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Point Blue Quarterly

Conservation science for a healthy planet.

Tales of the Unexpected:

Scientific Surprises that Led to New Conservation Insight

An Exception to Every Rule

Data Reveals Surprising Trend in Regional Birds

Author and biochemist Issac Asmiov once said "The most exciting phrase to hear in science, the one that heralds new discoveries, is not *eureka!*, but *that's funny* ..." Point Blue scientists often experience those "Asimov moments"—surprises, incongruences, and coincidences that lead to new insights or trigger a new line of investigation.

A curious scientific mindset requires questioning assumptions and, at times, following evidence down an unexpected path. That's what happened when Pacific Coast and Central Valley Director Tom Gardali, along with San Francisco State University graduate student Rae Goodman and other collaborators, decided to investigate changes in bird body size in western North America. "We had noticed a few published research papers that looked at long-term trends in body size and found that birds in other regions were getting smaller, likely due to a warming climate," says Tom. The papers were in keeping with something biologists know as *Bergman's rule*: the tendency for animals living in warmer places to be smaller compared to those living in colder regions. The thinking is that larger bodies retain heat more efficiently, whereas smaller animals can shed heat more effectively. As the planet warms, some scientists predict that many animals, including birds, will adapt by decreasing their body size.

"We wanted to assess whether climate change is already impacting biodiversity," says Tom. "Body size affects metabolism and fitness," he explains, "so changing size has implications for resilience—those species that can adapt might be better off than those that are not changing fast enough."

Ecologists and interns at Point Blue's Palomarin Field Station in Bolinas, California, have conducted bird banding and data collection nearly every day since 1966, making the Palomarin Keystone Dataset a natural place for Tom to examine changes in bird body size. "Could we see the fingerprints of climate change in our long-term data?" he wondered. The team reviewed decades of data from Palomarin, analyzing more than 32,000 individual birds representing a range of species with differing classifications such as whether they migrate or are year-round residents.

Tom expected the study, which was published in the journal *Global Change Biology*, to confirm the results of research that showed birds on the East Coast were getting smaller. "We had no reason to believe our results would show anything different," he ex-

Above: Measuring a Wilson's Warbler. Photo by Sam Snowden. Next page, top: Avian Ecologist Renée Cormier and former banding intern Maria Chavez examine a Song Sparrow. Photo by Lonnie Bowling. Bottom: Practicing social distancing while monitoring California Gulls at Mono Lake. Photo by Annie Schmidt/Point Blue.

plains. But after an initial look at the data, a strong pattern for birds getting larger began to emerge. “We did not believe it,” says Tom. “We thought there must be something wrong with the data.”

The team looked more closely at the data, species by species, accounting for any strange data points and checking for potential changes in how the data were collected and entered over the many decades. But they could only conclude that the changes were real. “We wanted more corroboration,” says Tom, “so we asked a collaborator at San Francisco Bay Bird Observatory if we could analyze their data. They agreed and we found the same patterns, so we were feeling very good about our work.”

Although they haven’t identified a definitive reason why our regional landbirds are getting larger—the beauty of science is that there are always more questions to be asked!—Tom and his colleagues suspect that climate change is a driving factor. Beyond warmer temperatures, the consequences of

climate change include changes in extremes such as drought and rainfall, making the global climate more variable. “Birds may be getting larger to be able to deal with greater uncertainty in the environment, including more climate extremes,” explains Tom. Alternatively—and Tom is leaning more toward this explanation—changes in climate could improve environmental conditions such that birds have more food of greater nutritional value, leading to larger body size.

Although more research will be needed to test these hypotheses, the study has already advanced our understanding of the status of western bird populations. And the more we know about how nature is adapting, the better prepared we are to empower effective and efficient climate-smart conservation solutions for our changing world.

For Tom, some other very important takeaways have emerged from the study. First is that Point Blue’s Keystone Datasets, including the long-term records from Palomarin, are essential. “Studies like this just would not be possible without them,” he says. The second lesson? “Never assume you know the answers already! Anecdotal information is important,” Tom acknowledges, “but when combined with data, the findings are likely to be the most robust.” Tom’s final reflection is a hopeful reminder: “Nature is resilient—we can see that, if we give it some time and attention.”

by Stacey Atchley-Manzer, Editor

staying resilient

The nature of conservation science lends itself to both unexpected discoveries in analyzing complex datasets and unexpected experiences doing outdoor field work (in case you missed it, see our issue dedicated to “Life in the Field”). But in March of 2020, we all experienced something unexpected when COVID-19 spread around the world, disrupting our lives.

