SAFMC Science and Statistics Committee, Bio-Assessment sub-Committee

April 23-24, 2003
Charleston SC

Attendance:

Committee Members: John Carmichael (Chair), Bob Muller, Pat Harris, Carolyn Belcher
Snapper-Grouper Assessment Group: Fritz Rohde
SEFSC/Beaufort: Mike Prager, Jerry Scott, John Merriner
SAFMC Staff: Gregg Waugh

I. Certify Assessments for red porgy, black sea bass, and vermillion snapper. Establish Adequacy for management.

Most issues identified regarding the input data are applicable to all three assessments, so for efficiency the committee review first addressed the specific data concerns listed in the following.

1. Do fishery-independent surveys fail to cover deepwater habitats?

The bulk of favorable habitat in the South Atlantic is within areas that are surveyed by MARMAP (Table 1), although in the Northern areas (North Carolina) there is proportionally more favorable habitat in deepwater (beyond the shelf edge) areas. Most fishing activity in the region occurs within the areas covered by the MARMAP survey. Most of the populations of vermillion snapper, black sea bass, and red porgy are found within areas surveyed by MARMAP, making it likely that the survey does represent the relative abundance of the majority of the population. Therefore it is considered unlikely that the coverage of the MARMAP survey produces a significant bias in the assessments.

It is possible and probable that the fishery has changed over time, with increased effort and landings from offshore areas as more traditional nearshore areas were heavily exploited and population abundance and availability of legal sized fish declined in those areas. This is most apparent in areas south of North Carolina. Such changes cannot be addressed in analyses, because data characterizing the spatial distribution of the fishery, both now and in the past, are lacking.

2. How can fish of the maximum age encountered be observed if stocks are severely depressed?

The presence of old fish in the population does not in itself disprove the overall assessment results, which are based on multiple sources of information. It is biologically feasible for fish to escape harvest and reach old ages in spite of heavy exploitation that substantially reduces abundance of the population.

One characteristic observed of many snapper-grouper populations is that size at age declines noticeably under heavy exploitation, thus size at age declines and truncation of size becomes more noticeable than truncation of age. In several cases older fish remain in the population in spite of high exploitation, however these older fish are considerably smaller than observed prior to heavy exploitation. For example, Figure 4 in the Red Porgy assessment well documents the decline in size in response to exploitation over time. This situation is exacerbated by the generally poor age sampling of red porgy,

vermillion snapper, and black sea bass. It remains probable that fish of similar ages have been harvested or even measured in recent years, but age structures were not taken from them. Further, species associated with dispersed or patchy habitats and comprising populations that do not aggregate (such as for spawning) likely stand a better chance of having individuals escape harvest and survive to old ages in spite of high overall population exploitation.

In general, it is not highly probable, but still possible, to observe very old fish that have escaped harvest in spite of high exploitation levels. In severely depressed stocks it is these mature fish that have escaped harvest that contribute to early gains in recruitment when regulations are enacted. In the case of black sea bass and red porgy, however, it is likely that these fish would be male.

Specifically regarding red porgy, truncation of the length distribution may be indicative of changes in the population or changes in the fishery and fishing activities. However, the model cannot discriminate between behavioral and population changes, making interpretation difficult. Further, alternative models that do not rely on age information (e.g., production model), produce results that are similar to the age structured model.

3. How was the SEAMAP survey overlooked

The intent of the entire SEDAR process is to expand involvement in stock assessments, specifically to improve the quality and quantity of input datasets. Data workshops are intended to include expert researchers for the species considered, and hopefully all potential data sources are considered. Nonetheless, it is still possible that datasets could be overlooked. It is not clear whether the SEAMAP survey was considered during the DW for SEDAR II.

A preliminary review of provided SEAMAP black sea bass data revealed the following:

Few black sea bass are encountered by SEAMAP (reportedly under 100 fish).

The trend in SEAMAP CPUE supports the conclusions of the black sea bass assessment, in that CPUE declines from 1990 – 2000.

The SEAMAP survey starts around the time of estimated significant declines in black sea bass abundance, and would be unlikely to provide much of a bridge between recent periods of higher and lower abundance.

