

GOLDEN GATE  
NATIONAL  
**PARKS**  
CONSERVANCY

# PACIFIC RAPTOR

GOLDEN GATE RAPTOR OBSERVATORY

ISSUE

40

FALL  
MIGRATION  
2018



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# PACIFIC RAPTOR 40

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# INTRODUCTION

## DEAR FRIEND OF THE GGRO,

In the fall of 1984, three National Park Service volunteers climbed a steep trail in the Marin Headlands carrying clipboards and toolboxes, hauling hand warmers, rain jackets, binoculars, and banding pliers. A few hundred meters up the hill, they dropped their packs, unlocked the banding blind, and started a day of banding hawks. That same day, a half-mile to the south, a parallel ritual unfolded—a handful of volunteers hiked to the summit of Hawk Hill, pulled out optics and datasheets, and started the day’s hawk count.

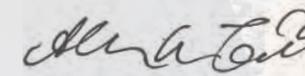
Thanks to these pioneering volunteers, 35 years later we have the longest-running and largest database on raptor migrations in the Pacific states. In that time, more than 45,000 hawks have been banded, and more than 800,000 raptor sightings tallied. Over 2,000 volunteers have contributed more than a million hours to make all this possible. This is the legacy of the Golden Gate Raptor Observatory, the first community science program of the Golden Gate National Parks Conservancy in cooperation with the NPS.

From these early successes, the Parks Conservancy and our partners have grown an amazing array of community conservation science programs—the Native Plant Nurseries, Habitat Restoration Team, Park Stewardship programs, and most recently, One Tam’s Wildlife Picture Index. All were built on the idea that connecting people with their parklands creates powerful results. Watching hawks, sprouting oaks from seed, restoring native lupine plants to support an endangered butterfly population—these simple acts create a deep connection between a person and a place.

Not so long ago, inviting volunteers to join ecologists to conduct monitoring, research, and restoration in national parks was an unusual practice. Today, it’s a magnificent strategy for supporting complex urban parklands like the Golden Gate National Parks. A deep and sincere thank you to all the GGRO pioneers who nurtured a simple bird-banding operation to become a pillar of community science in our parklands.

Another big thanks goes to you, our supporters. Because of your generous contributions, the Parks Conservancy can help band hawks, bring school groups to Hawk Hill to learn about raptors through the Migratory Story program, and build trails that allow more people to discover the beauty of raptors soaring past.

When people discover these parks in their own backyard, you never know what might happen. They could build the next GGRO or discover something small and new for themselves. The thing that matters most is the connection. Thank you for helping build more park connections at Hawk Hill and beyond. ●



**Allen Fish**  
GGRO Director, Golden Gate National Parks Conservancy



**Christine Lehnertz**  
President & CEO, Golden Gate National Parks Conservancy

## 2018 PRESENTATIONS AND PUBLICATIONS

Abernathy, EV, JM Hull, AM Fish, and CW Briggs. 2018. Secondary anticoagulant rodenticide exposure in migrating juvenile Red-tailed Hawks (*Buteo jamaicensis*) in relationship to body condition. *Journal of Raptor Research* 52 (2): 225-230.

Ely, TE, CW Briggs, SE Hawks, GS Kaltenecker, DL Evans, FJ Nicoletti, J-F Therrien, O Allen, and JP DeLong. 2018. Morphological changes in American Kestrels (*Falco sparverius*) at continental migration sites. *Global Ecology and Conservation*. doi: 10.1016/j.gecco.2018.e00400.

Fish, AM, M Malec, D Bell, S Peterson, P Sharpe, and C Cicero. 2018. Iconic Bird, Iconic Tower: Monitoring Peregrines on the Campanile. Invited lecture. CAL Alumni Day, UC Berkeley.

Ju, K, and S Morreno. 2018. Migratory Story: raptor migration and human immigration. Presentation. People of

the Global Majority One Summit 2018. Oakland, CA.

Kwasnoski, L. 2018. Examining sub-lethal effects of anticoagulant rodenticides on parasite load and body condition in Red-tailed Hawks (*Buteo jamaicensis*). Senior thesis. Hamilton College, New York.

Lujan-Vega, C, MG Hawkins, CK Johnson, CW Briggs, C Vennum, PH Bloom, JM Hull, C Cray, D Pesti, L Johnson, P Ciembor, and BR Ritchie. 2018. Atypical Chlamydiaceae in wild populations of hawks (*Buteo* spp.) in California. *Journal of Zoo and Wildlife Medicine* 49 (1): 108-115.

