Review of "Estimating Marine Recreational Fishing's Economic Contributions in New Zealand"

Prepared by Ralph Townsend, Ph.D., under contract
to the Ministry of Primary Industries

23 June 2016

Introduction

The Ministry of Primary Industries (MPI) contracted for this peer review of: "Estimating Marine Recreational Fishing's Economic Contributions in New Zealand", by Southwick Associates, which I will refer to as the "Southwick report." The Terms of Reference (ToR) for this review are attached. MPI provided four additional documents that are referenced several times in this review: "Recreational Fishing in New Zealand: A Billion Dollar Industry" ("NZMRF report"), produced by the New Zealand Marine Research Foundation; a letter from Paul Breen ("Breen letter") dated 6 May 2016; the minutes of the 13 May 2016 Marine Amateur Fisheries Working Group meeting ("MAFWG minutes"); and a letter from Southwick Associates to Martin Cryer, dated 25 May 2016 ("Southwick letter.") The Southwick letter responds to several issues raised in the Breen letter and the MAFWG minutes. In the Southwick letter, Southwick indicates that an updated technical report will be submitted to address some of those issues. Note that the updated technical report was not available when I conducted this review.

I will organize my review into four sections, plus a summary: my assessment of the methodologies used to estimate recreational fishing expenditures; response to the specific technical questions about the Southwick Report raised in the ToR; a discussion of the use of input-output multipliers in this application; and a discussion of how the Southwick report fits into fisheries management decisions. The summary is organized around how well the Southwick report meets each of the five RSIS criteria.

Estimation of recreational spending in the Southwick report

1. The technical presentation in the Southwick report left me feeling confident that Southwick understands the technical requirements of this research, that they have the technical background to carry out the research, and that they took the necessary steps to execute the project successfully. The comparisons to results from similar studies in Australia and the US also provide substantial confidence that the underlying methodology was successfully implemented.

When this kind of research is conducted for an industry association, it is not unusual for the research provider to selectively choose data and assumptions that result in unrealistically high estimates of the industry's impact. Southwick seems to have consciously avoided this source of bias. And I agree with the MAFWG that the benchmarking of the resident fishing rates to the NPS survey is a strength of the report.

2. An important question is whether the level of technical detail in the Southwick report is sufficient to meet RSIS expectations for peer review. The ToR, as well the Breen letter and MAFWG minutes, raised multiple questions about technical aspects of the estimation. The Southwick letter addresses a number of those technical questions. The Southwick letter also indicates that a revised report will be prepared that addresses details in four areas.

The level of documentation is what I would expect of an economic impact analysis provided to an industry group. However, the ToR indicates that the Southwick report should meet the expectations of the RSIS. In my opinion, the technical documentation in the Southwick report is too limited to be the basis for a thorough technical review. I do not intend this as a criticism of the Southwick report, because I doubt that Southwick was aware of the level of expectations about its documentation.

The Southwick letter indicated that a revised technical report that addresses four specific issues will be submitted. I do not think that it is sufficient simply to address those areas that were most quickly identified by the MAFWG. Rather, Southwick should probably submit a complete revision of the methodology explanation, with the detail that it believes is required for a thorough and transparent peer review of all aspects of its work. It should be the task of the researcher to anticipate what information is required for peer review, rather than the job of reviewers.

I think that peer reviewers of such a revision would be appreciative if Southwick made the document easier to review in terms of organization. The report provides a "Summarized Methodology" on pp. 3-12 and then a more "Detailed Methodologies" as Appendix A, pp. 92-136. Of the 44 pages in the Appendix, about 29 pages are tables of intermediate results, so the detailed methodology discussion is actually about 15 pages. In addition, some details of the methodology are actually presented on an "as needed" basis in the "Findings" section. The reader who wants to understand the details of the methodology must read back-and-forth between these three sections.

Let me illustrate the presentation weaknesses with one point that I needed to understand: How is the data on average trip-related spending for four categories of international visitors (Table 6, p. 18) generated? Based upon my initial reading of the report, I assumed that it was all derived from the International Visitor Survey (IVS.) On p. 6, it is reported that for international visitors who did not come primarily to fish, "the modelling process was limited to only their direct fishing expenditures." I initially assumed that there was some modelling process based upon the IVS and perhaps other data. However, after some time reviewing the IVS data and questionnaire, I realized that this level of detail could not have come from the IVS. Then, on p. 19, we find that resident spending is actually used for the missing data on international visitors. On p. 18, we find that "For those travelling primarily to go marine fishing, in-country trip-related expenditures reported by MBIE are used." Again, I found that the IVS data had no way to distinguish those who hire charters from those who do not. On p. 107, I finally realized that the IVS estimate per international visitor must be $2790, and that those who did use a charter were assumed to spend an extra $141, for a total of $2931. The $141 is the average one-day cost for someone using a charter. (I am still unclear about why the IVS expenditure is assumed not to

include charter boat hire.) It was a great deal of work to put the surprisingly simple pieces together.

