SUMMARY MINUTES

Scientific and Statistical Committee

Pacific Fishery Management Council
DoubleTree Hotel - Columbia River
Deschutes Room
1401 N Hayden Island Drive
Portland, OR 97217
(503) 283-2111
September 9-10, 2002

Call to Order

The meeting was called to order at 8 a.m. Dr. Donald McIsaac briefed the Scientific and Statistical Committee (SSC) on priority agenda items. He noted the limited numbers of items on the SSC agenda. He suggested that, while groundfish items C.2 and C.3 were of great interest to the Council, the SSC should be able to cover all of the agenda items and develop reports for the Council.

Dr. Han-Lin Lai was introduced to the SSC. Dr. Lai is the new National Marine Fisheries Service-Northwest Fisheries Science Center representative on the SSC.

After discussing the need to be flexible on the timing of certain items, the agenda was approved. After review, the June 2002 meeting summary was approved.

Members in Attendance

Dr. Brian Allee, Northwest Power Planning Council, Portland, OR
Mr. Alan Byrne, Idaho Department of Fish and Game, Nampa, ID
Dr. Ramon Conser, National Marine Fisheries Service, La Jolla, CA
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Michael Dalton, California State University, Monterey Bay, CA
Dr. Martin Dorn, National Marine Fisheries Service, Seattle, WA
Dr. Robert Francis, University of Washington, Seattle, WA
Dr. Kevin Hill, California Department of Fish and Game, La Jolla, CA
Mr. Tom Jagielo, Washington Department of Fish and Wildlife, Olympia, WA
Dr. Han-Lin Lai, National Marine Fisheries Service, Seattle, WA
Dr. Peter Lawson, National Marine Fisheries Service, Newport, OR
Dr. Stephen Ralston, National Marine Fisheries Service, Santa Cruz, CA
Ms. Cynthia Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Shijie Zhou, Oregon Department of Fish and Wildlife, Portland, OR

Members Absent

Dr. André Punt, University of Washington, Seattle, WA

Scientific and Statistical Committee Comments to the Council

The following text contains SSC comments to the Council. (Related SSC discussion not included in written reports to the Council is provided in italicized text).

Groundfish Management

C.2 – SSC Report on Final Harvest Levels and Other Specifications for 2003

Yelloweye Rockfish

The SSC reviewed the new yelloweye rockfish stock assessment (Exhibit C.3, Supplement NMFS Assessment Report, September 2002) and yelloweye rockfish rebuilding analysis (Exhibit C.3, Supplemental NMFS Report, September 2002). The SSC subscribes to the findings of the Stock Assessment Review (STAR) Panel that the new baseline stock assessment model represents the best available scientific information concerning the status of the stock and endorses the use of the assessment and rebuilding analysis by the Council in setting 2003 harvest levels. However, the SSC would like to underscore that great uncertainty remains about stock status and that strict reliance on the baseline model is not without considerable risk. In particular, the estimate of steepness from the spawner-recruit curve (0.437), which underlies stock productivity, is imprecisely estimated in the baseline assessment model. Given this level of uncertainty the SSC advises that the 2003 optimum yield (OY) not exceed the Ad Hoc Allocation Committee's recommendation (22 mt), which is based upon rebuilding using the baseline model with a 50% probability of rebuilding by T_{MID} (halfway between T_{MIN} and T_{MAX}).

The new model is very different from the model considered by the Council in June. In particular, the following changes were implemented, (1) the assessment is based on a coastwide stock, (2) selectivity curves are now allowed to be dome-shaped, (3) the natural mortality rate is constant, (4) there are two informative new data sources (Washington sport catch per unit of effort [CPUE] and Oregon age compositions), and (5) California Marine Recreational Fisheries Statistics Survey (MRFSS) CPUE data were excluded from the model. The SSC notes that important model diagnostics (e.g., age and length composition residual plots) were unavailable in the documentation package. In addition, there was concern that incomplete justification was provided with respect to certain changes in the model's formulation (i.e., items 2 and 3 above). The rapid manner in which the assessment was prepared and reviewed between June and September no doubt contributed to these oversights and, as a consequence, the SSC recommends against future use of the accelerated stock assessment process that was used for yelloweye rockfish this year.

Bocaccio

New results from the Bocaccio Rebuilding Analysis for 2002 (Exhibit C.2.b) indicate that under the SSC's Guidelines for Rebuilding Overfished Stocks, which are consistent with the NMFS National Standard Guidelines, bocaccio will fail to rebuild by T_{MAX} with 50% probability, even with no catch. This curious result is due to the fact that the new bocaccio analysis is an update from the original rebuilding analysis and two unfavorable events have occurred since the original work, (1) the 1999 year-class is not considered to be as strong as previously believed, and (2) landings over the last three years have greatly exceeded the OY. Thus, because of the accelerated pace of removals and lower productivity, the stock will likely not rebuild by T_{MAX}, even with no catch.

The SSC discussed the recommendation of the Ad Hoc Allocation Committee (Exhibit C.3.f, Table 1) that the OY for bocaccio be as close to zero as possible, but not to exceed 20 mt. This recommendation is based upon a sustainability analysis that shows that at this level of harvest the stock will rebuild in 170 years with 50% probability, as opposed to 106 years under default policy. Moreover, at this harvest rate there is a low probability of further decline over the next 100 years.

The SSC concluded that the new rebuilding/sustainability analysis represents the best available scientific information concerning the status of the bocaccio stock and endorses its use by the Council in setting 2003 harvest levels. At this time bocaccio appears to be a very unproductive stock, which makes it extremely difficult to develop a rebuilding plan that will tolerate errors in the biological estimates, fishery management, or interactions with other fisheries (i.e., bycatch). These difficulties highlight the importance of developing sensible and robust procedures for updating rebuilding plans for overfished stocks, an issue covered under Council agenda item C.7 (Amendment 16, Process and Standards for Developing Rebuilding Plans).

The SSC concluded that the proposed OY is technically sound, given the minimal surplus production of the bocaccio stock. However, the SSC notes that a new stock assessment will be conducted next year and further investigation of the stock-recruitment relationship and the appropriate natural mortality rate would be very useful.

Sablefish

The SSC notes that an OY of 5,000 mt, as recommended by the Ad Hoc Allocation Committee (Exhibit C.3.f), is consistent with the SSC's recommendation in June that a precautionary adjustment for this stock is warranted. To reiterate from that statement, the likelihood profile of the slope survey catchability coefficient was determined to be very flat, which creates substantial uncertainty with respect to total stock biomass. Therefore, the medium and high OY's (7,359 mt and 8,091 mt) are relatively risk-prone, and caution should be exercised when setting the 2003 harvest level.

