

**A Re-examination of Cuban Catch Rates
in the West-Florida Red Grouper Fishery
1940–1976**

prepared by

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October 2000



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Introduction

Schirripa *et al.* (1999) upgraded and updated the assessment of the red grouper resource in U.S waters of the Gulf of Mexico. In doing so, they went to particular efforts to extend the data sets backward in time by compiling catch and effort data for the Cuban and U.S. fisheries back to 1940. That “long” data set was then analyzed alongside a “short” one, the latter being truncated at 1986¹. While all of the analyses run showed the red grouper to be both overfished and undergoing overfishing, the severity of the problems (and thus of the required remedial measures) differed markedly. Schirripa *et al.*’s (1999) age-structured ASAP model, when run on the “long” dataset, suggested that 1997 spawning biomass was 26% of target, while the fishing mortality rate that year was 321% of the threshold. In contrast, the same analysis applied to the “short” dataset returned a range of results, the most optimistic placing the biomass at 60% of target and the mortality rate at 138% of threshold.

The “long” dataset is inherently the preferred one for analysis, if its data can be trusted and if the analytical model used is deemed valid over a period of several decades, since it captures something of the long-term history of the resource, including indications of a potential productivity that does not seem to have been realized in the recent past. In contrast, truncating the analysis at 1986 risks drawing a spurious conclusion that the future can expect no better red grouper catches than have been observed in the past fifteen years. It is therefore critically important to determine whether the pre-1986 data can be trusted sufficiently for them to be used in an advanced analysis such as ASAP or, conversely, whether errors in the data, the model structure or both invalidate any conclusions drawn from such analyses.

Kenchington (1999) reviewed Schirripa *et al.*’s (1999) assessment and raised a number of doubts about this “long” dataset and its analysis. Those included:

- The recorded Cuban catches and catch-rates dropped sharply at the start of that nation’s Revolution in 1958–59, before respectively recovering and stabilizing as the turmoil ended (Figure A) – suggesting that the data stream was corrupted (in unspecified ways) by political and social upheaval,
- The available long-term measure of U.S. fishing effort is the number of west-coast Florida vessels reporting handline catches that were Coast Guard documented, yet there seems little reason to suppose that that number corresponds to a count of the boats that were involved in red grouper handlining (while the data also show some anomalous inter-annual changes in fleet size), and
- The ASAP model assumes a lack of long-term environmental trends affecting red grouper productivity – an assumption that is at best questionable for a

¹ After which the available catch data were fully identified to species.

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species which (at least sometimes) utilizes inshore waters of the eastern Gulf of Mexico as nursery areas.

Kenchington's (1999) analysis of the Cuban data did not proceed beyond recognizing the coincidence in time between the Revolution and the fall in recorded catches and catch rates. The actual mechanisms leading to the reduced numbers were not considered.

The above concerns and others were examined during the August 2000 Reef Fish Stock Assessment Panel (RFSAP) meeting and the doubts about the influence of the Cuban Revolution on that nation's data were considered sufficient to justify an additional analysis in which the Cuban data would be divided into two periods, pre- and post-Revolution, with the figures from the disturbed years between being discarded. However, it was also pointed out that the Cuban "deepwater" fleet –the *flotta del alto*– was rebuilt in the 1960s, with old sailing schooners being replaced by modern motor vessels, each working a number of launches from which the crews longlined (Tashiro & Coleman 1977). It was therefore suggested that, even if the Revolution disrupted the catch and effort data for a time, Cuban catch rates in the late 1960s and early 1970s should have exceeded those of the 1950s, unless the resource had seen a substantial decline in the interim. Since the recorded catch rates actually remained low, it appeared that the biomass might have been considerably reduced in the later 1950s and early 1960s.

This additional information drawn from Tashiro and Coleman's (1977) work prompted the authors to make a closer examination of the Cuban "deepwater" fishery for Gulf of Mexico groupers –the "*pesca del alto*". In doing so, I have searched the ASFA and WAVES databases (the latter the on-line catalogue of the libraries of Canada's DFO) and consulted both the items found there and such accessible English-language material as was cited in the listed items. I have not attempted to obtain Spanish-language reports nor any limited-circulation materials. Nor have I attempted to contact anyone with direct knowledge of the *pesca del alto*. Thus, this report is not a final comment on that fishery and the data derived from it. It may, however, be sufficient to point out the dangers of using the "long" red grouper dataset in advanced mathematical analyses.

