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Brief Review of Red Snapper Data Workshop Report

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Summary of Key Issues of Concern Arising from the SEDAR workshop in New Orleans

Note that the order of points listed in this document does not reflect their relative importance, but rather the order of issues addressed (if at all) in the April SEDAR report.

Note also that the comments provided in the margins are those provided by Bill Gazey to an earlier draft of this note and attempts have been made to revise my text in response to these comments.

1. Base case values for natural mortality rates of age 0 and age 1 red snapper

- No agreement was reached about whether to update the 1999 base values for M_0 and M_1
- The values chosen, particularly if they are considerably higher than the current ones as suggested by some of the recent field experimental studies, can strongly affect the results of the stock assessment (e.g., the impact of shrimp bycatch on estimates of MSY reference points, stock status and stock recovery).
- It is likely that there will be some further debate over this issue at the August workshop and the choice made will be quite influential.
- Good points are that the report recommends that the sensitivity of stock assessment results to different values for M_0 and M_1 be tested. Also it is recommended that a prior probability distribution be constructed for these parameters that reflects the uncertainty in these values and existing knowledge about them.

2. There are no clear guidelines for how the base case assessment should estimate steepness

- There is still some uncertainty over whether the 1999 approach to estimating steepness in the stock-recruit function will be considered to be the base case. This approach fixed the average unfished recruitment (R_{max}) at a value based on a 1970's SEAMAP abundance index and then computed the likelihood of different values for steepness. This approach is not often applied. In data-limited situations, it is instead common practice to fix the value for steepness or use a prior for steepness based on other stocks and then to estimate R_{max}. In the red snapper stock-recruit data, the range of spawning stock sizes is very low and estimates of steepness may be quite dependent on the values assumed for R_{max}. It could be argued however that at very low stock sizes, providing there are abundance index data, there may be more information in the data about steepness than R_{max}. Perhaps because the MRFSS and SEAMAP abundance indices show increases over the 1980s and 1990s when exploitation rates are very high, the 1999 method gave rise to high estimates of steepness in the 1999 assessment (compared to values estimated for similar fish stocks) and this influenced the estimates of management reference points and rebuilding recommendations.
- A good point is that the report recommends that the stock assessment for 2004 consider applying the more conventional approach of forming a prior for steepness based on data for other similar fish stocks, freeing up the parameter R_{max}, rather than fixing it at an arbitrary value, and using this to constrain estimates of steepness obtained in the stock assessment.

3. There is uncertainty over what method will be used to calculate MSY reference points

- The method used to compute MSY reference points in the 1999 assessment was unconventional in that it linked (through use of a single selectivity function combined for all fisheries) the harvest rate of the shrimp bycatch fishery with that of the directed fisheries when searching for the fishing mortality rate that gave MSY. This gave

Comment: A very important issue that should be added is at what point(s) in the life history do density dependent mechanism's operate. At present, red snapper are treated strictly as a benthic fish with reefs playing no role in their population dynamics. I will put my suggestion of how to treat density dependence in a separate document.

Comment: I agree with your comments and approach but I think the issue ranks low in significance (see next comment). The issue is contentious because in the past values used were arbitrary, declared as not open to discussion by NMFS and seemed to be low for a small red fish without protection of a reef.

Comment: The impact of larger rates is not that great (unless they become very large -- > 1.5, say). The cumulative effect of higher mortality, smaller bycatch estimates and split between (age composition of) age-0 and age-1 (bycatch and age composition are now in line with our previous recommendations), however, can alter some of the conclusions WRT bycatch mortality.

Comment: Why are estimates from other species more pertinent than the data collected for red snapper?

Comment: I agree with using a prior based on related species that is then updated using red snapper data to form the posterior distribution. However, you lose me if the approach is to "fix" steepness at a value highly inconsistent with the snapper data. If the data are to be rejected then a rationale must be given and all impacted parameters altered (e.g., bycatch mortality).

estimates of MSY, F_{MSY} and B_{MSY} that were difficult to interpret because the values underlying them represented quantities quite different from those represented in conventional MSY calculations. It also strongly affected estimates of stock status and the evaluation of rebuilding options.