In New Zealand fisheries working groups, it is not uncommon that contract researchers are expected to redo some of their analysis to reflect feedback received in the peer review process. I am not sure if the MAFWG has this expectation for the Southwick report. Just in terms of providing appropriate expectations for Southwick, I would suggest that the MAFWG communicate its expectations in this regard before Southwick rewrites the technical documentation.

3. A key methodological issue is the definition of what constitutes spending by resident recreational fishers. Quite candidly, there is no single right answer and a good deal of judgement is involved in that definition. One reviewer of that definition could agree with the Southwick position that its definition of spending by recreation fishers is reasonable and even somewhat conservative. Another reviewer could look at the same definition and come to Breen's conclusion that the spending has been "very liberally defined."

Southwick's letter explains that its approach is modelled after the US Fish and Wildlife Survey, which is indeed a well-established data collection program. That its results are close to similar US estimates supports its claim to have applied an established methodology appropriately. So a peer review should conclude that Southwick used established methodologies.

I do, however, have considerable sympathy with Breen's criticism of the prevailing definition. The costs of food, lodging, and transportation are typically a large share of spending under that definition. But people would have eaten and slept somewhere, even if they did not go fishing. Moreover, if they had not gone fishing, they probably would have engaged in some other recreational activity that also involved eating, sleeping, and travelling. For most purposes, the most logical theoretical definition would be "How much more did you spend on fishing than you would have spent on your next choice?" The problem is that this is very difficult to measure. And defenders of the established definition would probably argue: (a) the comparison should be to what you would have spent had you stayed home; and (b) there is no additional cost to sleep in your own bed; you will spend nothing on travel; and your eat-at-home food costs will be low enough to ignore.

But, to get the analysis above dueling definitions, the right definition depends upon how the estimates will be used. For the use of the Southwick data proposed by NZMRF, I think that a compelling case can be made that the Southwick definitions result in incorrect inferences. The NZMRF report argues that the Southwick economic impact estimates support the case for fisheries management policies that are more favorable to recreational fishers, because that would increase economic activity in New Zealand. To apply the Southwick estimates, NZMRF must argue that the increased spending on fishing does not result in any decreased activity elsewhere in the economy. That position cannot be defended. If New Zealand residents spend more time fishing, they must spend less time on some other activity. And they will almost certainly reduce their spending on that other activity. In fact, it is very likely that the amount families spend on recreational activities is quite insensitive to which activities are pursued. Additional money

spent on fishing will very likely translate into an almost equal reduction in spending on activities such as visiting wineries, going to sporting events, bungee-jumping, and sight-seeing.

4. The methodology for estimating expenditures by international visitors is much more open to question than the methodology used for residents. Obtaining information on international visitors who engage in fishing in New Zealand is challenging, and Southwick faced some inherent limitations on the detail of the data available for this part of the exercise. Most fundamentally, the international visitor estimates could not be benchmarked to the NPS. Consequently, there are a number of legitimate technical questions around this entire issue. As international visitors account for 25% of direct spending and 30% of direct income, how international expenditures are estimated is quite important.

The Southwick report relied upon data from the International Visitor Survey (IVS) for fishing participation rates for international visitors. This data is collected by TNS New Zealand, with analysis and presentation by the Ministry of Business, Innovation and Employment (MBIE.) For visitors who come to New Zealand primarily for marine fishing, Southwick also relies upon the IVS for expenditure data. For visitors who go fishing but whose primary purpose for visiting New Zealand is not to fish, the Southwick report assumes that visitors incur the some one-day costs as residents. (These details are discussed above.) Some of the technical details on the IVS can be found at:

> http://www.mbie.govt.nz/info-services/sectors-industries/tourism/tourism-research-data/ivs/about-the-ivs/ivs-methodology

The website does not present sufficient detail to evaluate all the technical aspects of that survey. Moreover, such an evaluation would be beyond the scope of the current review. I would say that the technical detail available on the website suggests that MBIE is well aware of the inherent limitations of the survey methodology and that MBIE has made very credible efforts to address those limitations.