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The Cuban data used by Schirripa *et al.* (1999: their Table 54) was presented to Dr. Klima of NMFS in 1977 (on the termination of the *pesca del alto* off Florida) by officials of the Castro administration². The origins of this dataset do not seem to have been documented (at least, relevant documentation does not seem to be available in the United States) and thus it could readily be dismissed as anecdotal. Yet it purports to

² The earliest version of these data that I am aware of is Table 36 of the Appendix to the *Environmental Impact Statement and Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico* as revised by the Gulf Council in 1980. To Klima's dataset, Schirripa *et al.* (1999) added annual counts of the number of vessels in the *flotta del alto* from 1963 to 1975. Those seem to have been extracted from Tashiro and Coleman's (1977) figures or perhaps from the same, unpublished, source as those authors used.

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present the Cuban catches of red grouper from the grounds west of Florida, along with the corresponding fishing efforts and catch rates, from 1940 to 1976. During that period, the *pesca del alto* was the dominant fishery for red grouper off Florida and thus its catches and catch rates are essential to an understanding of the long-term dynamics of the resource. Simply dismissing the numbers given to Klima because their source is unknown or politically tainted would risk wasting valuable information. Besides, on its face, there does not seem to be any reason to suppose that this dataset is any less accurate than the norm for commercial fisheries statistics. The uncertainty surrounding Klima's numbers is, however, sufficient to justify a closer inspection.

In the catch rates presented to Klima by the Cuban authorities, Schirripa *et al.* (1999) saw a more-or-less linear decline from the late 1940s to 1976. Kenchington (1999), in contrast, saw a period of approximate stability (averaging 829 lb per boat-day) from 1940 until 1957, then a collapse during the Revolution followed by near-stasis again (at 334 lb per boat-day average) from roughly 1963 until the end of the fishery. For further discussion of this 60% drop in recorded catch rates, it seems best to examine the *pesca del alto* separately in each of the two periods.

Pre-1958 Pesca del Alto

Martinez (1948), a U.S. official based at the embassy in Havana, provided a comprehensive report on the Cuban fisheries of the early to mid-1940s, while some supplementary details were recorded at much the same time by Fiedler *et al.* (1947), of the U.S. Fish and Wildlife Service, during a broader-ranging survey of the Caribbean fisheries. In 1946, the *flotta del alto* comprised about 60 schooners and was centered in Havana (Martinez 1948). Among the 60, there were 31 “*neveros*”, carrying ice to preserve their catches on 20–25 day trips, and 29 “*viveros*” fitted with live wells for the grouper. The latter made 25–27 day trips in winter but 30–40 day ones in summer. This fleet was entirely sail-powered, save for five of the *neveros* which had motors (Martinez 1948). It seems that motor power was considered incompatible with keeping fish alive in wells open to the sea (Fiedler *et al.* 1947). The schooners were 60 to 105 ft in length and most had been built in Cuba, though some of the oldest and largest in the overall Cuban fleet (and thus likely in the deepwater fleet also) were imports from New England and Nova Scotia (Fiedler *et al.* 1947). From surviving photographs, it appears that the northeastern style had been copied by the Cubans and hence that the *flotta del alto* of the 1940s resembled the Massachusetts banks fleet of 1900.

Each crew typically comprised 10 to 12 men (Martinez 1948). The gear used was handline, Martinez (1948) providing photographs of six or eight fishermen lining the rail of the schooner as they fished – much as New England cod fishermen had done before the adoption of dories in the mid-19th century. Assuming that captain and cook did not regularly fish, one might therefore expect each schooner to have had eight to ten handlines active at any one time. Notably, neither Martinez (1948) nor Fiedler *et al.* (1947) made any mention of small boats (g. dories or launches) used in conjunction with

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these schooners and it seems certain that all fishing was done directly from the schooner's deck.

