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Observer

Tools for conservation

Radio and Satellite Technology

Figure 2: 78.4-gram satellite tag (actual size)

Nils Warnock, Ph.D.

Somewhere over the coast of British Columbia on my way to Alaska, I look out the window of a Boeing 737 down at the far off, wind-swept, rocky islands that dot the coastline. I am struck again by how amazing it is for small birds to be able to traverse these immense distances seemingly at ease. Knowing how animals use their landscape—on local, regional, and global scales—is integral to conserving them and their habitats, and is central to our understanding their ecology.

Figuring out how individual animals use their landscape is no easy task, since exploring the phenomenon of space use requires following individuals around. However, this is a task that modern technology is equipped to deal with. Through the advent of devices that can be placed on animals, biologists can locate marked animals from remote sites. Traditional radiotransmitters send out pulses at very specific frequencies that can be detected by a properly tuned receiver if the receiver is within broadcasting range of the radiotransmitter. Since small radios require small batteries that have low power, one must get within a few kilometers of the marked animal before the signal can be heard. Batteries in some of these small radios may only last a few weeks before running out (Figure 1). Larger radios that fit on bigger animals may have batteries that last for 2-5 years and can be heard from 30-50 km away. Larger radios have another advantage in that their electronic circuitry can be more complex. Features can be added to record information such as, the depth an animal goes in the water, heart rate, body temperature, and foraging activity.

Scale: from local to worldwide

Another tracking option for larger animals is the satellite tag (Figure 2). This type of transmitter is powerful enough to send its signal to a bevy of satellites circling the Earth, and these satellites can pinpoint the location of the marked animal. The satellites then beam information back to a central computer on Earth and those data can then be downloaded by the biologist. The advantage of this method is that a biologist can track animals over the entire world (as long as it is an area covered by satellites) from the comfort of his or her own office. The disadvantage is that satellite tags may cost up to $5,000 per unit and the smallest units still weigh over 15 grams, as much as many of the small animals that we study.

This issue of the *Observer* highlights how biologists actively track birds and White Sharks to determine how these animals use their environment. Telemetry is an exciting tool with which to study animals, and prbo biologists will continue to make new discoveries with this ever-changing technology to aid our conservation efforts.

Nils Warnock, Ph.D., is the Co-Director of PRBO's Wetlands Program.

Figure 1: 1.1-gram transmitter (actual size)

Photos by Tom Gardali

Scientists are beginning to answer a host of questions about wildlife behavior.

Technology in the field & in the office

PRBO & Technology

Ellie M. Cohen

I arrived early that morning to find prbo biologist Jennifer Roth, with a huge antenna in her hand, meandering across the parking area. The aluminum device looked similar to the TV antenna we'd had on our roof as kids to improve reception.

She was wearing a headset, listening intently to beeps emanating from a small receiver slung over her shoulder, when I called out "good morning" and startled her. Jen was following one of the ravens that had been fitted with radiotelemetry backpacks—part of a collaborative study to understand how these intelligent predators use the landscape (see p.7).

A few days later, I was driving to my office along a beautiful stretch of country road when I spotted another prbo biologist—Jennifer White—intensely focused on an equally large antenna alongside the road. I wondered if anything was wrong but quickly realized she was locating a Swainson's Thrush (see p.5). I refrained from interrupting her and just prayed that she'd hurry off the road to more safely study that marvelous migrant!

Using radiotelemetry and other technology, these and other prbo scientists are beginning to answer a host of questions about wildlife behavior.

Through our strategic planning process, led by the Stanford Alumni Consulting Team last year, prbo committed to using technology to advance our "conservation through science" mission—in the field *and* in the office.

We are hiring our first Information Technology Specialist and initiating a strategic communications plan that includes upgrading our website to facilitate real time data exchange with our partners as well as interactive communication with our valued members!

We are also delighted to announce the founding of prbo's new *DMARLOU Wetlands Research Center* at the Point Reyes National Seashore (prns). Accessible to high-speed Internet, the Center will house prbo's Wetlands Program and our Geographic Information Systems (gis) staff, along with state-of-the-art computer equipment.

prbo is extremely grateful to both the Dmarlou Foundation for the major grant that makes this move possible and to prns, our long time partner. From low-tech to high-tech, prbo is enabled to accomplish even more for birds, other wildlife and ecosystems across the West!

Ellie Cohen is PRBO's Executive Director

PRBO's Jennifer White in the field with tracking antenna

photo by Tom Gardali

Personal Message from the Executive Director:

As this issue of the *Observer* goes to press, our country is reeling from the horrific terrorist attacks of September 11th. These despicable acts challenge each of us and our society in previously unimaginable ways. On behalf of everyone at PRBO, I send heartfelt condolences to those of you who may have lost family, friends or colleagues in this tragedy. To all PRBO friends and partners, we thank you for your ongoing support and wish each of you only the best as we redouble our efforts to make this planet a better place for all life.

PRBO's Wetlands Research Program has been studying shorebirds through radiotelemetry. In the past two years, we have studied how radio-marked Black-necked Stilts, American Avocets, and Long-billed Dowitchers use salt ponds and other habitats in north and south San Francisco Bay. This past spring we also used telemetry to track migrating Dunlin and Short-billed and Long-billed Dowitchers from San Francisco Bay and Grays Harbor, Washington all the way to their Alaskan breeding grounds. Results of some of these studies will be published in future *Observers*.

—Nils Warnock, Ph.D.

This *Observer* issue was co-edited by Terrestrial Research biologist Tom Gardali and Co-Director of Wetlands Research, Nils Warnock, Ph.D. Assistance was provided by Sue Abbott, Matt Leffert, Claire Peaslee, and other PRBO staff. Layout design by Point Reyes Printing Co.

