SUMMARY MINUTES

Scientific and Statistical Committee

Pacific Fishery Management Council
Clarion Hotel San Francisco Airport
Sausalito B Room
401 East Millbrae Avenue
Millbrae, CA 94030
(650) 692-6363
October 29 - 30, 2001

Call to Order

The meeting was called to order at 8 a.m. by Chair Cynthia Thomson. Dr. Donald McIsaac, Executive Director, provided opening comments and discussed the priority of items on the Scientific and Statistical Committee (SSC) agenda. The agenda was approved.

Members in Attendance

Dr. Brian Allee, Columbia Basin Fish and Wildlife Authority, Portland, OR
Mr. Alan Byrne, Idaho Department of Fish and Game, Nampa, ID
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Ramon Conser, National Marine Fisheries Service, La Jolla, CA
Dr. Michael Dalton, California State University, Monterey Bay, CA
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. Peter Lawson, National Marine Fisheries Service, Newport, OR
Dr. Andre Punt, University of Washington, Seattle, WA
Dr. Stephen Ralston, National Marine Fisheries Service, Santa Cruz, CA
Dr. Gary Stauffer, National Marine Fisheries Service, Seattle, WA
Ms. Cynthia Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Shijie Zhou, Oregon Department of Fish and Wildlife, Portland, OR

SSC Reports to the Council

Groundfish

SSC Statement on Final Groundfish Harvest Levels for 2002

As part of the process of setting harvest guidelines for the 2002 groundfish fishery, the Groundfish Management Team (GMT) has undertaken a more comprehensive analysis of bycatch rates than was carried out in the past. The SSC discussed this analysis in some depth under Agenda Item C.4. With respect to final harvest levels for 2002, the new GMT analysis, including revised bycatch and discard estimates, is considered to be the best way to proceed for the coming year (see SSC Statement on Management Measures for 2002 and Environmental Assessment [EA] for details).

With regard to the 2002 optimum yield (OY) for shortspine thornyhead, the SSC recognizes that it had not provided advice to the Council on a preferred alternative during the September 2001 Council meeting. In many ways, the analysis and data employed in the new stock assessment are improvements over the previous assessment carried out in 1998. However, the SSC notes that the Stock Assessment Review (STAR) Panel review in July 2001 indicates the assessment and, in particular the 2002 stock projections, remain highly uncertain. If the Council wishes to be risk-averse, the “Low OY” alternative is warranted (751 mt – Exhibit C.3, Attachment 1).

The SSC discussed the results from the National Marine Fisheries Services Alaska Fisheries Science Center (NMFS-AFSC) Shelf Survey conducted during June-August 2001. While it is encouraging to see estimates of incoming recruitment for sablefish at higher levels than in the recent past, the SSC cautions that these early indicators of year-class strength are uncertain, and it will take at least another year or two of data (survey + fishery) to better determine year-class strength. Further, the SSC notes that the results of the 2001 NMFS-Northwest Fisheries Science Center (NWFSC) Slope Survey, when available, should provide much better indices of exploitable biomass for the Dover sole/thornyhead/trawl-caught sablefish complex (DTS) species than those indices provided by the 2001 shelf survey. In the absence of quantitative analyses of the 2001 survey indices (shelf and slope surveys) conducted in concert with the relevant stock assessment model, the Council should not consider modification of 2002 OY's in response to the newly available 2001 shelf survey data.

SSC Statement on Management Measures for 2002 and Environmental Assessment

As part of the process of setting harvest guidelines for the 2002 groundfish fishery, the GMT (in conjunction with NMFS, state agencies, and the SSC) has undertaken a more comprehensive analysis of bycatch rates than was carried out in the past. Dr. Jim Hastie presented Evaluation of Bycatch and Discard in the West Coast Groundfish Fishery (Exhibit C.3, Supplemental Attachment 3). He described new methodology and the use of additional sources of data to estimate bycatch rates and discards. In the past, *Sebastes* discard rates were largely determined from the observed discard of widow rockfish across all fishing strategies from the Pikitch study (1988). In recent years, several analyses have been done that used logbook, Enhanced Data Collection Program (EDCP), and other data to estimate discard rates for lingcod and the DTS species. In this year's analysis, a new approach was adopted that involves calculating bycatch rates of overfished species in the context of specific target strategies, then calculating discards by assessing, on a vessel basis, the degree to which bycatch exceeds available landings limits for each species. Simulation analysis was also carried out to examine the effect of high variability in the estimation of key bycatch rates on the subsequent discard estimates.