Pacific Whiting

In June the SSC supported the recommendation of the 2002 whiting STAR Panel against adopting 2003 projections from the stock assessment model until a new assessment is conducted. This recommendation is consistent with the low OY option presented in Table 1 of the Ad Hoc Allocation Committee Report (Exhibit C.3.f), (i.e., 129,600 mt).

C.3 – SSC Report on 2003 Groundfish Management Measures

The SSC discussed the methodology proposed by Dr. Jim Hastie to estimate projected bycatch rates and discards of overfished groundfish species for the upcoming 2003 fishing year. The basic approach is the same as that used for the 2002 fishing year – i.e., for each targeting strategy, bycatch rates of the overfished species are estimated, then discards are calculated, on a vessel basis, as the amount that bycatch exceeds available landings limits for each species. However, for the 2003 fishing year, the approach was extended to allow for depth-based closed areas, (e.g., restricting fishing at depths of 100 fm to 250 fm and other possible depth ranges.

Dr. Hastie reported that the basic approach worked well for the 2002 Dover sole/thornyhead/trawl-caught sablefish complex (DTS) fishery. However, the incorporation of critical depth data from logbook records for the 2003 analysis introduces considerable uncertainty. Bottom trawl tows are often lengthy (5 hours or more) and cover a considerable depth range. However, for each tow, only a single depth is often recorded in logbooks, and consequently, it is difficult to estimate the depth from which any individual animal is taken. Observer data – scheduled to become available in late 2002 – should provide some validation of logbook data, but are unlikely to provide a good understanding of depth-specific distribution. While the first year of observer data will not become available in time for establishing the Council's 2003 management measures, they should be useful for inseason adjustments during the 2003 fishing year.

The discard estimation methodology also assumes that baseline trawl activity in 2003 will be similar to the 1999-2001 level of activity, relies on an ad hoc formula to predict how effort will be redistributed to open areas, and assumes that catch per unit of effort (CPUE) will remain the same after effort redistribution. Recognizing that (1) the Groundfish Management Team (GMT) analysis is only the first part of a necessary, more comprehensive evaluation and (2) a full SSC review was not possible given the urgency of the work and its immediate application in the 2003 management measures process, the SSC considers the GMT analysis to be a reasonable way to proceed for the coming year.

The area closures being considered for 2003 are unprecedented. Effort shifts to the nearshore and slope areas may result in undue pressure in open areas with consequent crowding and safety concerns. A full SSC review of the 2003 environmental impact statement (EIS) was not possible as that document is still a work in progress. It is important the socioeconomics as well as environmental effects of the options be analyzed before the document is distributed for public comment.

The SSC looks forward to working with the GMT on further improvements of the methods and refinements in the data analysis. The Council may wish to sponsor a bycatch workshop to fully review the methodology and address other outstanding issues. The SSC's Economic Subcommittee (with support

from the SSC Groundfish Subcommittee) is willing to organize such a workshop.

C.7 – SSC Report on Update on Amendment 16 – Rebuilding Plans

Dr. Kit Dahl updated the SSC on the current status of Amendment 16, which incorporates rebuilding plans into the groundfish fishery management plan (FMP). Three options addressing "The Form and Required Elements of Rebuilding Plans" were advanced from the June Council meeting (options 1a, 1b, and 1c). Options 1b and 1c are inflexible as to accommodating new science or new data and may require significant administrative effort to implement, because they require numerical values for specified rebuilding parameters. The SSC emphasizes that the Council should expect numerical details of rebuilding plans (e.g., B_{MSY} or B_0) to change over time – whether due to improved estimates of these parameters from updated stock assessments, the development of new models, or due to technical errors that were not discovered in the previous stock assessment review. For example, the recent changes to the estimate of the 1999 year class for bocaccio and the biomass estimate for yelloweye rockfish have led to changes to virtually all of the biological rebuilding parameters. The use of hard numbers in the rebuilding amendment should be minimized in order to avoid the need to repeatedly amend the FMP with each stock assessment cycle. The SSC suggests that consideration be given to specifying only the formulae or algorithms for the biological parameters that govern the rebuilding process in the FMP amendment.

C.8 – SSC Report on Groundfish Stock Assessment Priorities for 2003

Dr. Rick Methot briefed the SSC on the working list of species planned for stock assessment review in 2003. The list is similar to that considered in June, with the omission of yelloweye rockfish, which was already fully reviewed in August 2002. Species identified for full assessment include whiting, lingcod, bocaccio, cabezon, and black rockfish. Updated assessments are planned for Pacific ocean perch (POP), darkblotched, widow, cowcod, and yellowtail rockfish. Dr. Ralston commented that Dr. Xi would be willing and able to conduct a full assessment of widow rockfish rather than an update. Dr. Methot noted that lead authors have yet to be identified for the lingcod, cabezon, and cowcod assessments. The cabezon assessment will be new, so the authors will need more lead time than other assessment teams if data are to be gathered and a new assessment model is to be developed.

The current list of groundfish assessment candidates is an ambitious one, even given the opportunity for holding expedited reviews. The longer list is a direct outcome of the multi-year management process, and may present challenges in finding an adequate number of assessment authors and independent experts for review. In the event that assessment authors cannot be identified, the long-term management consequences of postponement should be considered.

The SSC questions the practicality of holding four concurrent expedited reviews within a two-day panel. All assessments, full or expedited, can present unexpected problems, and each review panel will be unique in composition and perspectives. It may be wise to have contingency plans for assessments which cannot be resolved in the expedited review process.

Salmon Management

D.3 – SSC Comments on SSC Methodology Review

The SSC, in consultation with the Salmon Technical Team (STT), reviewed the status of the salmon methodology topics identified as possible review candidates at the April 2002, Council meeting. There has been little progress on most of these items due, primarily, to limited agency resources. Modifications to the chinook Fisheries Regulation Assessment Model (FRAM) for mark-selective fisheries are scheduled for review in October. Two other items, the Management Plan for Lower Columbia River coho salmon and coho FRAM Terminal Fisheries may have material for review in early 2003. Discussion of specific projects identified in April follows.

1. Klamath Ocean Harvest Model (KOHM) effort estimates for Ft. Bragg area: there has been no subsequent work. At the start of the March Council meeting the STT was going to use 1980s data to model 2002 Ft. Bragg effort in July and August. The STT responded to objections that the effort levels were inappropriate by modeling effort shifts from Monterey and San Francisco based on historical

contribution rates. By December they will have complete data from 2002 fisheries in the Ft. Bragg area. The STT will have a summary of the performance of the model by March 2003. At that time the Council can make a decision on the need for future reviews. The STT anticipates using the revised method for 2003.