Which areas of ocean & bay are most important to feeding cormorants?

Diving birds—unique radiotelemetry subjects

A Telling Silence

Ben Saenz

I sit huddled for warmth, back to wind, at the base of my towering 8-foot tall, 6-foot wide antenna. The date is 6 July 2001, and the blowing mist bites at every inch of exposed skin on this typical summer day in the Golden Gate Channel of San Francisco Bay. My headphones are emitting a faint pulse of beeps at a rate of about forty times a second, from a radio-transmitter fixed to the back of a Brandt's Cormorant previously captured on Alcatraz Island. Before I get an accurate fix with the compass, the headphones emit a single, sharp tone, just before the pulses vanish completely.

Field biologist Maya Hayden's voice immediately crackles over the radio: "I had zero-dot-eight-six-one somewhere near Seal Rocks but I can't hear him now." Silenced radios often signal doom for an animal telemetry project, but I smile as I note the time of the signal disappearance. "Perfect," I reply to Maya, "we'll get him again when he comes up."

As diving birds, Brandt's Cormorants are unique radiotelemetry subjects. When mounted with the antennas sticking up slightly off the birds' backs, the transmitters can tell us much more than just where a bird is located. While the bird sits on the surface of the ocean, the antenna stays clear of the water and is able to send out its pulsing tone. But as soon as the bird dives in search of a meal, the conductive salt water immediately extinguishes the broadcast. By timing the interval between silence and pulses, we can obtain a very accurate measure of how long a bird stays underwater on each dive, and also a measure of how long it needs to recover on the surface before diving again.

Maya Hayden recording dive times and tracking Brandt's Cormorants in the Golden Gate Channel of San Francisco Bay.

Brandt's Cormorant with transmitter mounted to its back before its safe release.

Foraging behavior

In this manner, we are compiling a fairly complete picture of the foraging behavior of these West Coast endemic cormorants. Once our radioed birds leave their nests on Alcatraz, we are able to track their movements, through triangulation, using simultaneous tracking stations around the San Francisco Bay. We can then take exact measurements of the cormorants' foraging locations, because we can hear them begin to dive. When a bird is on the surface, a slight warble in the wave signal can often be detected as the bird moves in and out of wave troughs which partially block transmission. Then when the bird dives head-first to begin feeding, it sends its rear end, along with the transmitter antenna, up into the air for a brief moment. Having the transmitter's antenna elevated causes a sharp increase in signal strength, heard through the headphones as a single, sharp tone that allows us to be sure that a dive has started.

The diving comes in bouts of subsequent dives, which we measure. After a number of dives, the bird may then haul out on a rock to rest a while before beginning another dive bout, or it may fly back to Alcatraz to feed its nestlings. By measuring where Brandt's Cormorants are foraging, and how long they are spending there, we can infer which areas of ocean and bay are most important to feeding cormorants and possibly other top marine predators. Determination of these areas will aid in the management of the waters within the largely urban environment where these seabirds feed and raise their young.

"He's up again," says Maya's voice over the radio, just as the pulsing begins again in my own ears. I jot down the time again, noting that it was an average dive, around 55 seconds long. I swivel the antenna back and forth, aimed at Seal Rocks until I am confident about the bird's location, and I take a bearing. "280 degrees, I'm pointed at Seal Rocks also," I tell Maya. Twenty-five seconds later our bird is already underwater, and again I smile. I appreciate a little silence during my workday.

Ben Saenz is a Marine Program biologist.

photos by Ben Saenz

We have become fond of speculating that our sharks migrate south.

Deploying satellite tags at the Farallones

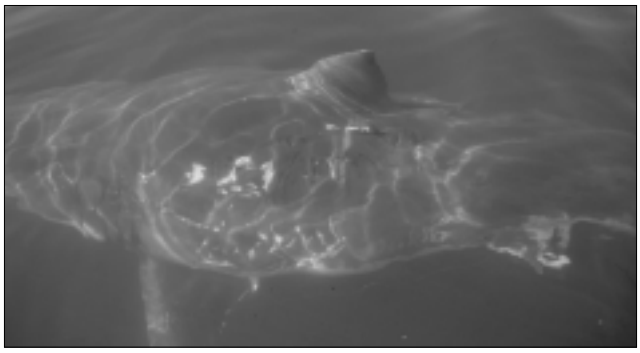
Where do our White Sharks go to Pup?

Peter Pyle and Scot Anderson

White sharks are strongly seasonal in their occurrence at the Farallon Islands (27 miles west of San Francisco). As documented by prbo research since the early 1970s, there is a strong peak of surface feedings by these sharks in the fall, coincident with the peak haul-out period of their preferred prey, immature Northern Elephant Seals. The sharks' absence in spring, even underwater, has been confirmed to us by abalone and urchin divers. Evidence from Harbor Seal wounds indicates that a few smaller, 10-12' sharks (subadults that are not breeding yet but have made the dietary switch from fish to mammals) can be found along the adjacent coast during spring and summer, but the larger (13-19') adults that we see at the Farallones in fall are somewhere else at these times.

Andre Boustany and Scot Anderson prepare to deploy a pop-up archival satellite tag into a White Shark off Southeast Farallon Island.