Given these observations, it is improbable that including the SEAMAP CPUE will change conclusions regarding the status of black sea bass.

4. If stocks of red porgy, vermillion snapper, and black sea bass are as severely depressed as portrayed in the assessments, why are these species the top discarded species?

Catch in and of itself, whether directed landings or discard, is not a reliable indicator of population abundance. Relative levels of catch among different species and stocks is not a reliable indicator of stock status. One stock may be relatively high in abundance compared to other stocks in a given area, but still be severely depressed with regard to its overall productivity and optimum abundance. The distribution of both fishing effort and fish populations may affect relative discard levels while remaining uninformative regarding abundance and stock status. Estimated benchmarks of minimum

and target abundance for these species are typically high, leading to higher expectations of encounter and thus discarding possibilities

Strict management regulations were in place restricting red porgy landings during the period covered by the discard estimates. The stock assessment indicates some improvement in red porgy abundance over this time as well. The increase in abundance coupled with strict management results in discard levels that are not especially unexpected.

Black sea bass, red porgy, and vermillion snapper were historically very common species in the complex and common species in the areas of greatest fishing effort. This contributes to their importance in the fisheries as well as to their current depressed conditions, and to their relative abundance in discard estimates.

Discarding is a problem that management must address if the rebuilding strategies are to be successful. If effort patterns do not change in response to management activities, and management does not change in response to identified discard problems, then discarding will remain a major issue.

5. Is the Headboat survey a reliable indicator of abundance?

It is widely accepted that fishery-dependent surveys are not as reliable as fishery-independent surveys for measuring abundance. It is also accepted that assessments are improved when auxiliary information such as surveys or fishery-dependent CPUE's are incorporated. Given the choice between fishery-dependent and fishery-independent surveys, fishery-independent surveys are preferred. However, for these species, independent surveys are totally lacking in the early years and the available time series of consistent methodologies is a severe limitation. Given the clear need for some measure of CPUE and relative abundance in assessment models, the consistent, long time-series of the headboat survey justifies consideration of the headboat CPUE a reasonable compromise.

The headboat CPUE index is modeled to remove the influence of temporal changes in variables such as area fished and depth. This may not be a perfect solution, but is an accepted method of refining any abundance signal that may be reflected by the CPUE.

According the headboat survey, only 4 of 13 boats in North Carolina used electric reels and fished primarily in deep waters during the 1970's. This is not believed to produce a significant bias in results.

While regulatory changes may contribute to an overall decline in headboat CPUE, technological changes (navigation and fish location electronics, improved tackle, improved boat speed and reliability) may contribute to an overall increase in CPUE.

There is no information with which to evaluate any changes in the average head boat patron's fishing skills. There is no documentation of commercial fishermen who owned vessels regularly patronizing headboats in lieu of their own vessels, although there is some expectation that crew or mates may have done so. Relative skill may have changed over time, but such changes cannot be accounted for without any quantitative measurement of skill.

One approach for judging the merit of the headboat survey is comparison with fishery-independent surveys over similar time periods. Figure 18 in the Black Sea bass assessment provides such a comparison. The figure suggests similar trends for the various surveys, however there is some debate in the degree of consistency, as there is little

overlap in the early years when the headboat survey was highest and little overlap in the early 1990's when headboat catches declined further. In practice it is difficult to develop fair comparisons of alternative surveys in the best of circumstances, and even more so in this case where the information is sparse and the alternative surveys represent such short time series. Moreover, the MARMAP fishery-independent surveys are quite noisy and difficult for the model to fit, further adding to the comparison difficulties. MRFSS survey trends are contrary to the headboat, however the MRFSS survey was rejected from the model due to difficulties in tabulating effort (trips) where black sea bass (as well as red porgy and vermillion snapper) were likely or targeted but not caught.

Many of the regulatory changes likely to impact headboat fishery operations and CPUE were implemented in the 1990's, after the most noticeable declines in CPUE. Regulatory changes could be addressed by allowing headboat CPUE catchability or selectivity to change, however this will require additional assumptions and some method of evaluating appropriate time periods. Doing so will negate one of the primary advantages of the survey, that of providing a long time series.