Total catches for the *neveros* were typically in the range of 10,000 to 18,000 lb per trip (Martinez 1948) – 400 to 900 lb per day at sea. With their sometimes-longer trips, the *viveros* took 20,000 to 35,000 lb per trip (Martinez 1948) suggesting rather higher catches per day than the *neveros* achieved. (They may have been larger with slightly larger crews or the handling time per fish may have been lower, allowing more fishing time.) Thus, the fleet-wide average may have been around 750 lb per day. These “typical” catch rates approximate to Klima's 829 lb per boat-day for 1940–1957 and even more to his 736 lb per boat-day for 1940–1945 (the period of concern to Martinez 1948), raising confidence in the latter's specific annual values.

Subsequently, Suarez Caabro (1957), a Cuban fisheries official, provided a description of his nation's fisheries as of 1955, thus updating Martinez' (1948) account by ten years. He noted that there had been little change in that time, though the *flotta del alto* had grown to 68 vessels, 53 of which were *neveros* and only 15 *viveros*. Most were motorized, only six remaining sail-only, while radios and echo-sounders had become common. Otherwise, they continued to make 20–23 day trips (Suarez Caabro did not mention the long summer trips made by the *viveros* in the 1940s), which involved four days travel to and from the grounds with 16 to 19 days of fishing in between. Each vessel carried 10 or 11 men, fishing with handlines, each bearing three hooks. Suarez Caabro (1957) recorded that hand reels had been tried but were not adopted in the fishery. As with the earlier U.S. commentators, he made no mention of dories or any equivalent small boats.

The *flotta del alto* took predominantly grouper (presumably red grouper, though Suarez Caabro did not say so) and largely fished Campeche Bank. The fleet sometimes moved to the grounds west of Florida in summer and particularly during the hurricane season (Suarez Caabro 1957).

Besides this descriptive information, Suarez Caabro (1957) provided monthly catch and effort data for 1955 for a cooperative in Havana at which 47 of the *pesca del alto* vessels landed their catches. Together, those 47 made 331 trips in that year, landing a total of 3,887,777 lb, of which 3,620,423 lb was grouper (all groupers combined), for a grouper catch rate of 10,938 lb per trip or about 500 lb per day at sea (above 600 lb per fishing day). Those values are rather less than the 695 lb per boat-day quoted by Klima for the same year but fall within the range that Martinez (1948) regarded as typical a decade earlier. Suarez Caabro's (1957) tabulated figures also include a monthly count of the number of fishermen fishing which, when divided by the number of trips, gives an average crew size of 9.85 men (perhaps excluding captain and engineer or cook), suggesting a grouper catch rate of around 60 lb per man-day on the grounds.

The portion of Suarez Caabro's (1957) data that relates specifically to the west Florida grounds cannot be determined with an certainty. However, taking “hurricane season” as

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September to November inclusive, and assuming that the fishing then was all off Florida, 77 trips landed 720,907 lb for a catch rate of 9,362 lb per trip – rather less than the annual Gulf-wide average. It may be that the fishing off Florida was rather less promising than that on Campeche Bank (which would also explain why the latter was favored) or it may be that fall was a poor season, perhaps with difficult weather interrupting the fishing.

Combining these various reports, there seems little doubt that the catch rates for 1940–1957 provided to Klima by the Cubans in 1977 represent catches per schooner-day (whether day at sea or day of fishing is uncertain), with the fishing being undertaken by about ten men per schooner, using one handline each. Those lines seem to have typically carried three hooks. How precisely Klima's figures represent the fishing success of these schooners is impossible to say but they need not be any less accurate than fishing statistics usually are. It is noticeable that motorization of the fleet and the addition of echo-sounders did not increase the recorded catch rates, suggesting either that the actual fishing ability of the men, rather than the vessels, had always been limiting or else that a decline in resource biomass matched an increase in effective fishing power.

