ASSESSMENT OF BLACK MARLIN AND BLUE MARLIN IN THE AUSTRALIAN FISHING ZONE
REPORT OF THE BLACK AND BLUE MARLIN WORKING GROUP

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The exceptional gamefishing for marlin species off the eastern coast of Australia has been widely recognised since the 1930s. Commercial catches of marlin in the region covered by the Australian Fishing Zone (AFZ) were not recorded until the 1950s. In 1954 the Japanese conducted exploratory fishing operations 200 nautical miles east of Townsville in northern Queensland. They reported 'exceptionally good' catch rates for yellowfin tuna *(Thunnus albacares)* and concluded that commercial fishing for tuna was economically viable in the region. Japanese longlining for tuna had also commenced in the north-eastern Indian Ocean including off north-western Australia between 10-20° S latitude where the operations were found to be economically viable. Although these operations targeted various species of tuna including yellowfin, albacore *(Thunnus alalunga)* and southern bluefin *(Thunnus maccoyii),* they were also likely to catch a range of billfish species including black marlin *(Makaira indica)* and blue marlin *(Makaira mazara).*

Longlining activities by Australian domestic longliners operating in the AFZ have increased dramatically in the past decade while Japanese longliners ceased to operate in the AFZ before the end of 1997. Also, the expansion of global commercial and recreational fisheries has seen an increase in activities that are viewed as likely to catch marlins and there is a need to understand the impact of these activities. Although there may be an increase in overall fishing pressure, the nature of these fisheries and the way in which they impact on marlin species is extremely complex. In June 1998, an Amendment of the Fisheries Management Act 1991 was passed which stated 'A person must not, in the AFZ, take blue marlin *(Makaira mazara)* or black marlin *(Makaira indica)* unless the person: (a) is the holder of a scientific permit that authorises the taking of the fish; or (b) takes the fish in the course of: (i) recreational fishing; or (ii) using a charter boat for fishing.' This legislation is intended to alleviate potential conflict between groups likely to catch marlin species and ensure that black and blue marlin numbers remain high and the recreational sector can develop in an ecologically sustainable manner. In addition, the legislation required '...an analysis of the numbers of blue marlin and black marlin in the AFZ and the impact of… [charter and recreational angling]…on those species.'

In response to this legislation a report (Black and Blue Marlin Working Group 2000) was produced that drew upon the technical expertise of a group including commercial fishers,

recreational anglers, independent scientists, the Bureau of Rural Sciences (BRS), Commonwealth Scientific and Industrial Research Organisation (CSIRO) and New South Wales Fisheries Research Institute (NSW FRI). The report was tabled in both houses of the Parliament of Australia in June 2000 and will be available for public distribution before the end of 2000. The summary from the report is provided below.

References

Black and Blue Marlin Working Group. 2000. Assessment of black marlin and blue marlin in the Australian Fishing Zone. Department of Agriculture, Fisheries and Forestry-Australia, Canberra, Australia. 199 pp.

Summary

Competition between fishers leads to ban

Black marlin and blue marlin are highly mobile oceanic fish that can grow to enormous sizes. Because of their large size, elusive nature and fighting qualities, marlin are prized by recreational anglers ('game-' or 'sportfishers') and commercial charter boat operators. Off eastern Australia, for example, black marlin support a valuable charter boat industry based in Cairns and recreational angling for black marlin extend throughout coastal Queensland and New South Wales. Some marlin species, such as striped marlin, fetch high prices at sashimi (raw fish) markets and are sought by commercial fishers using longline fishing gear. Other marlin, such as black marlin and blue marlin are not particularly valuable. However, they are sometimes taken incidentally, as a 'bycatch', by longliners. Growth in commercial and recreational fishing activities has led to concern over the health of marlin stocks and friction between the groups over access to the resource. In particular, increased fishing by Australia's longliners near Cairns raised concerns over the commercial bycatch of marlin, leading to 1998 legislation that banned commercial fishers from retaining black marlin and blue marlin in the AFZ. The legislation required an analysis of the numbers of blue marlin and black marlin in the AFZ and the impact of charter and recreational angling on those species. This report, which draws on the technical expertise of a group of commercial fishers, recreational anglers and BRS, CSIRO and NSW scientists, addresses that legislative requirement.