For current purposes, the key question is whether MBIE has been successful in identifying the response biases in their sampling and made adequate adjustments for those response biases. The website states:

> "Each respondent within the sample is weighted to represent their fraction of the total number of all international visitors departing New Zealand within the survey's target population.
>
> "Survey response weights are adjusted to reflect the unequal probabilities of respondent selection from the composition of the target population, and known discrepancies between the sample and the population definitions."

Details on how this is achieved are not explained on the website. However, that MBIE recognizes the problem and takes steps to correct for nonresponse biases indicates a strong commitment to creating an accurate survey. I believe that the estimation by MBIE is probably

superior to what is available in most other countries. Given the apparent technical sophistication that MBIE has brought to this project, MBIE might be willing to provide a candid assessment of the strengths and weaknesses of its data as applied here.

Southwick Associates deserves credit for recognizing the problem that many international visitors go fishing, but fishing is not the major motivation for their trip. They addressed this problem by asking charter boat operators to estimate how many of their international clients visited New Zealand primarily for fishing. For those who visited New Zealand primarily for fishing, the entire cost of their visit was attributed to fishing. For those whose purpose for the visit was not primarily to fish, Southwick used the average one-day expense for New Zealand residents.

By surveying charter boat operators about the reasons for New Zealand visits by their international clients, Southwick is relying upon judgements and inferences by the charter boat operators. Fishing on a charter boat typically involves very direct involvement with clients, so this second-hand assessment should not be dismissed as speculation. Moreover, some charter operators undoubtedly cater to destination fishers while others cater to more casual fishers. The more difficult issues are: (a) is the sample of charter operators representative; and (b) might the charter operators have perceived some reason to bias their estimates? Some discussion of these potential biases are probably warranted in the revised document.

By using only an estimate of one day of direct fishing costs for those visitors who did not come primarily for fishing, Southwick probably underestimates the economic spending attributable to fishing. First, there are some non-fishing expenditures on that day. Second, fishing may have induced some visitors to stay longer than they would have in the absence of fishing. On the other hand, as the Breen letter (p. 3), suggests, using the total trip expenses for someone who came primarily to fish probably overstates the impact of fishing on economic activity. Alternative assumptions could be explored to test the sensitivity of the final results to these assumptions.

As the Breen letter (p. 3) indicates, there is a particularly questionable assumption that those who come to New Zealand specifically to fish and those whose primary reason for a visit is not to fish use charter boats at the same rate. This is a highly questionable assumption, perhaps with no good alternative. Again, some sensitivity analysis on this assumption might be warranted.

Note that the IVS data posted on the Stats NZ website combines "fishing and hunting" for international visitors. The IVS collects, but does not publish, data for "salt-water fishing" that is used by Southwick. As the salt-water fishing data is not readily available to a peer reviewer, Southwick should report the raw data.

While the estimation of expenditures by international visitors is challenging, the results for international visitors are perhaps the most noteworthy part of the report. The share of spending attributed to international visitors, 25%, is quite significant when one considers the high rate of fishing by New Zealand residents. And, unlike increases for spending on fishing by domestic fishers, increases on spending by international visitors are very likely to be net increases in economic activity. There could well be a case that New Zealand should consider a strategy to

attract more international visitors for marine fishing in order to increase total economic activity. There are, however, two areas that require further research. First, the robustness of the Southwick estimates should be examined. Second, it would be necessary to establish the link between the status of particular stocks and the number of additional international visitors who would be attracted. Because New Zealand fisheries are already very healthy in relation to stocks elsewhere in the world, it is not obvious that incremental improvements in stocks will have a significant impact on the attractiveness to international visitors. My intuition would be that there may be specific trophy fisheries where management strategies might help attract more international recreational fishing. I am more doubtful that the analysis would conclude that management for international visitors would be central to the management of many stocks in New Zealand. But the Southwick report has identified a very plausible area for future research.

5. There is some imprecision in defining exactly what 12-month period the estimated expenditure and income cover. The report states that the goal is to generate estimates for "2014-15." The expenditure data is collected for May 2014 to April 2015, so the reader can perhaps assume that all data is being adjusted to that base. The report indicates that the IVS data is for 2014, but does not indicate whether this is the calendar year or some other 12-month period. The NPS data is for October 2011 to September 2012. I believe that the input-output model is based upon data for 2013. The report assumes that data for one period can be joined with data for another period to yield reliable estimates, but does not explain if any adjustments were made to make data comparable in the base year. This joining of data from slightly different periods is inevitable in this type of analysis. It is reasonable to explain exactly what period is being estimated and what assumptions were made to transform data from different time periods to the base period.