Wang, OW, S Skalos, C Tyson, AM Fish, and JM Hull. 2018. Changes in the autumn migration timing of two North American raptor species. Poster presented. University of California, Davis Undergraduate Research Symposium. Davis, CA. ●

Inside Cover: Juvenile Sharp-shinned Hawk. Photo: Jeff Robinson

Facing page: A Park Academy class enjoys an informative talk from GGRO Hawkwatch Manager Step Wilson against the backdrop of the Golden Gate as two Turkey Vultures fly overhead. Photo: George Eade

Cover photo by André Gregoire: "When I first came across this family of Peregrine Falcons, one fledgling was on top of a gull. She was soon joined by her other siblings. The three attempted to get to the meat of the bird without much success. When mom showed up, she was chased away by the fledglings, as seen here. In the end though, she fed all of them on the beach. Follow me on instagram @andre.takes.photos"



# RAPTORS AND SMOKE

*Allen Fish*

November 2018 was a month punctuated by smoke in the San Francisco Bay Area. Eastern winds, locally called the Diablos, sent smoke from the Camp Fire (near Paradise, CA) first coastward toward Bodega Bay, and then shifted southerly to fill the San Francisco

*As we are an organization devoted to raptor migration monitoring, one big question circled us throughout these hazy weeks: How do raptors respond to fire smoke?*

Bay basin. By its first night, November 8, the Camp Fire had grown to 20,000 acres, and at sunset, the western sky blushed orange-red.

Although Butte County is 140 miles from San Francisco, the Air Quality Index (AQI) ([airnow.gov](http://airnow.gov)) was at 174 by November 10 and scored well over 200 by the end of the week. What is the AQI? It is an index of the five most hazardous airborne materials as regulated

by the Clean Air Act: (1) ground ozone, (2) particulate matter, (3) carbon monoxide, (4) sulfur dioxide, and (5) nitrogen dioxide. The EPA scores good air as 0 to 50, moderate as 51 to 100, unhealthy for sensitive people as 101 to 150, and unhealthy for all as 151 to 200.

For most of twelve days, the Bay Area skies remained brown-orange and we cancelled GGRO field research knowing that volunteer and staff safety was our highest priority. Daily AQIs floated in the 100-200 zone, occasionally jumping over 200. Even inside the GGRO office next to Rodeo Beach, my eyes and sinuses were hot and dry. Schools closed on the worst days. Many Californians put on face masks just to get outside, this inconvenience just a tiny reminder of the lives and homes lost in Butte County.

As we are an organization devoted to raptor migration monitoring, one big question circled us throughout these hazy weeks: How do raptors respond to fire smoke? Do migrants change routes? Do hawks in the fire zone escape the smoke plume? Are hawks more sensitive to corruptions of the air than we are? All great questions, and worthy of research. After doing a little digging online, I had a much better framework for thinking about the impact of smoke on raptors.



An adult Red-tailed Hawk soars above the Marin Headlands, against a backdrop of blue-gray smoke from the 2018 Camp Fire on November 15, 2018. Photo: George Eade.

## BIRD BREATHING

The first thing to think about is bird breath—avian lungs are fundamentally different from our own. Bird breathing creates air flow in one direction. It's a four-step process that first moves inhaled air from the mouth to abdominal air sacs. The second step moves oxygenated air across very fine air capillaries inside the lungs, where a highly efficient counter-current system exchanges O<sub>2</sub> for CO<sub>2</sub>. Third, the CO<sub>2</sub> from the lungs is pulled forward to anterior air sacs, and fourth, these air sacs press the CO<sub>2</sub> out through the nostrils.

This as opposed to our own lungs—inhalation once, fill the lungs, and exhalation once. We mammals essentially have a tidal system. Birds have a continuous river of O<sub>2</sub> coming in and a continuous river of CO<sub>2</sub> coming out.

Mammals have a cul-de-sac; birds have an on-ramp, lots of traffic, and an off-ramp.

What is the upshot of this dramatically different respiratory structure? Biologists conclude that birds have a more effective breathing system. A few of the details that support this: (1) birds have longer (2-10x) and wider (1.3x) trachea than comparably-sized mammals; (2) bird gas exchange takes place in hundreds to a few thousand (depending on species) parabronchi, whereas mammalian gas exchange takes place in millions of very tiny alveoli. One result of this is that bird lungs have 2x the surface density of gas exchange tissue in contrast to comparable mammals. (3) The tissue thickness of the avian gas exchange barrier is about half of the mammalian lung. As a result, birds can take up to 2x the amount of gas as mammals in one inhalation.