2. Coho Impact Model (CIM) for California: additional coho encounter rate data have been gathered by the California Department of Fish and Game (CDFG). No analysis or modeling has been done.

3. Oregon Coastal Natural (OCN) coho salmon prediction methodology: no new predictors have been proposed.

4. Oregon Department of Fish and Wildlife (ODFW) Management Plan for Lower Columbia River coho salmon: the draft plan needs data cleanup and method improvements. A reviewable document may be available in early 2003.

5. FRAM for mark-selective fisheries: the Washington Department of Fish and Wildlife (WDFW) has modified the chinook FRAM to accommodate mark-selective fisheries. The SSC will review these modifications in October.

6. Columbia River Fall chinook abundance predictors: there has been some preliminary work on producing ocean run-size predictors for these stocks. No methodology review is needed at this time.

7. Coho FRAM terminal fisheries: The Coho Technical Committee (CoTC) of the Pacific Salmon Commission (PSC) is in the process of working to modify the coho FRAM for bilateral management. Upcoming changes are anticipated to include: breaking the September-December time step into separate September and October-December time strata; incorporation of additional fishery sequences in the final time step to accommodate preterminal/terminal/extreme terminal fisheries; and addition of fishery and stock strata for Canadian management. The CoTC anticipates these modifications will be ready for use in 2004 and wishes to schedule a status update for the SSC in January or February 2003.

8. Protocol for boundary changes: when management boundaries shift, the associated fisheries databases change so historical information is not consistent with new management areas. There are usually insufficient data to evaluate effects of boundary changes or to model fishery impacts based on the resulting new management areas. There are no proposals for a protocol.

Marine Reserves

E.1 – SSC Report on Marine Reserve Proposals for Channel Islands National Marine Sanctuary

The SSC's Marine Reserves Subcommittee met on June 10-11, 2002 in Portland, Oregon to review a Draft Environmental Document (DED) prepared by the California Department of Fish and Game that evaluated the effects of alternative marine reserve options at the Channel Islands National Marine Sanctuary (CINMS). The socioeconomic analysis contained in the DED was taken largely from a separate document prepared by Dr. Vernon Leeworthy and Mr. Peter Wiley (National Ocean Service). Mr. Wiley, who attended the Marine Reserves Subcommittee's June 10-11 meeting, was able to answer some of the Subcommittee's questions regarding the socioeconomic analysis. He also agreed to ask Dr. Leeworthy (who was not at the meeting) to respond to the SSC at a later date regarding SSC questions that Mr. Wiley could not address. On June 14, the Subcommittee received a memo from Dr. Leeworthy and Mr. Wiley (Exhibit E.1.a, Attachment 1). The Subcommittee shared that memo with the entire SSC at a June 16 meeting in San Francisco at which the results of the Subcommittee's review of the DED were discussed.

On August 14-15, the Council's Ad Hoc Marine Reserves Policy Committee met in El Segundo, California. At that time, the Committee requested the SSC prepare a response to the Leeworthy/Wiley memo. The SSC's response is attached to this statement. The response takes the form of specific comments that are embedded at appropriate points in the memo and are boldfaced and italicized to distinguish them from the original text of the memo.

The SSC's response to the Leeworthy/Wiley memo can be summarized as follows:

1. Information provided in the memo regarding the derivation of consumer surplus estimates for recreational activities at CINMS did not address the concerns expressed by the SSC Marine Reserve Subcommittee at our June 10-11 meeting. The SSC concludes that six of the eight consumer surplus estimates used in the socioeconomic analysis represent misinterpretations of the literature or errors in converting estimates from per-trip to per-day values. All six of these erroneous numbers underestimate the value of recreational fishing at CINMS.

2. In response to SSC concerns regarding the inappropriate use of price elasticities to predict increases in non-consumptive recreation associated with reserves at CINMS, the memo cites quality elasticities purportedly provided by Freeman (1995) as an alternative justification for their predictions regarding non-consumptive recreation. The SSC notes that this alternative justification is based on a misinterpretation of Freeman's results, that Freeman's numbers are not quality elasticities nor do they pertain to quality increases associated with marine reserves.

3. The memo does not provide any substantiation for the non-use benefits claimed for reserves at CINMS. The benefits transfer literature does not support the approach to non-use benefits taken in the socioeconomic analysis.

4. The socioeconomic analysis characterizes each of the marine reserve options in terms of whether the probability of relocating effort is "high," "medium," or "low" and whether the probability of crowding/congestion is "low" or "high." The memo does not address SSC concerns regarding the lack of data (particularly the lack of commercial fishing effort data) and analysis to support these conclusions. The statement in the memo that "We have no idea how fishermen will reallocate effort either across species or space after being displaced" confirms the uncertainties noted by the SSC in predicting the effects of effort relocation and crowding/congestion.

To summarize, the Leeworthy/Wiley memo does not address SSC concerns regarding the shortcomings of the socioeconomic analysis. In order to improve the analysis, it will be important that errors and misinterpretations of the literature be corrected, that sources of uncertainty in the analysis be explicitly identified, that all conclusions be carefully substantiated, and that monitoring, evaluation, and enforcement costs be estimated.

In addition to preparing a response to the Leeworthy/Wiley memo, the SSC also reviewed the draft letter prepared by the Council's Ad Hoc Marine Reserves Policy Committee to the California Fish and Game Commission (Exhibit E.1.b, Attachment). The SSC supports the Council's commitment to obtaining a complete regulatory analysis prior to making recommendations regarding reserves in federal waters at CINMS. Given the significant uncertainties that exist regarding the effects of reserves, the SSC also agrees with the Council regarding the need for long term monitoring and evaluation, as well as the need for effective enforcement. In addition, the SSC notes the importance of identifying specific criteria for evaluating progress toward meeting reserve objectives, developing a monitoring and evaluation program that provides a statistically valid basis for evaluating whether these criteria are being met, and incorporating monitoring requirements into reserve design. All of these tasks should be accomplished prior to the establishment of reserves.

Pacific Halibut Management

F.1 – SSC Report on Status of 2002 Pacific Halibut Fisheries

Dr. Rick Methot presented an updated report on Pacific halibut bycatch and mortality in the groundfish fishery with new estimates for 2001. Although no new data on halibut bycatch rates are available, total bycatch estimates for 2001 were derived from effort data by stratum from trawl logbooks in 2001 and halibut bycatch rates during 1995-1999 in the Enhanced Data Collection Program (EDCP). The estimates use methodology accepted by the SSC in September 2000, and are based on bycatch rates stratified by season, depth, latitude, and the level of arrowtooth flounder catch.