Specific questions raised in the ToR.

Let me turn to the 9 specific questions raised in the ToR.

1. Can the apparent inconsistencies between the published National Panel Survey results and the Southwick report in the numbers of fishers and number of trips be reconciled (raised in Paul Breen's comments)?

Response. The Southwick letter (p. 4) explained that they included trips where no fish were caught, while the Wynne-Jones report excludes those trips.

2. Are the methods used to select (and combine the results from) participants for the online survey of spending appropriate; what can be inferred about the representativeness and reliability of the sample?

Response. The report does not have sufficient methodological detail to answer this question. Both the report and the Southwick letter have essentially the same answer, that Horizon Research is technically competent at this work. I am left wondering why the Southwick letter was less forthright in its response to this question, as compared to its answers to other MAFWG

questions. Perhaps this work was completed by Horizon Research, so Southwick is not fully knowledgeable about the exact methodology. It could also be that there are proprietary issues around the Horizon Research data and/or methodology.

3. Are the methods used to weight and scale the results from the online survey of spending to the fishing population appropriate?

Response The report does not have sufficient methodological detail to answer this question. The Southwick letter indicates that more technical detail on this point will be provided in the revised report.

4. Are the methods used to deal with or correct for missing data (e.g., from participants who did not complete the whole survey) appropriate?

Response The report does not have sufficient methodological detail to answer this question. The detail provided in the Southwick letter indicates that Horizon Research had additional data to reduce the loss of observations due to missing data. This would seem to be a significant advantage of using the Horizon Research panel. This additional information is reassuring, but falls short of complete transparency. The Southwick letter also refers to the data cleaning phase of the project, and that discussion reassures me that Southwick took the time to understand their data and to correct for the kinds of deficiencies that can be addressed. As Southwick implies in its letter, this kind of data management requires detailed work and good judgement. However, the RSIS criteria for peer review requires a more transparent explanation of this process.

5. Are the definition and assumptions related to what constitutes a fishing-related expense reasonable for a study of this type?

Response. See discussion above under point 3 of the previous section.

6. Are the definition and assumptions related to proportionate use of major items reasonable for a study of this type? (An example discussed by the MAFWG was the purchase of a 4x4 vehicle necessary to tow a boat when a vehicle would be required anyway and would be used mostly for non-fishing activities)

Response. The discussion referenced in question 5 is also relevant here. But further, allocating the cost of durable equipment between fishing and non-fishing activity is an inherently arbitrary process. Given the significance of these costs, it is reasonable to expect a detailed explanation in the report. There is not sufficient detail in the methodology description to carefully assess this question. The Southwick letter indicated that greater detail will be provided on how the costs for major durable items, such as vehicles, were divided between fishing and non-fishing activities. The results from the Southwick process do not seem implausible.

7. Is the presentation of uncertainty of estimated economic quantities in the report appropriate for a study of this type? (It was noted by the MAFWG that most biological

studies include estimated statistical confidence limits and sometimes include sensitivity analyses and qualitative comments to assess and convey additional, non-statistical uncertainty. The MAFWG's belief was that economic analyses rarely include such explicit treatment and discussion of uncertainty in the results)

Response. The MAFWG is correct, economic analyses of this sort typically do not include estimates of variances or other measures of statistical uncertainty. The report uses both a wide range of sources of data, some with explicit estimates of variances and some without, and also a number of assumptions that are inherently non-statistical. This is typical of this type of study. In principle, some type of Monte Carlo modelling could be used to estimate the statistical properties of the resulting estimates. This is, however, a rather complicated and expensive exercise. Similar studies in other contexts would not usually include such modelling.

However, the researchers in such studies can discuss in some detail both the limitations of the data and also what assumptions are most critical to the results. The report does offer a comparison to comparative studies, which is generally reassuring. The report does not, however, offer the reader a candid explanation of how sensitive results are to aspects of the data and assumptions. The Southwick letter indicates that the revised report will provide information about the level of uncertainty around key spending measures. I would suggest that they expand the discussion of uncertainty to address, even if only qualitatively, where uncertainty in other assumptions or data may have a significant impact on results.