There is a long-standing and very stubborn rumor that Tomales Bay (just north of Point Reyes) serves as a breeding ground for White Sharks, but there is absolutely no evidence to support this. Indeed, there are no records of pregnant female White Sharks anywhere in the Eastern Pacific Ocean! By contrast, there are at least ten records of pregnant females or those in the process of pupping (they bear live young) in the Western Pacific, primarily off New Zealand, Australia, and Japan. We've always thought this odd, since numbers of adult White Sharks caught overall are apparently similar in the Eastern vs. the Western Pacific. Most or all of the pregnant females were found in water temperatures greater than 17 degrees C. Accordingly, we have become fond of speculating that our sharks migrate south to waters off Southern and Baja California to pup, where water temperatures are warm enough to accommodate live young and where there may be less commercial fishing, hence, fewer capture records of adult sharks. But for all we know about these misunderstood creatures, they may make transoceanic migrations to the Western Pacific to pup.



"White Slash", a 17-foot female White Shark, circles our research boat with a tag. The tag was inserted just below the dorsal fin.

To explore these notions we have begun to deploy pop-up satellite archival tags (psats) on our adult White Sharks. These tags were developed to understand the migration and diving patterns of Blue-fin Tuna, a species with huge commercial value and, consequently, research funding. Psats are essentially mini-computers that collect depth and temperature data, store the data, pop off at a predetermined date and time, float to the surface, and download data via satellite to computers. Thus, we do not have to retrieve the tags. There is also a light sensor on the tag, from which sunrise and sunset times can be roughly determined. Based on these times, we can estimate the shark's location on a daily basis, to the nearest 10 miles.

In 1999 we deployed two psats as a pilot study. Psats are not cheap ($5000 each!), so before going for broke we wanted to be sure that they could be used on White Sharks at all. Following an attack and feeding off the Farallones, White Sharks typically investigate our boat, hoping it might be something to eat. This allows us to safely insert the tags with a pole. In each case, the shark continued circling the boat as it had before, so the insertion of the tag seemed to have negligible effect (the equivalent of a mosquito bite for a 16-foot, 5,000-lb shark). We deployed the first tag on October 19th for two weeks and the second on October 30th for four weeks. As programmed, each tag popped off its respective shark, one four miles south of the Farallones and one just off Tomales Point, about 35 miles north of the Farallones. The second tag stopped transmitting after a day, indicating that it had washed

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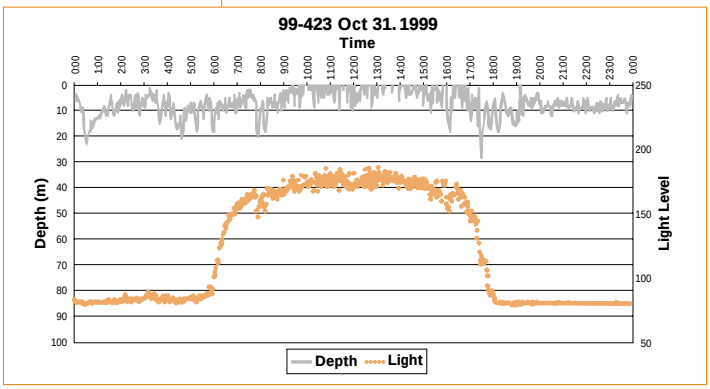

Figure 1: A day in the life of a White Shark. Dive patterns (line) indicate a lot of vertical movement, with a tendency to be closer to the surface during the middle of the day. The rust-colored line indicates light levels; calculations of sunset and sunrise times from this data allow us to estimate the shark's position, on this day (the day after tagging) still at the Farallones. The deepest dive on this date was to 28 m at sunset.

photos by Peter Pyle

Even though a nest fledges young, what percent survive?

Tiny radio-transmitters for songbird research

Unraveling the Mysteries

Jennifer White

Information on the survival of young songbirds during the post-fledging period is nearly non-existent, though it may be a critical component in estimating reproductive success. Likewise, juvenile movements and habitat requirements are an integral part of the breeding season but poorly understood. Studying this aspect of the breeding season has been nearly impossible until the advent of tiny radio-transmitters. By attaching 1.1g transmitters to Swainson's Thrush nestlings, I have been able to collect data that will help conservation actions in the Golden Gate National Recreation Area by providing insight into the following questions. Are the predators that kill fledglings the same as those that take eggs and young from nests? Even though a nest fledges young, what percent of those young survive? What are the appropriate scales (i.e., area) and types of vegetation that we should consider for managing the reproductive success of riparian associated songbirds?

Most fledgling mortality occurs within a few days after birds leave the nest. At this stage, juvenile thrushes cannot fly more than a few meters at a time. Instead, they sit on the ground or in low shrubs and wait to be fed by their parents. Juveniles are very vulnerable to predators during this period. So far I have tracked transmitters from juvenile thrushes that have been preyed upon to rodent nests (Black Rat?), creek pools (Raccoon?), and this year I tracked a transmitter to inside a Common Garter Snake!

Habitat & diet data

Once juveniles reach independence, they fare much better and I am able to record data on habitat-use. To do this, I take a Global Positioning System reading where I locate transmitter-marked thrushes. These readings can be overlain with National Park Service vegetation maps. For example, Figure 1 compares locations for two individuals at Lagunitas Creek during the 2000 field season. Starting at the nest, the dotted lines connect juvenile locations by date (but do not represent routes traveled) and end with the date the birds were last located. Both birds were tracked for about two months. During that time, juvenile #1 roamed widely and was found primarily in mixed-hardwood forest, while juvenile #2 was comparatively sedentary and was found only in riparian forest. While they differed in their choice of forest type (macrohabitat), their choice of foraging patch (microhabitat) was similar. Each bird spent more than fifty percent of its time in patches with an abundance of ripe Himalayan blackberry, part of their post-fledging diet on Lagunitas Creek.

Radiotelemetry appears to be a critical tool to study the post fledging ecology of Swainson's Thrushes, a task that otherwise would not be possible for this elusive species during this important part of the breeding season.