When the headboat survey is deleted from the black sea bass configuration, model fitting becomes more difficult. It is believed that this stems from the fact that the available data are already minimal, and dropping a large source of observations increases the ratio of parameters to observations, perhaps resulting in a model that is over-parameterized relative to available information. Dropping the headboat survey leads to increases in F, which is contrary to the belief that the downward trend in headboat CPUE drives abundance down. The effect of the headboat survey during the time when headboat values overlap independent surveys seems to be to moderate some of the decline in the independent surveys.

Summarizing, there is a need for some measure of relative abundance. The headboat survey fills this need and reasonable steps were taken to verify the adequacy of the survey and improve the signal provided by the survey. Scenarios can be hypothesized that would both increase and decrease headboat catchability over time, however, data are not available to judge which is most probable. The headboat survey is considered representative of abundance over the areas of operation. The preferred solution to this challenge is to provide more information, specifically improved fishery-independent monitoring, rather than to reduce the available information by removing the headboat survey from consideration. Another alternative would be development of spatially-explicit models that allow surveys to be applied to specific areas of stock distribution, although this is not practically feasible given the extremely limited data.

6. The Review Panel (Black Sea bass, Vermillion snapper) stated that there was insufficient information from which to judge the reliability of input data. How, therefore, can results be considered representative of the stocks?

The concern raised by the panel was related to specific details of data collection programs, coverage, and methods. It is uncommon for such detail to be included in assessment analyses. Such documentation is desirable, but often difficult to obtain. Generally, those charged with data collection are trusted to do their jobs reliably, and assessment scientists trust data managers to provide reliable and properly collected information. SEDAR was designed to minimize such concerns. Specifically, the data workshop includes those directly involved in data collection, and issues regarding data collection methods should be addressed at that level by the experts in attendance.

Procedures of the Data Workshop may need to be modified if such concerns continue to arise.

The panel comments are not believed to represent a lack of faith or trust in the input data, but instead a statement that reviewing all aspects of data collection and manipulation require more detail than is typically included, and may be beyond the scope of reasonable review.

7. McGovern et al (2002, NAJFM) report signs of improvement in the black sea bass stock, presumably related to management actions, while the SEDAR assessment shows increased fishing mortality in recent years.

It is believed that the results of McGovern et al and the SEDAR Black Sea bass assessment are not qualitatively dissimilar, although comparing different metrics across the two sources may produce some discrepancies. McGovern et al state that the stock has improved; Figure 6.13 of SEDAR assessment of Black Sea bass, annual estimates of SPR, also shows slight increases in overall stock status in recent years.

Fishing mortality estimates vary slightly between the two reports, but this variation is not considered to result in contradictory conclusions and qualitative determinations of stock status are similar. Given ongoing concerns over MARMAP coverage and adequacy of age samples, it is difficult to determine that the McGovern et al. catch curve results, based on aggregated age length keys (1978-1982, 1983-1986, and 1987-1998) are more reliable than those provided from the SEDAR analysis.

8. Is the growth model of black sea bass representative when the asymptotic weight is 2.5 lbs while 3 and 4 lb fish are landed by the fishery?

The asymptotic weight provided by the model is the mean weight expected. Weight at age is likely log-normally distributed, thus weights considerably higher than the mean are not unexpected. There is also considerable variation in weight at age, especially at the older ages and larger sizes where sample sizes are lower. Collection of weight and age information from the commercial fishery is necessary to determine whether or not the growth model is representative of commercial catches. Although the MARMAP catches far fewer large fish (400+ mm) than the commercial fishery, it does encounter fish up to 500 mm. Changes in length distributions between two data sources do not prove that growth models estimated from one source are unreliable. It is believed that the MARMAP age and weight data represent a reasonable range of sizes for development of growth curves, and in general represent the bulk of the size range encountered by the commercial fishery.