8. Is the use of the Statistics NZ Visitor Survey and Amateur Charter Vessel records as a base for estimating spending by International fishers reasonable, noting the difficulty of obtaining such estimates?

Response. Please see discussion about the estimation of spending by international visitors.

9. Is the use of detailed input-output tables provided by Insight Economics rather than the simpler ones provided by Statistics NZ reasonable for a study of this type?

Response. The Insight Economics model is derived from the same underlying data as the Statistics New Zealand model. Based upon my experience with input-output models, including those in New Zealand, different input-output models for the same country tend to produce very similar results. This is because (a) the same underlying national accounting data is used by all models, and (b) the mathematics of static input-output models is very straight-forward. As the Southwick letter explained, Insight Economics had developed regional input-output models, which were better suited to its needs. Based upon my experience, I strongly doubt that use of an alternative input-output model would result in much change in the estimates.

Use of input-output multipliers to estimate "economic impact"

In my opinion, the decision to use input-output multipliers to define the "economic impact" of an industry is an inherently biased approach. Direct income in an industry is the single best measure of the economic impact of an industry. Let me be quick to add, however, that this use of input-output analysis is the norm for consulting firms that are hired to estimate an industry's impact.

Input-output is inherently static and short run. It assumes that the economy remains static in the face of some change. While input-output analysis is arguably a useful short-run impact analysis tool, it is less useful as a long-run prediction tool. This is because economic actors have incentives to respond to changes in ways that minimize the economic impact upon themselves. For example, when an industry declines, the short-run impact is to create immediate unemployment. But in the long run, workers have incentives to prepare themselves to move to other parts of the economy. So, consider an industry that faces a $1 billion reduction in income and a multiplier of 2. It might be reasonable to say that the $1 billion reduction in income will have a short-run impact that could be about $2 billion for the economy. It would not reasonable to predict that permanent impact on the economy would be a $2 billion reduction. Both the impacted sector and the indirectly affected sectors will take steps to reduce those losses, such as learning to produce other goods that are needed in the economy.

To illustrate the underlying fallacy of the input-output multipliers, consider the following simple example. Assume that an economy has 10 industries, each of which generates $10 billion in income, and that these 10 industries cover the entire economy. The national income for this economy would be $100 billion. Now assume that each industry has an input-output multiplier of 2. So now these 10 industries would have a total "economic impact" of $200 billion—in an economy of $100 billion!

Input-output multipliers are especially suspect when applied to spending by recreational fishers. When we apply the multiplier to an increase in recreational spending, we must assume that the spending elsewhere in the economy will not decline in the least. This is clearly not correct, for the reasons discussed above. If fishing becomes more attractive, it is certain that some or even most of the additional spending will be offset by reductions in spending for other recreational activities.

The use of input-output multipliers is more justified for those international visitors who come to New Zealand for the specific purpose of marine fishing. If more international visitors come to New Zealand because fishing is improved, that additional expenditure is indeed new to the economy. It is not simply being diverted from elsewhere in the economy.

Not surprisingly, industry groups like input-output multipliers simply because they make every industry seem more important. It is also not surprising that researchers who estimate multipliers often fail to discuss the severe limitations of the approach. I do not feel, however, that the excuse "everyone else plays the game this way" justifies the game. This report should candidly explain the limitations of input-output multipliers, especially as applied in the current context.

Southwick Report and Fisheries Management

Economic analysis is conducted to be of benefit to decision-makers. So it is worthwhile to ask how the economic analysis in the Southwick report should be used for the management of shared fisheries in New Zealand. The NZMRF (p. 4) report explains how the Southwick report will be applied to fisheries management:

> "This report offers substantial evidence to support a change of management focus, from the current state of sustained depletion, to a state of restored abundance."

It is perhaps useful first to explain the NZMRF analysis in a more neutral tone. Stocks in New Zealand are generally managed with the goal of maintaining SSB_{msy}, or some similar goal. In fisheries with substantial recreational harvest, stocks that are substantially above the SSB_{msy} may have significantly greater recreational benefits. That is because recreational harvests and recreational participation may increase significantly as stock sizes increase. I believe that this is the argument behind the language about changing from a state of "sustained depletion" to "restored abundance." Of course, to achieve that goal, commercial harvests must be permanently reduced. But if the increase in the value of recreational activity exceeds the reduction in commercial value, then the above-SSB_{msy} management will increase overall economic value.