Jennifer White is a graduate student at University of Missouri at Columbia and is working with PRBO on her Ph.D. dissertation project.

Figure 1: Locations of two juvenile Swainson's Thrushes at Lagunitas Creek.

White Sharks, *from page 4*

ashore. But with a publicized effort and reward, the tag was found on "Driftwood Beach" just northwest of Pierce Point Ranch. From this tag we were able to obtain daily tracks and follow the shark's progress from the Farallones to Tomales Point (Figure 1).

Encouraged by these results, we deployed nine more tags in the fall of 2000, with pop-up times of two to six months each. While we are not yet ready to release results from these tags (we are collaborating on this project with researchers from Hopkins Marine Station and U.C. Santa Cruz), our eyes have been opened to say the least. Stay tuned.

Peter Pyle and Scott Anderson are Farallon Island researchers with PRBO's Marine Program.

Photo by Ryan DiGaudio

The advent of satellite telemetry has opened up a window into the unknown....

Black-footed Albatrosses during the breeding season

Foraging Destinations

David Hyrenbach, Ph.D.

The Black-footed Albatross is considered a vulnerable species due to a projected population decline of 20% over the next three generations (approximately 45 years). Incidental mortality in fisheries (termed "bycatch") is partly responsible for this decline. An estimated 1,831 birds were killed every year between 1994 and 1998 by the Hawaiian longline fishery for Swordfish and tunas. In addition, an estimated 31 and 611 individuals were taken yearly by coastal longline fisheries operating in the Bering Sea and the Gulf of Alaska during 1993–1997. These data are cause for concern, since they suggest that approximately 1% of the worldwide Black-footed Albatross population (300,000 birds) were killed yearly during the 1990s. Therefore, determining the overlap between longline fishing effort and albatross foraging zones is an important first step toward decreasing the incidental killing of albatrosses. In 1998, Dr. David Anderson from Wake Forest University initiated a telemetry study of Black-footed Albatrosses nesting at Tern Island, French Frigate Shoals, Hawaii. I became involved in this research as part of my Ph.D. dissertation.

Black-footed Albatross.

Tern Island lies at the northwest end of the Hawaiian archipelago and in the middle of the North Pacific (Figure 1). Black-footed Albatrosses arrive at the colony in mid-October and lay one egg by early November. Chicks hatch between the middle of January and the first week in February, and fledge by the end of June. The breeding season can be divided into two distinct periods. During the brooding period (0–18 days after hatching), parents take turns foraging at sea and an adult bird guards the chick continuously. During the chick-rearing period (19–140 days post hatching) both parents forage independently, leaving the chick unattended.

In January 1998, we placed 32-gram satellite transmitters on albatrosses of each gender during the brooding period. The transmitters were attached to the back feathers using heavy-duty adhesive tape. Overall, we tracked 15 albatrosses during a total of 77 complete foraging trips.

The telemetry data (date, time, latitude, longitude) were processed to recreate the birds' movements. We then overlaid the telemetry tracks on maps of ocean temperature and chlorophyll concentration, measured from satellites, and calculated how much time the satellite-tracked albatrosses spent over specific oceanic habitats. Water temperature and chlorophyll concentration can be used to map the extent of different oceanic habitats termed "water masses." These large water masses (in the order of thousands of kilometers) are characterized by different levels of ocean productivity and support distinct ecosystems. For instance, Bigeye Tuna inhabit low-productivity, warm tropical waters with low chlorophyll concentrations while Swordfish venture into cooler and more productive waters. Hence, longline fisheries are not distributed evenly across the North Pacific Ocean. Instead, fishing effort is focused on specific habitats

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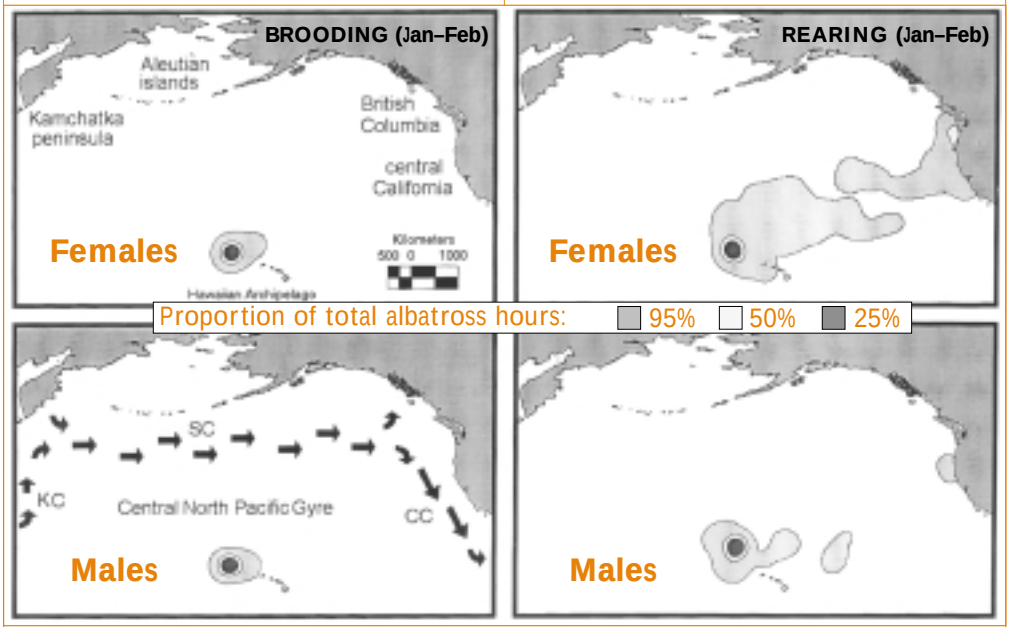


Figure 1: Maps of the amount of time satellite-tracked Black-footed Albatrosses nesting on Tern island, Hawaii, spent at sea during the 1998 breeding season. Three arbitrary contours corresponding to distinct levels of habitat use are considered: 95% (foraging range), 50% (high use feeding area), and 25% (core area around the breeding colony). The arrows depict the currents delineating the extent of the North Pacific Central Gyre: Kuroshio Current (KC), Subarctic Current (SC), and California Current (CC).

