available quota became binding.
 - The review panel finds that the random selection is acceptable, but that alternative trip selection criteria such as selection from more efficient trips might be investigated.
 - The review panel notes that MB of quota is zero when quotas are not binding. Adding additional trips (and hence increasing the aggregated harvest), only to force the quota to bind, is uninformative (there is no way to know ex-ante where the new equilibrium of the fishery will be). You may as well say that quota is not binding and MB is zero.
 - An issue of concern is with the quota not binding, why are net marginal revenues positive? What is the model not capturing that is constraining the fishery? At what point is net marginal revenue equal to zero? How does this point compare to the simulated quota?
- Calculation of MB of scup
 - The empirical model results in input compensated supply and marginal quota values (λ_i) for all species groups included in the model. Changes in scup quota affects the marginal values for all species groups (likewise a change in quota for another species group affects the marginal value of scup, provided that the quotas for those other

species are binding). This means that λ for each species group needs to be solved to obtain the correct MB for scup.

- Total benefits shown in Table 3.12 are based on MWTP multiplied by pounds of quota.
 - The review panel notes that 1) total benefits should be based on integration of producer surplus and not MWTP*Quota, and 2) that the pounds of quota shown in Table 3.12 is the total quota and not the portion of quota that would be allocated to the commercial fishery.

TOR 2: Were the theoretical and statistical model specifications for the consumer valuation module done in a manner consistent with professional standards?

- a. Are the statistical methods themselves compliant with theory?**
- b. Are the statistical methods appropriate for the problem being addressed?**
- c. How appropriate were the data to the analysis?**
- d. Are the data sufficient to estimate the model?**
- e. Do missing data pose a risk of biasing the parameter estimates or the model results?**
- f. Are appropriate reasons listed for not including specific data sets? Where proxy data are used and was it the most appropriate data to use?**
- g. Were alternative model specifications investigated and tested? Were assumptions underlying the statistical analysis of the models clearly stated?**

The review panel finds that the analytical approach using the Synthetic Inverse Demand System (SIDS) in the consumer valuation module is based on the state of the art in modeling consumer demand. However, the manner in which the SIDS was applied is not consistent with professional practice. The panel data notes that the consumer valuation module for scup, and for that matter, valuation of consumer demand for other species would be much improved if scanner data were used. The panel acknowledges that scanner data was not available to GCG and may not be useful for scup that is not likely to be adequately covered by scanner data. As a general observation, the panel finds that empirical models for scup may be particularly challenging due to its low volume in the overall local seafood market and ease of substitution for a number of other wild caught and aquaculture species (eg. tilapia). The following outlines the recommended approach to applying the SIDS model.

- The theory of inverse demand is appropriate only if the quantity supplied is exogenous to consumers in the local market and consumers could only modify the price they offer. The methodology should start by identifying the market structure and show how price responds with landings of scup from the commercial fleet and other species in the local market.
- If scup is marketed in the Mid Atlantic, the species groups included in the commodity set that is specified in the demand system should reflect species that are also marketed in the Mid-Atlantic region. Based on the correlation analysis in the report, commodities were selected from the entire U.S., which may not be marketed in the same area as scup. As it is, the commodities included in table 4.1 likely have no impact on price of scup. Species groups should be selected based on their local market relationship to scup.
- A table for expenditure share for each of the commodities is needed in order to determine whether or not the grouping is appropriate. Both the own quantity flexibility and scale flexibility associated with groundfish/reef fish category in table 4.1 (page 33) are significantly positive and this is not consistent with inverse demand theory, i.e. groundfish price will increase if either landings of groundfish or all included species increases.

- The treatment of imports needs to be consistent with the concept of local markets which means that imports that are not shipped to the Mid Atlantic region should be excluded. Import data are available based on customs district. The import data should be based on imports through customs districts in the Mid-Atlantic region.
- As stated in the report on page 33, “the estimate of consumer MWTP was calculated using Equation 4.4.” This equation is for total compensating variation for the quota change and not for MWTP. The corresponding values for each of the variables in Equation 4.4 need to be provided. As it stands, it is not clear how MWTP was calculated shown in Table 4.2. This is also the case for the consumer net benefit reported in Table 7.1.
- The difference between the various allocation scenarios for dockside price in table 4.2 is insignificant, i.e. \$1.04 for status quo and \$1.07 for -9%, yet the difference is much larger for MWTP under each scenario, i.e. \$.0761 for status quo and \$.1855 for -9%.