It is possible, and even likely, that there are New Zealand stocks for which the total benefit to New Zealand would increase if commercial harvests are reduced, stocks rebuild well above SSB_{msy}, and recreational users therefore harvested more fish. Of course, it is also possible and even likely that there are other stocks where maximizing economic value would require management that shifts harvests from recreational to commercial uses. Maximizing total economic value of fisheries is not an argument that cuts neatly in one direction.

But the Southwick report does not offer any evidence, much less "substantial evidence", to support the case that stocks should be rebuilt above SSB_{msy} in order to maximize the economic benefit to New Zealand. The primary reason to manage a stock to favor recreational fishers would be because it increases the direct benefit to those recreational fishers. It is not because those fishers would buy more fuel, more food for the chilly bins, and more fishing gear. Nor is it because the businesses who sell things to them will also buy more things. The relevant research agenda is about (a) the value that recreational fishers place on the activity of fishing; and (b) how that value changes as stock conditions change. If the goal is to maximize the total economic value from commercial and recreational fisheries in some stock, the Southwick report adds nothing to that analysis. (The minutes of the MAFWG indicate that the MAFWG specifically asked why the Southwick report did not chose to estimate economic surplus. The Southwick letter avoids directly answering the question by responding that this was "outside the scope of this particular project." Given that I am sure that Southwick understood both the question and its significance, this dismissive response seems disingenuous.)

I would strongly encourage the MAFWG to pursue a research agenda that in fact answers the very important question implied in the NZMRF report: Does the goal of maximizing the total economic value of fisheries in New Zealand support the strategy of managing above SSB_{msy} in some stocks? I think that this research agenda could help clarify a number of important issues on how to best manage shared stocks in New Zealand. This would be a much better use of the time

of the MAFWG than debating the technical details of the Southwick report, which does not move this important question forward.

The research agenda required to answer this question is relatively clear, albeit complicated and moderately expensive to execute. The Ministry of Fisheries has funded at least two contracts related to that research agenda. Data on the recreational value of several species from project REC9801 (South Australian Centre for Economic Studies, 1999) has been widely cited in discussions of recreational fisheries management in New Zealand. The research conducted by Economic Research Associates (2010) was a simulation applied to specific question of the benefits of managing at different SSB levels in SNA 1 and KAH 1. They conducted a sensitivity analysis around alternative assumptions about the value of landings in those commercial and recreational fisheries and alternative parameterization of the stock dynamics. Not unexpectedly, they find that the optimal management of shared fisheries does vary under alternative assumptions. Their results do suggest that, under most assumptions for KAH 1, shifting management to favour greater recreational catch would increase total economic value. For SNA 1, many but not all scenarios result in the conclusion that higher commercial catches would increase total economic value. While the Economic Research Associates analysis is based upon relatively simple modelling, their work provides valuable insights on how to move forward the research agenda on managing shared fisheries for maximum economic value.

Summary

Let me summarize my review by putting my assessment within the frame of the five criteria in the RSIS.

Peer review

Southwick has already communicated its intention to submit a revised description of its methodology. I would recommend that Southwick go beyond simply responding to the criticisms already raised to re-writing the methodology description with an eye to making thorough and transparent peer review of the research possible. I think it likely that Southwick will be able to submit a revised report that can meet the RSIS peer review criterion.

Relevance

In my opinion, the Southwick study fails the relevance criterion in the RSIS in two major areas.

First, the report provides a poor basis for accomplishing its avowed purpose, to project how changes in recreational fishing will impact the New Zealand economy. Using the Southwick methodology would completely ignore that more resident spending on fishing will mean less consumer spending on other recreational activities. To apply the Southwick estimates as proposed by NZMRF will result in seriously misleading inferences.

Second, the key benefit of improving the recreational fishing for New Zealand residents is the value that they place on that activity. That is the benefit that needs to be calculated for input into

fisheries management decisions. The Southwick report has no connection to the estimation of consumer surplus from recreational fishing.

I fear that the Southwick report may go beyond being merely irrelevant to being a serious distraction. The NZMRF report indicates that the recreational sector intends to use the Southwick report to make the seductive, but economically incorrect, argument that because recreational fishing generates a lot of income, the management system should be tilted more towards recreational fishing in all areas. The recreational sector would obviously like some sort of official endorsement of the report. The commercial sector undoubtedly anticipates this use of the report. The commercial sector will build as strong a case as possible that the report is technically flawed, that the estimates are exaggerated, and that the report should not be endorsed. Both sides are undoubtedly prepared to spend a lot of time and energy waging this irrelevant debate in the MAFWG. This is a poor use of the time and energy of the MAFWG. It would be vastly preferable if the MAFWG would use that time and energy to develop an economic research program that will, in fact, address the question of how the value of recreational fishing should impact the choice of stock management objectives in individual fisheries.