Recognizing that (1) the GMT analysis is only the first stage of a more comprehensive evaluation that will be undertaken over the next two years, and (2) a full SSC review was not possible given the urgency of the work and its application in the 2002 landed catch OY-setting process, the SSC considers the GMT analysis to be the best way to proceed for the coming year. The analysis is well thought out and makes more comprehensive use of the available data than the work used in previous years. The SSC looks forward to working with the GMT on further improvements of the methods and refinements in the data analysis.

Mr. John DeVore and Mr. Jim Seger overviewed the contents on the draft Environmental Assessment/ Regulatory Impact Review (EA/RIR) for the proposed 2002 groundfish Acceptable Biological Catch and Optimal Yield Specifications and Management Measures for the Pacific Coast Groundfish Fishery (Exhibit C.4, Supplemental Attachment 1). The SSC notes that the document provides a basis for evaluating the impact of alternative harvest levels, assumed discard rates, and season options. The version of the document supplied to the SSC does not include information regarding bycatch alternatives, but this will be included in the version presented to the Council.

The alternatives considered in the EA/RIR attempt to capture a range from the status-quo to reducing the impact of reduced OYs on the size of trip limits through seasonal modifications. The draft EA/RIR only considers a subset of the possible alternatives. Additional alternatives, which may include modification of season length, may be developed and refined during Council deliberations. No formal analyses of the alternatives are included in the EA/RIR, precluding a review by the SSC. The tables included in the draft EA/RIR nevertheless, do provide a basis for consideration of the impact of management measures on gross revenue, but little information relative to costs and community impacts.

Benefits and costs of seasonal alternatives may have substantial impacts on different segments of the fleet and processors. The document includes economic information gathered during a survey of trawlers conducted several years ago, as well as processor data recently provided by the West Coast Seafood Processors Association. While the representativeness of these data has not been evaluated, they nevertheless illustrate the usefulness of industry cost data for evaluating the effects of management options.
For the immediate issues at hand, the SSC recognizes the desirability of incorporating the available trawl

and processor data in the EA/RIR for purpose of eliciting public comment. Given continuing expectations regarding the need for economic analyses, the SSC encourages the collection of additional economic data for all fishery sectors by means of designed surveys or through interviews with key participants. These data collections should be conducted independently of specific management issues and should occur periodically to reflect changes in fishery conditions.

SSC Report on Groundfish Strategic Plan Implementation

Dr. Astrid Scholz briefed the SSC on the Groundfish Fleet Reduction and Analysis (GFR) Project. The GFR project is a joint effort of Ecotrust and the Pacific Marine Conservation Council (PMCC). The goal of the project is to provide databases and policy tools that will facilitate Council deliberations regarding groundfish capacity reduction. The project expects to receive $150,000 in funding, largely from foundations, and has a stated completion date of September 2002.

The SSC has the following comments regarding the GFR project:

The project will involve creating databases of existing fishery and community information from a variety of sources, providing spatial depictions and analyses of such data, and developing policy tools that allow the Council to evaluate capacity reduction options in a way that considers fishery, ecosystem, and community effects. The analyses will range from descriptive summaries to models that predict industry response to regulatory changes. The project description is not specific enough to allow the SSC to comment on its technical merit. Even given this non-specificity, it is clear the scope of the project is much too ambitious to be accomplished with the available funding or within the stated time frame. The SSC recommends Ecotrust focus on one or more aspects of the project that will allow them to provide a tangible and useful product by the stated deadline.

The SSC commends Ecotrust/PMCC for attempting to develop their project in concert with the Council and the fishing industry. Continuing consultation with the Council family will be important for determining how their databases and analyses should be customized to ensure the results are meaningful and useful for management. Continuing consultations with Council entities, particularly the Groundfish Advisory Subpanel, as well as other members of the fishing community, will also be important for encouraging trust. Without such trust, it will be very difficult for Ecotrust to obtain cooperation or to instill confidence in the results of their project.

It is important for Ecotrust to recognize that the willingness of individual members of the Council family to provide input to their project should not necessarily be construed as endorsement of the project. If Ecotrust is seeking endorsement, they should be careful to obtain permission from individuals before using their names or their organizations in that manner.

Salmon

SSC Report on Results of SSC Salmon Methodology Review

The SSC Salmon Subcommittee and the Salmon Technical Team (STT) jointly sponsored a meeting on October 22 and 23, 2001 in Portland, Oregon to provide a thorough overview of both the coho salmon Fishery Regulation and Assessment Model (FRAM) and the Klamath Ocean Harvest Model (KOHM). The SSC is appreciative of the effort made by the STT and specifically, Mr. Jim Packer and Mr. Larrie LaVoy of the Washington Department of Fish and Wildlife (WDFW) for their presentation of the coho FRAM and Mr. Michael Mohr of the National Marine Fisheries Service (NMFS) for his presentation of the KOHM. Their respective discussions allowed the SSC a unique opportunity to better understand both of these models.