The SSC notes that observer data collected since August 2001 are scheduled to become available in late

2002. These data will make it possible to obtain annual estimates of halibut bycatch and mortality starting with 2002. For future updates, the SSC recommends use of the current year bycatch rate and halibut length composition to estimate bycatch and mortality. Given the ad hoc nature of using mean bycatch rates and proportion legal for strata without observations, the SSC encourages exploration of alternative approaches to handle missing data. The SSC notes that estimating halibut bycatch is conceptually no different than estimating bycatch of other non-target species, so adopting a uniform approach to analyzing observer bycatch data may be advantageous.

Other Matters

The SSC also discussed CPS STAR matters. Draft terms of reference will be developed by the CPS Subcommittee for review at the November meeting. The CPS STAR panel has been tentatively scheduled for September 2003.

Public Comment

No formal public comment was provided.

Adjournment

The SSC adjourned at approximately 5:30 P.M., Tuesday, September 10, 2002.

Research and Data Needs

From March 2002 –

Coho Fishery Regulation and Assessment Model needs documentation, postseason review, evaluation and validation. It might be useful to establish model evaluation committees. Need estimates of abundance in addition to preseason forecasts.

SSC may need to further define the requirements for model "validation."

Need review of coded-wire tag data.

Research recommendations from the market squid STAR Panel should be incorporated into Research and Data Needs document. Note recommendation for 2004 squid STAR Panel.

SSC Subcommittee Assignments

Salmon	Groundfish	CPS	HMS	Economic	Marine Reserves
Brian Allee	Ray Conser	Michael Dalton	Alan Byrne	Michael Dalton, Chair	Ray Conser
Alan Byrne	Michael Dalton	Alan Byrne	Robert Conrad	Martin Dorn	Michael Dalton
Robert Conrad	Martin Dorn	Ray Conser	Ray Conser	Cynthia Thomson	Martin Dorn
Kevin Hill	Robert Francis	Robert Francis, Chair	Kevin Hill, Chair		Tom Jagielo
Pete Lawson, Chair	Tom Jagielo	Tom Jagielo	André Punt		Pete Lawson
Shijie Zhou	Han-Lin Lai	André Punt	Cynthia Thomson		André Punt
	André Punt	Shijie Zhou			Steve Ralston
	Steve Ralston, Chair				Cynthia Thomson, Chair

PFMC
10/08/02

Attachment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Special Projects Office
Silver Spring, Maryland 20910

MEMORANDUM FOR: Pacific Fishery Management Council
SSC Marine Reserves Subcommittee

FROM: Dr. Vernon R. (Bob) Leeworthy
Peter C. Wiley
NOAA/NOS/Special Projects

SUBJECT: Responses to questions and comments on "Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary", April 29, 2002.

A Questions and Responses

Question 1. In the Net Assessment, where did the $8 million commercial fishing consumer's surplus estimate came from?.

Response 1. See pg. 108 "Commercial Fishing and Kelp".

The SSC is aware (as indicated on p. 108) that the Net Assessment assumes the value of the commercial fishery at Channel Islands to be similar to the value of the commercial fishery at the Tortugas Ecological Reserve at the Florida Keys National Marine Sanctuary. What the SSC is requesting is documentation regarding similarities between the Channel Islands and Tortugas fisheries that justify this assumption.

Question 2. Were there specific studies that the $3, $5, and $10 in non-use values came from or were they a range of estimates from the Desvouges and Carson papers?.

Response 2. See pg. 102 "What we know about nonuse economic values".

The SSC is aware of the source of the $3, $5 and $10 estimates. What the SSC is requesting is a substantive rationale for assuming that $3, $5 and $10 accurately reflect the non-use value of reserves at Channel Islands. (See SSC comments under Response to Comment 2 for further elaboration of our concerns regarding this issue.)

Question 3. What were the source(s) of the multipliers used in the recreation industry analyses?

Response 3. They were simply a range of multipliers taken from our experience. They are Keynesian type multipliers, which are not the same as sectoral multipliers that would be found in the U.S. Department of Commerce's Regional Information Management System (RIMS) or in the IMPLAN input-output models. The counties of Los Angeles, Ventura and Santa Barbara are relatively large and diverse economies and the multipliers used are at the upper range of County Keynesian type of multipliers from our experience. The range of multipliers is also important (See Appendix H) because of the lack of more detailed estimates on the amount of activity by residents of each county versus nonresidents of each county relative to the County of access.

The SSC agrees with the analysts regarding the importance of distinguishing expenditures by residents and nonresidents when estimating multiplier effects. However, based on the information provided in Response 3 ("They were simply a range of multipliers taken from our experience" and"...the multipliers used are at the upper range of County Keynesian type of multipliers from our experience"), the source of the multipliers is still not clear to the SSC.

Question 4. Were commercial fishing logbooks used?

Response 4. Generally the answer is no. In the beginning of the project, we attempted to obtain logbooks for the commercial fisheries. We found out that not all the fisheries had a logbook requirement and for those that did, the California Department of Fish and Game (CDFG) neither had a master list of who maintains which logbooks, but also that there were no standards for how information was maintained. Some maintained electronic databases others simply had information in paper files (not necessarily organized in any fashion for public consumption). Our contractor, Dr. Craig Barilotti, did obtain urchin logbooks and the information contained in them was used to check the data against what we obtained from the fishermen directly with respect to distribution of catch. The squid logbook forms were shown to us by the squid fishermen early in the project, but they were not yet implemented.

The SSC appreciates this clarification.

Question 5. How were the consumer's surplus estimates for recreation derived?

Response 5. Sent to you by e-mail from Pete Wiley early on Friday 6/14/2002. The question was how the person trip estimates in Wegge et. al. were translated to person days estimates. The answer is that they were divided by the mean number of days per trip found on page 30 (third paragraph up from the bottom).

The SSC's question regarding how Wegge's estimates were converted from a per-trip to a per-day basis reflects a number of larger concerns regarding the consumer surplus estimates contained in the Net Assessment.

The estimates of consumer surplus included in Table 1.20 (p. 30) of the Net Assessment include three multinomial logit estimates from Rowe et al. (1985), two travel cost estimates from Wegge et al. (1986) and three contingent valuation estimates from Wegge et al. (1986). These eight estimates (reproduced below from Table 1.20) are characterized in the Net Assessment as estimates of consumer surplus per person day. The average of these estimates ($11.58) was used as the basis for the consumer surplus estimates for recreational fishing and non-consumptive recreation provided in the Net Assessment (p. 28).