INP Fishery from 1963

The Cuban Revolution began during 1958 and the following year the new Castro government began to nationalize its fisheries. A program of building motor vessels commenced in 1961 and two years later the industry was brought under a new administration, the *Instituto Nacional de la Pesca* or INP (Tashiro & Coleman 1977). During this period, the catch rates reported to Klima dropped sharply but they then stabilized under INP's direction. The new agency inherited 65 "deepwater" vessels, or much the same size fleet as had been fishing ten years earlier, but the *flotta del alto* increased to 140 vessels in 1967 before declining again as boats were retired or moved to other fisheries. By 1975, there were only 55 vessels in the *flotta*. By the latter date, they were typically of the 75 ft "lambda" type, carrying an 11 to 20 man crew, most of whom were trainees being prepared for Cuba's other fisheries. The lambdas worked to an approximate 40-day trip cycle, with 30 of those at sea (27 on the fishing grounds) and ten in port (Tashiro & Coleman 1977).

In contrast to the earlier period, these vessels worked 16ft diesel-powered "launches" from which the actual fishing was done – much in the mode of the former dory-schooner fishery out of New England. Each lambda usually carried six launches, with a two-man crew per launch. In a further contrast, after 1965 handlines were no longer the principal gear, the men in the launches usually setting longlines. (In the 1970s, those were 1.0 to 1.5 km in length and bore 250 to 300 hooks. The lines were under-run six to eight times per day before being hauled for the night.) With up to 20 men per vessel and only about a dozen required for the launches, the remainder were left handlining from the lambda,

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much as an earlier generation had fished from their schooners (Tashiro & Coleman 1977)³.

Tashiro and Coleman (1977) did not provide any independent catch rate information with which to check the data provided to Klima but since the latter's numbers were contemporaneous with the last years of INP fishing off Florida, there is little reason to doubt their general validity. It is still necessary, however, to consider what they represent.

The version of Klima's dataset presented in the 1980 *Environmental Impact Statement and Fishery Management Plan for Reef Fish Resources* has the catch rate labeled as "catch per launch day fished". A direct comparison of the corresponding annual numbers of "launch days fished" with Tashiro and Coleman's (1977) counts of the numbers of vessels in the fishery shows annual values of 38 to 329 "days" per vessel per year. The latter figure, from the data for 1975, would be improbable as a number of sea-days per lambda even before making allowance for the majority of the fishery being on Campeche Bank and not on the Florida grounds. If, however, the "launch days fished" is assumed to indeed refer to launch-days (not vessel-days), the average lambda would have spent some 55 days on the Florida grounds in 1975 – or roughly two trips of the nine made per vessel per year (Tashiro & Coleman 1977).

The conclusion seems inescapable that Klima's tabulated catch rates for the post-1965 period represent the catches per day per two-man launch, fishing with longlines. Whether they are the actual catches per launch-day of fishing (*versus* the total catches, including whatever was taken by handlining from the lambda, divided by the days at sea and the number of launches carried) is much less clear⁴. In short, whereas Klima's figures for the pre-1958 period are almost certainly catches per schooner-day with about ten men handlining, those for the post-1964 period are catches per-launch day with two men longlining. It should be no surprise that the two time periods have yielded such different catch rates.

Tashiro and Coleman (1977) did emphasize that the efficiency of the Cuban fleet rose from 1964 to the end of its fishing off Florida in 1976. The suite of electronics was improved, the launches became diesel powered, numbers of hooks per launch rose from 100 to 300 and fleet operations were introduced, with carriers to take the catches to Havana so that the vessels could remain on the grounds. That improvement was not reflected in increasing grouper catch rates, which might suggest that there was a corresponding decline in grouper biomass or perhaps a steady erosion of human efficiency under the Castro regime, such that the actual efficiency of the fleet did not

³ In my earlier comments on these data (Kennington 1999), I took Klima's Cuban catch rates to be derived from the handline portion of the fishery only. On re-examination of Schirripa *et al.*'s (1999) document, I cannot find any justification for that conclusion which seems to be simply an error on my part.

⁴ It is also far from clear what the tabulated catch rates for the 1958 to 1964 period comprise since launches and longlines seem to have been introduced only after 1961 and not to have been in general use before 1965.

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increase despite its improved technology. (The use of the grouper fishery as a training ground, rather than a place for highline fishermen, may have contributed to such a decline.) The annual catch per vessel of groupers and snappers combined did rise from about 100,000 lb in 1967 to nearly 300,000 in 1975 (Tashiro & Coleman 1977), which may indicate that the efficiencies appeared per vessel-year, rather than per launch-day, or it may show a shift in effort away from the red grouper west of Florida and onto snappers in that area and groupers on Campeche Bank.