Development of both models has progressed rapidly in the past few months, as the modelers push to be ready for 2002 season setting. Both model revisions represent substantial improvements over the models currently in use. However, at this point neither model is ready for use. The SSC is prepared to approve both models for use in 2002, provisional on completion of tasks detailed in the following discussions. The SSC Salmon Subcommittee and the STT have scheduled two joint meetings in early 2002 to review the models for final approval. The coho FRAM meeting is scheduled for early January while the KOHM meeting will be held in early February 2002. If the models are not deemed ready for use at that time then

the previous versions will be used for 2002 season setting.

Coho FRAM

The coho cohort analysis project, which has been underway since 1994, has been completed. Complete cohort data for the years 1986-1991 have been generated for all pertinent coho salmon stocks. These data include estimates of exploitation rates and contribution rates for all stocks and fisheries; the numbers of modeled stocks and fisheries have been substantially increased from the previous base period data used in the coho FRAM. The coho cohort analysis project was a major undertaking that is reflected by the amount of time required for its completion. All those that contributed to the completion of this project are to be commended.

The major proposed change to the coho FRAM model for the 2002 salmon fishery management process is to replace the old 1979-1981 base period data with the new 1986-1991 base period data from the coho cohort analysis. The new base period data are a significant improvement in stocks and fisheries covered by the model compared to the 1979-1981 base period. There are no changes proposed to coho FRAM for the overall fishery impact assessment methodologies or the algorithms used in the model. Other changes that will occur if the new 1986-1991 base period is adopted are:

The number of modeled stocks increases from 37 to 128.
The number of modeled fisheries increases from 66 (27 Council fisheries) to 206 (25 Council fisheries). For Council fisheries, the separate Eureka and Crescent City fishery areas in the old base period have been combined into a single fishery in the new base period (California-Klamath Management Zone [KMZ]).
The number of modeled time periods has decreased from 13 monthly periods (December to December) to four periods (January–June, July, August, September-December).

Currently, the coho FRAM has been run using each of the new base period years individually. The most critical problem that must be resolved before FRAM could use the new base period data is a methodology for combining or “averaging” fishery exploitation rate and stock contribution rate estimates across the six base period years. There was considerable discussion of how this might be done. Work efforts on the coho FRAM during the next two months will focus on resolving this issue.

If the above problem can be resolved, there are several additional issues related to coho FRAM data input and output that must be addressed before the new base period data can be used in the 2002 salmon fishery management process:

1. Preseason forecasts will be needed for each of the 128 modeled stock units in the new base period. Those responsible for producing these forecasts need to be aware of these new requirements and prepare forecasts in a format compatible with the updated FRAM. Many of the added stocks currently have separate forecasts that are combined for the current FRAM.
2. All output reports needed for the Council, South of Falcon, and North of Falcon management processes must be developed and need to incorporate the new stocks and fishery units.
3. The Terminal Area Management Models (TAMMs), which have been external to the FRAM model with the old base period, will now be internal to the model. Those who have supplied input for the TAMMs in the past need to know the new data requirements and formats for this information to be used in the updated FRAM. In addition, reports analogous to the TAMM output sheets will need to be developed.
4. Washington coastal coho stocks are now part of the updated FRAM where they were not in the past. Analyses for these stocks have been conducted external to the model. A decision needs to be made whether this will continue or whether the updated FRAM will now be used for these stocks.
5. There are a number of other management models that use output from the FRAM as input. Users of these models need to make sure the developers of the updated FRAM are aware of their data requirements so these data are available during the management process.

Finally, the SSC recommends that Model Evaluation Subgroups be formed for both the coho and chinook FRAM models. These groups should have participants from all interested agencies. The purpose of these groups would be to:

Increase the number of people who: understand the model, can run the model, and can make changes to the model, so the departure of any single person does not disrupt the viability of the FRAMs.
Propose changes to the model which would improve the model for its intended management purposes.
Review and validate changes to the model.
Conduct a postseason assessment of model performance.
Develop comprehensive documentation.

Klamath Ocean Harvest Model

The KOHM revision is near completion, and the model may be ready to use for setting the 2002 fisheries. The revision included transferring all supporting data from spreadsheets into databases, error checking of all data, and converting the KOHM from a spreadsheet into a programming language. Two new databases were created: a Regulation database documenting all ocean chinook fishery regulations since 1978 and an Effort database that documents the number of chinook landed and effort in the sport and commercial fisheries. A revised cohort analysis, using the corrected data, was done on the five components (Trinity hatchery fingerling, Trinity hatchery yearling, Iron Gate Hatchery fingerling, Iron Gate Hatchery yearling, and natural fish) of the Klamath fall chinook production. Many of the parameters used in the KOHM have changed as they are derived from the cohort reconstruction. The new KOHM models contact rates (defined as number of chinook brought to the boat) as a function of effort. There is a direct and explicit link between fishing effort and the number of days the fishing season was open in each unit.