Differ from other species

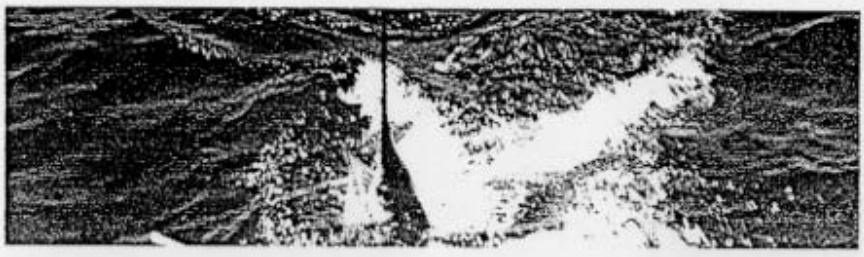
Marlin are difficult to study, and effective management and assessment requires the cooperation of diverse nations. Blue marlin and black marlin are distributed throughout tropical and sub-tropical waters of the Pacific and Indian Oceans. Black marlin tend to be most abundant near land masses, whereas blue marlin are more uniformly distributed through the oceans. Marlin are less abundant than tuna and they do not form schools. Like other billfish and tuna, marlin spawn frequently, releasing millions of eggs at a time. They are migratory fish that grow quickly in their early years and become top predators. Fishing activities in Australia are likely to have a small impact on the stocks compared with currently unregulated fishing activities in the wider Pacific and Indian Oceans.

Unable to accurately count marlin

The group of experts concluded that it was not feasible, or desirable, to 'estimate the numbers of black marlin and blue marlin in the AFZ'. Instead, estimates of relative abundance are the most satisfactory means to assess the status of marlin and the potential impacts of recreational and charter boat fishing. Our assessment considers the species' biology in relation to recent results of tag-recapture studies and tracking experiments and the collective impact of the various fishing activities catching marlin, both in Australia and globally.

No evidence of decline in gamefishing catches

Recreational gamefishing for marlin has a relatively long history in Australia with continuous records of marlin catches held by many fishing clubs and charter boat operators over several decades. Those records show variable catch levels and catch rates that are difficult to interpret in relation to the species' abundance. Fishing practices, for example, have evolved with technological improvements (e.g. more efficient and safer boats and Global Positioning Systems) and changes in target species that subsequently influence reported catch rates. Furthermore, the fundamental goal of gamefishing has changed, with many anglers resistant to landing and weighing marlin. Most (>90%) marlin are now tagged and released.



Summary

...but decline in charter catch rates

A previous analysis of data provided by charter boats targeting black marlin off Cairns showed a 20–30% decline in black marlin catch rates during 1970–97. Nearby longliner activity accounted for about 20% of the variation in charter boat catch rates. However, the affect of commercial fishing on charter catch rates was not particularly strong, and the major restrictions on the area where Japan's longliners were permitted to fish had not resulted in a statistically significant increase in charter catch rates. Seasonal variations in sea surface temperature were correlated with some of the variations in charter catch rates. Those variations in temperature are linked to ocean circulation and may have resulted in changes in the distribution of marlin off north Queensland or their migration patterns. Charter boats tend to fish in close proximity to the outer edge of the Great Barrier Reef near Cairns during a brief (October–December) season. Subtle variations in the distribution of marlin on an ocean-scale may be responsible for the year-to-year variation in black marlin catch rates witnessed by charter boats.

No clear trend in longline data

A series of restrictions and agreements on Japanese longline operations within the AFZ reduced their reported total catch and catch rates of black marlin, notably:

- progressive exclusion of longliners from nearshore waters (e.g., within 12 nm) of the coastline;
- a 1980 closure of the region off north Queensland known as 'Area E';
- a 1986 voluntary agreement to release all live black marlin and blue marlin caught within the AFZ;
- a 1987 ban on retention of marlin and October–May exclusion of Japan's longliners from northern waters of New Zealand's EEZ;
- a 1990 extension of the Area E closure along the Townsville Trench; and
- delays in finalising access agreements during the mid 1990s.

Delays in finalising access agreements may have reduced Japan's eastern AFZ catch of marlin by about 70%; the area closures may have reduced the catch by about 60%. However, the closures and delays did not result in any detectable reduction in catch levels of blue marlin, perhaps due to the species' more oceanic distribution. In November 1997 Australia terminated the access agreement for Japan's longliners fishing in the AFZ.

Australia has small impact on stocks

Black marlin are more important to gamefishing than blue marlin (e.g., about 20 black marlin are caught by recreational anglers for each blue marlin). Black marlin are more likely to be affected by fishing activities in the AFZ, compared with blue marlin, which have a more oceanic distribution and larger global catch levels (e.g., annual catches of blue marlin amount to about 12,000 t per year in the western Pacific compared with about 1,000 t for black marlin). Domestic longlining activities expanded rapidly off eastern and western Australia in the late 1990s to replace the historical levels of activity by Japan's longliners. Off the east coast, Australia's longlining is at similar levels to the historical Japanese activities. Yet, the levels of longline activity (and marlin catch) remain small compared with those in the wider Pacific and Indian Oceans. Australia's highest reported catch of black marlin in 1987 was only 1.1% of the estimated total catch of the species in the western Pacific Ocean. Our blue marlin catch was 0.5% of the western Pacific's catch. Reported catches since 1987 are an even smaller percentage of the estimated catch in the western Pacific. The major harvesters of marlin in the Pacific and Indian Oceans are Japan, Taiwan, Korea, Sri Lanka and the Phillipines. Their catches might impact on Australia's catches, depending on their catch levels, the proximity of activities to Australia, marlin movement patterns and the species' biology (e.g., growth and natural mortality rates).