**ALLEN FISH**, GGRO Director, starts his 35th year at the Golden Gate National Parks Conservancy in 2019, still convinced that the first job is the best job.

Brown et al (1997) offer up these bird-mammal contrasts in a fascinating article: “The avian respiratory system: a unique model for studies of respiratory toxicosis and for monitoring air quality” published in the journal *Environmental Health Perspectives*. Somehow, they resisted using the phrase “canary in the coal mine” but of course that is their point: bird breathing has a high level of efficiency that could prove invaluable to humans as a highly sensitive barometer of air quality.

### GETTING BACK TO SMOKE

With this new-found knowledge of bird lung efficiency, I started mining the scientific literature for articles relating birds and smoke, and all signs led me to Olivia Sanderfoot, who had just published her master’s thesis on exactly that.

As a graduate student at the University of Wisconsin, Madison, Sanderfoot worked with Professor Tracey Holloway to summarize the science on birds and air pollution. Sanderfoot and Holloway (2017) was published as “Air pollution impacts on avian species via inhalation exposure and associated outcomes” in *Environmental Research Letters* in 2017. Sanderfoot and Holloway produced a broad review, encompassing all of air pollution as opposed to just smoke impacts. They recovered more than 200 papers published since 1950, and they emerged with some important findings.

### THREE STUDY TYPES, FIVE IMPACTS

Most of the published research on birds and air pollution fell into three forms of research: lab studies, natural landscape studies (*in situ*, meaning in its normal place), or case studies. Sanderfoot and Holloway grouped the pollution impacts on birds into five areas: (1) respiratory distress; (2) detoxification and immune-suppression; (3) behavioral changes; (4) habitat degradation; and (5) impaired reproduction and its population effects.



Smoke from the Camp Fire at Paradise, CA, swamped the San Francisco Bay Area in mid-November 2018, and spiraled westward hundreds of miles into the Pacific. Photo: NASA Earth Observatory

The wide range of respiratory responses alone encountered by Sanderfoot and Holloway made my head spin and sent me back to the web to read the newest online articles on bird physiology. For example, birds exposed to greater pollutants in urban zones showed: (1) decreased effectiveness of the pulmonary surfactant system, a lipoprotein complex that promotes lung structure and immune response; (2) heightened amounts of adrenomedullin-type proteins that signify high respiratory stress; and (3) greater numbers of macrophages, white blood cells that “eat” alien particles.

Before your eyes glaze over from reading words like adrenomedullin, think about the range of molecular responses in just these three examples, signifying how difficult it might be to demonstrate a simple pollution or smoke impact on birds. (Then go look up adrenomedullin, a mammalian protein related to vasodilation and asthma response, just discovered in 1993.)

Although Sanderfoot and Holloway offer a detailed canvas to help us comprehend the range of impacts of smoke on birds, they acknowledge the complexities that must be considered. Among them, the range of types of chemical compounds

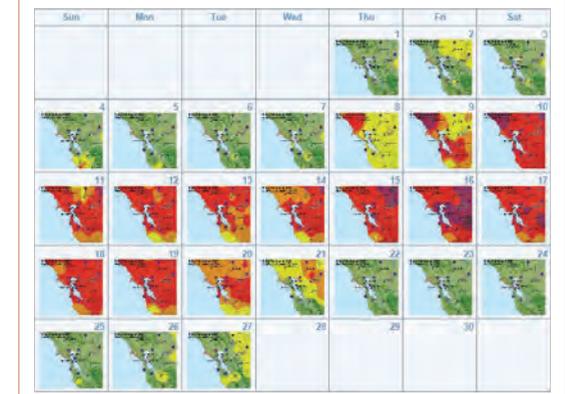
or particulate matters; fire smoke, especially *urban* fire smoke, is a cocktail of chemicals. Other confounding aspects: the size and proximity of the pollution point source; the gradient of the pollution; wind dynamics; inversion layers; even the timing in the bird’s annual cycle.

Sanderfoot and Holloway also remind us that not only is it difficult—maybe impossible—to assess ambient concentrations of specific chemicals in the real world, but there is also a likelihood of impacts from habitat degradation, or from changes in bird diet and behavior, that would accompany an exposure event. How can we possibly tease these factors apart?