Rowe et al. (1985) multinomial logit estimates	***$ 6.90***	***Santa Barbara county, boat modes***
	$ 4.74	***Ventura county, boat modes***
	$ 7.29	***San Luis Obispo county, boat modes***
Wegge et al. (1986) travel cost estimates	***$ 5.33***	***Party/charter boat***
	$17.92	***Private boat***
Wegge et al. (1986) contingent valuation estimates	***$ 5.45***	***Party/charter boat***
	$15.00	***Rental boat***
	$30.00	***Private boat***
Average	***$11.58***	

The SSC's concerns regarding the above estimates are as follows:

1. The $6.90 estimate of consumer surplus is taken from Table 5.2 (p. 5-5) of Rowe's report and represents the expected loss of consumer surplus per trip associated with elimination of all boat modes in Santa Barbara county for anglers who reside and fish in Santa Barbara county. The $4.74 and $7.29 estimates are defined in a similar manner for anglers who reside and fish in Ventura and San Luis Obispo counties respectively. In order to properly interpret these numbers, it is important to note that Rowe's multinomial logit model predicts the choices made by anglers residing in each county regarding fishing mode and site on each choice occasion (i.e., occasions when they have already made the decision to go fishing). In other words, Rowe's Table 5.2 consumer surplus estimates do not reflect the value per trip for trips associated with a particular mode, county of residence and fishing county, but rather the value per choice occasion for anglers residing in each county. As Rowe himself indicates on p. 1-9 of his report, "The values ... apply to all trips [emphasis his] from each origin county." Due to this misinterpretation of Rowe's results, the SSC concludes that the $6.90, $4.74 and $7.29 estimates - as used in the Net Assessment - underestimate the per trip value of recreational fishing.

2. The $5.33 and $17.92 estimates were derived by converting two of Wegge's original consumer surplus estimates from a per-trip to a per-day basis. Based on the statement on p. 30 of Wegge's report that "The mean length of party/charter boat trips greater than 1 day was 4.13 days," the Net Assessment analysts derived the $5.33 estimate by taking one of the party/charter consumer surplus estimates ($22) from Table 16 (p. 38) of Wegge's report and dividing it by 4.13. The SSC notes that the $22 estimate should not have been adjusted downward, given Wegge's explicit characterization of the $22 as an estimate of consumer surplus per trip for party/charter boat trips of one day or less. Additionally, the analysts derived the $17.92 estimate by taking one of

Wegge's private boat consumer surplus estimates ($74) and dividing that by 4.13. The SSC notes that the $74 estimate should not have been adjusted downward either, given the statement on p. 30 of Wegge's report that "the mean length of private/rental boat trips greater than 12 hours was 22 hours." In addition to the $22 and $74 estimates, Wegge's Table 16 provides three other estimates of consumer surplus for party/charter boat trips of one day or less ($40, $91, $185) and two other estimates of consumer surplus for private boat trips ($61, $272). The SSC notes that, in addition to making inappropriate downward adjustments to Wegge's original $22 and $74 consumer surplus estimates, the Net Assessment provides no justification for why the $22 and $74 estimates were selected over the other consumer surplus estimates provided by Wegge for inclusion in the Net Assessment.

3. The $15 and $30 contingent valuation estimates are described in the Net Assessment as estimates of median consumer surplus per person day for rental and private boat mode; this characterization is consistent with Table 17 (p. 40) of Wegge's report. However, the SSC questions the $5.45 contingent valuation estimate, which represents Wegge's median consumer surplus estimate per party/charter boat trip ($22.50) divided by 4.13 days per trip. Given that (a) Wegge's $22.50 estimate pertains to all party/charter boat trips, regardless of length and (b) 4.13 is the average trip length for party/charter trips that are longer than one day (not all trips), the $5.45 obtained by dividing $22.50 by 4.13 underestimates value per angler day.

In addition to our concerns regarding six of the eight consumer surplus estimates used in the Net Assessment, the SSC notes the following:

1. The Rowe and Wegge consumer surplus estimates are based on surveys regarding fishing activity in 1981 and 1984 respectively. The SSC requests that these estimates be corrected for inflation to the 1999 base year used in the Net Assessment.

2. Given that Wegge's sample was drawn from subscribers to a sportfishing magazine, the SSC requests that the Net Assessment address the issue of whether Wegge's consumer surplus estimates are representative of the angling population as a whole.

Based on the above concerns, the SSC does not find the consumer surplus estimates for recreational fishing and non-consumptive recreation used in the Net Assessment to be adequately substantiated.

1. Comments and Responses

Comment 1. It is wrong to use price elasticity of demand as a proxy for quality elasticities of value as was done for the Step 2 analysis of non-consumptive recreation. This coupled with the fact that the estimates of quality elasticity are arbitrary made these benefits meaningless.

Response to Comment 1. We know it is not technically correct to use price elasticities of demand for quality elasticities of demand. The former represent movements along a demand curve and the latter represent shifts in the demand curve. In our application, the quality elasticities are not technically quality elasticities of demand, but instead quality elasticities of consumer's surplus. We should have cited Freeman (1995). What we found was that the range of price elasticities from the literature on recreation demand was not different from the quality elasticities found in Freeman (1995).

The Freeman (1995) study covered marine recreation. Most were fishing studies with a few beach, boating or swimming studies, and the quality parameters were mostly catch rate or water quality. (See A. Myrick Freeman III, 1995, The Benefits of Water Quality Improvements for Marine Recreation: A Review of the Empirical Evidence. Marine Resource Economics, Volume 10, pp 385-406.). We should have cited this study instead of the study on price elasticities.

There are few studies available with quality elasticities but we would argue that our estimated range of quality elasticities is not arbitrary. They do reflect a reasonable range of values for policy simulation and do provide useful information about the possible magnitude of potential benefits to a particular user group.

The Appendix to Smith and Kaoru's 1990 paper describes price elasticities from a number of travel cost demand studies involving a variety of recreational activities. In addition to being concerned regarding the manner in which the Smith/Kaoru's price elasticities are interpreted in the Net Assessment (which we discussed at the June 10-11 meeting), the SSC is additionally concerned regarding the manner in which the Freeman paper is interpreted in Response to Comment 1. The SSC's reservations are as follows:

1. The analysts' reference to "the quality elasticities found in Freeman" indicates that they are misinterpreting Freeman. Freeman's Table 5 provides estimates of value per trip associated with various percentage and absolute changes in catch rates; these estimates would have to take the form of percentage

changes in value associated with percentage changes in catch rates in order to be characterized as elasticities. Moreover, while the SSC agrees with Freeman's characterization of catch rates as a qualitative attribute of the fishing experience, it is not clear why catch rates are relevant to the "quality" of non-consumptive recreation at Channel Islands.

