Sailfish: the fastest fish in the world?

The fascination for speed runs deep in humans: we are in awe of fast cars and the 100-meter race is the most popular event at the Olympics. Similarly, we are intrigued by fast animals, like the cheetah hunting its prey. For animals, speed is often a matter of life or death. Under water, the consensus appears to crown sailfish as the fastest fish in the ocean, with its top speed presumably around 110 km/hr (68 mph). At least, this is what multiple sources on the internet claim. However, these sources are based on speed estimates that were done in the 1940's using a method that was possibly not very accurate, i.e. timing hooked specimens with a stop-watch.

Photo by Amanda Cotton

To investigate if sailfish indeed use such exceptional speed, we conducted fieldwork in the Gulf of Mexico where sailfish are known to live and hunt in groups on large schools of sardines. We particularly investigated sailfish behaviour and speed during hunting since one might expect this to be the most likely situations in which high speeds would be used. In order to estimate their speeds, we used two methods. First, we used high-speed video recording to measure the frequency with which they beat their tails, known to be related to their speed. Second, we caught sailfish, equipped them with an accelerometer and released them again. This accelerometer also measured the frequency of the tail beats. Both methods estimated that the maximum speed achieved by sailfish lies around 36 km/h (22 mph). Not quite the phenomenal speeds that early measures reported. How do they then catch their prey if not by speed? It turns out that sailfish rely heavily on the use of their bill to capture their prey. Surprisingly, sailfish can sneak their bill into a school of sardines without eliciting any reaction from the prey. Subsequently, the sailfish swing their bills producing an effective slash which moves faster than the sardines can swim, giving them no chance to avoid the blow.

We also studied the function of another distinctive feature of the sailfish: its sail. Interestingly,

sailfish keep their sail tucked in (Fig. 1 A) when cruising around. This makes sense, because a sail as large as that of the sailfish may cause increased resistance in the water. So what is its function? We observed that the sail is extended only when the sailfish are maneuvering around their prey.

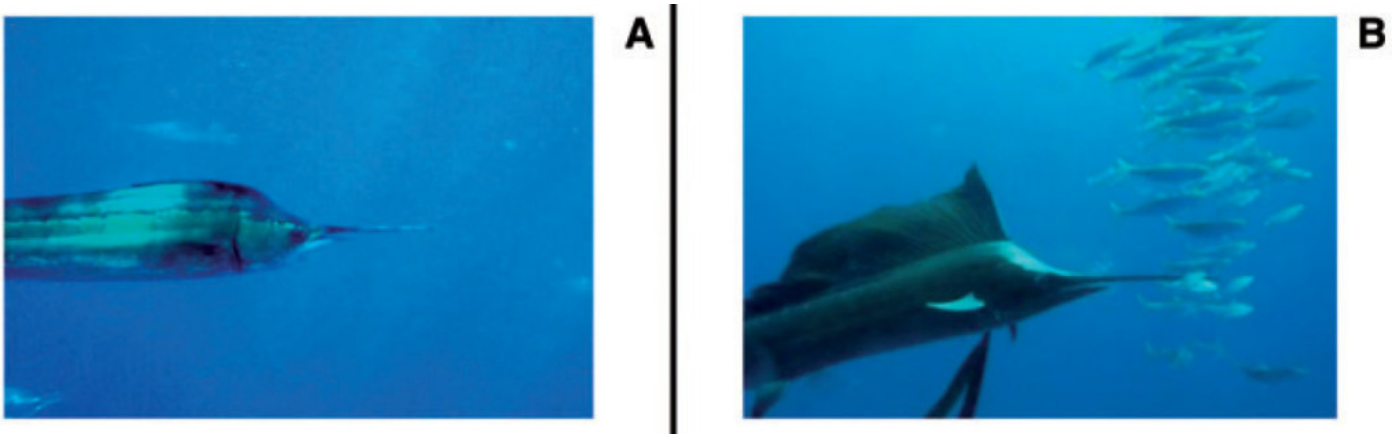

Fig. 1. Photographs from Marras et al (2015) Not So Fast: Swimming Behavior of Sailfish during Predator–Prey Interactions using High-Speed Video and Accelerometry. Integr Comp Biol. 2015 Oct;55(4):719-727

This may aid in making tight turns. However, another instance for which the sail is extended is when sailfish have caught up with a school of prey and have inserted their bill inside the school (Fig. 1 B). Interestingly, the prey does not seem to react to this long, thin bill. We found that when extending the sail, sailfish manage to keep their bill steady with no lateral oscillations, which are present when sailfish swim with their sail tucked in. We think that the sail acts as a control surface, damping and thereby minimizing the oscillations of the bill and the potential disturbance these oscillations could create. This allows the sailfish to swim right behind a school of sardines without startling them, until they slash with their bills, thrashing through the school and injuring the prey. Therefore, sailfish appear to rely mainly on accuracy of movement and the use of the extension of their bodies such as their bill and sail, rather than resorting to extremely high speeds when hunting their schooling prey.

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Publication

Not So Fast: Swimming Behavior of Sailfish during Predator-Prey Interactions using High-Speed Video and Accelerometry.

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