### NO SUMMING UP YET

The smoky November of 2018 left all of us with much new food for thought, especially given the ancient history of fire events in California summers and autumns. How do raptors—local or migrating—respond to massive amounts of smoke? How do we measure this response unless we are out in the event, ourselves exposed to dangerous smoke? Could there be an easy examination, or a sampling of a hawk in hand (blood, feather, mucous) that might give evidence of its smoke exposure? Smoke antibodies? None of this has been worked out yet, but these will clearly be questions for the GGRO future in this climate-changing California.

NOVEMBER 2018



How the air quality changed over the San Francisco Bay Delta region for 13 days in November 2018. Red indicates an Air Quality Index of 151-200 for an “unhealthy” rating. Photo: AirNow.gov

*My huge thanks to Olivia Sanderfoot and Dr. Tracey Holloway for their well-timed 2017 review article on birds and pollution. Sanderfoot is now a doctoral student at the University of Washington, where she is studying birds and smoke. She maintains a blog of her writings at ovsanderfoot.com.* ●

Brown, RE, JD Brain, and N Wang. 1997. The avian respiratory system: a unique model for studies of respiratory toxicosis and for monitoring air quality. *Environmental Health Perspectives* 105 (2): 188-200.

Sanderfoot, OV, and T Holloway. 2017. *Environmental Research Letters* 12. Doi.org/10.1088/1748-9326/aa8051.

# AIR QUALITY AND HAWK QUANTITY

Step Wilson



The Thursday 11 hawkwatchers didn't let the rain stop them from getting to Hawk Hill on their last day of the 2018 season. From left: George Eade, Step Wilson, Helen Lau, Erin Barry, Olivia Wang, and co-dayleader Cheryl Lentini. Photo: Nancy Elliot

The Golden Gate Raptor Observatory's hawk count is staffed by 175 community scientists who collect data for the ultimate goal of monitoring raptor migration through the Golden Gate National Recreation Area. This count conducted by birders, retirees, teenagers, hawk-nuts, friendly conservationists, and people just wanting to make a difference, is making a difference. This mighty village has gathered

annually since 1986 for this autumn task. The 2018 GGRO counters recorded raptor-sightings on 83 of 112 potential count-days. The August through November season is broken into eight two-week cycles. Our season begins the second week of August to capture the early movements of some raptor species, also to gather and ready the teams for the increasing number of migrants.

**STEP WILSON** came to GGRO as a bander in 1995 and caught the raptor bug, committing the next twenty years to raptor studies in Mexico, Israel, and across the American West. Step returned to GGRO in 2016 to be GGRO's first Hawkwatch/Outreach Manager.

✓ LAK/EMP 12/10/18  
✓ KLC+BRT 1-7-19

GGRO Hawkwatch Field Form  
Team (e.g. Mon 1) CAT 2 Date (month/day/year) 10/06/18 Dayleader (with Initials) J.H

Species	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	Totals
Turkey Vulture									170 1028
Osprey (J/A/U)		2	10	43	91	14	23	5	2
White-tailed Kite					10	3			2
Bald Eagle (J/A/S/U)									
Northern Harrier									
Juvenile						3			10
Adult male									1
Adult female									
Undoc									2
Sharp-shinned Hawk									198
Juvenile	19	43	63	111	73	17	13	13	
Adult									1
Undoc									59
Cooper's Hawk									127
Juvenile	10	11	13	15	20	18	3	3	
Adult									1
Undoc									22
No. Goshawk (J/A/U)									
Red-shouldered Hawk									24
Juvenile			5	11	7	6			
Adult									3
Undoc									
Broad-winged Hawk									10
Juvenile	7	5	5	7	7				
Adult									8
Undoc									
Swainson's Hawk (J/A/S/U)									
Red-tailed Hawk									87
Juvenile	5	7	7	10	21	21	4	3	
Adult									59
Undoc									1
Ferruginous Hawk (J/A/U)									
Rough-legged Hawk (J/A/U)									
Golden Eagle (J/A/S/U)									
Amer Kestrel Male									4
Female									2
Undoc									4
Merlin									7
Peregrine Juvenile									1
Adult						4	1		4
Undoc									
Prairie Falcon									
Unidentified Accipiter									24
Buteo									5
Falcon									1
Eagle									
Raptor									4
Hourly totals	47	173	230	191	94	165			235
Total Hours									6
Entered by LAK/EMP Date 10/16/18 HPH (hawks per hour) 139.2									

Hawkwatch data sheet from Oct 6, 2018—the highest count day of the 2018 migration with 835 raptor-sightings.