The KOHM revision is a vast improvement of the model. Major components of the model are designed as independent sub-models which can be revised as our understanding improves (e.g., size at age, contact rates vs. effort). Documentation of the models and the supporting data sets is impressively thorough and comprehensive, greatly enhancing the utility of the model.

Mr. Mohr stated there are three unresolved issues: (1) how to account for non-Klamath catch, primarily from the Rogue River and Central Valley; (2) what is the appropriate contact rate to use for naturally produced fish and; (3) a comparison of the new model with the old model and, more importantly, a hindcast of the new model using abundance and harvest estimates from previous years.

Important changes and improvements incorporated into the new model include:

1. The model uses ocean abundance estimates beginning September 1 rather than May 1 allowing earlier fisheries to be modeled.
2. Drop off mortality, shaker mortality, and straying are modeled.
3. Sport and troll fisheries are modeled in all units on a monthly basis.
4. The KMZ was split into Oregon and California units: KO (California-Oregon border to Humbug Mountain) and KC (California-Oregon border to Horse Mountain.
5. The Southern California (SOC) unit was split into two units: SF (Pt. Arena to Pigeon Pt.) and MO (Pigeon Pt. to Pt. Sur).
6. The proportion of legal size fish in a unit is now based on a size-at-age model.
7. There is monthly accounting of natural mortality.
8. The base period used for cohort reconstruction was expanded from 1986-1990 to 1986-present.
9 There is age specific accounting of river fisheries and spawners.

SSC Comments on Queets River Coho Status Review

Mr. Dell Simmons presented the STT's Queets Coho Stock Assessment to the SSC. The Queets system is unique in the richness of data appropriate for coho salmon productivity analysis. The analysis presented by the STT makes a good case that poor marine survival was the immediate cause of the low spawner escapements in 1997, 1998, and 1999. Breaking out the factors of harvest, marine survival, and freshwater survival, and isolating the effect of each on natural spawner escapements was an effective technique.

The SSC also discussed Washington Department of Fish and Wildlife's response and concluded it did not change our evaluation of the STT status review.

The SSC agrees a review of the maximum sustainable yield escapement range for Queets natural coho is warranted; however, the SSC does not necessarily agree the data suggest the range should be lowered.

Marine Reserves

SSC Report on Status of Marine Reserves Proposals for Channel Islands National Marine Sanctuary

Introduction

In April 2001, Mr. Matt Pickett, Mr. Sean Hastings, and Dr. Satie Airame of the Channel Islands National Marine Sanctuary (CINMS) made a presentation to the SSC in which they described the process being used to consider marine reserves at CINMS. They described the roles of the Sanctuary Advisory Council, the Marine Reserves Working Group (MRWG), the Science Advisory Panel, and the Socioeconomic Panel in that process. They also described work conducted by the Science Panel to map and characterize habitats within the CINMS and the algorithm used to ensure each habitat type would be adequately represented within reserve areas. The SSC was impressed by the site selection algorithm developed by the Science Panel.

At the April meeting, the CINMS also informed the SSC of the Science Panel's recommendation for a reserve size of 30%-50% for all CINMS waters and, in justification, provided a table listing references from the marine reserve literature. However, the conclusions that could be drawn from the citations in the table and the Science Panel's size recommendation were not fully persuasive to the SSC. The SSC, therefore, requested that the CINMS provide written documentation of the rationale underlying the Science Panel's 30%-50% size recommendation. The CINMS subsequently provided the SSC with a draft document dated May 23, 2001 and entitled "How Large Should Marine Reserves Be?" The CINMS also provided the SSC with copies of many of the references cited in that document.

At the June 2001 Council meeting, the SSC offered to create an SSC Ad-Hoc Marine Reserve Committee to meet with CINMS and the Science Panel to further review the reserve size recommendation and its potential relevance to the Council's future consideration of marine reserves, particularly for the groundfish fishery. The Council accepted the offer. The meeting was held on October 1-2, 2001 in Santa Barbara, California. The meeting itself was devoted to three specific discussion points: (1) the analytical basis for the Science Panel's 30-50% reserve size recommendation, (2) the relationship between the reserve size recommendation and existing management controls, and (3) the extent to which the approach underlying the Science Panel's reserve size recommendation can be generalized to the West Coast groundfish fishery. The SSC appreciates the participation of the Science Panel and CINMS staff at that meeting.

