A new study has used a marine monitor radar system to monitor California marine protected areas

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Marine Monitor (M2) Radar System monitored activity near the Piedras Blancas Light Station in central California. Credit: ProtectedSeas

A new study has found that boaters often cluster along the edges of marine protected areas (MPAs) off the coast of California. These new findings suggest that fishers are aware of the MPA boundaries and cluster just outside them to potentially benefit from better fishing opportunities by "fishing the line."

The study, recently published in *PLOS ONE*, used the ProtectedSeas Marine Monitor (M2) autonomous data collection tool to continuously monitor vessel activity 24 hours a day, 7 days a week for a year in the vicinity of five state-managed MPAs near San Diego, Santa Barbara and Cambria. The M2 systems, which combine marine radar with custom software, were deployed to record the movement of boats on the water, allowing researchers to measure boat activity continuously in and around MPAs for the first time.

The network of M2 systems in California are managed by ProtectedSeas and site partners based at each location.

The researchers identified specific boat movements and found that overall, 40 percent more boating activity occurred in the vicinity of MPAs compared to the surrounding areas. A well-documented benefit of MPAs is the "spillover" of marine life from inside an MPA into the surrounding areas.

"Most activity occurred at or beyond MPA edges, and not within the area itself," said ProtectedSeas researcher Samantha Cope, the lead author of the study. "This suggests that boaters are aware of the MPA and that the areas are serving their purpose of creating safe refuges for ocean life regeneration. Fishers see a benefit from spending time near the area because MPAs are working.

The researchers found that boating activity clustered at MPA edges occurred at all five locations. Clustering intensified at the southern

California MPAs during both commercial and recreational spiny lobster seasons, a valuable fishery in the state. During the commercial spiny lobster season, clustering was 30 times greater also at the Campus Point State Marine Reserve near Santa Barbara.

Recreational boat traffic monitored by the Marine Monitor (M2) Radar System in California. Credit: ProtectedSeas

"Conservation work needs to be driven by data, and M2 helps us understand trends in what's happening in MPAs," said study co-author Jess Morten, a researcher with the California Marine Sanctuary Foundation, a site partner with M2 in California.

MPAs in California primarily restrict fishing activities to conserve valued species and habitats. When fishing activity is concentrated at MPA edges, it suggests that fish may be more abundant closer to the MPA compared to elsewhere in the local area. Monitoring human activity can help managers evaluate both the ecological and community benefits of the MPA, detect patterns in boat activity and other human uses, and ensure MPA regulations are followed.

The M2 system provided researchers with an independent method for continuously documenting activity. "We specifically designed M2 to monitor important marine places at a cost that was realistic for local managers," said M2 Product Manager and study co-author Brendan Tougher. "This research shows that M2 is an accessible and robust tool for monitoring MPAs."

The state's first MPA Decadal Management Review is currently underway to evaluate the existing network of MPAs. Investigating human activity near MPAs is important for evaluating the success of current ocean protections.

There are currently 18 active M2 systems globally, with six of them in California, and many deployed internationally in developing countries.

"As a 'low-tech' solution for more efficient MPA monitoring, M2 is especially valuable for anyone with limited technical experience or resources since people can be quickly trained on how to use and interpret data from our systems," said Tougher.

Hot spots of activity occurred at MPA boundaries, and this activity was generally most common at midday and on weekends. There was less activity overall at the site in central California that monitored the Piedras Blancas State Marine Reserve and State Conservation Area, likely due to its remote location. But hot spots at MPA boundaries were still present.

More information: Samantha Cope et al, Coastal radar as a tool for continuous and fine-scale monitoring of vessel activities of interest in the vicinity of marine protected areas, *PLOS ONE* (2022). DOI: 10.1371/journal.pone.0269490

Provided by ProtectedSeas