- NMFS reports in the SEDAR workshop review that this method is a policy-neutral regarding allocation of economic value between the shrimp and red snapper fisheries and contended that politicians will need to identify the level of bycatch before the bycatch and directed catch modelled become unlinked.
- However, some SEDAR papers pointed out that the stock assessment could identify different scenarios for shrimp bycatch and do computations with these and then let the council decide which of these scenarios is most appropriate.
- Thus there still remains uncertainty over whether the 1999 MSY calculation method will be considered as base case in the 2004 assessment. Effort is needed to ensure a transition to a more credible and proper method to compute MSY reference points.

Comment: I go a little ballistic with the assertion that linking the fisheries is policy neutral. This approach explicitly values shrimp at zero (i.e., there is no benefit in catching age-0 or age-1 snapper). This method is policy driven for the benefit of red snapper over that of the shrimp fishery.

Comment: . The assessment (science) has a responsibility to provide the impact of current and proposed restrictions on the shrimp and snapper fisheries

Comment: I vote for calculating MSY conditional on bycatch mortality.

4. Criterion used to formulate recommendations about which indices of abundance to include and exclude in the 2004 assessment appear to have been inconsistently applied. For example, the criterion used to exclude the headboat data as an index applied also to the MRFSS data but yet recommendations were for the MRFSS data to be applied. This may be due to there being more information available in the MRFSS database than the headboat data base with which the potential effects of regulations may be evaluated and removed.
5. The point(s) in the life history at which density dependent mechanism operate is a further important issue that has been and will be brought up by Bill Gazey. At present, red snapper are treated strictly as a benthic fish with reefs playing no role in their population dynamics. Density dependence is modelled to occur immediately after the egg stage. However, it is plausible that density dependence also operates after settlement on reefs, e.g., at higher densities natural mortality will be higher because of the limited number of habitat on reefs. If this is the case, then the impacts of shrimp bycatch may be considerably less than currently predicted by the age 0 density dependence assumptions. Bill Gazey will introduce a paper addressing this issue at the August workshop.

Review

Overall, the SEDAR 7 Red snapper data workshop report summarized accurately and to varying levels of detail the discussions and findings within each of the SEDAR workshop working groups: 1) life history, 2) commercial statistics, 3) recreational statistics, 4) fishery dependent indices, 5) fishery independent indices, 6) release mortality, and 7) shrimp bycatch. However, there still remain many issues yet to be resolved about parameter and data inputs, the stage at which density dependence occurs in the stock-recruit function and the formulation of the base case stock assessment. Some of these issues have been flagged in the review document. In some instances, the document does not make it clear whether some optional data inputs should or should not be used and in some places applies inconsistent criteria in recommendations for some data to be used and not others. Also, although this is supposed to be a summary review document of the data workshop, it provides very few tables with data series that the report recommends to be utilized in the stock assessment, making it difficult to review the consistency of the data series and permit their application in exploratory modelling exercises. The main findings reported within each of the SEDAR workshop report sections are discussed in corresponding sections below. Where additional issues arise, these will be noted under the relevant sections of the report addressed.

1. Life History

The life history section covered in considerable detail the most controversial aspects, stock-recruit function steepness and natural mortality rate, and in less detail other aspects including reproductive biology, growth, aging, habitat requirements and stock structure. It left out entirely, however, the issue of where in the life history, density dependence occurs and whether the 2004 stock assessment should consider a revised stock-recruit function to take this into account. This latter point will be addressed further below within this life history section.

