In February 2025, graduate students in the CCE-LTER undertook a scientific voyage to the Santa Lucia Escarpment off the coast of central California. The student research cruise was led by CCE PhD candidate Grace Cawley and funded through UC Ship Funds Program. The study aimed to explore how bottom-up processes, including physics and a productive plankton community, might explain an unusually high diversity and abundance of seabirds and marine mammals. The research site lies within the newly designated Chumash Heritage National Marine Sanctuary which was approved only months before in November of 2024. The site spans the coastal and offshore region between San Luis Obispo and Point Conception and is co-managed by NOAA and the Chumash Peoples.

The inception of this expedition dated back to 2022, when post-doctoral researcher (then PhD student) Dr. Tammy Russell observed a sea bird hotspot around the Santa Lucia Escarpment. Dr. Russell assembled an interdisciplinary team of graduate students and was awarded funding and ship time to conduct an ecological survey. During the first attempt of the cruise, cases of COVID wreaked havoc on the crew including Dr. Russell, resulting in a delay in the voyage until April 2024. Unfortunately, the productive springtime in the CCE comes with strong winds and large swells, which severely limited the science the team could conduct on Scripps' smaller vessel, the *R/V Gordon Sproul.* Despite these conditions, the team of students' energy and intrigue to understand this unique region remained unphased and they returned with as many samples as they could and unwavering optimism.

In fall 2024, Grace Cawley led an even larger team of interdisciplinary graduate students to earn funding for a follow-up expedition. The team included graduate students studying phytoplankton, zooplankton, physics, seabirds, marine mammals, and even humanities

researchers in visual arts and ethnography. This time, the scientists were prepared for conditions, with more sea time (11 days) and a larger vessel, the *R/V Sally Ride*, to buffer against any unpredictable ocean conditions. In the lead-up to the cruise, the mission faced further challenges as the stacked science party of 22 was slowly depleted to only 16 members, many of whom had never been to sea before.

Images. Left: Bongo net deployment. Upper: CTD Sunset, Lower: Marine mammal and seabird observers on the bridge.

Despite the limited capacity, the scientific goals of the mission and execution of high-quality science came to fruition. The team sampled a grid of 12 sites on the Santa Lucia Escarpment where they collected water samples, physical data, and deployed 3 different net types: the Manta net (for sampling the surface neuston layer), the Bongo net (for quantitative analysis of the upper ocean), and the Isaacs-Kidd Midwater Trawl (IKMT; which targeted the mesopelagic in search of deep-sea squid). Sampling the 12 stations was a marathon, with a week of 24-hour full science days and little margin for error. Between sites, the dedicated marine mammal and seabird observers witnessed a captivating diversity of birds, whales, dolphins and large fish thriving on the productive ecosystem while the net and CTD team tried to find intermittent bursts of rest. A few sites even provided a rarely seen display of what appeared to be Humpback whale courting behavior between pairs of cetaceans, which earned the region the nickname “the Humpback Hotel.” The cruise ended with a physical oceanography study where researchers

measured current speeds and other physical properties to test whether internal waves in the region might be driving the inexplicable productivity.

Images. Upper: Left: Humpback pair at the "Humpback Hotel." Right: Mesopelagic fish from the IKMT. Lower: Left: Strawberry Squid. Right: IKMT tow contents.

After 11 days, the science team returned to shore, bodies and minds weary from the hard work, but hard drives rich with data and hearts full with the lifelong impact that each research cruise provides. The next several months will be spent processing samples, analyzing data and staying connected to try to piece together the story of this unique marine sanctuary.

Image. Science party returning to San Diego.

Written by Dante Capone, CCE graduate student, March 2025