2. The analysts defend their use of price elasticities as a proxy for what they assume to be quality elasticities in Freeman by stating that "What we found was that the range of price elasticities from the literature on recreation demand was not different from the quality elasticities found in Freeman (1995)." Even if Freeman's numbers were quality elasticities (which they aren't), there is no basis for claiming an association between price elasticities and Freeman's numbers. Just because the range of estimates for a specific parameter obtained from one set of studies is "not different" from the range of estimates for a different parameter obtained from a different set of studies does not imply that these two parameters can be used as proxies for each other. There is no a priori reason to surmise that these two parameters have anything to do with each other.

In addition to questioning the basis of the quality elasticities used in the Net Assessment, the SSC considers the changes in "quality" of non-consumptive recreation (10%, 50%, 100%) attributed to reserves to be ad hoc and not substantiated and also questions the plausibility of applying these "quality" changes to all nonconsumptive recreational activities. According to Table 1.17 (p. 26) of the Net Assessment, the baseline distribution of non-consumptive recreational effort at Channel Islands is 62% whale watching, 26% non-consumptive diving, 10% sailing and 3% kayaking/island sightseeing. While an increase in "quality" associated with reserves may provide non-consumptive divers with better underwater viewing opportunities, it is not clear why whale watchers, sailors and kayakers would also benefit from such changes. The SSC requests that the Net Assessment either substantiate the assumption that changes in quality associated with reserves at Channel Islands would benefit all non-consumptive uses or restrict their claims regarding such benefits to non-consumptive diving.

Comment 2. The non-use value estimates found in the net assessment table (Table 3.29 on page 109 of your report) are not based on proper benefits transfer techniques. The studies in Desvouges were not marine resources and Carson has said that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate.

Response to Comment 2. First, your comments on proper benefits transfer techniques. You are going to have to back that up. I have organized two National Workshops on the topic of "Benefits Transfer" with the Association of Environmental and Resource Economists (AERE). The latter one was a formal follow-up to the first. "Benefits Transfer: Procedures, Problems, and Research Needs", 1992 Association of Environmental and Resource Economics Workshop, Snowbird, Utah, June 3-5, 1992. I have also assisted the U.S. Forest Service by teaching "Benefits Transfer" procedures to Forest managers (National Workshop on Obtaining Recreation Values and Economic Impacts, Chattanooga, TN, March 10-12, 1998). Our workshops both preceded and followed the special issue of Water Resources Research, Volume 28, Number 3, March 1992 devoted to benefits transfer. The conclusion from these workshops is that the profession is divided and could not come to consensus on a set of protocols and procedures. Several authors have presented sets of protocols and procedures, but they were not generally accepted. Most still fall back on professional judgement.

There are issues such as transferring values of functions (no consensus) or calibration (adjusting for various methods —direction and scale of adjustment coming from meta analyses). Again, no consensus. And, an important point is that these issues dealt with studies where use values were at issue. There has been very little attention given to transfer of nonuse values.

The benefit transfer literature (including the papers presented at the 1992 AERE Workshop and the papers in the March 1992 issue of Water Resources Research) demonstrates the thoughtful and methodical manner in which the benefits of an amenity are transferred from an original study site to a policy site. The literature reflects a careful attention to detail that the SSC considers highly appropriate, given the policy implications that often underlie the use of benefit transfer. The SSC agrees that there are no hard-and-fast rules for how to conduct benefit transfer. However, while different papers approach benefit transfer in somewhat different ways (transferring values, transferring functions, calibration), all make serious attempts to justify the benefit transfer by addressing the following issues:

1. whether the benefit estimates for the study site are technically sound and the data and analysis are adequately documented to provide a basis for benefit transfer;

2. whether the study and policy sites are similar - e.g., in terms of their characteristics and location, the

nature of the amenity being valued at each site, the baseline level and change in the amenity, the availability of substitutes for the amenity; and

3. whether the human populations expected to accrue benefits from the amenity at the study and policy sites are similar - e.g., in terms of their area of residence, site use, demographic and attitudinal characteristics.

It is this type of care and documentation that the SSC was looking for and did not find in the Net Assessment.

The SSC agrees with the analysts' statement that "there has been very little attention given to transfer of nonuse values." As indicated by Desvousges, Dunford and Mathews (p. 9 of their 1992 AERE Workshop paper "Natural resource damages valuation: Arthur Kill oil spill"), "Even in a full-blown analysis, nonuse values are extremely difficult to estimate. Economists have used contingent valuation to estimate nonuse values, and disagreement exists about its validity for this use. The difficulty of the situation is amplified in a transfer study." The SSC notes that the difficulties associated with transferring nonuse values are all the more reason to proceed cautiously and with full awareness of the limitations of current knowledge in this area.

Second, you say the studies in Desvouges were not marine resources. What evidence do you have that nonuse values for marine resources, especially the range from the lowest end of the distribution of values, would be any different from those from non-marine resources. There is none. In fact, we say there are no known studies of nonuse or passive economic use value for marine reserves (see pg. 101, Nonuse of Passive Use Economic Value).

With regard to the question - "What evidence do you have that nonuse value for marine resources…would be any different from those from non-marine resources" - the SSC is not aware of any evidence demonstrating similarities or differences in non-use values for marine and non-marine resources. Moreover, the burden of proof does not lie with the SSC. It is up to the Net Assessment analysts to clearly and methodically substantiate why it is reasonable to transfer benefit estimates from other valuation studies (marine or otherwise) to the Channel Islands. To simply assert that they can do it because the existing literature does not tell them that they can't is to provide no substantiation at all. The fact that "there are no known studies of nonuse or passive economic use value for marine reserves" merely points up the lack of information on which to base quantitative estimates of non-use value at Channel Islands.

Third, you cite Richard Carson as saying that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate. The statement is completely irrelevant. It is the same tact that the panel hired by Exxon used in attacking the estimates for nonuse value lost by the Exxon-Valdez Oil Spill. That panel attacked the contingent valuation method in general and especially it's use in estimating nonuse values. The NOAA Blue Ribbon Panel countered their findings. However, what you are implying is that any estimate that has wide variance is not useable. Many economists have found that the demand for any good or service can have wide variation depending upon functional form of the estimating equation or a host of other econometric issues. This doesn't make econometric estimates unusable. Many have found that prices for the same goods and services in the same markets have wide variation. Your point about the possibility of wide variation in any estimates of value are irrelevant, it applies in almost all cases.