The review panel recommends that scanner data would provide a more appropriate source of data from which consumer valuation would be estimated. In making this recommendation, the panel recognizes that scanner data comes from larger retail establishments that may not include meaningful quantities of scup. However, should the Council wish to extend the analytical framework to other species obtaining scanner data may be of greater use. Absent scanner data the SIDS remains the most appropriate analytical approach to estimating consumer benefits from changes in quota.

TOR 3: Were the theoretical and statistical model specifications for the for-hire producer surplus module done in a manner consistent with professional standards?

- a. Are the statistical methods themselves compliant with theory?**
- b. Are the statistical methods appropriate for the problem being addressed?**
- c. How appropriate were the data to the analysis? Are the data sufficient to estimate the model? Do missing data pose a risk of biasing the parameter estimates or the model results? Are appropriate reasons listed for not including specific data sets? Where proxy data are used and was it the most appropriate data to use?**
- d. Were alternative model specifications investigated and tested? Were assumptions underlying the statistical analysis of the models clearly stated?**

The review panel finds that the for-hire module was done in a manner consistent with professional standards. GCG used the best available data in an appropriate manner. Data sources, assumptions, and limitations were documented. Alternative data and analytical approaches were investigated. The following reflect review panel comments.

- The data used yielded accounting profit per angler trip not producer surplus as labeled in Table 5-4. Neither opportunity cost of capital nor opportunity cost of owner labor was taken into account reasoning that individuals have different opportunity costs. This assumption results in an overestimate of producer surplus in the for-hire sector.
- It would be useful to see the distribution of estimated accounting profit. If these data are skewed then the use of a statistical mean may not be appropriate to represent producer surplus per angler trip.
- The estimates of angler “surplus” per trip need to be checked. Neither the charter nor the party producer values for surplus per trip could be replicated.
- The cost and returns data were based on data collected from a stratified random sample of operators in the Northeast region. The response rates from the survey should be noted in order to evaluate the representativeness of the data used on the estimate of surplus per passenger trip. It would also be appropriate to evaluate whether these data are representative of for-hire operators that carry passengers on trips where scup are landed. This could be done by comparing descriptive statistics such as vessel size, number of trips, and number of passengers in the sample data to party/charter operators in the VTR data.
- The producer surplus estimate is for a passenger trip yet trips typically catch several different species. For this reason the producer surplus cannot be attributed only to scup.
- The data used to compute for-hire producer surplus were based on stratified random design and not a simple random sample. This means that the sample statistics need to be weighted according to the survey strata.
- Note that a final report on the data collection methods and estimated net returns for party and charter operators is now available from <http://www.nefsc.noaa.gov/publications/crd/crd1303/>. This report was not available to GCG at the time the for-hire module was developed.

TOR 4: The analysis was based on a suite of established allocation changes (e.g., +6% commercial/-6% recreational, +3% commercial/-3% recreational, status quo, -3% commercial/+3% recreational, -6% commercial/+6% recreational and -9% commercial/+9% recreational) rather than an optimal allocation.

- a. Were the results of the analysis clearly interpreted?**
- b. Could the model be used to map out a benefit curve given changes in allocation across commercial and recreational fisheries to reach an optimal solution?**
- c. Can the model be used to consider allocation alternatives that were not specifically analyzed?**
- d. Can the model be used to map out a benefit curve given changes in allocation across commercial and recreational fisheries and can the results be used for management purposes?**
- e. Is it possible to make modifications to the current model that would allow for the measurement of benefits (both total and marginal) in situations where allocations are not binding?**

The review panel finds that the framework could be used to map out the marginal benefits for allocation changes other than what were actually estimated in the report. At present, the modeling framework does not provide for an optimization algorithm that would seek out an optimal allocation although, an optimal allocation could be approximated by systematically tracing out the benefit curve. However, the reliability of estimated marginal benefits outside the range of the empirical models in each module becomes increasingly uncertain. The review panel has no specific recommendations beyond which changes in quota or allocation could not be used for management purposes. That said, under current ACLs and management measures in both commercial and recreational fishery the model cannot be used for purposes of making allocation decisions. Should ACLs become binding either because of lower stock size or a change in management (relaxation of either recreational or commercial regulations) or nearly so, the modeling framework subject to review panel findings on TOR 1, 2, and 3 could be used to evaluate allocation decisions. Depending on how much time has elapsed between when ACLs become binding and the current status of the empirical model, the model data may need to be updated and parameters re-estimated. Re-estimating the empirical models is likely to be less problematic for the commercial and consumer valuation modules than for either the recreational or for-hire producer surplus modules both of which rely on survey data that are both time consuming and expensive to replicate.

TOR 5: Was the link between the commercial valuation, consumer valuation, and for-hire producer surplus modules done in a manner consistent with professional standards?