Photos by Rich Stallcup

Insight into raven populations & human-modified landscapes.

The role of Common Ravens as nest predators

Tracking Common Ravens

Jennifer Roth

The role of Common Ravens as nest predators is becoming more of a concern as their populations increase throughout the West. For example, nest predation by ravens has negatively impacted the Snowy Plover population in Marin County. What factors contribute to the increasing population size of this native predator and its subsequent impacts on other native species? This is one of the questions that we, in partnership with Audubon Canyon Ranch and the Point Reyes National Seashore, set out to address when we began capturing and outfitting ravens with radio-transmitters in 1998 (see Summer *Observer* 1999).

We now have ravens radio-tagged throughout western Marin County and have been able to gather important information on raven ecology, including nest location, home range size, and landscape-level habitat use of individual birds. This information is providing valuable insight into the relationship between raven populations and human-modified landscapes. For instance, we found that a radio-tagged bird that nested at Abbott's Lagoon split its time between dune habitat and a nearby dairy ranch (Figure 1).

Additionally, through radio-tracking, we determined that ravens travel from different parts of the Point Reyes Peninsula to forage along the beaches where the Snowy Plovers nest. This information has provided us with more insight into the management issues surrounding this threatened shorebird and its major nest predator in Point Reyes National Seashore. Along with information on raven ecology, observations of egret and murre breeding colonies conducted by Audubon Canyon Ranch and the U.S. Fish and Wildlife Service, respectively, will allow us to assess the impact of raven predation on those species.

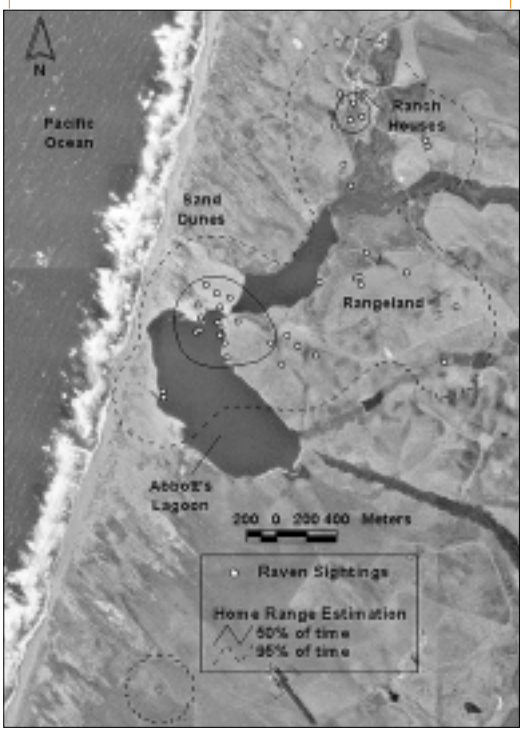


Figure 1: Locations gathered on a radio-tagged Common Raven nesting at Abbott's Lagoon.

Understanding spatial use (what is the appropriate scale for management?) and its underlying factors (what habitat features influence raven distribution and abundance?) is an important step in managing raven populations. Thus, radiotelemetry techniques have allowed us to collect information valuable to land managers faced with the task of managing wildlife populations.

Jennifer Roth is a graduate student at Humboldt State University and is working with PRBO on her Masters project.

Albatross, *from page 6*

used by commercially-valuable fish species. Therefore, the degree of overlap between the habitats of the target (tuna and Swordfish) and non-target species (seabirds, sea turtles) influences their susceptibility to bycatch in longline fisheries.

The satellite-tracked albatrosses behaved differently during the brooding and rearing periods (Figure 1). Brooding birds engaged in foraging trips of shorter duration and did not range as far as those individuals rearing young.

Satellite telemetry revealed that Black-footed Albatrosses use different oceanic habitats when brooding young than when rearing young (Figure 1). Brooding birds likely feed on flying fish eggs found in warm tropical waters, and albatrosses during the rearing period forage for squid in the more productive colder waters of the California Current. This habitat shift is likely related to the higher energetic demands of the chicks and the adult birds later on in the breeding season. Moreover, male and female albatrosses forage in different oceanic regions (Figure 1). These patterns of temporal and spatial segregation have important implications for the susceptibility of Black-footed Albatrosses to longline fisheries. While rearing young, far-ranging albatrosses are more likely to encounter longline fisheries. Moreover, because females commute to the California Current, they likely overlap with fisheries that target Swordfish and Albacore along the California Current. Conversely, males likely overlap more strongly with fisheries targeting Yellowfin and Bigeye Tuna in the Central Pacific Gyre. The advent of satellite telemetry has opened up a window into the largely unknown ecology of far-ranging seabirds during their foraging trips to sea. This enhanced understanding is helping scientists protect majestic species, like the Black-footed Albatross, from human impacts in the high seas.

Dr. David Hyrenbach is a post-doctoral Research Associate in ocean ecology and is supervising PRBO research on where to locate marine protected areas and "no-take" marine reserves in the California Current.

F O C U S 58

Migrants Astray

Rich Stallcup

It's early August and a Prairie Falcon whacks a McCown's Longspur in flight just inches above the Pawnee National Grasslands. The attempt is not fatal, but knocks the livin' symmetry out of the smaller bird.