1.1 Natural Mortality

The report went a little further than the draft at the close of the workshop to make some further caveats and interpretations about Szedlmayer's field work on the total mortality rate for age 0 fish. For example one added interpretation of Szedlmayer's high estimate of Z_0 inserted after the workshop was that this estimate was close to Z_0 in the 1999 assessment and hence was plausible. It suggested that it could still reflect a small value for M_0 (e.g., 0.5) if fish went off of the artificial reefs at night to forage and many of these fish were captured in shrimp trawls. However, stakes put up around the artificial reefs indicated that no shrimp trawls fished in the vicinity of the reefs. This in contrast makes it unlikely that fishing mortality rate could account for much of the value of Z_0. But overall, the section represented major progress in addressing the very limited and cryptic treatment of uncertainty in values for natural mortality rate for age 0 and 1 fish. It very significantly identified the protocol that Goodyear had applied in the mid-1990s to attempt to ground truth his assumed values for M_0 and M_1 which have stuck since then. Quite sensibly, it was recommended that Goodyear's protocols for ground-truthing the estimates of Z_0 and Z_1 be updated with more recent data. Scott Nichols' April SEDAR workshop paper SEDAR7 DW3 actually provides some estimates of Z_1 which appear to be fairly large e.g., in the order of 1-3 yr^{-1} that are not inconsistent with higher values for M_1. The review report also indicated that the upcoming assessment must evaluate the sensitivity of stock assessment results to different assumed values for M_0 and M_1 and should also incorporate a probability distribution for these quantities that reflects the uncertainty in them, rather than only fixed assumed values, as in the 1999 assessment. However it was noted that there was as yet still no resolution as to whether the 1999 values for M_0 and M_1 should be maintained as the base case or replaced by some updated base case values based on more recent evidence. This may continue to be one of the most contentious issues in the August SEDAR workshop. The proposal for a prior probability distribution to be developed that incorporates all available evidence may provide a route to resolve this issue and provide a more transparent and acceptable set of inputs for the values of M_0 and M_1.

1.2 Steepness in the stock-recruit function

The section on steepness in the stock-recruit function indicated considerable progress in updating the 1999 procedure to estimate steepness. In the 1999 assessment, an unconventional and ad hoc method was used to estimate stock-recruit function parameters. It assumed a fixed value for the maximum recruitment based on proxies for this value based on 1970's SEAMAP abundance indices and then estimated steepness based on the 15-year time series of catch-age data and abundance indices. There appears to be very low contrast in the spawning stock sizes, making it difficult to reliably estimate simultaneously the stock-recruit parameters, steepness (h) and average unfished recruitment (R_{max}). If R_{max} is fixed at some particular value, and steepness is estimated, the estimate of steepness obtained is potentially quite sensitive to the assumed value for R_{max} and the other data applied in the stock assessment. For example, the SEAMAP abundance indices have been used as an abundance index and also been applied to compute the catch-age data used in the stock assessment and are hence used twice over and given more weight than they should in the likelihood function. Furthermore, the April SEDAR review report found that the MRFSS recreational indices which show a strong increasing trend over the last few decades to be less reliable as an index of abundance than originally assumed. This was due to the confounding effects of progressive changes in fishing regulations over this time period. The review therefore recommends that the MRFSS indices not be used in the base case stock assessment. Moreover, given that Gulf of Mexico red snapper has been heavily exploited since the 1800's, and even more heavily exploited following the Second World War, it is possible that R_{max} could be considerably higher than the value indicated by the 1970's SEAMAP indices. The method gives estimates of steepness that are very high (e.g., about 0.95) relative to the range of estimates for other similar fish stocks (e.g., median about 0.75). The high estimates of steepness may result partly from the increasing trend in the recreational MRFSS series which by the April SEDAR workshop may no longer be usable in the base case stock assessment. Other indices recommend for use in the April SEDAR workshop report actually do not show the pronounced increase in abundance implied by the MRFSS index.