Over the last five months Point Blue has focused on keeping our staff as safe as possible while continuing to do our critical work studying and conserving the natural world. And in many cases, we’ve been able to respond creatively to achieve both goals at once.

At our Palomarin Field Station in Bolinas, CA, we’ve always pursued three objectives at once: maintaining the long-term datasets, training the next generation of conservation scientists through our renowned internship program, and educating the public through our Nature Center. While the Nature Center has been closed to the public, we’re happy to say that data collection and intern training has continued.

On the Farallon Islands, we’ve continued our 50-year history of keeping our field station there staffed 365 days a year, although we’ve reduced the size of the field crew and lengthened their stays to reduce turnover and associated potential exposure.

In the Sierra Nevada, we were unable to bring on field crews this spring, as non-essential visitors were not allowed in the rural counties we work in. Our locally based staff worked long hours to keep our important projects moving forward.

Our Spotted Owl monitoring continued apace this spring, having been deemed part of the “essential” work associated with drinking water security and fire safety in Marin County.

We’ve moved many workshops and events online, including our annual meeting in June, which drew over 100 participants, and a recent workshop on climate-smart restoration, which drew over 350 participants.

Life is, of course, full of the unexpected. And as we know from our in-depth studies of how climate change and other disruptions affect humans and wildlife, building in resilience and flexibility is key to survival.

by Zachary Warnow, Director of Communications

Thinking Outside the Handbook

An Unexpected Lesson from a Wrentit Pair

How do you find a Wrentit nest? It was all detailed in the Palomarin intern handbook, and I used this knowledge one spring morning out on my study plot: You wait for one of the parents to sing, you follow it closely, but not too closely. You watch the poison oak and coyote brush leaves twitch, allowing you to key into where this skulking and secretive bird is stealthily moving through the scrub. When the leaves stop moving you focus your senses—sight, sound—fully on that spot, and wait for the second parent to appear. If you see that second parent, it has come off the nest, trading places with the first. "X" marks the spot! Another nest to be monitored!

Intensive nest and habitat monitoring has been ongoing at Point Blue's Palomarin Field Station in Point Reyes National Seashore since 1979. So intensive, in fact, that researchers there have literally written the book on the subject. This focus allows us to understand how changes in vegetation impact the wildlife that depend on it, while also studying the other variables that influence their populations.

As an intern, I was to be a nest-searching machine, following the instructions carefully. But that morning what I observed was that Wrentits are not automatons. I watched the first adult sneaking through the brush. Then the second adult appeared. Just like clockwork. I had been looking for their nest for several days and finally I had found it. Or so I thought.

As I peeked through my binoculars, what I saw I have not forgotten nearly 20 years later. Both adults were snuggled next to each other on a branch. No nest in sight. One was gently preening the other. They sat there huddled together for close to 30 minutes.

I finally backed away and gave them their privacy, assuming they did not have an active nest. But the next day I did find their nest, full of nestlings. It was as though the parents were taking a much needed timeout.

That day I learned firsthand that Wrentits and birds in general don't hew to any handbook guidelines. They are each unique and varied and this is part of what makes them such interesting study subjects.

I also learned that encounters like this are integral to Point Blue's approach to both science and training. We're grounded in natural history and careful scientific practices like those outlined in my intern handbook. But we also know the value of first-hand field experiences that incite passion and encourage discovery.

In the case of the Wrentits I observed that day, they may have been strengthening their bond, potentially increasing their chances of successfully raising young. It is this kind of experience that has kept me on my toes and provided me with a reason and motivation to continue to head out to the field to keep learning and discovering.

by Dennis Jongsomjit, GIS Specialist

Above: A banded Wrentit is carefully handled at the Palomarin Field Station. Photo by Sam Snowden.

Perplexing Plankton Parts

A Marine Lab Mystery

As I pull a packet of pinkish-orange goop from the freezer, I think of the little, black puffball whose partially-digested seafood dinner was intercepted by a curious biologist. The smell of the goop, a regurgitated Cassin's Auklet diet sample, vastly overpowers the usual marine lab fragrance of cormorant pellets and tern feces. Under the microscope, drifting sets of round eyes look up at me through the thawed mush.