On October 24th, a McCown's Longspur is found with Horned Larks on a plowed field on outer Point Reyes. Some disheveled feathers on its right flank suggest a previous wound. A stronger left side may have overrode the internal compass and, instead of arriving to winter in West Texas, this bird finds itself on the coast of California and will probably press on to the west-southwest, offshore.

It's early May 1998, and, as usual, all of Earth's few Bristle-thighed Curlews are restless. They have wintered on beaches and rocky shores of the equatorial Pacific, but now it's time to go. They gather in small groups, calling as they move from atoll to island, staging for their annual nonstop oceanic flight to Alaska—their natal home. By the 10th, most of the world's population is in the air to fly day and night, thousands of miles north. There is no shelter along the way.

Most years, the trip is easy. May is past the period of Arctic borne storms, and though it is often windy, these are wind-birds and their navigation is almost flawless (there are near zero extra-limital records for this species anywhere). But spring 1998 is not a normal weather year. El Niño has welled up in the Pacific Gyre, and two-thirds of the way home, the curlews collide with a violent south borne storm and are tossed, tumbled and torn. Many are probably lost, others thrown far from course, and by the 20th, individuals are found scattered along the coast from California to Canada. Most show injuries. With this many seen, how many have crashed? While we are ecstatic to see one at Point Reyes, some of us are concerned for the continuance of the species.

On October 24th, this McCown's Longspur was found on Point Reyes with disheveled feathers on its right side, perhaps from a previous wound.

Photo by Mike Danzenbaker

This Bristle-thighed Curlew, en route from islands in the tropical Pacific to Alaska with others of its kind, was slammed into the California coast by anomalous weather.

It's August in western Quebec near the south end of James Bay, and four recently fledged Magnolia Warblers are feeding voraciously, onloading fat to be used as fuel for their first migration. The correct date arrives, and at twilight they hurtle upward, each giving Dendroica "vamanos" calls. When the appropriate altitude is reached, the internal compasses lock-in. Three head off to the southeast, eventually to Northern Columbia . . . the other goes southwest towards California.

Perspectives on misorientation

Vagrancy in migratory birds is not random. It happens because something has gone wrong in the vagrant's life, and the most common causes seem to be physical trauma, violent weather and genetic anomalies.

Physical trauma incurred before or during migratory travel causes far-flung displacement for some. The longspur was injured at "home," but maladies for others happen along the way. Sometimes birds run into things like wires or windows, and sometimes things run into them— things like Sharp-shinned Hawks and Merlins. Anything that results in asymmetry—especially, it seems, retrices or remiges (tail and major wing feathers)—might cause migrating birds to go wrong ways. A single missing rectrix unbalances the bird's rudder. Vagrants we see here, often show such deficiencies.

Extreme or violent weather (like hurricanes, monsoons, and blizzards) can throw individual migrants or groups of them far from their programmed destinations. Migratory birds are equipped to survive normal bad weather and stick to course, but catastrophic disturbances toss birds around the map.

Genetic "Mirror-Image Misorientation" proposed by former prbo biologist Dave DeSante, based on Farallon Islands vagrants in the 1970s, suggests that a small percentage of young, southbound migrants are born with a genetic glitch causing them to be directionally challenged. This probably accounts for most of the songbirds rarities found along our coast each fall. Their flight compass sends them southwest instead of southeast, a mirror image of their intended direction, stacking them up along the coast from Oregon to Baja. It is likely that most of these lost birds will continue on, over the ocean where they will be taken by jaegers or skuas . . . it is not good to bring faulty navigation back to the gene pool.

Rich Stallcup is a Naturalist with PRBO's Education Program.

Photo by Steve Howell

"One of the unique aspects ot the work at prbo is the scope of its projects."

New staff and a new position

News from PRBO

We are delighted to announce two additions to our staff at PRBO and introduce our new colleagues to Observer *readers.*—Editor

Mary Chase, *Terrestrial Science Coordinator*

Observer: Our warmest welcome to prbo. How did you become involved with prbo?

Mary Chase: I first got involved with prbo as an intern at Palomarin in 1992. The following fall I started graduate school at the University of California in Riverside. In 1996, I moved back to the Bay Area and approached Geoff Geupel and Nadav Nur about doing my dissertation research at Palomarin. I just completed my Ph.D. this June, and I

Mary Chase

am now working on publishing four papers on the Palomarin Song Sparrow population.

Observer: Please tell us about your exciting new position.

Mary: My position is new at prbo, and my title, Terrestrial Program Science Coordinator, reflects the direction in which we hope it will evolve with time. Currently, my main task is to coordinate the Adaptive Conservation Planning efforts of the Terrestrial Program, which are supported by a recent grant to prbo from the Packard Foundation. The goal of this project is to use science to guide the conservation of landbirds and their habitat in California. I am also working on designing new research and monitoring studies that will be useful in conservation planning and habitat management.

Observer: What led you to work for prbo? What is it about prbo that makes it a good match for you?

Mary: When I heard about this opportunity to work for prbo, I knew right away that this was what I wanted to do. My personal goal is to use science to guide the conservation of natural habitats and wildlife, so I am thrilled to be working for an organization whose mission is to do exactly that!

Sarah Huard, *Manager of Individual Giving*

Observer: Welcome to prbo. Where were you before you joined prbo?

Sarah Huard: Stanford University, where I learned a great deal and met wonderful people. It was a fascinating experience to work with alumni who were in the thick of the high technology and start-up boom and to understand why they were giving to the university—and very rewarding to watch them continue to give generously as the economy changed.

