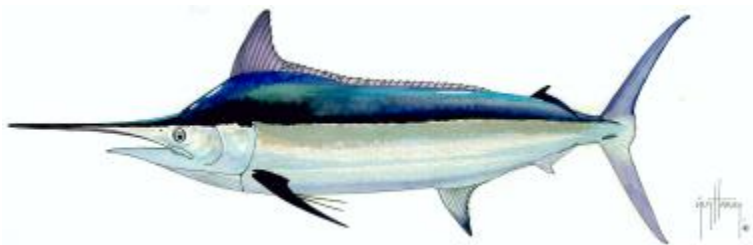


BLACK MARLIN BULLETIN

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Samuel Williams & Dr. Julian Pepperell



Attention all Billfish Anglers Black marlin fin clips needed

As promised in this final edition we dig into some of the more interesting conclusions from our research such as, *where do the small black marlin in the Gulf of Carpentaria most likely come from? How many black marlin stocks are there in the central indo-pacific? What information supports spawning grounds for black marlin and where?*

What we know... or thought we knew

Understanding where any fish move and reproduce is highly important to management and this is no different for black marlin. Black marlin of various sizes are known to form seasonal aggregations off northeastern Australia, the central east Pacific Ocean, northwestern Australia, the central western Indian Ocean, the Gulf of Thailand and the South and East China Seas. A number of these locations had also been suggested as spawning grounds, while others had been rejected (East China Sea, the western Indian Ocean, Mauritian waters, and the west coast of Panama). Tagging data suggested that black marlin were capable of undertaking very wide ranging movements, which were most commonly documented to occur after spawning off Australia's, Great Barrier Reef. Despite this, they had also been shown to return to the same spawning site year after year, with return recaptures occurring up to five years at large. But, this evidence along with early genetic, otolith microchemistry and parasitology studies were inconclusive in identifying separate (genetically independent) populations for black marlin throughout its Indo-pacific range.

Fast forward to late 2013; during the international billfish symposium new research emerged identifying a second known spawning ground in the South China Sea (south of Taiwan), with additional evidence that fish also return to that region to form annual aggregations in the spring and summer months. This stimulated speculation that the conventional assumption of a single population of black marlin and a single spawning ground (off the Great Barrier Reef) may not ring true. With all this as background, a genetic investigation on our collection of black marlin finclips was well under way... so what did we find?

Key research findings



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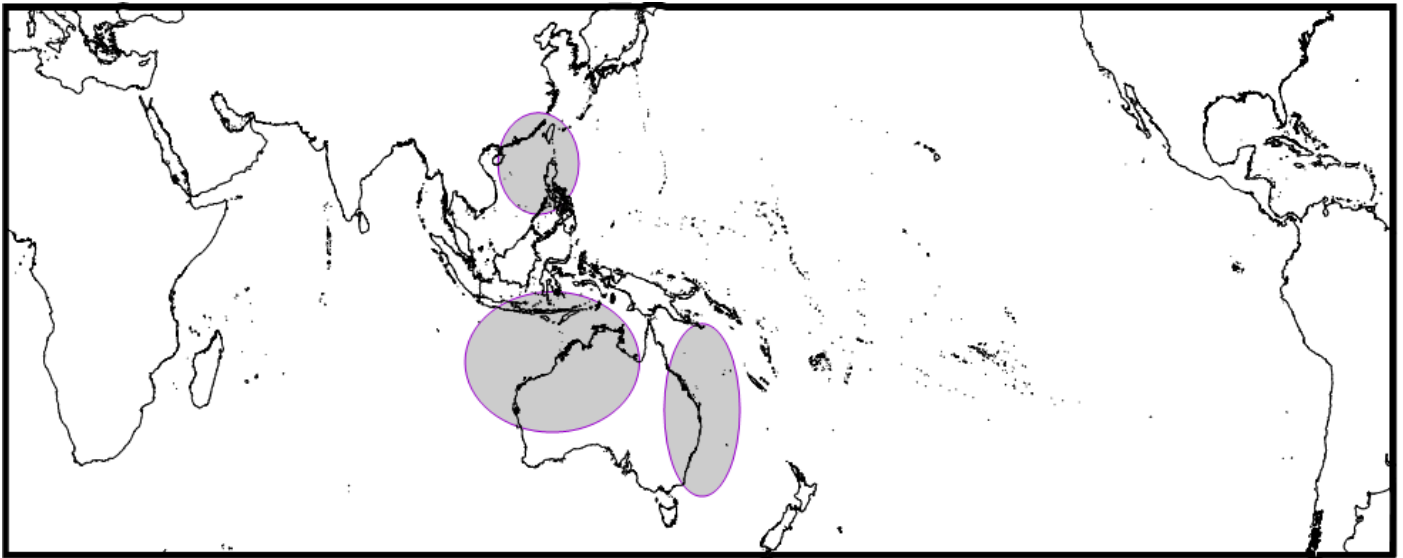


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How many black marlin stocks are there in the central indo-pacific?