One of my responsibilities as a laboratory research assistant is to process the auklet diet samples here in Point Blue's Marine Laboratory. It's our first year processing them here instead of sending them to a partner lab, so there is lots to learn! The samples come from the Cassin's Auklet colony on the Southeast Farallon Islands, collected by Point Blue field scientists monitoring the birds during their breeding season. Understanding what Cassin's Auklets feed their chicks helps us learn about the health and status of seabird populations on the Farallones, as well as the overall health of the ocean.

After a day of foraging at sea, the adult auklets return to their breeding crevices at night. Biologists wait in the dark for the birds to land, and with their headlamps turned on, they scoop the small seabird up and encourage them to vomit up some of the night's haul, ideally into a nicely labeled Whirl Pak. The samples are then sent back to Point Blue's headquarters on the mainland, where it is our task in the lab to determine which marine critters the parents brought back to feed their chicks.

The soupy samples rarely offer intact specimens, so matching up the pieces is a bit of a guessing game. We know from past years that Cassin's Auklets feed mostly on krill and larval fish, but they sometimes eat mysids (small, shrimp-like crustaceans) when krill are scarce. Mysid females have a brood pouch called an *oostegite* where they rear their young instead of releasing eggs into the water column. These oostegites look like teardrop shaped baskets and are often found separate from the rest of the mysid in the auklet samples.

After finding several of these baskets—some green and others smaller than usual—but no other identifiable mysid parts, I wondered if krill had similar structures. I dissected a krill from our preserved collection, but there were no oostegites. Perplexed, I explored further into the krill's body, and it was here that I made a discovery. During the digestion process, the krill's mandibles (similar to jaws) had detached from the krill and resembled an oostegite! We also found that the green baskets were actually krill stomachs filled with phytoplankton. The mysid mystery had been solved– this auklet had only caught krill.

This experience taught me a lesson about the importance of accurately identifying the prey species. From the species we find in the auklet's diet, we can make inferences about reproductive success, prey availability, and zooplankton community composition. Misidentifying those baskets as belonging to mysids instead of krill could jeopardize our understanding of this food web. We need consistent, accurate data to be able to track and learn from ecological shifts over time—especially important now, as our oceans experience change at an unprecedented rate.

by Olivia Boisen, Laboratory Research Assistant

Olivia Boisen in the Point Blue Marine Laboratory. Photo by Rebecca Forney.

Partnership: the Mono Lake Committee

Four Decades of Science and Collaboration

Before there were "Keep Tahoe Blue" stickers on cars around California, there was the campaign to "Save Mono Lake." Covering more than 70 square miles at the base of the Eastern Sierra Nevada, Mono Lake is an ancient saline lake dotted with unusual geologic formations known as "tufa towers." The lake is one of the most productive ecosystems in North America, providing habitat for brine shrimp, alkali flies, and millions of nesting and migratory birds.

Despite its significance as a rich natural community, Mono Lake was facing an ecological crisis just two generations ago. Growing human demand for water prompted the city of Los Angeles to begin drawing water from the Mono Lake Basin in the 1940s, and as a result, the lake had lost half of its volume and doubled in salinity by the 1970s. Land bridges emerged from the depleted lake, allowing coyotes to easily prey upon nesting California Gulls that depend on the lake's islands and islets as safe breeding grounds.

Dedicated conservationists formed the Mono Lake Committee (MLC) in 1978 because, as current Executive Director Geoff McQuilken says, "People knew that this wasn't how water resources in California should be managed. And they thought that if people knew what was really happening, they'd speak up and take action."

Point Blue became involved in the work to protect and restore the lake nearly 40 years ago, including our annual monitoring of California Gull population size and breeding success—work that has continued every year since. And since the Mono Lake Committee's history is deeply rooted in science-based conservation, the partnership between MLC and Point Blue is a natural one.

"Projects like the monitoring of California Gulls and their reproductive success were at the forefront of the drive to conserve Mono Lake," Geoff says. Understanding how big the population was and how significant the lake was to their health was part of the core science from the beginning. "Partnering with a scientific organization like Point Blue has been absolutely fantastic, because we get those science-fueled answers that are necessary to gauge the status of Mono Lake."

The Mono Lake Committee secured a huge victory for the lake in the early 1990s when, after a lengthy lawsuit, the Los Angeles Department of Water and Power (LADWP) settled out of court in an agreement to restore the lake to a more sustainable level. Point Blue data was crucial in the fight, with our scientists testifying in court and at water board hearings to win protection for the lake. "It was incredibly satisfying to be a small part of the grassroots effort of many organizations and individuals who successfully challenged the water rights of the behemoth of LADWP, something which had previously never happened," says Dave Shuford, a current Research Associate with Point Blue who was leader of the organization's first gull monitoring team in the 1980s, early in his long Point Blue career. In the years since, MLC has seen the lake level slowly increase as less water is drawn from the streams and tributaries that feed the lake.