Observer: What are your plans for prbo's individual giving program?

Sarah: Some of my goals include increasing the number of people who understand the impact and importance of a gift to prbo, while at the same time ensuring that our current friends continue to make conservation through science a philanthropic priority.

Observer: Why do you think prbo's current friends and members support prbo and our mission?

Sarah: One of the unique aspects of the work prbo does is the scope of its projects. I was talking with Geoff Geupel, Terrestrial Program Director, and was amazed at the many innovative ways that prbo pursues its mission. Through collaborative partnerships like the Riparian Habitat Joint Venture, work done through the education and internship programs, and papers and articles that prbo scientists regularly publish, prbo stands out as a highly effective conservation organization.

Sarah Huard

Observer: What is it about prbo that attracted you to this position?

Sarah: I was initially intrigued by a position with prbo because my father is a birder and, perhaps, because I grew up in Louisiana and experienced living in a state where the state bird, the Louisiana Brown Pelican, virtually disappeared for years! One of my favorite moments of a recent trip back home was sitting on the shores of Lake Pontchartrain in Mandeville, Louisiana, with my dad and watching a line of pelicans make their way across the horizon. After talking with Ellie, the program directors and the field biologists, I grew certain that the reason behind prbo's success is an absolute dedication to and belief in the importance of conservation through science.

Photos by Sue Abbott

Birds use beaches year round.

Did you know. . .?

Beaches Are Habitat

Melissa Pitkin

Beaches provide birds with nesting, feeding and roosting habitat year round. Overcrowding, disturbances, and pollution make beaches inaccessible to birds.

How you can help:

- Support the designation of some beaches as wildlife habitat.
- Keep dogs on leashes! Dogs harm flightless chicks and flush nesting birds from the nest, leaving chicks and eggs vulnerable to strong winds and predators.
- Walk low on the beach to decrease the chance of disturbing nesting birds. Flightless chicks are well camouflaged and easily stepped on!
- Leave driftwood flat on the beach. Driftwood structures (forts, for example) provide unnatural perches for predators like raptors and ravens that may prey upon adult and young shorebirds and their nests.

Melissa Pitkin is Director of PRBO's Education Program.

Farallon Patrol Log

Thanks as always to the expert skippers of prbo's volunteer Farallon Patrol for providing the nautical connection with our field station on Southeast Farallon Island.

Jul 21	Al Divittorio	*Solbritt*
Jul 28	Mick Meningoz	*New Superfish*
Aug 4	Rob MacFarlane	*Magic*
Aug 11	John Wade	*Starbuck*
Aug 18	John Gratton & Linda Hill	*Nakia*
Sept 1	Tom Camp	*Just Imagine*
Sept 15	Tom Camp	*Just Imagine*
Sept 29	John Gratton & Linda Hill	*Nakia*

bird bio

WINTER WREN (*Troglodytes troglodytes*)

Characteristics: Tiny, 4 inches in length. Tail short, usually cocked; thin bill; well defined short supercilium (eyebrow). Brown plumage.

Distribution: Found year-round along the West Coast of North America; also winters in the southern United States, and breeds across central Canada.

Habitat: Found in wet and shady woods and dense brush.

Feeding: Forages along the ground and through dark crevices, gleaning (picking up) insects. May even immerse entire head to eat aquatic insects.

Sounds: Song of western birds is long and complex – a rapid 36 notes per second, made up of a continuous series of high, buzzy trills and thin mechanical buzzes. Agitated birds give a rapid series of high staccato notes.

Behavior Notes: Winter Wren nests are built out of moss on a base of twigs and lined with soft feathers and hair. Nests are often built amid roots of upturned trees, rock crevices, in natural cavities in or under stumps, and even occasionally in old woodpecker nest cavities.

—Melissa Pitkin

The Grand List

The Grand List highlights prbo priority projects that are in need of funds. If you can help in any way to support these projects, please contact Ellie M. Cohen at 415/868-1221, ext. 18. We are, of course, always appreciative of general operational support that allows us to fund priorities as needed. Thanks very much!

- **Effects of Restoration on Birds:** funds a first-generation computer model to assist San Francisco Bay habitat managers evaluate the effects of different restoration alternatives on birds and wildlife. cost: $30,000
- **Farallon Island Research:** funds 5 graduate level biologists for 3 months each to assist in prbo's research of seabirds, marine mammals, and white sharks. cost: $15,000 or $3,000 each
- **Songbirds and Vineyards:** seed money for a new project to evaluate how vintners can develop songbird-friendly practices and promote ecotourism in oak woodland and riparian habitats of Napa and Sonoma Counties. cost: $10,000
- **Palomarin Visitor Center Renovation:** construction is almost complete and we are only $5,000 short of our goal. All gifts welcome!

Drawing by Sophie Webb

Memberships

Our thanks to the following new members who have joined prbo 16 June–31 August, 2001:

Stephen E. Abbors, Susan G. Allan, Renee Besta, Albert Brewster, Elizabeth Garsonnin, Nancy H. Helmers, Susan N. Hirsch, Tracey Mader, Migratory Birds and Habitat Programs, Shari E. Sitko, Shawn Stevens

Gifts Honoring

Prbo is grateful for the following memorial gifts (16 June–31 August 2001):

In Memory of Lyman Lacy:
Mr. & Mrs. Gene Carey

In Memory of John Carson:
Kathryn D. Elbright, Mr. & Mrs. B.J. Gill, Virginia Harger, David & Edith Rogers, Tesemini Outing Club

In Memory of Clayton R. Coler:
Ms. Carole L. Feasel

In Memory of Bill Wilson:
Don McCarthy

In-Kind Donations

We are grateful to the following individuals for recent donations to prbo:

Many thanks to Burr Heneman and Dr. Benson Roe for their recent equipment donations to prbo.

