

It may be world famous,
but the black marlin is
poorly understood.

Katherine Johnson
outlines efforts to know
and protect this sporting
species.

Black marlin are charismatic creatures. They grow to four metres and 600 kilograms and are thought to reach speeds of 100 kilometres an hour. Individual marlin have journeyed from Australia to the Marquesas Islands in French Polynesia. It's easy to see why these striking athletes are prized by game fishers. But marlin have been in the news for other reasons of late.

Some game fishers claim that tuna longlining in the tropical waters of North Queensland, in a region known as Area E, is threatening black marlin stocks, reducing the numbers available to the world-renowned game fishery off Cairns. The longliners, on the other hand, claim they catch black marlin only incidentally as bycatch and that most are returned to the sea alive.

CSIRO Marine Research, with funding from the Australian Fisheries Management Authority and the Eastern Tuna Management Advisory Committee, is providing scientific information needed to help resolve the resource management dispute and to help ensure the black marlin's future.

Despite worldwide interest in the species, little is known about the factors dictating its distribution, or whether



This black marlin, pictured off Lizard Island, probably weighs more than 400 kilograms.

there is one global stock or several smaller ones. Assessing the impact of tuna longlining in Area E requires an understanding of black marlin biology and information on the catch and effort of commercial and game fisheries.

As a starting point, CSIRO has examined logbook data and placed scientific observers aboard eight of the 13 commercial longliners with permits to operate in Area E to examine their fishing operations and catch.

This was the first time such a detailed examination of domestic longline vessels had been undertaken, although observers have been routinely

placed aboard Japanese longliners operating in the Australian Fishing Zone (AFZ) since 1979.

The observer-based study was run by CSIRO's Dr Robert Campbell. He says the surveys, together with logbook data from the whole fleet, indicated about 1450 black marlin were caught as bycatch by longliners targeting bigeye and yellowfin in Area E from August 1995 to September 1996. These marlin were all returned to the sea, with more than 70% alive at the time of release.

The study has allowed the number of black marlin deaths resulting from longlining in Area E to be placed in

context. Conservative estimates of the annual number of black-marlin mortalities in the Western and Central Pacific alone are between 20 000 and 30 000. The number of black marlin dying as a result of longlining in Area E therefore represent about 2% of the number taken in this vast region. Black marlin are also caught by longliners and purse seines in the Eastern Pacific.

Campbell says the black marlin found off north-eastern Queensland are thought to be part of much larger stocks which inhabit the Western and Central Pacific Ocean, if not the whole Pacific. He says the surveys suggest it is

unlikely the comparably small number of black-marlin mortalities resulting from longlining in Area E would be impacting on the Pacific stocks.

The surveys have also shown scientifically what longliners and game fishers had assumed for years. Black marlin are highly seasonal and occur in large numbers off Cairns only during the four months of the year between September and December: months corresponding to those of the peak game fishing season.

While the catch rates of black marlin averaged about nine fish per 1000 hooks during the spring, not one black marlin was caught on the observed vessels during winter. This information will be useful for effective management of the fishery.

According to CSIRO Marine Research industry liaison officer, Wade Whitelaw, CSIRO research indicates that minor changes in the way lines are set could further reduce the number of black marlin caught as bycatch and boost the number of tuna caught.

Whitelaw says by reducing the duration of each fishing set from 16 to three hours, the estimated mortality of black marlin decreases from about 50 to 20%. But what happens to the tuna catches when the duration of sets is reduced? The good news is they increase. Set durations of about eight hours yielded the best tuna catches, and still resulted in about 70% of the marlin surviving (see diagram on page 9).

The CSIRO research also suggests that if the longline fishers sink their hooks quickly to depths greater than 75 metres, fewer black marlin will be caught and catches of tuna should be boosted. This is because black marlin were mostly found to occur in waters shallower than 75m while tuna, especially bigeye tuna, prefer deeper, cooler waters. Using commercially available depth temperature monitors, CSIRO is also looking at where exactly the longlines are fishing. This information will help fishers target the appropriate depths, and the desired fish species, more effectively.

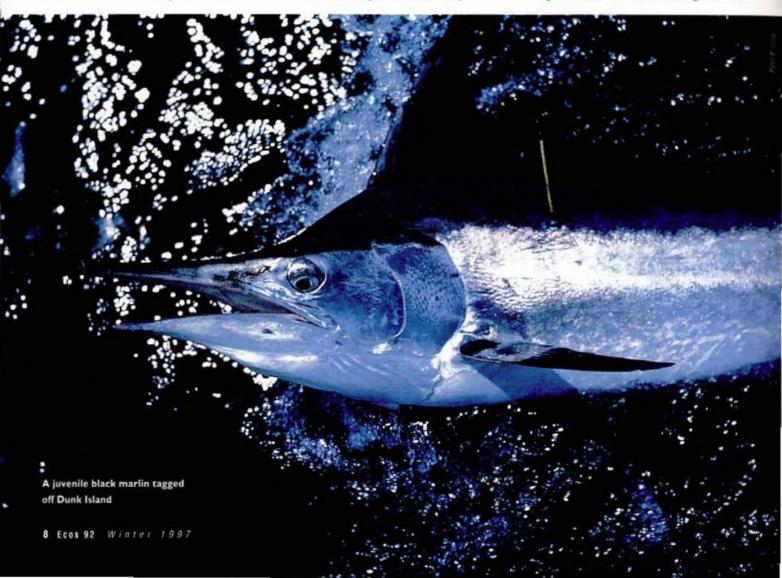
The new information from CSIRO surveys is now available to fishers in two reports submitted to the Australian Fisheries Management Authority.