But MLC knows that their work is far from done and new threats continue to emerge. "For a long time now, we've been thinking about how climate change might affect the lake ecosystem," says Bartshe Miller, Eastern Sierra policy director for MLC. "There are some fundamental questions we need answers to about how changes in temperature affect the ecosystem and we are already observing that the ecosystem is behaving much differently than how it traditionally behaved." Right now, MLC is focused on getting independent scientists to answer questions about how climate change affects lake productivity, and how that relates to gulls. "It's a really important climate-related puzzle to solve," Bartshe says.

Point Blue is committed to continuing our Mono Lake research, looking for new ways to innovate whenever we can. This year, we brought a set of drones with us to assist in our annual population monitoring (see Chief Science Officer Grant Ballard operating one on the cover). The drones take pictures of the gull colonies, which can then be analyzed by computers and researchers to determine the breeding population size and how many young they produce—two key indicators of the health of the population. This new approach allowed us to complete the two surveys in two days instead of the ten days it used to take. We're proud of our years of collaboration with such a fantastic, science-driven, dedicated organization and look forward to many more years of partnership with the Mono Lake Committee!

by Zachary Warnow, Director of Communications

California Gulls depend on Mono Lake for critical breeding habitat. Photo by Barbara Ash.

Fast Ice and Rapid Change

Bearing Witness to an Unusual Loss in Antarctica

The howling wind wasn't particularly unusual. The duration of the storm wasn't even that remarkable, lasting around 24 hours and with winds peaking around 74 mph—a gale, but a moderate one. If there is one rule for the weather at Point Blue's Cape Crozier study site on the Ross Sea, Antarctica, it's that it will be windy and unpredictable. We learn to expect the unexpected around here.

The next day, after the winds calmed, we could venture once again into the Adélie Penguin colony. We noticed right away that the fast ice, a rim of sea ice attached to land, was noticeably reduced. Again, an event that is not particularly remarkable. It happens almost every year in December as the Antarctic summer progresses. The fast ice breaks up and drifts away—a normal part of the seasonal sea ice cycle.

However, as we made our way through our daily tasks monitoring Adélie Penguins—banding birds, weighing chicks, marking nests, and more—we noticed trouble at the neighboring Emperor Penguin colony: a large chunk of the ice where the Emperor Penguin chicks were gathered, waiting for their parents to return and feed them, had broken off.

Emperor Penguins—the largest species of penguin and the only other species besides the Adélie Penguin that breeds only in Antarctica—rely on the fast ice to raise their chicks. Rather than nesting on land, Emperors have evolved to carry out their entire breeding cycle on ephemeral sea ice. A strategy that can pay off, as it allows them to breed in many places around the snow-and-ice-covered continent that have no suitable land-based habitat.

But it can be a costly strategy if the sea ice breaks up too soon, as it had on this day. The fast ice had broken up so early that the Emperor chicks, which normally become independent and leave before the break-up, were still at their colony. By the next day, that chunk of fast ice, along with nearly half the chicks from the colony, was gone.

Although this unfortunate early separation may not be unusual in the history of Emperor Penguins, it was unusual for Crozier, something we had never before witnessed in the 20+ years our team has spent there.

While we can't say for sure why this particular event happened, it certainly raises some concerns, as it could indicate that the impacts of global climate change have already reached deep into the Ross Sea.

This unexpected event also emphasized the importance of our long-term presence at Cape Crozier, the importance of bearing witness—how just being in a place over many years allows us the opportunity to notice and understand as events unfold. And the more we understand, the better we'll be at developing climate-smart solutions that help nature adapt and thrive.

by Annie Schmidt, PhD, Antarctica Program Leader

Above: Antarctica Program Leader Annie Schmidt, PhD, monitors Adélie Penguins. Photo © Chris Linder.

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Visit pointblue.org/birdathon to register or donate today!

Point Blue Advancing nature-based solutions to climate change, habitat loss, and other environmental threats for wildlife and people, through science, partnerships, and outreach.

Above: Allen's Hummingbird. Photo by Zhuclear. Cover: Chief Science Officer Grant Ballard, PhD, deploys a drone at Mono Lake, CA. Photo by Annie Schmidt/Point Blue.

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