PRBO Field Biologists

Summer 2001

Dan Barton, Jill Bluso, Paola Bouley, Andrew Campomizzi, Roy Churchwell, Capucine Deltour, Anthony Dotolo, Jennifer Durbin, Todd Eggert, Pete Erwin, Shannon Farrell, Dale Fiess, David Figueroa, Michael Freiberg, David Gardner, Matt Genova, Pierre Geoffray, Eric Grant, Manuel Grosselet, Noah Hamm, Jill Harley, Heriberto Munguia, Robin Hirsch-Jacobson, Russell Japuntich, *continued*

Institutional Giving

We deeply appreciate the corporate and foundation grants that support prbo's increasingly successful conservation through science efforts.

We are very grateful to the **DMARLOU Foundation** for a major grant to establish prbo's new Wetlands Research Center and Intern Housing Facility at the Point Reyes National Seashore. The foundation has been enormously supportive of prbo 's efforts and we are delighted to establish this new partnership with them.

The **Dean Witter Foundation**, a long time supporter of prbo, awarded a very generous grant to expand prbo's Conservation Education Program for the 2001-2002 school year. The grant provides ongoing support to our K-12 Education Program at the Palomarin Field Station and allows prbo to significantly expand our leadership role in Students and Teachers Restoring a Watershed (straw). We also thank **The Bay Institute**, co-sponsor of straw.

We are enormously appreciative of renewed funding from the **Compton Foundation** to support the modernization of prbo's Palomarin Visitor Center. The renovated Visitor Center, where prbo's Conservation Education Program reaches over 10,000 students of all ages annually, is expected to re-open by the end of October, 2001.

Many thanks again to the **Homeland Foundation** for renewed support of prbo's long-term seal and sea lion monitoring program in the Gulf of the Farallones National Marine Sanctuary. prbo has conducted year-round monitoring of marine mammals for more than thirty years, compiling the longest data set on seals and sea lions in the United States.

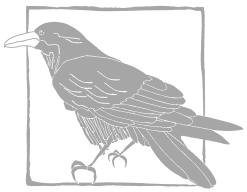
We are also most grateful to the **Winifred and HB Allen Foundation.**

The Tern Society & Planned Gifts to prbo

There are many ways to help prbo conserve birds, other wildlife, and their ecosystems. Becoming a member of the Tern Society and remembering prbo in your estate plan is a wonderful choice! Planned gifts to prbo ensure the continued success of long-term projects across the organization and provide critical support to current programs.

If you are interested in a Charitable Remainder Trust, including prbo in your bequest, or other ways in which you can benefit prbo in perpetuity, please call Sarah Huard at 415/868-1221, extension 24.

As always, PRBO is deeply grateful to Audubon Canyon Ranch, Point Reyes National Seashore, and the U.S. Fish & Wildlife Service for providing facilities and field stations where we work.



Field Biologists *continued*

Else Jensen, Kim Hruska, Mary Huang, Andrew Jobes, Dennis Jongsomjit, Heidi Kirk, Quresh Latiff, Kirsten Lindquist, Yen Luc, Anthony Maguire, Verne Marr, Chris McCreedy, Kristie Nelson, Mike Palladini, Kate Peterlein, Peter Pintz, Mark Pollock, Alex Port, Sue Prentice, Andrew Rush, Trina Schneider, Jeff Schwilk, Jennifer Wang, Missy Wipf, Eliza Woo, Nolan Zeide, Douglas Zimmerman.

PRBO
CONSERVATION THROUGH SCIENCE

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Stinson Beach, CA 94970
Telephone (415) 868-1221

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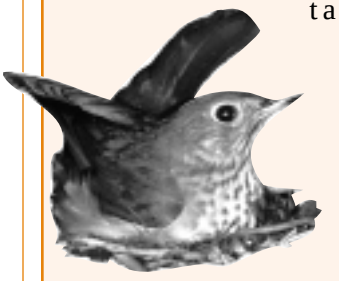
You are invited to prbo's

Bird-A-Thon 2001 Awards Dinner
Saturday, December 1, 2001

A gathering of prbo friends
for food, music, laughter
and
tales of Bird-A-Thon prowess.
All are welcome.



For informaton
Call Matt Leffert
(415) 868-1221, ext. 10

Please Mark Your Calendar!

PRBO MEMBERS' EVENTS

415/868-1221, ext. 33.

December 2 ■ **Waterbirds on Bolinas Lagoon:** Welcome back wintering populations of shorebirds and waterfowl to this beautiful lagoon. Wear rubber boots for exploring the pickleweed marshes and Pine Gulch. Meet at prbo's headquarters.

Saturday January 5, 2002 ■ **Winter At Palomarin:** Begin the New Year with a visit to Palomarin Field Station for a look into our mist nets and a hike to learn the winter birds. Call 415/868-0655 to confirm if weather is windy or rainy that morning.

Sunday February 3 ■ **Abbotts Lagoon Excursion:** On a winter day on the outer coast, hike out through coastal scrub to the dunes surrounding this beautiful lagoon looking for resident landbirds, wintering waterfowl, and shorebirds.

PRBO online :: WEB SITE www.prbo.org :: E-MAIL prbo@prbo.org

PRBO — working to conserve birds, other wildlife and their ecosystems through objective, innovative scientific research and outreach.

♻ Printed on recycled paper using soy-based inks

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Benefactor: $1,000 & more	Family: $50
Sponsor: $500	Regular: $35
Sustaining: $250	Student & Senior: $20
Contributing: $100	

Photo by Ian Tait