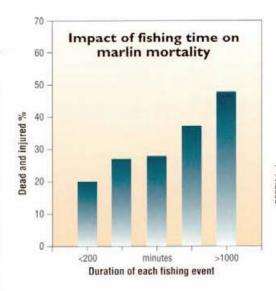
Tagging tactics

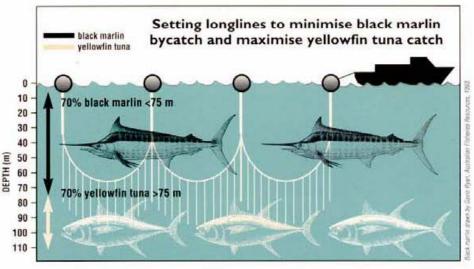
While stocks of black marlin in the wider Pacific do not appear threatened by longlining in Area E, the level of potential conflict between the game fishing and commercial fleets remains an issue. Is it possible that the comparably small number of black marlin mortalities in Area E could affect the high strike rates that make the game fishery off Cairns famous?

Several key issues need to be resolved to answer this question. Firstly, how many black marlin move through the fishery, and secondly, how long do they stay there? For example, if there is a large throughput of black marlin in the area, the small numbers caught as bycatch by the longliners should have a minimal impact on the game fishery. On the other hand, if the throughput is small, even small numbers of black marlin mortalities may affect strike rates.

CSIRO's Dr Tim Davis says objective and quantitative assessment of what dictates black marlin distribution requires an understanding of the







biology and the movement dynamics of the species. For example, do black marlin move into Area E only to spawn, or are they following prey species? Also, what drives their distribution in Area E?

Davis has received funding from the Fisheries Research and Development Corporation to help resolve the issue. The pilot study will use two different tag techniques to assess black marlin movements.

Striped black or blue?

STRANGE as it may seem, it can be difficult to tell a black marlin from a blue or striped one. Given that the landing of black marlin in Area E is not permitted under the terms of tuna longliners' licenses, it is important that fishers know how to identify which fish they have on their deck.

A guide enabling fishers to identify the species quickly and accurately is being prepared by Julian Pepperall of Pepperall Research and CSIRO Marine Research geneticist Dr Peter Grewe.

The guide, funded by the Australian Fisheries Management Authority, will ensure the different billfish species, which look similar, can be told apart and marlin which can not be kept are returned to the sea alive.

According to Grewe, the identification handbook provides ample information for tuna fishers to know if they can land a fish or not. 'If there is any doubt about the type of marlin landed, genetic tests can identify the species from a blood stained rag or a small piece of tissue,' he says.

Pop-up radio tags will be used to determine residence times in the area targeted by the game fishery. The radio tags will be fitted with electronic releases activated at staggered intervals to achieve point-by-point movements of marlin. Pop-up satellite tags will also be used and their performance in helping to determine broadscale marlin migration patterns, residence times, post-release mortality and behaviour assessed.

By understanding the movement of black marlin through the fishery, the researchers will be able to make recommendations to managers on whether black marlin mortalities in the commercial fishery are affecting strike rates in the game fishery.

Seeking agreement

CSIRO studies provide a baseline for black marlin research, and have provided managers with a scientific basis required for management decisions.

But the researchers warn the larger threat to black marlin posed by foreign longline fleets operating throughout the Pacific should not be overlooked. While there is no evidence that black marlin are endangered, no detailed assessments of black marlin stocks have been completed and their status remains unclear.

In the case of highly migratory species such as black marlin, effective management must be by international agreement. Moves are afoot to establish international management arrangements for tropical tunas and associated species in the Central and Western

Pacific, which supports the largest tuna fishery in the world. A regional commission, the Indian Ocean Tuna Commission, has been established under the United Nations Convention on the Law of the Sea to promote cooperation between member nations on the management of tuna and associated species including billfish in the Indian Ocean.

Given the importance of the fish resources of the Western Pacific, to both commercial and game-fishing interests, it is necessary to ensure that the Western Pacific arrangement, when established, adopts a sound scientific approach to managing its tuna and billfish resources.

To this extent, the collection of good fishery statistics from both the game and commercial fisheries and continued scientific research into the biology and movement of the black marlin is vital.

More about black marlin

Campbell RA Williams DMcB Ward P and Pepperell J (1996) Synopsis on the billfish stocks and fisheries within the eastern AFZ. AFMA, Canberra.

Campbell RA Whitelaw W and McPherson G (1997) Domestic longline fishing methods and the eatch of tunas and nontaract species off north-eastern Queensland (1st Survey: October to December 1995). AFMA, Canberra.

Campbell RA Whitelaw W and McPherson G (1997) Domestic longline fishing methods and the catch of tunas and nontarget species off north-eastern Queensland (2nd Survey: May to August 1996). AFMA, Canberra.