

Seabirds Offer Tool to Help Manage California's Marine Protected Areas

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Adaptive management is vital for the success of marine protected areas (MPAs) as a fish conservation tool. Effective management requires that managers establish realistic expectations for how quickly fish populations will increase within MPAs so that they can assess when an MPA is working versus when it needs more time to mature. Setting realistic timelines for population change requires an understanding of how many juvenile fish enter populations protected by MPAs each year.

Because seabirds consume juvenile fish, they can be used to track juvenile fish abundance. Past Point Blue studies have shown that seabird numbers and behavior can reflect juvenile fish abundance and changes in abundance from year to year. The goal of our study was to use the methods previously developed by Point Blue to identify where and under what oceanographic conditions we should expect to find high abundances of juvenile fish.

Not all areas along California's coast are equal in their potential to receive juvenile

fish. Oceanographic processes like upwelling create currents that push young fish away from their nearshore habitats. Coastal headlands can provide protection against these currents and enhance juvenile fish delivery to habitats in their lee. Thus, it is important to consider annual oceanographic conditions and coastline orientation when establishing expectations for MPA performance.

Our study used data on seabird foraging from 46 study sites throughout California's MPA network over eight years. Foraging seabirds showed that juvenile fish abundance was highest in the lee of coastal headlands, especially in years when upwelling was pulsed with periods of relaxation that allowed for the delivery of young fish to nearshore habitats. Juvenile fish abundance was also higher in the lee of larger headlands compared to smaller headlands.

Our results suggest that MPAs located in the lee of large headlands should show faster increases in fish population size compared to MPAs at windward and exposed sites,

especially during years of pulsed upwelling.

Main Points

Seabird foraging rates showed high abundances of juvenile fish in the lee of large coastal headlands.

Pulsed upwelling led greater delivery of juvenile fish to nearshore habitats.

Fisheries managers should expect faster increases in fish abundance within MPAs located in the lee of large headlands, especially following years of pulsed upwelling.

Robinette, D.R., N. Nur, and J. Jahncke. 2019. [Spatial patterns in nearshore juvenile fish abundance throughout the California network of marine protected areas as revealed by seabird foraging rates](#). *CalCOFI Reports* 60: 109-122.