

## Seabirds on the GBR detect El Niño events before they occur

El Niño events have long been known to threaten species' reproduction, recruitment and survival. However, effects of the El Niño Southern Oscillation (ENSO) vary temporally and spatially across the Pacific Ocean. Seabirds are traditionally recognised as being impacted by El Niño events through seasonal-scale crashes in prey availability. However, Carol Devney and Brad Congdon's research on long-term population dynamics of tropical seabirds on the GBR has demonstrated links between seabird breeding participation and thermocline depth and surface chlorophyll that occur well in advance of El Niño-generated sea-surface temperature (SST) anomalies. Changes in thermocline depth are a precursor to changes in the ENSO in the western tropical Pacific and are also known to affect fish-eating seabirds. To investigate the influence of thermocline depth on reproductive success in the western tropical Pacific, Carol Devney, Mike Short and Brad Congdon used 18 years of data on population dynamics of three tropical seabirds and environmental descriptors for ENSO precursors and associated environmental variation. They found that for the Sooty Tern and Common Noddy, populations decreased as the average thermocline depth deepened. Additionally, for these two species, the surface chlorophyll concentration was significantly positively related to breeding participation.

### **Why does change in thermocline depth affect these pelagic seabird species?**

The mechanisms by which thermocline depth changes may influence prey accessibility to foraging seabirds are unknown. The two most likely possibilities are changes in the distribution of subsurface predators and changes in the distribution of prey. Most tropical seabirds rely on subsurface predators such as tuna or marine mammals to drive prey to the surface. Early stage El Niños drive thermocline shoaling in the central and western tropical Pacific, causing tuna foraging resources to decline as the area of highest productivity moves into the central Pacific, redistributing subsurface predators. Variation in thermocline dynamics may also influence the concentration of forage fish, by, for example, inducing aggregation or dissociation of vertically migrating prey. The redistribution of both predators and prey are likely to impact pelagic seabird populations.

### **Why is this research important?**

The relationship between advanced El Niño sensitivity and seabird dynamics has been documented previously in two other studies, though no mechanisms were demonstrated. Carol Devney et al.'s research demonstrates a link between seabird behaviour and El Niño characteristics that develop a year later. These findings add to increasing evidence that El Niño conditions not only interfere with major seasonal-scale processes, but also add additional fine-scale within-season trophic stresses. Also, the significant population fluctuations in tropical seabirds at Michaelmas Cay, northern GBR, may be directly linked to contemporary increases in the frequency and intensity of El Niño events, suggesting that similar impacts may be occurring in declining populations declines seabirds throughout the GBR.

For more information contact  
[carol.devney@jcu.edu.au](mailto:carol.devney@jcu.edu.au)

### References:

Devney CA, Short M and Congdon BC (2009) Sensitivity of tropical seabirds to El Niño precursors. *Ecology* 90(5): 1175 - 1183



AIMS@JCU E-Research is edited by Vanessa Adams. For more information, comments or enquiries please email [aims@jcu.edu.au](mailto:aims@jcu.edu.au).