Although the original intent was to develop a completely integrated model linking the commercial, consumer and producer surplus modules time was not sufficient to do so. Instead the modules were evaluated independent of one another. The review panel finds that treating each module in this manner was consistent with professional standards and does not compromise the ability to evaluate allocation alternatives. In future assessments it would be appropriate to include the predicted prices from the consumer valuation model in the commercial valuation module. The review panel notes that valuation among user groups is conditional on how each sector is managed. This was illustrated in the GCG report as improved economic gains may be realized by changing the seasonal allocations in the commercial sector and from adjusting recreational measures. Although the recreational commercial allocation analysis provided in the report included changes in recreational measures, but omitted the commercial season allocation. The review panel recommends that inefficiencies within sectors should be dealt with before inter-sector allocation analysis is conducted.

TOR 6: Was the link between the commercial and recreational models done in a manner consistent with professional standards?

As noted in TOR 5, none of the modules were directly linked as such. The review panel finds that the independent treatment of the modules was consistent with professional standards. As pointed out earlier the computation of the reported commercial and consumer benefits reported in Table 7.1 need to be redone.

TOR 7: The Recreational Angler Surplus module is based on a bioeconomic recreational fishing simulation model developed by the NEFSC's Social Branch to analyze the biological and economic effects of recreational measures for Gulf of Maine cod. However, a full bioeconomic model was not developed due to lack of time. What are the implications of this shortcoming?

The review panel finds that the given the structure of the NEFSC's simulation model and that fact that it was not made available to GCG means that it would not have been possible to develop a full bioeconomic model incorporating both commercial and recreational valuation even if time were not a constraint. As previously noted, the allocation framework developed by GCG can be used in its modular form without a fully integrated bioeconomic model.

Other Comments:

As noted in the agenda and TOR materials provided to the review panel the recreational module was based on a previously reviewed bioeconomic simulation. Although the current review did not include any TOR for the recreational module the panel offers the following observations and recommendations for improving the estimation procedures in the current model and makes recommendations for future surveys.

- Recreational valuation estimation procedures
 - Substitute species should be included in the underlying RUM. Omission of substitute species in the current estimation procedure has been shown in peer-reviewed literature to result in an upward bias in willingness to pay.
 - The current simulation approach samples from the realized catch distribution. The simulation could sample catch from a poisson model, parameterized using catch data, rather than the empirical distribution. This may result in improved efficiency in simulation procedures.
- Recreational survey design
 - Survey needs to improve the opt-out choice. During the meeting the review panel believed that the 2010 survey did not include an opt-out of fishing choice. After checking with NEFSC it was found that the 2010 survey design included three trip choices. The first two trips were fully described in terms of numbers and size of scup, summer flounder, or black sea bass. The third choice was to take an alternative trip for bluefish and/or striped bass, but lacked any information about numbers or size of fish caught. The survey form then asked respondents to select from trip A, B or C but did not include an opt-out of fishing choice. The review panel notes that this approach deviates from the accepted peer reviewed literature and recommends that the trip option that includes an alternative nondescript alternative fishing trip be dropped and replaced by a traditional “opt out” of fishing.
- Site choice models for commercial fishery
 - As pointed out by Brad Gentner, integration between the recreational and commercial valuation modules may be enhanced with the development of commercial fishery site choice models. The review panel concurs with this suggestion as it would improve the use of the trip data to estimate a spatial choice RUM with the expected revenues for the species in the model. This could then be used to obtain estimates on the marginal value of the species versus using the commercial valuation model in the GCG report.

ATTACHMENT

AGENDA

Expert Panel Review of the Project
Examining Allocations in the Scup Fishery

DoubleTree Baltimore-BWI Airport
890 Elkridge Landing Rd., Linthicum Heights, MD 21090
410-859-8400.

1 August 2013
9:00 AM to 5:00 PM

- 9:00- 9:30* Introductions, Meeting Objectives, and Organization
- 9:30 - 10:30 Presentation on project to evaluate scup allocation Brad Gentner - Gentner Consulting Group
- 10:30 - 10:45 Break
- 10:45 - 12:00 Continue 9:30 Agenda Item - Q & A
- 12:00 - 1:00 Working Lunch Q & A / Discussion of TOR 1
- 1:00 - 3:45 Q & A/Discussion of TORs 1-7
- 3:45 - 4:00 Break
- 4:00 - 5:00 Wrap-up and Discussion of TORs 1-7
- 5:00 Adjourn

* The meeting will be treated as a working meeting. The agenda reflects approximate times. Questions from the review panel may be entertained at any time during presentations.