Comment: I dispute these conclusions. First, there is considerable data. The 1999 assessment used 1984-1998 (15 years). There should be at least 4 more years now. A 19 year data set is not short. The problem is one of contrast. All the observations are at small stock size. So a lot information is available on steepness but little or none on Rmax. I can not reproduce the stated sensitivity of steepness under various Rmax values using the 1999 estimation model. Of course, as you get closer to the maximum observed recruitment (about 100 million) there is increasing impact on steepness. (Steepness wants to go even closer to 1 as you get closer to the data). For Rmax set greater than 175 million there is very little change in the behaviour of the steepness estimate. Actually, I had trouble with other parameter estimates when I let steepness go free (i.e., estimate it). I fixed both recruitment parameters (as was done in the 1999 assessment) and recorded the objective function value for a grid of recruitment parameter values.

The 1999 estimation method goes against common practice which is instead to either fix steepness at some value consistent with the biology of the stock or values used in other similar fish stocks and to estimate R_{max} or to do a meta-analysis of stock-recruit data for other similar fish stocks to estimate a probability distribution for steepness and then to estimate both steepness and R_{max} by fitting the stock assessment model to the available data. This latter approach thereby constrains the estimate of steepness to be consistent with estimates for similar fish stocks, and not just the limited data available for the stock. While there had been some resistance to abandoning the old protocol in the working group, the SEDAR data workshop report advocates the latter, more common approach to estimating steepness. It also provides candidate prior distributions for steepness that are consistent with the range of estimates for other similar fish stocks.

Comment: This stuff is misplaced. Further, density dependence of immature age-classes should not markedly impact the estimation of steepness.

1.3 Stock definitions

On stock definitions, the report reviews evidence for their being separate red snapper stocks in the Gulf of Mexico and summarizes suggestions to recognize two sub-stocks for the August assessment with an east-west dividing line running south of the Mississippi River estuary.

The West Gulf includes Texas and Louisiana and the East Gulf includes Mississippi, Alabama, and West Florida. The possibility of a third stock offshore of Texas was mentioned but evidence and capability to disaggregate data to this third level were recognized to be too limited at present.

1.4 MSY reference points

The section on MSY reference points also presents a major advance over the unconventional treatment of MSY estimation in the 1999 stock assessment. In the 1999 stock assessment, the calculation of MSY for Gulf of Mexico red snapper by linking shrimp bycatch mortality rate with directed fishery mortality rate assumed that shrimp trawl effort was directly linked to directed fishery effort such that when the directed fishery effort levels were adjusted e.g. upwards to find the effort that gives MSY, the effort of the shrimp fishery was also adjusted upwards in exactly the same manner. This was supposedly taken as a policy-neutral methodology to identify MSY since it supposedly avoided allocation issues between the shrimp trawl fishery and the directed fishery for red snapper. In fact, it may be argued instead that the linked selectivity function method to compute red snapper MSY reference points is not policy neutral but instead takes into account only the interests of the red snapper fishery while ignoring those of the shrimp fishery. By linking the shrimp bycatch mortality with the directed fishery fishing mortality, the 1999 MSY calculation method effectively adjusts the shrimp fishing effort to be directly in line with red snapper directed fishery fishing effort. The 1999 MSY calculation method thus ignores the economics of the shrimp fishery and the implications of different levels of shimp trawl fishing effort on profitability in the shrimp fishery. This ad hoc technique to compute MSY is moreover not common practice and leads to B_{MSY}, F_{MSY} and MSY values for red snapper that are counter-intuitive, e.g., B_{MSY} is well over an order of magnitude the value of MSY despite F_{MSY} being in the order of 10%.

Comment: See comments above on so called policy-neutral

At the workshop, a few papers presented (e.g., SEDAR7-DW-51) suggested more intuitive alternatives. These included assuming that mortality due to bycatch in the shrimp trawl fishery is fixed at some average long-term value and not linked to fishing effort in the directed fisheries. Another approach was suggested as a control in which the MSY should be calculated and reported with the bycatch mortality rate set at 0. This would indicate how much red snapper yield is being traded off by the shrimp bycatch. The workshop report quite appropriately advocated that the August assessment consider applying these latter alternatives but also that some policy guidance as to how the mortality from shrimp trawls should be treated in MSY computation be also provided by council members.