Integrity

My general impression is that the technical analysis in the Southwick report seems to be professionally done. The benchmarking of the expenditure data to the NPS survey is a particular strength. From the evidence available, I would expect that the MAFWG will be able to conclude that the Southwick report meets the RSIS objective of integrity.

Objectivity

In general, I think that the MAFWG will be able to conclude that the Southwick report meets the RSIS criterion of objectivity, once adequate peer review is possible. However, the use of input-output multipliers, without explanation of their very serious limitations in the present context, could raise questions about objectivity.

Reliability

Reliability has two aspects: (a) Could the specific estimates be replicated by an independent investigator? (b) Is it likely that research that approached the questions with alternative, but valid, data and assumptions would yield similar results?

For the estimates generated by the Southwick report to be reliable, Southwick will need to submit a much more detailed explanation of its methodology, as discussed above. Assuming that an adequate methodology explanation is submitted, the estimates of residential expenditures should be reliable. The estimates of spending by international visitors is more problematic. The information from the underlying IVS is sparse and subject to many limitations, so I am not confident that alternative approaches would necessarily yield similar estimates. I do think that

the MAFWG may want Southwick to conduct some kind of sensitivity analysis on the impact of alternative assumptions in the estimation of spending by international visitors. I think that the input-output modelling presents no significant issues with respect to reliability.

References

Economic Research Associates. 2010. "Cutting the Cake in a Shared Fishery with a Minimally Managed Non Commercial Sector." Report prepared for New Zealand Ministry of Fisheries.

South Australian Centre for Economic Studies. 1999. "Value of New Zealand Recreational Fishing." Report prepared for New Zealand Ministry of Fisheries.

TERMS OF REFERENCE FOR RESEARCH PROJECT REVIEW

The core purpose of this review is to obtain external, independent, expert peer review of the methods, outputs, and conclusions of an assessment of the economic contributions of marine recreational fishing in New Zealand commissioned by the New Zealand Marine Research Foundation.

SCOPE

This external review is a science peer review of the study "*Estimating Marine Recreational Fishing's Economic Contributions in New Zealand*."

The review should consider the extent to which the study aligns with the Research and Science Information Standard for New Zealand Fisheries (RSIS, see Ministry of Fisheries 2011), especially with regards to:

- Peer review (already conducted or necessary)
- Relevance to fisheries management
- Integrity of the information used
- Objectivity of the information presented, and
- Reliability of the conclusions

It may be appropriate to incorporate information from other projects or fields of enquiry (especially economics) into the review and provide advice on the relevance and application of the methods used and how they might be improved.

The external review is part of a wider peer review process being conducted by MPI. An initial review by MPI's relevant standing working group (the Marine Amateur Fisheries Working Group, MAFWG) identified a number of specific questions that ought to be considered also in an external review and these are included below. Further meetings of the MAFWG will be necessary to consider any revised reports or assessments received (in the light of MAFWG or external expert reviews) and to make a final grading against the RSIS.

EXTERNAL REVIEWERS

Reviewers must have no connection with the original work and must declare any actual or potential conflicts of interest that might affect their ability to provide an independent and objective review. Reviewers will have scientific and/or economics expertise in the design and delivery of surveys of marine amateur fishers or other sporting groups intended to deliver estimates of economic expenditure or value (interpreted broadly), including quantitative methodologies commonly or customarily used in the field.

CONTEXT

New Zealand's Ministry for Primary Industries (MPI) funds a range of research to estimate harvest by marine amateur fisheries and to derive related information on the nature, location, and variability of the catch. Given the contention surrounding the reliability of some previous surveys and the implications of this information for future fisheries management decisions, MPI organised an external expert review of the quality of key projects, including the National Panel Survey (NPS), in 2013. That review concluded that the NPS results were reliable and fit for purpose in fisheries management decision-making.

Based on the 2013 review, MPI considers the 2011/12 estimates of the number of trips undertaken by marine amateur fishers is broadly reliable. These estimates were used by Southwick Associates (and their co-authors) to develop their estimates of economic activity and value, and it is that scaling that is one focus of the current external review.