Hawkwatcher George Eade photographs a raptor in the distance. Photo: Laura Kwasnoski



Hawkwatch volunteers raise their binoculars in unison. Photo: Linda Sudduth

During the 2018 season the collecting of raptor data was interrupted by fourteen days of fog, three days of rain, and twelve days of bad air quality. The resulting 408 count-hours produced 24,323 sightings of all nineteen raptor species that we regularly expect in the Marin Headlands. The 2018 hawk count was shortened by almost two weeks due to the poor air quality caused by California's wildfires in early November. Because of this, I removed the same dates from each of the counts in our ten-year average for more accurate species-by-species comparisons.

When I examine the 2018 hawk count season compared to the truncated ten-year average, the total number of raptor sightings is close to average, but the total is floated by a healthy 2018 increase (22%) in our number-one-sighted raptor, the Red-tailed Hawk.

Raptors that increased by more than 5% in 2018 counts over the previous 10-year average include: Bald Eagle (+133%), Northern Harrier (+20%), Broad-winged Hawk (+7%), Red-tailed Hawk (+22%), Ferruginous Hawk (+7%), Rough-legged Hawk (+166%), and Merlin (+6.5%).

Raptors that decreased in 2018: Osprey (-12%), White-tailed Kite (-21%), Sharp-shinned Hawk (-7%), Cooper's Hawk (-20%), Red-shouldered Hawk (-18%), Swainson's Hawk (-29%), Golden Eagle (-22%), and Prairie Falcon (-60%).

Although it is a major undertaking to schedule, train, and keep nearly 200 volunteers on the same schedule, and to accurately record almost four months of daily raptor migration, the dedicated GGRO counters continue to Hawk Hill each fall to dance the dance with the new migration. ●

# CUMULATIVE HAWKS

*Bob Power*

It seemed like the start to another great season at Hawk Hill. It turned out to be the most memorable season yet of my sixteen years participating in the fall raptor migration at the Golden Gate.

The early hawkwatch days of late August and early September are filled with Red-tailed Hawks and Turkey Vultures, an occasional Cooper's Hawk for excitement, and prayers for something else. "Dear Hawkwatch Gods, please send me something different, unusual, cool, exciting. Please!" I know that most of us think that just a good solid look at any raptor is "cool and exciting." I'm referring here to those birds that you don't get to see very often or have never seen on Hawk Hill.

"Cool and exciting" came in the form of a Prairie Falcon on our first day on Hawk Hill in 2018. On an early Sunday in September the first Broad-winged Hawks of the season were spotted. This small buteo from the east (well, it's not, but come on up to Hawk Hill and we'll explain) marks the beginning of the trickier identification phase of the hawkwatch season. Now we have to tell the difference between this mini Red-tailed Hawk (the Broadwing) and real-sized Red-tailed Hawks, and the difference between Cooper's and Sharp-shinned Hawks, and the difference between a Merlin and a Peregrine Falcon. The first two to three weeks of the

season were a warm-up and now this is the real deal; raptor identification fast and furious.

The very next day brought the first Ferruginous Hawk of the season. This is a bird whose scientific name, *Buteo regalis*, is a fitting match to this magnificent raptor. Now every team held the hope that their day on the hill would bring a Ferruginous or a Broad-winged Hawk, or better. Well, maybe not better, but equally exciting.

*This will be the season remembered for when our hearts turned to the north, not for the migrating raptors, but for our fellow men, women, and children.*

One raptor that we might not see at all in a hawkwatch season has an average annual count over the past 30 years of—wait for it—one! One Rough-legged Hawk per year. On October 21, 2018, the hawkwatch team of the day was gifted with their Rough-legged Hawk. While I had carried with me the training axiom of "October 20 is the



**BOB POWER** has been a dedicated GGRO hawkwatch volunteer for over fifteen years and became a dayleader just one year after joining the program. In addition to leading the Saturday I hawkwatch team since 2004, Bob also spearheaded the GGRO Mentor Program, creating one-on-one raptor ID training opportunities for GGRO volunteers.



The 2018 Saturday I hawkwatch team, led by Bob Power, at Hawk Hill. Standing from left: Tom Holmes, Bob Blumberg, Eli Gross, Bob Power, Jane Rudebusch, Olivia Wang, Brian Tsuru, Willet Moss, Nora Holmes, Oscar Moss, Erin Barry, Jeff Peterson. Kneeling: Melissa Kohner, Marika Brown, Andrew Bradshaw

first day for Roughlegs" for sixteen seasons, this was the first one in my experience that came close to that date. I began thinking this could be a significant year for Rough-legged Hawk sightings at Hawk Hill. Well, I was hopeful, anyway.