1.5 When does density dependence occur and implications for the stock-recruit function

One issue that has been brought up by Bill Gazey and was not considered at the April workshop is the point in the life history at which density dependence occurs in the recruitment of red snapper. Bill argues that density dependence should occur not prior to settling as assumed currently but after settling onto the substrate, for example in first and second years of life. Those fish that do not find adequate shelter will be considerably more susceptible to natural mortality. This would require a shift in the stock-recruit function from one which computes age 0 recruits from eggs to one which computes age 1 fish from age 0 fish and/or one which computes age 2 fish from age 1 fish. The implications for the impact of shrimp trawl bycatch versus the directed fishery on the status and recovery of the red snapper stock of this change are considerable and may suggest a much smaller impact of bycatch. This is because the abundance of snapper 0 and 1 fish may be much higher under a post settlement density dependent process than a pre-settlement density dependent process. This revision of the stock-recruit function could have impacts on the estimates of MSY reference points, stock status, rebuilding potential, and the effectiveness of shrimp bycatch reduction devices in facilitating stock recovery. The implications for long term yield and long term average recruitment from applying density dependence at age 0 versus age 2 under different shrimp bycatch and directed fishery fishing mortality rate scenarios are illustrated in a recent note by Bill Gazey.

2.0 Commercial Fishery Statistics

The section on Commercial Fishery Statistics was mostly non-controversial and outlined the main objective of commercial statistics data compilation and the various limitations in the datasets available to compute landings. The main objective was to provide a dataset that contains the landings at the year, month, fishing area, state/country of landing level of resolution. In the report however the issue of distinguishing closed season from open season vessel landings was not directly addressed. This is disappointing, given the potentially large bycatch of recruited and non-recruited red snapper in the closed season and the hopes of the conservation groups that this issue would be resolved at the workshop. It was however sensibly recommended that the landings data series be extended as far back in history as possible to provide an additional source of data with which to estimate stock-recruit parameters. Also reported were estimates of the total mass of red snapper discarded in Gulf of Mexico reef fish and South Atlantic snapper-grouper fisheries and mean weights of snapper discarded in season and out of season.

2.1 Discards by the commercial directed fishery

The section in the report with this subtitle set out to estimate the total number of red snapper discarded in the Gulf of Mexico reef fishery and South Atlantic snapper-grouper fisheries. The data utilized are based on supplementary forms in the existing vessel log books that were distributed starting in August 2001. A GLM analysis used covariates to predict the total annual number of discards. The estimate for 1/8/2001-7/31/2002 was 738,900 red snapper. However, this was not broken into separate amounts for the closed season and open seasons. This is important because the mean weight of discarded fish in the closed season was found to be quite a bit larger (4.25 pounds) compared to that in the open season (1.96 pounds). The report indicated that there were currently no data available to evaluate the age distribution of fish discarded in the closed season.

3.0 Recreational Statistics

The section on Recreational statistics was also quite brief but made evident the very low fraction of trips sampled. The potential biases in the data could have been given more attention. For example, if there is sampling bias in the MRFSS survey (e.g., every recreational fishery does not have an equal chance of being sampled and those who tend to be sampled deviate systematically from the average), this can lead to considerable bias in recreational catch statistics. The issue of sampling of recreational fishermen to obtain statistics is important since they are estimated to catch such a large amount of the total annual catch and thus could do with further attention. Also, Table 3.1 that reports recreational landings by fishing method covers relatively few years, i.e., only 1981 to 2002 (compared to 1962-2003 for commercial landings) and does not report the units of the values reported in the table (presumably numbers of fish). There are some big discrepancies between annual estimates in this table and those in Table 20 of Schirripa and Legault (1999). For example in the workshop report the value is 1,712,286 for 1996 but in Schirripa and Legault (1999) this is 1,127,000. The report mentions that the method to estimate annual catches was modified but did not address the very large discrepancies between some of the new estimates and those in previous years. Gerry Scott more recently informed me over the telephone that NMFS is currently checking further into why these discrepancies have occurred and are trying to do their best to come up with improved recreational catch statistics.

