

Distribution and feeding ecology of megamouth shark,  
*Megachasma pelagios*  
メガマウスザメの分布状況と食性

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**要旨**

Research on large filtering shark species, especially the biological information and movement pattern is extremely difficult due to the rarity and unpredictable behavior. Fortunately, the advancement in science and technology is a powerful tool for scientists to better understand these animals. The megamouth shark (*Megachasma pelagios*) is one of the rarest shark species in the three oceans, and its biological and fishery information is still very limited. Due to the scarcity of biological and catch data, it has been categorized as of least concern on the red list by the IUCN. Previous evidence showed that *M. pelagios* was panmictic population with no genetic structure, indicating the vulnerable situation under high strength fishery development. Some resource management strategy had established in order to protect *M. pelagios*, indicating it is high-profile species and needed to be studied. Therefore, the aims of this study were to integrate scattered records of *M. pelagios* from the three oceans, refine previous results, and provide additional information on the biology of *M. pelagios*.

Firstly, the data from published scientific articles, gray literature, online information, news, social network service (SNS) resources, private contact with research institutes, interviews with fishermen, and public websites were collected, cross-validated and checked each record from the above sources for further estimation of the spatial-temporal distribution of *M. pelagios*. A total of 261 landing/stranding records were examined, including 132 females, 87 males, and 42 sex unknown individuals, to provide the most detailed information on global *M. pelagios* records, and the spatial-temporal distribution of *M. pelagios* was inferred from these records. The vertical distribution of *M. pelagios* ranged 0 – 1203 m in depth, and immature individuals were mostly found in the waters shallower than 200 m. Mature individuals are not only able to dive deeper, but also move to higher latitude waters. The majority of *M. pelagios* are found in the western North Pacific Ocean ( $> 5^{\circ}$  N). The Indian and Atlantic Oceans are the potential nursery areas for this species, immature individuals are mainly found in Indonesia and Philippine waters. Large individuals tend to move towards higher latitude waters ( $> 15^{\circ}$  N) for foraging

and growth from April to August. Sexual segregation of *M. pelagios* is found, females tend to move to higher latitude waters ( $> 30^{\circ}$  N) in the western North Pacific Ocean, but males may move across the North Pacific Ocean.

In the second part, feeding information were compared between two filtering shark species, *M. pelagios* and *Rhincodon typus*. Through the mandatory catch and report system in Taiwan, some stomach composition specimens of *M. pelagios* and tissue sample of two species were collected and analyzed. Five *M. pelagios* stomach content specimens were unrecognized due to the high digested level, and the result of stomach composition analysis (SCA) of 14 stomach specimens showed that *M. pelagios* mainly feed on zooplanktonic prey, including krill (Euphausiacea), jellyfish (Medusozoa), shrimp larvae (Dendrobranchiata), squat lobsters (Anomura), and crab larvae (Brachyura), indicating the low trophic diet. The stable isotope analysis (SIA) between *M. pelagios* ( $n = 91$ ) and *R. typus* ( $n = 90$ ) inferred different feeding strategies and diet composition. *M. pelagios* is an inactive feeder, which displays engulfment feeding. While *R. typus* was an active suction filtering feeder, which is not only able to prey on swimming small fish and squids, but also exhibit ontogenetic change in diet. Both *M. pelagios* and *R. typus* were believed born in lower produced waters and move gradually to more productive habitat through they grow. The ontogenetic change was found in *R. typus* due to well-developed swimming behavior and gill-rakers for more active suction feeding. On the other hand, *M. pelagios* show no diet shift during growth, but there is a different isotope structure between males and females, indicating the sexual segregation and leading to different isotope signatures. However, more evidence from different size class individuals for both *M. pelagios* and *R. typus* are needed.

In general, this study not only gives the spatial–temporal movement frame of *M. pelagios*, but also provides feeding information of two filtering feeders. It is hoped that the complete global landing data, distribution, and feeding ecology of *M. pelagios* derived from these records can provide useful information on better understand the ecology of this mysterious species.

Keywords: *Megachasma pelagios*, megamouth shark, spatial–temporal movement, feeding ecology, elasmobranchs, western North Pacific.