Cuban Landings

Besides their information on catch rates, the contemporary accounts of the Cuban fisheries raise troubling doubts about the accuracy of Klima's red grouper landings figures. Martinez (1948) tabulated the total amount of red grouper consumed in Havana (combining those from Campeche Bank and the west Florida grounds but excluding any fish exported from the city) for the years 1942 to 1945. Compared to the figures provided by the Cuban authorities in 1977, those data show:

Year	Total red grouper consumed in Havana (Martinez 1948)	Cuban red grouper landings from west Florida grounds (Klima)
1942	3,068,000 lb	4,200,000 lb
1943	2,470,000 lb	3,800,000 lb
1944	3,834,000 lb	5,700,000 lb
1945	2,245,000 lb	6,400,000 lb

Thus, the supposed landings of red grouper from off Florida, as tabulated by Klima, substantially exceed the total amount of the species consumed in Havana, as recorded by a near contemporary. Yet all commentators agree that Campeche Bank consistently provided a majority of the Cuban red grouper landings, such that the catches from the Florida grounds should be substantially less than half the national total for the species. It is, of course, possible that not all of the red grouper landed in Cuba passed through the port of Havana, though the great majority clearly did. Moreover, some proportion of what was landed in the city was sold to other parts of the country – though Havana was an importer of seafood from other parts of Cuba and the city accounted for two-thirds of all fresh fish consumed in the country (Martinez 1948)⁵. Finally, there was substantial wastage in the Havana fish markets, amounting to 30% of the fish (Martinez 1948). However, even if only half of the national red grouper landings were consumed in the

⁵ There was no significant export of grouper from Cuba. The *pesca del alto* supplied domestic markets (Fiedler *et al.* 1947; Martinez 1948; Suarez Caabro 1957).

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capital and if the Florida portion of the catch reached 50% of the total (neither of which is likely), Klima's figures would still exceed Martinez' (adjusted for wastage) by up to 100% depending on the year. More reasonable assumptions would suggest that they are three to six times too high.

Unless one chooses to decide that figures compiled by the Castro regime's fisheries agency in the 1970s better reflect the Havana fishery of the 1940s than did those recorded by a U.S. embassy official at the time, the early catch data provided to Klima and used in the 1999 NMFS assessment looks highly questionable.

This impression is strengthened by information provided by Suarez Caabro (1957). His tabulated monthly values for the catch and effort of 47 deepwater vessels in 1955 show that their total grouper landings (likely predominantly red grouper) amounted to 3,620,423 lb for 1955. Assuming that the annual catches per vessel averaged much the same whether they landed at one coop or another, the total national red grouper catch by all 68 vessels in the *flotta del alto* in that year was less than 5,200,000 lb. Hence the portion taken west of Florida was likely well under two million pounds. Yet the figures supplied to Klima claim that the 1955 Cuban red grouper catch on the Florida grounds totaled 13,338,000 lb – or more than six times higher.

These numbers can be further examined. The Klima dataset shows annual fishing-effort levels in the 1940s in the range of, roughly, 5,000 to 12,000 days (presumably schooner-days since there were no launches at the time), while the numbers later rose to a peak of 19,182 in 1955. Yet the fleet in the mid-1940s comprised about 60 vessels (Fiedler *et al.* 1947; Martinez 1948) and by 1955 there were 68 in all (Suarez Caabro 1957). Sixty schooners could fish for 5,000 days on the Florida grounds, while putting more effort than that onto Campeche Bank, and still not be away from port for more than 170 days per year each. However, 68 of them would need to have spent an average of 282 days at sea to reach Klima's total for 1955, which is hardly a believable figure even if none of their time had been devoted to the Campeche Bank fishery – which Suarez Caabro (1957) stated that it was. In short, the high annual fishing efforts in the *pesca del alto* of the 1950s that are indicated in Klima's dataset are simply not consistent with the known size of the *flotta del alto* of that time.

