Marine Debris Increase in El Nino Years

Mary Donohue, Manoa’s Sea Grant College Program associate director, and a colleague revealed a link between Hawaiian monk seals entanglements in discarded fishing gear and El Nino. Their findings were reported in *New Scientist Environment*.

During El Nino years, the unusual wind and ocean currents concentrate fishing gear and other marine debris in the seals’ habitat. Young seals are especially prone to entanglement due to their natural curiosity and playful nature.

The new findings will help cleanup efforts aimed at the conservation of the world’s last remaining tropical seals. The Marine Debris Program is embarking on a program to remove debris from the seas before it accumulates on reefs.

Fatal monk seal entanglements linked to El Niño

A juvenile monk seal risks entanglement by resting on derelict fishing gear at Pearl and Hermes Atoll in the Northwestern Hawaiian Islands (Image: Yoshinaga, NOAA Fisheries)

A link between Hawaiian monk seals becoming entangled in discarded fishing gear and the global climatic phenomenon called El Niño has been revealed. The finding will help focus the cleanup efforts aimed at conserving the critically endangered animals.

The danger of getting caught up in old nets and other marine debris is seriously hindering the recovery of seal populations. The new work shows entanglement is more common in El Niño years because unusual wind and ocean currents concentrate the debris in the seals' habitat.

Hawaiian monk seals are the world's last remaining tropical seals. They are primarily found in the Northwestern Hawaiian Islands, an area recently made into the world’s largest marine sanctuary. Their numbers are declining at a rate of about 4% per year, and with only around 1200 animals left, scientists are keen to pinpoint the biggest threats to the population.

Shark predation and lack of food play a part, but drowning because of entanglement is a major problem, especially with young seals. The islands accumulate large amounts of debris, and juveniles, being naturally inquisitive, often play in the nets. “But they’re playing with a
very deadly toy,” says Mary Donohue, an oceanographer at the University of Hawaii in Honolulu.

Despite massive clean-up efforts over the past two decades, the rates of entanglement have not declined. Instead, they fluctuate wildly from year to year. After noticing that a graph of entanglement rates since 1982 looked very similar to a chart showing El Niño years over the same time period, Donohue decided to investigate. “We can’t just keep cleaning it up,” she says. “We need to find out why it’s accumulating in the first place.”

Useful cue

Donohue and her colleague David Foley, a physicist with the US National Marine Fisheries Service, used satellite remote sensing data to track the movement of the North Pacific Sub-Tropical Convergence Zone. The STCZ is a boundary between water masses and it stretches from Japan to the US.

It results from the interaction of wind and ocean currents and tends to collect large amounts of marine debris. They found that during El Niño years the STCZ intensifies and dips farther south, enveloping the Northwestern Hawaiian islands in marine trash.

“As the area of water slides over the Hawaiian archipelago, it leaves the coral reefs around the islands tangled with debris,” says Foley. The researchers found that the further south the STCZ dipped, the higher the seal entanglement rate.

El Niño events can be predicted 6 to 9 months in advance, says Foley, so knowing that debris will increase during the next one will cue conservationists to ramp up their efforts.

Pre-emptive strike

The Marine Debris Program, lead by the Pacific Islands Fisheries Science Center, was set up in the 1990s to tackle the problem of entanglement. The programme has typically focused on removing debris from the islands and reefs after it accumulates "but it would be better to pick it up on the high seas before it impacts the reefs", says Jason Baker, a marine biologist at PIFSC.
Based on the satellite data showing the STCZ movements, the programme is now embarking on a project to use aircraft equipped with LIDAR, an optical remote sensing technology, to locate debris so boats can be sent out to remove it.

Employing this strategy during the run-up to an El Niño year would be a smart move, says Baker. “You’ll get a bigger bang for your buck.”