Model Uncertainty

The committee discussed the range of confidence intervals for various estimated parameters in the assessments. Confidence intervals for values in the red porgy assessment are much smaller than those indicated by the sensitivity runs for black sea bass and vermillion snapper. It is believed that the confidence intervals for the red porgy assessment under represent the true uncertainty in parameter values. The structured sensitivity analysis approach used for black sea bass and vermillion snapper results in broad, but likely more representative, confidence

intervals given the overall uncertainty in model inputs and inherent difficulties in estimating some parameters (such as Bmsy and R0 necessary for estimating benchmark reference points) from the limited data available.

The SEDAR review panel stated that some of the black sea bass sensitivity runs were 'unlikely to represent the current stock status'. Two types of sensitivity runs were developed for black sea bass. The first series was a suite of 9 runs, bracketing likely values of natural mortality (M) and steepness (h), and designed to reflect the probable range of stock status and likely parameter values. The second series was a more typical selection of runs designed to evaluate model sensitivity to various configuration and input data selection alternatives. Input values of M and h in the first series were all considered probable or reasonable by the Assessment workshop, and should provide results that may in some cases seem unlikely but that cannot be discarded or omitted since the basis for those runs is considered reasonable. While the committee agrees that selection of specific parameter values must be made within a run, it disagrees with the conclusion that some of the runs among the 9 structured sensitivities fail to represent current stock status. Given that no statistical confidence intervals were provided for individual black sea bass assessment runs, the committee recommends that the range of parameter values indicated by the 9 structured runs be considered reflective of the uncertainty in the model and be used in establishing confidence intervals around chose point estimates of 'best values'. The SEFSC/Beaufort Lab will be requested to estimate confidence intervals for specific runs and for the central run.

Adequacy for Management

The committee supports the recommendations of the SEDAR review panels that the assessments for red porgy, black sea bass, and vermillion snapper are based on the best available data. The committee recommends that information contained in these assessments is adequate for management. Specifically, the committee agrees that the assessments provide reasonable information on the status of the stocks, and are informative regarding the direction and magnitude of management action. This endorsement does not imply consensus that every parameter and point value estimated in the assessments is reliable and useful for management, in fact some values (such as MSY-related benchmarks for vermillion snapper) are considered unreliable and of no management value.

A. Red Porgy.

The committee supports the Advisory Report of the SEDAR review, and agrees that the stock is overfished and that restrictive management measures stopped overfishing. The committee supports the biological reference points and rebuilding time frame.

Although there are concerns regarding the adequacy of input data for the forward projecting age structured model, that the simpler production model provides similar results and stock status determinations increases the committee's confidence in determining that the overall assessment provides information useful for management.

Confidence intervals around estimated parameter values are quite small, and are not believed to well represent the true uncertainty in the estimates. The wider range suggested by the production model may be more reasonable.

B. Black Sea bass.

The committee supports the Advisory Report of the SEDAR review, and agrees that the stock is overfished and overfishing is occurring. The committee supports the 18 year rebuilding time frame.

The committee believes that input data are pushed to their informational limits, leading to a lack of robustness in critical parameter estimates such as R0 and a wide range of estimates for biological reference points from the structured sensitivity analysis. In general there is considerable uncertainty in benchmark parameters at this time, due to the lack of contrast in the datasets and general lack of information regarding the stocks rebuilding potential. A period of recovery must be observed before the stocks recovery potential (i.e., steepness) can be reliably estimated. The committee believes that if fishing mortality is reduced, the precision of benchmark estimates will improve in subsequent assessments during the 18 year rebuilding time as the stock's recovery capability is observed.

The committee notes that the production model provides results that are similar to the more complex and data intensive forward-projection model. This is additional support for the determination that the stock is overfished and overfishing is occurring, and increases confidence in the utility of the assessment for guiding management actions.

C. Vermillion Snapper

The committee supports the Advisory Report of the SEDAR review, and agrees that the stock is undergoing growth overfishing. The committee does not believe that vermillion snapper are experiencing recruitment overfishing, thus there is no current threat to the viability and sustainability of the stock.