After the meeting in Santa Barbara, the CINMS provided the SSC with a slightly revised version of their draft report entitled "How Large Should Marine Reserves Be?" (dated October 17, 2001). The purpose of this statement is to summarize SSC's conclusions derived from the new Science Panel draft report and the discussions that occurred at the Santa Barbara meeting. This statement to the Council constitutes an independent peer review of one aspect of the marine reserve deliberations conducted at CINMS, namely the Science Panel's recommendation regarding reserve size. The SSC notes that this statement should not be interpreted as a comprehensive review of marine reserve deliberations at the CINMS.

In order to evaluate the Science Panel's size recommendation, it is important to first understand their specific charge. The Science Panel was asked by the MRWG to evaluate the size of marine reserves at CINMS needed to achieve two goals: (1) to protect representative and unique marine habitats, ecological processes, and populations of interest (hereafter referred to in this statement as the "biodiversity" goal), and (2) to achieve sustainable fisheries by integrating marine reserves into fisheries management (hereafter referred to in this statement as the "sustainable fisheries" goal). To facilitate their consideration of these goals, the Science Panel was provided with a list of 119 plant, invertebrate, fish, mammal, and bird species of particular concern in the CINMS. The list included: (1) economically and/or recreationally important species, (2) keystone or dominant species, (3) species listed or proposed for listing under the Endangered Species Act, (4) species that have shown long term declines in harvest and/or size structure,

(5) habitat-forming species, (6) indicator or sensitive species, and (7) important prey species.

Specific Comments

Given this background, the SSC has the following comments relative to the three specific discussion topics at the Santa Barbara meeting.

Topic 1. What is the analytical basis for the Science Panel's 30%-50% reserve size recommendation?

The Science Panel provided the SSC with various types of evidence (i.e., factors) relating to their 30%-50% reserve size recommendation, including (1) the Council's default harvest rate policy for rockfish, (2) dispersal rates of macro-algae, invertebrates and fish, (3) concerns about emerging fisheries, and (4) a general review of the marine reserve literature. While factor (4) represents the major driving force behind the Panel's size recommendation, a brief discussion of factors (1)-(3) is warranted before addressing factor (4).

Factor (1): At the Santa Barbara meeting, a Science Panel member made a presentation asserting that the 30%-50% reserve size recommendation is consistent with the Council's default harvest rate policy for rockfish (i.e., $F_{50\%}$ with 40:10 precautionary adjustment). The SSC notes the following regarding that assertion: (a) The Council's harvest rate policy seeks to maintain groundfish populations at a level equal to 40% of the unfished level ($B_{40\%}$) by reducing the exploitation rate when biomass drops below the target. If 40% of the available habitat were set aside in no-take reserves, that alone might be expected to provide long term protection to 40% of the stock, which would nominally satisfy the Council's spawning stock preservation requirements. The stock within reserves, combined with the portion of the stock residing outside of reserves would then represent an aggregate level of abundance in excess of $B_{40\%}$. (b) With respect to harvest rate, $F_{50\%}$ is the mortality rate that reduces spawning per recruit to 50% of that expected in the absence of fishing. Unless recruitment is completely independent of stock size, reductions in recruitment due to the effects of fishing at an $F_{50\%}$ rate will reduce the total spawning potential of the stock to a level lower than 50% of virgin conditions, often substantially lower. Given both these considerations, the SSC does not view a 30%-50% area set aside for marine reserves as equivalent to the Council's default harvest policy.

Factor (2): The Science Panel provided information showing that dispersal distances of fishes, in contrast to macro-algae, are relatively large (i.e., 10km-1,000 km). Thus, to ensure reserves replenish themselves, and do not simply export their larvae to unproductive areas, reserves for fishes must be large and/or highly networked. Recognizing there is little assurance that reserves within CINMS will be self-sustaining for species with large dispersal distances, such as groundfish, the Science Panel felt that large reserves within CINMS would at least enhance the self-sustainability of species with lesser dispersal ranges.

Factor (3): The Science Panel noted that emerging fisheries frequently require management attention to remedy inadequate controls on fishing during fishery development. Thus the benefits of marine reserves could extend to species that may become targeted in emerging fisheries. The SSC agrees with this point.

Factor (4): The Science Panel and CINMS staff provided the SSC with a histogram that depicted the distribution of optimal marine reserve sizes indicated by studies from the literature. The resulting distribution was very broad, ranging from 5%-80% of available habitat. Most of the studies that were cited indicated a minimum of 10%-40% of marine habitats would need to be protected to conserve ecosystem biodiversity, and 20%-50% of fishing grounds would need to be protected for fishery sustainability. The central tendency of the two distributions occurred in the range of 30%-50%. It was this result that provided the primary impetus for the Panel's reserve size recommendation. The SSC notes the following regarding the Science Panel's rationale under Factor (4):

In addressing the biodiversity goal, the Science Panel operated under the premise the inclusion of habitats in proportion to their occurrence within the reserve could be expected to provide broad ecosystem protections. In terms of protecting populations of interest, which were defined to include 119 diverse plant and animal species, the Panel assumed the best way to ensure protection of those populations

was to protect representative habitats. The SSC considers the Panel's approach to addressing the biodiversity goal to be reasonable, particularly given the large number and diversity of species the Panel was asked to consider and the limited information available regarding the life history and current status of many of those species.