The SSC is incorrectly characterized as using "the same tact that the panel hired by Exxon used in attacking the estimates for nonuse value lost by the Exxon-Valdez Oil Spill". The SSC made very clear at the June 10-11 meeting that our concerns pertained to the specific non-use value estimates applied to Channel Islands, not the concept of non-use value. Moreover, our June 2002 statement to the Council explicitly states that "…the SSC considers non-use value to be an essential component of cost-benefit analysis of MPAs at CINMS". SSC concerns regarding the non-use value estimates pertain to the methodology used in the Net Assessment to derive such estimates and should not be construed to mean anything more than that.

At the June 10-11 meeting, the SSC mentioned Richard Carson's work as a model for what good contingent valuation studies provide in terms of explaining the variation in value expressed by survey respondents. To surmise that the SSC concludes that "any estimate that has wide variance is not useable" is incorrect.

Our choice of $3, $5, and $10 was taken from the low end of the distribution of values from 19 studies of nonuse value in the literature. We argue that this biases the analysis against nonusers and we call these "conservative" estimates (see explanation on pg. 102 "What we know about nonuse economic values). We also use a very "conservative" (i.e., lower bound) estimate of the percent of U.S. households that might be willing to pay these

amounts. We use some National Surveys that would lend some support to our contention, as well as the fact that the Exxon-Valdez number were applied to 90 percent of the U.S. households and we were only applying the estimates to one (1) percent of U.S. households.

Our nonuse value estimates again apply a reasonable lower bound range of values for policy simulation and in our application, we find that even when biasing values upwards in favor of consumptive uses and downwards for nonusers and non-consumptive users, there would be Net National Benefits for marine reserves in the Channel Islands National Marine Sanctuary. We stand by that conclusion.

The SSC agrees that $3, $5 and $10 can be accurately characterized as "the low end" of non-use values for the particular survey populations and amenities covered by the 19 studies cited by Desvousges. However, it does not necessarily follow that $3, $5 and $10 are also "conservative" estimates of non-use value for reserves at Channel Islands. As indicated by our comments regarding benefit transfer (under Response to Comment 2), the Net Assessment provides no substantive basis for assuming any relationship between non-use value associated with reserves at Channel Islands and the non-use values associated with the studies cited by Desvousges, which pertain to such disparate amenities as bald eagles, whooping cranes, visibility at Grand Canyon, and water quality. Based on Carson's Exxon-Valdez work, the SSC agrees that 1% would be a "very conservative (i.e., lower bound)" estimate of the percent of U.S. households who comprise the extent of the market in terms of willingness to pay to avoid another Exxon-Valdez spill. However, the Net Assessment provides no substantive basis for assuming that the extent of the market for reserves at Channel Islands is 1% of U.S. households. As indicated in the SSC's June statement to the Council, the percentage used in the Net Assessment is arbitrary; the "true" percentage could just as well be 0.1%, 2% or any number of other percentages. In summary, the SSC can find no convincing basis for the analysts' conclusion that their non-use value estimates represent a "reasonable lower bound" for reserves at Channel Islands.

Comment 3. In your Step 2 analyses, you use the terms likelihood and low/high probability without statistical basis to back these claims up.

Response to Comment 3. We don't believe either of these two terms are in anyway restricted for use to only when one has a specific quantitative estimate based on a particular statistical procedure. All our statements in Step 2 analysis are based on our judgement bringing together quantitative information and qualitative information. Our judgements may not find consensus among all on the Socioeconomic Panel. When speculating on the future (short or long run) there is uncertainty and different judgements cannot either be proved or disproved. See our discussion in the Introduction to our report (page 1).

The Net Assessment evaluates the effects of the preferred option and the five other reserve options on the commercial fishery in terms of (1) whether the probability of relocating effort is "high", "medium" or "low", (2) whether the probability of crowding/congestion effects is "low" or "high", and (3) whether the likelihood of replenishment effects is "minimal", "medium" or "high" (pp. 81-83). For each reserve option, the Net Assessment also evaluates net benefits to consumptive recreational users in terms of whether they are "not likely", "likely" or "highly likely" (pp. 85-88). The SSC is not requiring (as suggested in Comment 3) that the terms "likelihood" and "probability", as used in the Net Assessment, have a statistical basis. However, the SSC is requesting clarification regarding the basis or thresholds that were used for classifying reserve options as high/medium/low or not likely/likely/highly likely under the various evaluation criteria. The analysts' Response to Comment 3 - "All our statements in Step 2 analysis are based on our judgment bringing together quantitative information and qualitative information" - does not provide the clarification requested by the SSC. Furthermore, with regard to the analysts' comment that "When speculating on the future (short or long run) there is uncertainty and different judgments cannot either be proved or disproved", the SSC notes that uncertainty regarding the future does not relieve the analysts of the responsibility to provide a substantive rationale for their conclusions balanced by appropriate caveats regarding sources of uncertainty. Given the absence of such a rationale, the SSC considers the conclusions in the Net Assessment regarding the effects of effort displacement and the effects of replenishment outside reserves to be unsubstantiated.

2. Suggestions and Responses

Suggestion 1. On page 5 of the report, last paragraph under the heading "Commercial Fishing and Kelp Harvesting", you say "It is not always true that there will even be short-term losses (Leeworthy, 2001a)". Put in example from Tortugas.

Response to Suggestion 1. We cite the report with the findings for the Tortugas. If someone wants to go check out the details they can access the report.

As pointed out by the analysts, the conclusion that "It is not always true that there will even be short-term losses" is drawn from the analysts' experience at the Tortugas. What the SSC wishes to know is whether this conclusion is intended to apply to Channel Islands and, if so, the basis for assuming a similar outcome for fisheries at Channel Islands and Tortugas.

Suggestion 2. Speculate about what other activities (i.e., other fisheries) that displaced fishermen might engage if displaced.

Response to Suggestion 2. We showed that the commercial fishing in the Channel Islands National Marine Sanctuary can be characterized as a multi-species fishery. We have no idea how fishermen will reallocate effort across either species or space after being displaced. This is the noted weakness in the current state-of-the-art in modeling (i.e., empirical applications of the Sanchirico and Wilen models and beyond). The only approaches available would be direct interview approaches asking the fishermen to say how they think they would change their behavior with respect to each of the proposed alternatives. Without some kind of additional research, we would not have any basis for such speculation.

The Net Assessment characterizes each of the reserve options in terms of whether the probability of relocating effort is "high", "medium" or "low" and whether the probability of crowding/congestion effects is "low" or "high" (pp. 81-83). It is not clear to the SSC how the analysts are able to draw such conclusions if, as indicated in their Response to Suggestion 2, "We have no idea how fishermen will reallocate effort either across species or space after being displaced."