The committee agrees that SFA benchmarks estimated from the stock-recruitment relationship are unreliable and of no use for management. This is not unexpected given the lack of contrast in the population over the assessment period. Population abundance has apparently increased over time, however the model has no way of establishing a reliable scale for abundance, thus estimated values for abundance, biomass, and recruitment are uncertain. The committee supports the recommendation that yield-per-recruit based references (e.g., Fmax) be used instead of SFA MSY/OY benchmarks. The committee recommends that the available data are not adequate to establish stock biomass targets and thresholds.

II. Magnitude and direction of management actions.

A. Red Porgy

The red porgy stock is recovering, as it is overfished but overfishing is no longer occurring. Discards of red porgy are apparently high, and may possibly increase as the stock recovers and becomes more abundant. The current management approach based on a constant fishing mortality is preferable to fixed catch limits. Although the current restrictions are considered severe, the preliminary analysis of management impacts suggests that they are leading to improvements in the stock. Under the constant mortality approach, allowable harvest levels will likely increase in the future as stock abundance increases, which could allow for relaxation of specific regulations such as trip or possession limits while still maintaining the target exploitation level (see Addendum Report regarding red porgy rebuilding projections)

Recommendations:

The committee recommends that the Council adopt the SFA benchmarks as recommended by the SEDAR Review Panel.

The committee recommends that the Council continue regulations to restrict fishing mortality to a level projected to rebuild the stock within 18 years (by 2016).

The committee recommends that the Council consider discard losses of red porgy in developing management regulations to improve the chance of the stock recovering within the stated period.

B. Black Sea bass

The black sea bass stock is overfished and overfishing is occurring. There is some indication that the stock has recovered slightly over the last few years, although mortality remains excessive and biomass remains low. These conclusions are supported by the forward projection and biomass models, as well as a recent publication based on MARMAP research (McGovern et al, 2002, N. A. Journal of Fish. Mgmt 22:1151-1163).

Recruitment declined by around 50% in the late 1980's – early 1990's, but catches remained fairly constant, resulting in a cost to the stock of markedly reduced abundance and biomass and increased fishing mortality rates. Recruitment has stabilized over the last 5-8 years, but current catch rates are excessive given the reduced abundance.

Although benchmark references are estimated with considerable uncertainty and the majority of values are well beyond the observed range of the stock, the overall conclusion remains that fishing mortality must be reduced so the stock can recover. The degree of reduction in fishing mortality is difficult to establish, however the committee believes that taking moderate steps in this early stage of recovery will allow the stock to continue to improve. The committee believes that the recommended MFMT from the review panel of F=0.04 is unreasonably low, as attempting to restrict the fishery to such a level will lead to considerable discard problems unless drastic seasonal or area closures are pursued. The Frebuild as estimated in Table 8.1 is more reasonable, and is projected to rebuild the stock in the allotted time.

The committee believes that the extended rebuilding time frame offers flexibility in developing management measures that will rebuild the stock while minimizing risk, discarding, and adverse socio-economic consequences. One approach in particular would be to reduce current fishing mortality by a significant amount (e.g., 50%) until the stock recovers such that yield equals the average yield from 1993-2001, and then maintain that level of yield until the stock is considered recovered. Such approaches may result in initial mortality levels that exceed Frebuild, but these would be offset by lower exploitation levels later in the recovery.

Recommendations:

The committee recommends that if a fixed F rebuilding strategy with a constant exploitation level for the entire rebuilding period is selected, then the maximum fishing mortality threshold should be Frebuild (F=0.16; central run).

The committee recommends that a range of rebuilding strategies be considered within the bounds of the 18 year recovery period, and that the results of such an analysis be used to develop alternative MFMT's.

The committee recommends that the council consider effort reductions (e.g., time and area closures, trap limits) and moderate trip and possession limits to reduce fishing mortality to reduce the chances of excessive discarding.

C. Vermillion snapper

Overfishing is occurring for the vermillion snapper stock, as fishing mortality exceeds Fmax. Whether the stock is overfished cannot be determined.