4.0 Fishery dependent indices of abundance

The section on fishery dependent indices of abundance discussed some commercial and recreational indices of abundance. Brief discussions of the potential reliability of the indices are provided and some attention to the sensitivity of the indices to changes in regulations and fishing practices is also given. Some tentative recommendations are also provided about which indices should and should not appear in the base case stock assessment applications. However, these recommendations as provided in the report are ambiguous, difficult to interpret and applied inconsistently to different indices. For example, two different MRFSS based indices were discussed. One was intended to replicate the MRFSS based index used in the 1999 stock assessment that also incorporated the Texas Parks and Wildlife Department's Recreational Angler Creel Survey (TPDW). A second index was constructed using only the MRFSS data. For a variety of reasons (e.g., the proportion of positive records being very small i.e., < 10%), the group recommended that the first MRFSS/TPWD recreational index may not be appropriate for the base case application. It was mentioned that there was a considerable increase in the proportion of fish discarded over time in the MRFSS data and this was a likely result of changes in management measures and that the overall increasing trend is like a result of the increase in the proportion discarded. It is also noted that the presumption that discard rates in Texas were negligible before 1990 is invalid. But in the following paragraph, presumably referring the second MRFSS index, the WG recommended that separate indices be calculated for east and west and the resulting indices be used for the assessment as appropriate.

The working group on the next page recommended that the headboat indices not be used for the assessment because of the conjectured effects of the changes in management measures, e.g., the proportion of catch discarded was almost certainly changing over time in response to management measure. Thus, whereas recommendations were made for headboat indices not to be used due to bias caused due to confounding from changes in management measures, recommendations were made for the MRFSS indices to be used, even though it was also pointed out that these indices are confounded by the effects of changes in management measures and changes in discarding. It was later divulged by Gerry Scott over the telephone that it is easier to control for changes in regulations (e.g., size limits) on MRFSS data because the MRFSS database is more detailed than the database for headboats and it is easier to take into account the potential effects of such changes in the formulation of indices of abundance.

Two sets of commercial indices were discussed in the workshop report. The first of these commercial indices is based on the commercial handline data. Two alternative indices using commercial handline data were discussed. One is based on Class 1 permit vessels fishing for red snapper in the open season. The second used associated statistics to identify species frequently caught with red snapper. Regarding the Class 1 permit vessel index, the WG recommended that indices be calculated for the eastern and western Gulf to permit flexibility in the assessment and for use in sensitivity analyses. No recommendation however was made to provide a single East-West combined handline index. Furthermore, no apparent recommendations were provided regarding the appropriateness for stock assessment of the second alternative handline index that used associated statistics. The second type of commercial index was based on red snapper landings in the shrimp trawl fishery. With this latter type of index, it was stated that the WG was not able to reconcile shrimp trawl landing values in Figure 4.3 with those in the Current General Canvas database. Unlike for the recreational indices, no guidelines at all were provided in the workshop report about whether these latter indices should be used in the base case or non-base case stock assessment runs.

Thus it remains unclear whether only one or both of the handline indices will be utilized in the base case assessment. It also remains unclear whether the MRFSS based recreational indices will end up being used in the base case assessment. It also appears that the same criteria used to disqualify the headboat indices should also apply to the MRFSSS indices.