The SSC is not asking the analysts to "speculate" about what displaced fishermen would do once reserves are established, estimate models that predict effort displacement or conduct additional interviews. The SSC appreciates the difficulty of predicting how displaced effort is likely to be distributed across fisheries and is not suggesting that the analysts make quantitative predictions in this regard. However, given the policy implications of effort displacement in terms of management of fisheries outside reserves, the SSC is suggesting that additional analysis of existing data be conducted to facilitate understanding of these implications.

The SSC suggests the following: According to the Net Assessment (p. 17), 737 commercial vessels participated in Channel Islands fisheries in 1999. The fish ticket data used to identify these vessels can also be used to identify the range of west coast fisheries in which these vessels participate, as well as the extent of their participation. Such information would provide a useful indicator of the fisheries that are likely to be considered viable alternatives by displaced vessels once reserves are established at Channel Islands. While the SSC recognizes the challenges associated with attributing fishing trips to specific fisheries, this can be done in a reasonable way by defining individual fisheries in terms of gear type and species composition of catch. Information on alternative fishing opportunities would be useful for alerting fishery managers to which fisheries outside Channel Islands may warrant closer monitoring or regulation as a result of effort displacement, as well as alleviating management concerns regarding fisheries that are not likely to be affected by effort displacement.

Suggestion 3. Estimate percent dependence on the Channel Islands for the population of fishermen in addition to your sample.

Response to Suggestion 3. As we have noted in the report, our sample is not a representative sample of all fishermen. It is biased towards the fishermen that account for most of the catch and value of catch. One cannot extrapolate to the general population of fishermen on the issue of dependence with this sample data. One can only get an idea of the extent of potential impact based on dependence with our sample. See tables 2.26 to 2.29.

Suggestion 3 is an abbreviated version of what the SSC recommended at the June 10-11 with regard to estimating dependence of commercial fishing vessels on Channel Island fisheries. Our specific recommendations are as follows:

1. The SSC suggests that the Net Assessment provide information not only on the extent of commercial fishing activity at Channel Islands (which is described to some extent in Table C.2) but also the extent to

which the 737 boats that fish at Channel Islands depend on fisheries both outside and inside Channel Islands. This type of information is available from fish ticket data.

2. While the Net Assessment includes information regarding aggregate ex-vessel revenue potentially lost under each reserve option (Tables 2.1, 2.5, 2.9, 2.13, 2.17 and 2.21), it provides very little information regarding the effects of each option on the fishing fleet. As indicated by the analysts in their Response to Suggestion 3, Tables 2.26-2.29 (pp. 53-55) provide information on the percentage of income potentially lost under each of the reserve options by fishermen who participated in the Barilotti and Pomeroy surveys. The analysts note that these samples are biased toward high-revenue vessels and further state that "...without sample weighting, extrapolating sample means (averages) to derive population totals would not be advisable. We are also evaluating the impact this might have on socioeconomic profiles" (p. C.3). Given the importance of the socioeconomic profiles for evaluating the effect of the reserve options on the commercial fishing fleet, the SSC requests that the analysts apply the sample weighting procedures needed to make these profiles representative of the population.

Suggestion 4. Estimate the potential loss of effort in addition to loss of ex vessel value. Look into PacFIN data to see if it would support it.

Response to Suggestion 4. This would require implementation of the Sanchirico and Wilen type models. We don't think this is possible at this time. We have reviewed all the fishery management plans and the literature on implementing such models and we find very little in the way of bioeconomic models or reliable catch-effort relationships for any fishery in the Channel Islands or elsewhere in California. The real issue is what will happen to displaced effort. See response to Suggestion 2 above. We attended the North American Fishery Economists meeting in New Orleans April 2001. Jim Wilen gave a presentation on the bioeconomic spatial model for predicting effort allocation as a result of hypothetical marine reserves for red urchins in Northern California. Jim concluded that even in the simple case of red urchins in Northern California (simple oceanography characterized by north to south current flow) model could only yield qualitative results about what happens to total effort and how effort would be reallocated. Quantitative estimates thought not to be reliable (current state-of-the-art). The Channel Islands have a much more complex oceanography. Also, the dominant fishery in the Channel Islands is for market squid. The latest report we reviewed with attempts to estimate fishery stocks from catch statistics were not very successful. This is an area that needs a lot of research and is certainly beyond the scope of our effort.

As indicated in our comments under Suggestion 2, the SSC is not asking the Net Assessment analysts to quantitatively predict how displaced effort is likely to be distributed across fisheries. However, given that the Net Assessment characterizes commercial fishing activity in terms of ex-vessel revenue rather than effort (e.g., Table 1.5, p. 13), it is not clear to the SSC how the analysts can conclude that crowding/congestion effects are "low" or "high" (as done on pp. 81-83) without even knowing how much effort might potentially be displaced. Given the potential implications of crowding/congestion outside the reserve in terms of gear effects on habitat, fishing costs and social conflict among fishermen, the SSC considers it important that the Net Assessment at least document the extent of existing fishing effort at Channel Islands. Such effort estimates can be derived from fish ticket data, using number of deliveries originating from the 22 area-of-catch blocks surrounding Channel Islands (p. C.34) as a proxy for number of Channel Islands trips.

Additionally, just as the Net Assessment analysts estimated displaced revenue associated with each reserve option by calibrating the relative distributions of fishing activity reported in the Barilotti and Pomeroy samples to aggregate ex-vessel revenue at Channel Islands reported on fish tickets, it should also be possible to obtain estimates of displaced effort for each reserve option by calibrating the Pomeroy sample distribution to aggregate squid/wetfish effort at Channel Islands and calibrating the Barilotti sample distribution to aggregate effort associated with other fisheries at Channel Islands. This can be accomplished by using information on gear type and species composition of catch reported on the fish tickets to distinguish squid/wetfish trips from other trips.

Finally, it is important to note that estimates of the total number of commercial vessels that fish at Channel Islands and the aggregate revenue earned by these vessels from Channel Islands fisheries - as reported in the Net Assessment (Table C.2) - are contingent on the reliability of the block data reported on the fish tickets. The estimates of displaced revenue associated with each of the reserve options (pp. C.1-C.2) - which were derived by calibrating the relative distributions of fishing activity reported in the Barilotti and Pomeroy samples to total revenue attributable to the blocks surrounding Channel Islands (pp. B.3-B.7) - are also contingent on the reliability of the block data. The SSC notes that the block data reported on the fish tickets

may not be fully reliable, as fish ticket information is provided by dealers who may or may not know where the fish that they receive were actually caught. Given the extent to which the Net Assessment relies on the block data, it is important that the reliability of the block data be identified as a source of uncertainty in the Net Assessment.