Fishing mortality declined about 5 years ago, and although the reason has not been clearly identified, it could be related to weather or regulations directed toward the complex as a whole.

The committee does not believe that stringent management measures should be implemented in response to the growth overfishing that the stock is experiencing, because such actions could increase discard losses which could in turn negate any effect on controlling mortality. Rather, general measures that apply to the entire species complex, such as overall effort reductions or seasonal closures, should be considered. Increasing the minimum size could reduce mortality and improve yield by increasing the size at entry into the fishery, and may also lead to an increase in the Fmax value if selectivity changes appreciably. However the potential for increased size based discarding must be considered.

Recommendations:

The committee recommends that the Council adopt Fmax as a proxy for Fmsy.

The committee recommends that the Council not adopt stock biomass and yield benchmarks at this time.

The committee recommends that generalized management measures be used to reduce fishing mortality on vermillion snapper.

The committee recommends that the Council consider increasing the minimum size limit.

III. Improvements/Research Recommendations

Research Recommendations

The committee supports the research recommendations of the SEDAR Assessment Workshops and Review Panels.

The committee is very concerned that MARMAP sampling will likely decrease in the coming year. Both SEDAR panels identified fishery-independent surveys as lacking. SEDAR also identifies inadequate coverage and sampling intensity of the MARMAP survey as a significant impediment to assessment efforts. Snapper-grouper stocks cannot be managed under the mandated MSY/OY benchmarks without adequate quantitative

stock assessments, and adequate, robust, and reliable stock assessments cannot be provided without adequate auxiliary information such as fishery-independent surveys. Precision and accuracy of benchmarks WILL decline rather than improve if future sampling efforts are reduced.

Logbook data must to be analyzed and provided for the next snapper-grouper assessments. Fishermen are justified in being angry at providing this information year after year if it is not used in any manner.

The committee supports using the ACCSP Bioprofile in developing specific sampling strategies for snapper-grouper species.

The committee encourages states to pursue sampling and survey programs through federal aid programs or state funding opportunities.

For those species for which larvae and juvenile information is available, or for which juveniles recruit to nearshore or estuarine waters, recruitment surveys may be feasible. However, little information is available on the distribution of larvae and juveniles for many snapper-grouper species, and obtaining such information would likely be expensive. Thus, recruitment surveys may not be an effective strategy for the complex as a whole. Resources may be better applied to improving surveys of older age fish.

When research recommendations are developed at the Data Workshop and Assessment Workshop level, specific sampling targets should be included (e.g., number of lengths, number of trips, area and seasonal coverage). Simply stating that sampling needs to be increased is not sufficient and does not help managers in determining the resources necessary to resolve sampling concerns. Data Workshop documentation should include a review and critique of sampling intensity for all programs providing input data, along with specific recommendations for improving those programs.

Methods should be developed that allow varying confidence in a particular data series over time. For example, landings data are more reliable now than 20 years ago, but the assessment model only allows a single, overall measure of reliability for the entire series. While it is likely that current reported commercial landings are within 10-20% of true landings, historic landings reports may differ from true landings by 50-100%.

Development of a synoptic fishery-independent survey for the entire MARMAP time-series should be explored further. This could aid in evaluating the headboat survey as an indicator of abundance and provide a better linkage between the various short time-series CPUE indices extracted from the MARMAP sampling.

SEDAR Improvements

The committee supports the recommendations in the April 2, 2003 memorandum from Mike Prager regarding SEDAR Quality Assurance.

The committee believes that a major issue facing SEDAR is a lack of resources to meet assessment demands. This applies to both federal and state agencies. Current resources are severely limited, and cannot support an increased workload.

The committee believes that it is unreasonable to develop more than 1 baseline assessment during a typical week-long Assessment Workshop. Many of the quality assurance problems arising with the black seabass and vermillion snapper assessments are due to the excessive workload during the second SEDAR Assessment Workshop.

Data Workshops must provide adequate documentation of all decisions, as stated in the design, but not always achieved in practice. This documentation must also be provided to the Assessment Workshop and the Review Panel.