5.0 Fishery independent indices

The section on fishery independent indices reviewed five fishery independent indices of abundance for the stock assessment. The first index, the SEAMAP (shrimp/bottomfish) index has been the only of the five indices used in previous assessments. The method of processing the SEAMAP data had been updated to the Bayesian method in SEDAR7 DW-2 which produced a similar time series as the previous method. Advances in the identification of larval red snapper have led the working group to recommend considering the second index, the ichthyoplankton index in the stock assessment. A model based estimate was advocated since it had a more realistic variance estimate. An index based on annual frequency of occurrence rather than mean estimated abundance was recommended based on experience in other larval surveys. The working group also recommended considering the use of a third index, a model-based index of number of red snapper per site from the SEAMAP reef fish survey. The group mentioned that the correspondence between these three independent indices in Figure 5.1 gave them confidence that all three indices were tracking trends in red snapper abundance. However, of the three indices recommended for use, only the SEAMAP (shrimp/bottomfish) index is plotted in Figure 5.1. The ichthyoplankton and SEAMAP reef fish survey indices are not plotted in Figure 5.1 as claimed, so no basis for confidence that the three recommended fishery independent indices correspond to each other and are tracking trends in red snapper abundance.

The other two indices (shark/snapper/grouper longline survey and small pelagic survey) were recommended not to be included in the stock assessment due to the short time series in the first and the lack of regularity in sampling location and temporal aspects in the second.

Thus there appear to be several different abundance indices that will be included in this stock assessment compared to only two last time (MRFSS and age 1 SEAMAP). There were a few mentions in the review document that there appeared to be consistency in the trends indicated by various sets of indices, e.g., the fishery independent indices, but plots of all of these recommended indices did not make it into the review document. Where a few have made it in, there appear to be inconsistencies in the trends in abundance suggested (e.g., in Figures 4.3, 4.6 and 5.1). The review workshop document, however, did not provide any guidance on what should be done in the stock assessment should some of the indices suggest differing trends in abundance of the same age groups. This is important because differing trends in abundance in different indices cannot all be correct and the different hypotheses suggested about trends in abundance may be obliterated with some commonly applied methods which fit a model to all abundance indices at once. It is the view of Bill Gazey and I that further work should be devoted to trying to explain why trends might differ (if they do) between different indices before putting them into the stock assessment model. If reasons for the differences in trends cannot be resolved and the different indices have similar credibility, then it is argued that they should be treated as separate hypotheses about trends in abundance and the stock assessment model should be run separately to the differing sets of abundance indices that each indicate different trends in historic abundance, rather than trying to fit the model through the middle of all of the indices combined.

6.0 Release mortality

The release mortality section appeared to be more comprehensive than the draft produced at the workshop. It reviewed a variety of studies on release mortality and formulated some estimates of release mortality by depth, fishing mode (e.g., recreational vs. commercial), and location (east versus west and gulf-wide), open versus closed season for the commercial fishery, and time period, e.g., 1962-1983, 1984-1992, and 1993-2003 for the commercial and 1981-1996 and 1997-2002 for recreational (Table 6.5). These were based on determining the effort at which fishing occurred in each fishery and then matching this with study estimates of release mortality at depth.

7.0 Shrimp fleet bycatch

Shrimp fleet bycatch in the last section of the report very briefly summarized the working group discussions of the data and methods applied. There was a major improvement in the methodology to estimate bycatch in the shrimp trawl fishery. This is a Bayesian method that takes into account uncertainty due to there being many zero observations and unsampled locations within each year. Among other things, some attention was given to changes in the performance of bycatch reduction devices. Also, while the commercial catch time series goes back to the early 1960's the shrimp bycatch estimates go back only to the 1970's. No mention was made of doing further analysis to try to extend the time series further back in time. However, Jim Nance has provided a time series of shrimp catch back to the 1960s to facilitate an attempt to extend the shrimp trawl bycatch time series further back in time. Furthermore, the section indicates that the effectiveness of shrimp trawl bycatch reduction devices has decreased considerably since they were first introduced in 1998. However, no recommendations are made for how the stock assessment should take this into account, e.g., in doing stock projections where it is necessary to make assumptions about the future effectiveness of BRDs. This is of concern because of recent assumptions that BRD's will reduce shrimp bycatch by about 40%. In contrast, the recent studies indicate that the reduction in bycatch achieved in recent years is only about 11%.

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Reference

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