While many of the studies from the literature cited by the Science Panel indicated a minimum 10%-40% of habitat would be needed to conserve biodiversity, the Panel noted that biodiversity benefits increase continuously with reserve size. Biodiversity per se cannot be used to establish an upper bound on reserve size. In other words, the upper bound on reserve size is driven more by the sustainable fisheries goal than the biodiversity goal.

The reserve size recommendations made in the studies cited by the Science Panel depend critically on assumptions about how well fisheries are managed prior to the establishment of reserves and/or how well they are managed in the open areas once reserves are in place. Significantly, many of these studies assume negligible or loose effort controls in the open area, which predisposes them to conclude that large reserves are required to achieve fishery sustainability.

The Science Panel identified the existence of an emerging body of spatial meta-population literature which suggests that effort controls alone are incapable of matching sustainable yields that are, in theory, possible when using a combination of methods. Beyond noting the existence of such a literature, they did not specifically link this literature to their reserve size recommendation.

Topic 2. What is the relationship between the Science Panel's reserve size recommendation and existing management controls?

As indicated under Topic 1, the Science Panel's size recommendation was based on results from studies that largely assumed existing management measures are ineffective or non-existent. The Panel felt this assumption applied to many of the species in CINMS. Their conclusion was not based on systematic analytical assessments of populations within the CINMS, but on a variety of trend indices and other types of information for a limited number of species. The SSC was unable to evaluate the general validity of this conclusion, given the limited documentation provided regarding state fishery management practices and the status of stocks within CINMS. Clearly some resources are in jeopardy (e.g., abalone), while others (e.g., market squid) are considered to be robust.

The Science Panel was instructed to consider the 119 populations of interest identified at CINMS to be circumscribed by the boundaries of the CINMS, thus invoking a non-biological definition of the term "population". This was done in recognition of the fact the CINMS has no authority over areas outside its boundaries. Even so, because the biological populations of virtually all species within the CINMS extend well beyond its boundaries, this is an oversimplification. Consistent with this narrow geographic focus, the Panel's reserve size recommendation was not tempered by any explicit consideration of fishery regulations outside of the CINMS and the conservation benefits that such regulations might provide to resources dwelling within the CINMS.

According to the Science Panel's October 17 draft report, "To enhance conservation benefits and the potential for fisheries to be sustainable over the long-term, the science advisory panel recommended either limiting catch outside of the reserves to current levels or reducing catch if current levels are insufficient to achieve sustainability". Given that the Panel's 30%-50% size recommendation is based on studies that generally justify large reserves as a substitute for management using more traditional measures (effort/catch controls), a reserve size of 30%-50% should reduce the need for strict controls in the open area. A number of studies cited by the Panel suggest the same sustainable fisheries benefit can be achieved (1) with controls on fishing effort alone, (2) with marine reserves and no restrictions on effort in the open area, or (3) with some combination of these approaches. The Panel's recommendation regarding the need for catch restriction outside a 30%-50% reserve appears to ignore the trade-off between reserves and traditional fishery management.

Topic 3. To what extent can the approach underlying the Science Panel's reserve size recommendation be generalized to the West Coast groundfish fishery?

Because the Council will be considering marine reserves under the auspices of the Magnuson-Stevens Act, a biodiversity conservation goal is not likely to be equally weighted with a sustainable fisheries goal, as it was by the Science Panel. Moreover, because of data limitations, the habitat inventory developed for CINMS to address the biodiversity goal by protecting habitats in proportion to their occurrence will be difficult for the Council to replicate with similar resolution on a coastwide basis.

As indicated earlier, the Science Panel's reserve size recommendation is derived largely from studies that assume poor to nonexistent fishery management. As such, the Panel's size recommendation is not broadly applicable to situations where traditional fishery management measures contribute significantly to sustainable fishery management. In conducting its own deliberations regarding reserve size for the groundfish fishery, the SSC recommends the Council be selective in terms of focusing on empirical studies that are most relevant to West Coast groundfish and on theoretical models based on assumptions that realistically reflect conditions in the groundfish fishery, where restrictive management measures have been implemented.

The marine reserve papers from the literature that were pivotal to the Science Panel's size recommendation consist largely of theoretical studies and a limited number of empirical studies; very few pertained to the U.S. West Coast. Any assertions that marine reserves provide similar benefits on the West Coast as they do elsewhere should be viewed with caution and subject to verification.