INFORMATION FOR THE EXTERNAL REVIEW

The following documents will be provided to reviewers:

- A summary report entitled "*Recreational fishing in New Zealand: a billion dollar industry*";
- A detailed methodological report entitled "*Estimating marine recreational fishing's economic contributions in New Zealand*";
- A presentation made to MPI's Marine Amateur Fisheries Working Group (MAFWG) on 13 May 2016 entitled "*The economic contributions of marine recreational fisheries to New Zealand's economy*";
- Written comments on the detailed report provided by Paul Breen;
- The notes of the MAFWG meeting of 13 May 2016;
- A written response to the issues raised by the MAFWG and a description of additional work to be conducted provided by Southwick Associates;
- A report on the National Panel Survey (NPS) conducted in 2011/12 and used as a basis for participation rates and scaling of economic activity by Southwick Associates; and
- A copy of the Research and Science Information Standard for New Zealand Fisheries (RSIS).

Other documents or information requested by the reviewers will be supplied if possible.

FORMAT FOR REVIEW

This review will be conducted in writing. Reviewers will be provided with the documentation specified above and will be asked to prepare written reports addressing the specific questions

listed below and the extent to which, in the reviewers' expert opinions, the work aligns with the Research and Science Information Standard for New Zealand Fisheries (RSIS). A specific grade against the RSIS is not required but comments on the appropriateness of the methods and assumptions used in the study with respect to the principles outlined therein should be included in reviewers' reports.

SPECIFIC QUESTIONS

The RSIS notes that the quality of research and science information (including socio-economic analyses based on verifiable data) relates primarily to relevance, integrity, objectivity and reliability. The primary, internationally-accepted mechanism for evaluating the quality of research and science information is peer review and, as such, peer review is both a principle and a mechanism. These five key principles should underpin all quality assurance processes for research and science information. Ideally, the key principles should be satisfied before research and science information is used to inform fisheries management decisions.

External reviewers should, therefore, assess the extent to which the authors of the report have used methods that meet these five principles, noting that customary practice may differ in biological and economic studies. This should lead to an assessment of the extent to which the authors' methods, outputs, and conclusions are reasonable and defensible. This assessment should include, but should not be limited to, the following questions raised by the MAFWG:

- Can the apparent inconsistencies between the published National Panel Survey results and the Southwick report in the numbers of fishers and number of trips be reconciled (raised in Paul Breen's comments)?
- Are the methods used to select (and combine the results from) participants for the online survey of spending appropriate; what can be inferred about the representativeness and reliability of the sample?
- Are the methods used to weight and scale the results from the online survey of spending to the fishing population appropriate?
- Are the methods used to deal with or correct for missing data (e.g., from participants who did not complete the whole survey) appropriate?
- Are the definition and assumptions related to what constitutes a fishing-related expense reasonable for a study of this type?
- Are the definition and assumptions related to proportionate use of major items reasonable for a study of this type? (An example discussed by the MAFWG was the purchase of a 4x4 vehicle necessary to tow a boat when a vehicle would be required anyway and would be used mostly for non-fishing activities)
- Is the presentation of uncertainty of estimated economic quantities in the report appropriate for a study of this type? (It was noted by the MAFWG that most biological studies include estimated statistical confidence limits and sometimes include sensitivity analyses and qualitative comments to assess and convey additional, non-statistical uncertainty. The MAFWG's belief was that economic analyses rarely include such explicit treatment and discussion of uncertainty in the results)

- Is the use of the Statistics NZ Visitor Survey and Amateur Charter Vessel records as a base for estimating spending by International fishers reasonable, noting the difficulty of obtaining such estimates?
- Is the use of detailed input-output tables provided by Insight Economics rather than the simpler ones provided by Statistics NZ reasonable for a study of this type?

Reviewers may also wish to make suggestions and recommendations on what could be done better to improve the quality and reliability of the estimates; it would be helpful if these could be listed separately for:

- revised analyses or documentation that could be done quickly (within a few days or weeks) and relatively cheaply;
- more complex or structural changes that might, for example, entail new surveys or databases; and
- different approaches, valuation methods, or metrics that might be more useful for tactical decision-making by fisheries managers.

TIMETABLE

This review will be conducted in May and June of 2016 and reports from the external reviewers should be received by MPI no later than 30 June 2016.

Additional meetings of MAFWG will be convened later in 2016, but the precise dates for such meetings will depend on the extent and timing of revisions to the document(s) considered appropriate by the New Zealand Marine Research Foundation and their contractor(s).