The source of these major errors in the numbers provided by the Cuban government in 1977 is a matter for speculation at the present time. The catch rates do seem to generally accord with the contemporary descriptions of the fisheries recorded by Martinez (1948) and Suarez Caabro (1957) but both the catches and the fishing effort are far too high. Interestingly, Suarez Caabro (1957) noted that the total annual landings in Havana (all species combined) were about 11 million pounds. He also said that the Cuban fishing industry was “almost the same as ten years ago”, suggesting a period over which he might have estimated such an average. For comparison, the numbers given to Klima claim an average annual Cuban red grouper catch from west of Florida between 1946 and 1955 of 10,888,000 lb. It is not impossible that some official of the Castro regime

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misunderstood pre-revolutionary data and took the total Havana landings of all species as representing the national red grouper figures, while those numbers were later passed to Dr. Klima without being subdivided between the Campeche Bank and Florida grounds. Application of catch-rate values from coop records (similar to those quoted by Suarez Caabro 1957) could then have generated the values for “days fished”⁶.

Whether that or something else was the source of the error, the very existence of a period of high (more than 5 million pounds annually) Cuban grouper catches off Florida between 1944 and 1960, as shown in Klima’s dataset, must now be considered improbable. Those supposed high catches were a major feature of the long-term landings series reconstructed by Schirripa *et al.* (1999) and will have strongly shaped the ASPIC and ASAP model fits to the “long” dataset. Regretfully, it is now clear that those data should be set aside along with the analytical results derived from them.

For a period in the 1970s, Tashiro and Coleman (1977) presented figures for the combined grouper and snapper catches taken from the Florida grounds by the Cuban fleet, based on estimates prepared by the NMFS Southeastern Regional Office. Their figures were as follows, with Klima’s numbers for comparison:

Year	Cuban grouper and snapper catches from west Florida grounds (Tashiro & Coleman 1977)	Cuban red grouper landings from west Florida grounds (Klima)
1971	3,960,000 lb	3,267,000 lb
1972	3,780,000 lb	4,903,000 lb
1973	4,960,000 lb	4,418,000 lb
1974	3,520,000 lb	4,200,000 lb
1975	4,880,000 lb	4,866,000 lb

While not identical, these two datasets are sufficiently similar to give each other some support. Thus, it seems that the catch figures for the early 1970s that were given to Klima in 1977 may be valid, unlike those for the pre-revolutionary period. Perhaps Klima’s tabulated catches could be accepted for analytical use for the period, commencing in 1963, that the fishery was under INP control.

⁶ One might, however, wonder why Suarez Caabro (1957) did not quote such values if they were available to him at the time – and where they later came from if they were not accessible to the government of the day.

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U.S. Catch Rate

U.S. red grouper catches for periods before the 1980s seem, based on anecdotal information from fishermen, to have been imprecisely recorded but perhaps no more so than many other fishery statistics. One known problem is that the landings of individual grouper species from Gulf waters were not recorded until 1986 and so Schirripa *et al.* (1999) estimated the red grouper at 80% of the total groupers landed. More seriously, there was no regular recording of a measure of fishing effort corresponding to these catches. Schirripa *et al.* (1999) developed an effort index representing a count of handline vessels engaged in the red grouper fishery, which they applied to the handline catch of groupers to get a measure of the catch per vessel-year. To get the number of handliners in this fishery, however, they extracted from the total number of handliners landing catches on the west coast of Florida only those which were Coast Guard documented – reasoning that those tended to be the larger boats and so the ones that would work offshore on the red-grouper grounds. The evidence supporting the assumption that these documented handliners corresponded to the red grouper handliners seems weak, however. The critical assumption, if a catch-rate time series constructed with these boat counts is to be used as an index of resource biomass, is that the number of documented handliners bears a stable relationship to the number of red grouper handliners rather than that the two numbers are equal. Yet even that lesser assumption seems questionable.

Schirripa *et al.* (1999) drew some support for their U.S. catch-rate index (Figure B) from a supposed similarity in its trend to that seen in the Cuban data. I have previously (Kenchington 1999) disputed that the U.S. series shows the same two periods of near stasis separated by a rapid decline that Klima's tabulated catch rates appear to do. However, it is true that a linear interpolation to the U.S. catch-rate series from 1950 to 1976 closely matches an equivalent line drawn through Klima's numbers for the same period⁷. Since the Cuban catch rates do not, in fact, allow for valid comparisons over those years, any similarity between the U.S. and Cuban time series does not encourage trust in the former – quite the reverse.