Summary

Fishery changes may reduce catch rates

Although there are serious problems with the reliability of catch and effort data, catch levels of black marlin and blue marlin have declined. Preliminary assessment of blue marlin in the Pacific showed a marked reduction in catch rates after the 1970s. Current catch levels are now close to the level estimated to be sustainable at the current biomass level. Blue marlin catch rates show a similar pattern in the Indian Ocean. The reductions in catch rates and total catch levels of blue marlin may be largely due to changes in longline fishing practices (e.g., the introduction of deep longline fishing techniques). Black marlin catch rates have declined substantially in the western Pacific. However, the decline is at least partly due to access restrictions and changes in fishing practices.

Many survive release by anglers

Survival of released marlin depends on the individual case; the species, its condition, stress and damage, the skills of the fisher in handling the fish and local conditions. While not statistically significant, the limited information from sonic tracking and satellite-transmitting 'pop-up' tags suggests that most black marlin and blue marlin survive for at least a few days after release. Many tagged marlin probably move to distant areas soon after release, where recaptures are unlikely to be reported. Tag shedding and natural mortality were also significant sources of uncertainty in our estimates of survival after capture and release.

Uncertainty over survival of longline releases

The results of sonic tracking and pop-up tagging experiments cannot be directly related to marlin that have been caught by longline and then released; longline-caught marlin are held on the line for long periods and may be subject to different levels of stress. Legislation in 1998 prohibited commercial fishers from retaining black marlin and blue marlin. Longliners continue to take an incidental catch of those species. However, they now cut-free live marlin and discard dead marlin. On Japan's longliners, which employed long soak times and caught mostly small marlin, a large proportion (about 60–70%) were dead at the time of longline retrieval and a further 5–10% were likely to perish soon after release. A limited number of observations suggest higher rates of survival for marlin released by Australia's longliners, which typically set 1,000 hooks or less per set and use much shorter soak times than Japan's longliners (Japan's longliners usually set about 3,000 hooks per day). The ban on retaining marlin has also reduced the reliability of logbook data reported by commercial fishers.

No evidence of unsustainable fishing

Recreational catches of black marlin and blue marlin (including tag releases) are a very small fraction of the total commercial catches when the ocean-wide distributions of the species are taken into account. With catch and release practices currently promoted by angler bodies and charter operators, the impact of recreational fishing is considered to be very low. Recreational catch levels have not increased significantly during the 1990s. Similarly, commercial catch levels have declined. Regulations and industry undertakings have reduced Australia's longline catch of black and blue marlin, and it is small by world standards; the activities of our longliners are unlikely to have significant impact on a broadly distributed, highly migratory species like blue marlin. For black marlin, a major spawning ground exists off Cairns, and it is plausible that unrestricted fishing by longliners in that area would reduce charter catch rates and may threaten the stock. Current levels of commercial fishing activity off Cairns are low compared with historical levels of effort by Japan. Nevertheless, catch levels have potential to increase further if regulations are relaxed.

Summary

Inadequate research places marlin at risk

The analysis of the status of black marlin and blue marlin reveals many gaps in knowledge of the species and understanding of fishing activities. It identifies several areas of uncertainty in catch levels, the species' biology and behaviour and fishing activities. Inadequate research and management are placing marlin at risk and failing to realise the considerable economic and social benefits that would be derived from optimum use of the resources.

The Marlin Working Group recommends:

1. implementation of a standard logbook to collect data on fishing activities and catches by charter boat operators;
2. continued monitoring of recreational angling activities through data collection at gamefishing tournaments;
3. placement of independent observers on Australia's longliners to verify catch data and to collect additional information (e.g., size, sex and biological samples) on marlin catches;
4. support of studies into the behaviour of marlin and their survival after release, for example, through sonic tracking, pop-up tagging and double-tagging experiments;
5. involvement in international studies of stock structure of marlin through techniques such as genetic analysis, hard tissue chemistry and tagging studies;
6. close cooperation with regional fisheries bodies (e.g., the Indian Ocean Tuna Commission) to improve catch reporting, to further understand the interaction between tuna fishing and marlin and to initiate regional research and assessment of marlin; and
7. support of other international initiatives in billfish research through support of the Third International Billfish Symposium to be held in Cairns in August 2001.