Standardized documentation of all typical snapper-grouper sampling and monitoring programs should be developed, archived with SEDAR materials, and provided at future Data Workshops, Assessment Workshops, and Review Panels. Programs include the headboat survey, TIP sampling, MARMAP survey, SEAMAP survey, NMFS general canvas, and state trip ticket programs.

The committee recommends that thorough and complete details of results and input data be provided to the Review Panel, either as appended tables in the assessment report or a spreadsheet included with other electronic documentation. Information should the 'standard' assessment outputs, such as numbers at age, time series of biomass and SSB, landings, length distributions, survey CPUE's etc.

The committee recommends that a permanent SEDAR coordinator be provided, similar to the SARC coordinator at the NEFSC.

The committee is concerned that the scheduled workload for 2004 is excessive. Attempting to push too many assessment through SEDAR with current resources will result in quality assurance problems.

IV. Requests

The committee requests that the SEFSC/Beaufort Laboratory explore size limit restrictions for vermillion snapper. Specifically, determine the feasibility of using size limit restrictions to stop overfishing, and identification of such size limit restrictions.

The committee requests that the SEFSC/Beaufort Laboratory revisit confidence intervals for black seabass, and attempt to develop statistical-based intervals, similar to those for red porgy, to complement the range of values from the structured sensitivity runs.

The committee requests the SEFSC/Beaufort Laboratory explore additional rebuilding strategies for black seabass.

Specifically:

1. A 50% reduction in F initially, followed by fixed landings once landings reach the recent average (e.g., 1993-2000), until F declines to Frebuild.
2. A projected time-series of landings at Frebuild, based on the central run.

3. A projected time-series of landings at F=0.04, following the Review Panel recommended control rule.
4. Landings fixed at 75% of the 1993-2000 level until F=Frebuild.

The committee requests that NMFS SEFSC/SERO expedite analysis of the snapper-grouper logbook data and provide the necessary data for calculating CPUE indices before the next SEDAR cycle, and that these indices be reviewed by the next SEDAR.

Table 1. Depth and latitude of MARMAP samples, 1979-2001. Includes gear types hook and line (electric reel), trawls (yankee, flynet), traps (mini-antillean, Florida, blackfish, chevron, experimental larval, fine mesh), and longline (Kali pole, vertical, horizontal).

Latitude	<25	25-50	50-75	75-100	100-125	125-150	>150	Total
<27.3	20	8	0	0	0	0	0	28
27.3-28	7	29	7	0	0	0	0	1
28-28.3	1	2	12	1	0	0	0	16
28.3-29	7	4	48	0	0	2	1	62
29-29.3	0	0	6	0	0	0	0	6
29.3-30	9	41	46	0	0	0	1	97
30-30.3	0	17	141	1	0	0	2	161
30.3-31	8	185	6	0	2	0	2	203
31-31.3	348	228	90	1	2	1	2	672
31.3-32	66	739	109	1	0	1	108	1024
32-32.3	250	2986	883	129	3	0	183	4434
32.3-33	832	2034	158	1	14	2	514	3555
33-33.3	682	794	20	28	16	1	0	1541
33.3-34	72	386	28	43	7	1	0	537
>34	250	248	15	22	9	0	0	544
Total	2552	7701	1569	227	53	8	814	12924

Table 2. Frequency of gear use by MARMAP, 1979-2001. The italicized gears are the only ones currently in use. An asterix is used to indicate some uncertainty as to the last year the gear was used (more detailed checks of the records need to be made).

Gear	Number of sets	Years used
Personal hook and line	122	1979-present
Yankee trawl-3/4 #35	206	1979-1986*
Mini-antillean S-trap	11	1979-1980*
Electric reel hook and line	1205	1979-present
Test panel	3	?
Blackfish trap	3165	1979-1990
Experimental larval trap	8	1979
Vertical longline	259	1979-present
40/54 Fly net	143	1980-
Experimental trap	151	?
Florida “Antillean” trap	1709	1979-1990
Kali pole (standard)	226	1980-1987
Bottom longline	354	1980-present
Chevron trap	5304	1988-present
Fine mesh trap	58	1979*