Conclusions

In fisheries stock assessment, it is essential to look backwards, ideally to the start of the fishery in question. Quantitative historical data are needed as a foundation for the forward extrapolations that are the essence of assessment but, for typical fisheries that began long before comprehensive data-collection systems came into use, it is also necessary to make some qualitative examination of earlier trends in order to understand the full potential of the resource and its development to date. Without such a long view, there is the continual risk of “moving baselines”, such that current conditions come to be seen as all there can be and depressed resources remain depressed since nobody recognizes that their biomasses were once higher. In that context, Schirripa *et al.* (1999) made a major

⁷ A comparison presented by NMFS at the August 2000 RFSAP.

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contribution to knowledge of the red grouper resource by compiling catch and effort data back to 1940⁸.

In using any data set, however, it is essential to understand the instrumentation through which the numbers were gathered. While the errors inherent to simple measuring rods may easily be understood, complex scientific instruments typically require calibration curves and a thorough documentation of their responses to various confounding factors. Such a developed understanding is required no less, and likely more, when the “instrument” used to gather the data is a commercial fishery operating out of the control of scientists, using methods that are anything but standardized – indeed ones which are being continuously adapted and optimized towards objectives far removed from providing valid inputs to population-dynamic models.

Thus, before historical catch and effort data can be used in an assessment, it is necessary to know something of the fishery that generated those data, particularly the gears and fishing practices used at different times. It is also important to understand the data-recording protocols and the factors that might have disrupted them. Inspection of the Cuban *pesca del alto* reveals a change from schooner handlining to launch longlining through the early 1960s. It also suggests an inadequate response in the Cuban data-collection protocols to that change, resulting in non-comparable numbers from the two periods being combined into one time series. These technological change were in addition to the effects of the Revolution, which seem to have disrupted either the fishery itself or the Cuban government’s documentation of it beginning in 1958 or 1959 but which should have been resolved by the mid-1960s.

This level of understanding is important when historical data are to be used in qualitative examinations of the development of a fishery – a purpose for which Klima’s catch rates, if not his pre-1963 catches, seem suited. But it is absolutely essential when the numbers are to be used in quantitative analyses, particularly forward-projecting ones like ASPIC and ASAP since those will respond in complex and unpredictable ways to errors in the input data (in contrast to SPA and more primitive assessment models where it is possible to determine at least the direction of the response). This required understanding does not yet seem to be available for the red grouper fisheries before about 1980 (and maybe not for later years) and the current brief examination of some readily-accessible sources, relating to the Cuban fishery only, is not sufficient to supply it. This lack of knowledge should alone be cause for caution in using Schirripa *et al.*’s (1999) “long” dataset.

Such review of the fishery as I have presented here does suggest that the Cuban catch data provided to Klima are unreliable for the 1950s and perhaps should not be used, even qualitatively, for the years before 1963. The corresponding catch-rate figures may be

⁸ They might have made a qualitative step still further back by noting Martinez’s (1948) record that Havana landings of red grouper in the years leading up to 1941 had been around 7 million pounds annually – the much lower landings of 1942–45 being attributed to the threat and reality of German submarine activity discouraging fishing effort during the war years.

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valid (with all of the severe caveats that are always necessary with such data) but relate to different fisheries in the pre-Revolutionary and post-1964 periods – and thus cannot be used to examine biomass trends outside of the 1940–1957 and 1964–1976 periods. Meanwhile, the U.S. handliner catch-rate series does not appear sufficiently reliable to substitute for the Cuban during the 1958–1964 period, nor in the post-1976 era until the advent of the modern logbook program in 1990 – at least not where quantitative analyses are concerned.