The Science Panel was not asked merely to provide scientific advice regarding the ecological/biological implications of alternative reserve sizes for achieving the separate goals of biodiversity conservation and sustainable fisheries. They were asked to provide a single reserve size recommendation by balancing the two goals, a task that was complicated by the fact that biodiversity benefits were thought to increase with increasing reserve size. The difficulties associated with achieving a balance in these goals may have been minimized and masked by results from the literature suggesting similar reserve sizes might be appropriate to achieve fishery sustainability and meet minimum biodiversity requirements. Nevertheless, the balancing of goals done by the Science Panel essentially makes their size recommendation a policy rather than a scientific recommendation.

In the context of Council groundfish management, an attempt is usually made to distinguish "risk-neutral" recommendations from "precautionary adjustments" when technical information is presented to the Council, with an accompanying decision table that allows the Council to assess the implications of uncertain decision making on its part. This procedure clearly separates science from management, as levying precautionary adjustments in the face of uncertainty is ultimately a policy decision, not a scientific one. Some of the studies cited by the Science Panel, however, incorporate insurance against management uncertainty as a factor influencing optimal reserve size. Thus, size recommendations derived from such studies should be interpreted in the Council context as precautionary rather than risk neutral.

Because socioeconomic issues were considered in a separate and independent process at CINMS, the Science Panel did not include members with socioeconomic expertise, nor were they provided access to socioeconomic information. It was, therefore, inevitable that their policy recommendation regarding reserve size would exclude any explicit consideration of socioeconomic factors. In the Council context, policy guidance of the type provided by the Panel would need to be informed by information on short-term transition costs, long-term benefits and costs, and other relevant socioeconomic information in order to meet the requirements of the National Environmental Policy Act.

General Conclusions

Given the mandate of the Science Panel and the constraints under which they conducted their deliberations, the SSC is generally supportive of their reserve size recommendation as it relates to the biodiversity and sustainable fisheries goals as defined in the specific context of CINMS. Beyond that context, however, the methodology used by the Science Panel will require substantial modifications and extensions to be more broadly useful to the Council in considering marine reserves for the groundfish fishery and other resources under its authority. The SSC recognizes the many benefits of marine reserves and endorses their use as a valid fishery management tool. For example, reserves are a potentially useful

way for the Council to protect essential fish habitat and to address other requirements of the Magnuson-Stevens Act. However, just as it is important to recognize the uncertainties inherent in traditional fishery management, it is also important to recognize the uncertainties associated with reserves as a management tool. Integration of reserves with traditional fishery management will require innovative thinking and careful consideration of costs and benefits. Next year the SSC will be reviewing its Research and Data Needs and Economic Data Plan, which will provide a good opportunity to revisit and perhaps expand on our previous consideration of information gaps as they relate to marine reserves.

Highly Migratory Species

SSC Statement on the Draft Highly Migratory Species Fishery Management Plan

Dr. Dale Squires, co-chair of the Highly Migratory Species Plan Development Team (HMSPDT), gave the SSC a brief overview on the development of the current draft of the Highly Migratory Species (HMS) Fishery Management Plan (FMP) and its supporting appendices. Dr. David Au, HMSPDT member, then presented to the SSC a description of the methods used to develop the productivity estimates for sharks that are presented in Chapter 3 of the FMP. He also addressed specific comments that the HMS Subcommittee of the SSC had made on an earlier draft of the FMP. The SSC discussion of the current draft FMP focused on two issues.

The exploitation rates presented in Chapter 3 (for example in Table 3-4) are expressed as a fraction of the total population, not as a fraction of the exploitable population as is commonly used. Dr. Au will work with Dr. Andre Punt to revise this.

A harvest guideline for common thresher sharks is presented in Chapter 3. This guideline was developed using an innovative approach that expresses the guideline as a local maximum sustainable yield (LMSY). The methods used to develop the guideline should be described in the text of Chapter 3. The SSC recommends that a range for the harvest guideline rather than a single value be included in the draft FMP. An LMSY within that range could then be specified and reviewed periodically.

The SSC will use the comprehensive list of research and data needs contained in Section 8.5 when we revise the Council's Research and Data Needs and Economic Data Plan next year. The SSC notes the development of abundance indices for tunas is an important item that needs to be added to that section of the draft FMP.

Finally, the SSC appreciates the efforts of the HMSPDT in preparing the current draft document. The HMSPDT has been responsive to SSC comments on previous drafts of the FMP. The current draft is substantially improved from previous versions and is ready for public comment.

