Photo-monitoring whale sharks

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Up to 20 meters long and weighing as much as 20 tons, its enormous size gives the whale shark (Rhincodon typus) its name. Known as the 'gentle giant' for its non-predatory behavior, this fish, with its broad, flattened head and minute teeth, eats tiny zooplankton, sieving them through a fine mesh of gill-rakers. Listed as a rare species, relatively little is known about whale sharks, which live in tropical and warm seas, including the western Atlantic and southern Pacific.

However, a new study combines computer-assisted photographic identification with ecotourism to study the rare species and suggests whale shark populations in Ningaloo, Western Australia are healthy. The study appears in the Ecological Society of America's January issue of *Ecological Applications*.

West Australian marine scientist Brad Norman (ECOCEAN/Murdoch University) began the study in 1995. Photographs were taken while swimming alongside each whale shark and photographing or video-taping the white lines and spots along the flanks of the animal. Norman teamed up with U.S. computer programmer Jason Holmberg (ECOCEAN, Portland, Oregon) and astronomer Zaven Arzoumanian (USRA/NASA, Greenbelt, Maryland) who adapted software originally used with the Hubble space telescope. The pattern-recognition software developed by Holmberg and Arzoumanian allowed the group to positively identify individual whale sharks. Like a human fingerprint, the speckles and stripes pattern on the skins of whale sharks are believed to be unique to each individual.

Ningaloo Reef, in Western Australia, is one of the best locations to find whale sharks, especially between April and June. The authors found that more whale sharks are returning to the northern area of Ningaloo Marine Park from season to season, suggesting the population is growing. In addition, they found that about two-thirds of the sharks were repeat visitors while one-third were sighted only once during the study period.

The authors say their study suggests that the management guidelines for whale shark ecotourism at Ningaloo appear to be on target.

“Applying these guidelines to other locations along whale shark migration routes may offer a viable alternative to hunting these fish, one that yields both economic and conservation benefits,” says Norman.

As a rare and highly migratory fish, whale sharks are a big draw for Ningaloo’s ecotourism industry, where tourists pay to get close views and even swim with the sharks. In spite of their gargantuan size, whale sharks are fairly docile; the main risk comes from getting in the way of their very large and powerful tails.

Based on 5100 underwater images contributed by hundreds of researchers, divers, and ecotourists, the authors obtained almost ten times more data than any previous study.

“To study whale sharks in a meaningful way, we really had to rethink how we collect data and how we analyze it,” says Holmberg. “The results surpassed our expectations, allowing hundreds of individuals to contribute and providing the necessary data to obtain a closer look at the population’s health.”

Norman and colleagues note that while their study is encouraging for the Ningaloo whale shark populations, global concern over their future is justified, especially in areas where the sharks continue to be hunted for

their fins and meat. The researchers hope others will apply their techniques to other whale shark populations, as well as to other species.

Source: Ecological Society of America