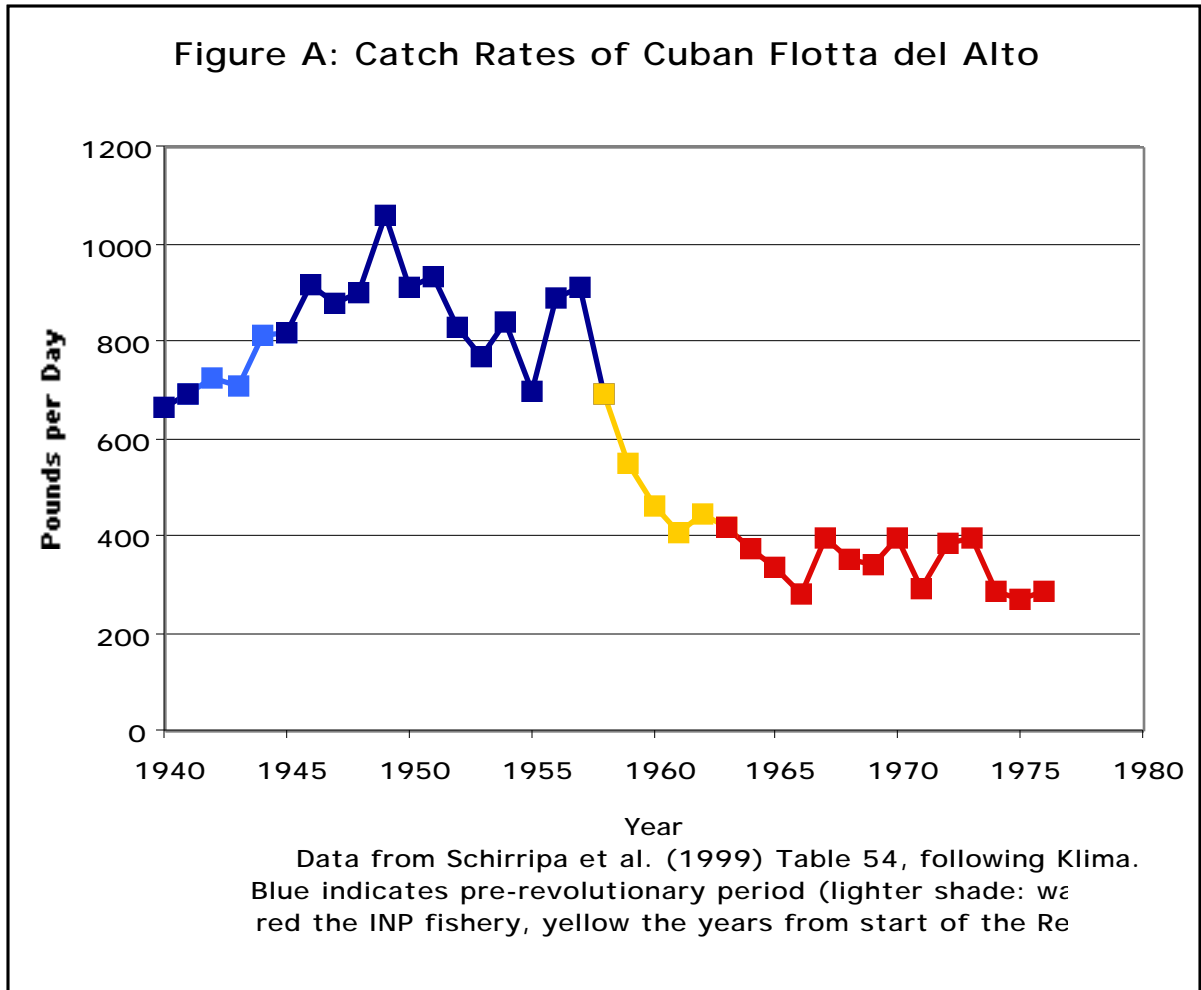
Where historical data are available but do not meet the rigorous requirements of quantitative modeling, it is not necessary to discard them, and hence to lose the vital long-term perspective that they alone can provide. But it is essential to use them only in robust (and likely qualitative) ways. In the case of red grouper, it might be best to confine quantitative analyses to the existing “short” dataset (analyses already undertaken by Schirripa *et al.* 1999), though a new “medium” dataset could perhaps be developed, reaching back to 1963 (the start of potentially comparable Cuban catch recording by INP) which might be adequate to support such analyses.

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Cuban Catch Rates

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