Coastal Pelagic Species

SSC Report on Final Report on Market Squid Maximum Sustainable Yield Methodology Workshop

At the Council's request, the SSC, in conjunction with the California Department of Fish and Game (CDFG) and the NMFS, held a market squid maximum sustainable yield (MSY) methodology workshop in May of 2001. Dr. Paul Crone of the Coastal Pelagic Species Management Team (CPSMT) presented an overview of the various modeling approaches and provided considerable detail on the egg escapement approach to assessing the market squid resource. SSC member Dr. Raymond Conser, co-chair of the squid Stock Assessment Review (STAR) Panel, briefed the SSC on the panel's report.

The squid MSY workshop was a highly successful collaboration among CDFG, NMFS, and the SSC. This collaboration was essential to the assembly and analysis of all available biological and fishery data. The panel provided a thorough review of the data and alternative approaches to the squid MSY problem. All of these efforts resulted in productive and timely completion of the review.

The STAT Team and STAR Panel worked together in refining a yield-per-recruit approach based on egg escapement, and both groups recommend this policy for monitoring status of the squid stocks. There are two parts to the egg escapement approach, 1) eggs produced per female in the catch, and 2) recruitment to the spawning grounds. Squid recruitment is highly variable and probably environmentally driven. The egg escapement approach requires an estimate of remaining eggs per female at the time of capture by the fishery. CDFG port samplers are collecting the specimens needed to make this estimate on a seasonal basis. It will be important to provide continuing support for this sampling and for the laboratory work needed to count the eggs.

The egg escapement approach developed by the STAT Team and further refined during the STAR Panel process, provides a sound basis for developing a harvest control rule based on biological principles.

However, there is a continuing need to address uncertainties in the science identified during the workshop. To this end, the SSC supports the idea of a STAR Panel review in 2004. It will also be important the CPSMT develop precautionary management options that reflect uncertainties in the science. The SSC looks forward to reviewing this work as it is incorporated into Amendment 10 of the CPS Fishery Management Plan.

SSC Statement on Pacific Sardine Harvest Guideline for 2002

Dr. Ray Conser briefed the SSC on the stock assessment results for Pacific sardine and the 2002 U.S. harvest guideline. The assessment model and data analysis are identical to those used in previous years. The analysis incorporates the most recent fishery and survey data.

The data shortcomings identified last year have not been rectified. The First Trinational Sardine Forum (U.S.A., Mexico, and Canada), which was convened in 2000, was not successful in building the coastwide database (British Columbia through Baja, California) needed for sardine stock assessment. Thus, the only option available to the Coastal Pelagic Species Management Team (CPSMT) for 2002 was to update the previous assessment model, which is based on that portion of the sardine population off the southern half of California, and extrapolate the results to include Mexico and the northern areas. The Second Trinational Sardine Forum will be convened in San Diego during November 29-30, 2001. If successful, the data thus obtained will provide a basis for developing a new coastwide assessment in 2003. The SSC views the Forum as the most promising venue for the Trinational collaboration needed to improve the assessment, and encourages the U.S. state agencies (Washington, Oregon, and California), federal agencies, and the Council family (CPSMT, Coastal Pelagic Species Advisory Subpanel (CPSAS), SSC, and Council staff) to fully participate in the Forum. For now, the SSC recommends the current assessment be accepted, as it is based on the best available information.

A year ago the SSC recommended a peer review (similar to the groundfish STAR process) be scheduled for Pacific mackerel and Pacific sardine in early 2002. The CPSMT is optimistic that the upcoming Second Trinational Sardine Forum will be more successful than the 2000 Forum in assembling a coastwide data base. If progress is made, the SSC recommends the peer review that we requested last year be rescheduled for spring of 2003, so the new coastwide sardine assessment can be reviewed, in addition to the Pacific mackerel assessment.

The SSC notes that Pacific sardine is now, along with Pacific whiting, the most abundant fish resource off the West Coast; at one time sardine was the largest single-species fishery in the world. Yet the research program for supporting sardine assessment is seriously underfunded. The current fishery independent surveys are restricted to the southern half of California and only provide indices of sardine egg abundance and daily egg production. The aerial fish spotter index only covers the nearshore areas of the southern California Bight. The adult parameters used in recent biomass estimates are computed on the basis of biological data collected in 1994, at a time when the population was one-tenth of the 2002 biomass. The SSC strongly urges the NMFS at both the regional and national levels to develop and fund a resource survey plan and budget with a specific time line, including ship time that will sample the sardine population over its range, with the objective of estimating spawning biomass and age composition of the sardine population.

Public Comment

There was no formal public comment on issues not on the SSC agenda. When necessary for specific agendum topics, public comment was accommodated during the course of the meeting.

Adjournment

The SSC adjourned at approximately 5 p.m., Tuesday, October 30, 2001.

PFMC
02/21/02