Our research, with your fantastic help, has been able to successfully disprove the conventional hypothesis of a single population of black marlin throughout the Indian and Pacific Oceans. Our results indicated that there are three genetically different populations in the Central Indo-Pacific. These populations occur in the southwestern Pacific Ocean, eastern Indian Ocean and South China Sea (see map below). Despite the ability of black marlin to undertake large distance movements, it is likely that the natal homing to form seasonal aggregations to spawn (much like salmon, which return seasonally to the same body of water to spawn) is most likely separating black marlin into different breeding populations. This outcome has led to the recommendation that regional management authorities use this information to help development of formal stock assessments for black marlin in both the Pacific and Indian Ocean.



What information supports spawning populations for black marlin and where are they?

As reported earlier, we found three different populations in the southwestern Pacific Ocean, eastern Indian Ocean and South China Sea. The southwestern Pacific Ocean population was derived from samples along the Queensland and New South Wales coastlines. This group of fish would be expected to form a single population due to our extensive knowledge from tagging on Australia's east coast. We also found that there are not many genetic differences between year classes of juveniles black marlin on the east coast, indicating that the same adults are contributing heavily to the seasonal spawn each year.

The South China Sea population was derived from samples collected from a fish market at the Port of Chenggong, in southeastern Taiwan. With recent research verifying the South China Sea as containing a spawning site, we were interested to see if individuals were mixing with those fish from the southwestern Pacific. We found that this population demonstrated the greatest differences among all three populations, not appearing to mix with other locations.

The third population in the eastern Indian Ocean (from samples off Broome, Dampier and Exmouth), answers but also asks many questions about this species. First and foremost though it answers the questions, *where do the fish in the Gulf of Carpentaria (from samples off Weipa) most likely come from?* Our analysis identified fish caught on the west coast from Coral Bay to Broome, as being from the same spawning population as the fish caught in the Gulf, off Weipa. However, this then raised the question of *where is this eastern Indian Ocean population spawning and is there any evidence for this?* Searching back through the historic literature, we were able to find multiple documented recordings (from 1941-1987) of black marlin larvae and reproductively mature females in the Indian Ocean and South China Sea. Below is a map documenting where these reports occur.

On that note, I would be interested to hear your thoughts on where you think spawning in the East Indian Ocean may take place?

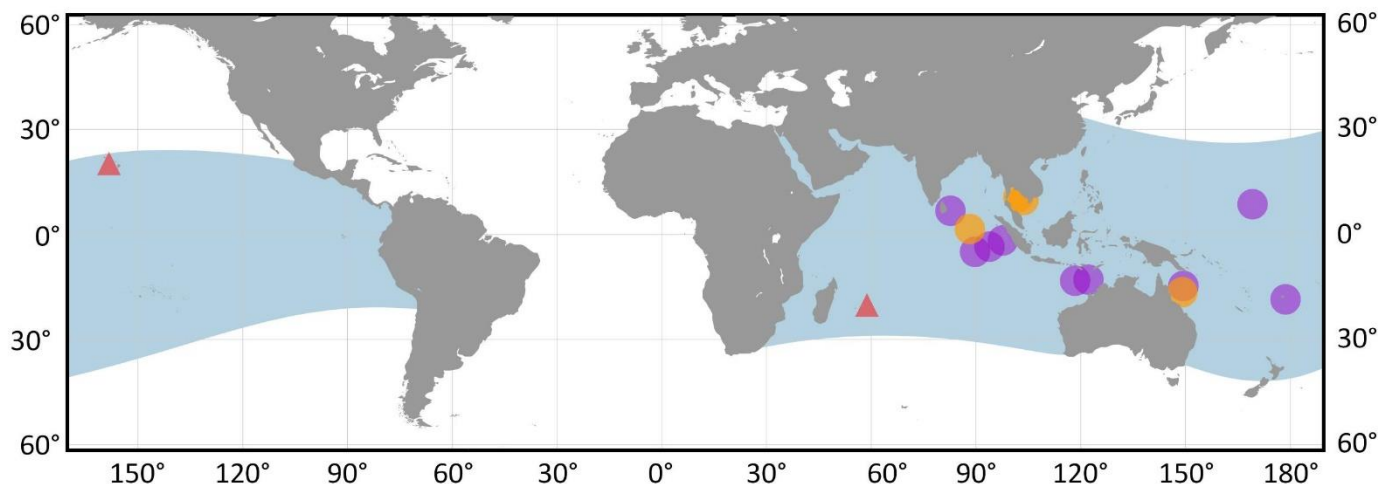


Figure 1. The approximate natural distribution of black marlin. Reported capture of larvae and gravid females as documented in the early literature as identified as; exact geographic co-ordinates for classified larvae (purple circle); exact geographic co-ordinates of gravid females (yellow circle); Reference to larvae from uncited literature source (red triangle) (as referenced in text).