In early November raptorial lightning struck Hawk Hill three days in a row. A juvenile Northern Goshawk, a species not seen at Hawk Hill since the 2015 season, was seen! And seen! And seen again! This is a dream bird for most hawkwatchers. Here's a typical conversation between hawkwatch team members when they aren't diligently scanning near and far for raptors:

Hawkwatcher #1: "I'd like to see a Northern Goshawk today."

Friendly, supportive Hawkwatcher #2: "You're dreaming."

In all likelihood, the same juvenile spent a three-day vacation stay in lovely Rodeo Valley, just below Hawk Hill, but we don't really know. It could have been three different birds. What a fabulous highlight to the season and there was still a month to go. Eagles, Rough-legged Hawks, Northern Goshawks—what else could the 2018 season have in store?

In mid-November, I flew to the east coast for family stuff and flew back via Burbank to Oakland. In Burbank, I was ready for icky yellow-brown smog of the LA kind, but Burbank was beautiful. A layer of fog had just cleared out the airways

and the San Bernardino Mountains never looked better. As we landed in Oakland, the icky yellow-brown smog was right here in my hometown. What? And right then our migration season came to a crashing halt. The Camp Fire had erupted while I was away and for the second year in a row, wildfires in northern California had inflicted horrendous harm on unsuspecting communities. This is a recap of the 2018 season, so it's easy to slip down the path of thinking about and discussing the impacts of fire and smoke on the season, but every even remote thought of "what might we have seen" or "we were disappointed to have our hawkwatch cancelled" is dwarfed to the point of insignificance compared to the hardship and suffering of those impacted by the wildfires.

The air-quality or lack thereof made activities outdoors, and as we all know, even indoors, untenable. For the record, nearly two weeks of the 2018 season were lost to conditions unfit for hawkwatchers or raptors. I cannot explain why this fire impacted me more than the fires of 2017, which were closer to the Bay Area and in which I lost a friend and mentor. I'm starting to believe it is an issue of cumulative impact—cumulative horror and cumulative disbelief.

This will be the season remembered for when our hearts turned to the north, not for the migrating raptors, but for our fellow men, women, and children. This will be the season that each of us, in our own small way, tried to help them navigate the hardships and hopeful road ahead. ●



A thick haze lingers over the Golden Gate as smoke from the Butte County Camp Fire settles on the bay. Photo: Allen Fish

## RAPTOR SIGHTINGS - MARIN HEADLANDS

	Autumn 2018 Excludes 2018 Smoke Dates* (408 hours)		10-Yr Average ('06-'17)** Excludes 2018 Smoke Dates* (430 hours)		10-Yr Average ('06-'17)** (488 hours)	
	Sightings	Raptors/hr	Sightings	Raptors/hr	Sightings	Raptors/hr
Turkey Vulture	6694	16.42	6989	16.25	7828	16.05
Osprey	67	0.16	76	0.18	78	0.16
White-tailed Kite	52	0.13	66	0.15	76	0.16
Bald Eagle	14	0.03	6	0.01	8	0.02
Northern Harrier	600	1.47	500	1.16	611	1.25
Sharp-shinned Hawk	3389	8.31	3653	8.49	3851	7.90
Cooper's Hawk	1914	4.70	2386	5.55	2475	5.08
Northern Goshawk	3	0.01	1	0.00	1	0.00
Red-shouldered Hawk	362	0.89	440	1.02	470	0.96
Broad-winged Hawk	295	0.72	275	0.64	275	0.56
Swainson's Hawk	5	0.01	7	0.02	8	0.02
Red-tailed Hawk	9230	22.64	7552	17.56	8693	17.83
Ferruginous Hawk	29	0.07	25	0.06	27	0.06
Rough-legged Hawk	8	0.02	3	0.01	6	0.01
Golden Eagle	14	0.03	18	0.04	19	0.04
American Kestrel	349	0.86	333	0.40	375	0.77
Merlin	182	0.45	171	0.78	192	0.39
Peregrine Falcon	205	0.50	201	0.47	237	0.49
Prairie Falcon	2	0.00	5	0.01	6	0.01
Unidentified	909	2.23	1039	2.42	1112	2.28
<b>Total</b>	<b>24,323</b>	<b>59.67</b>	<b>23,747</b>	<b>55.22</b>	<b>26,349</b>	<b>54.04</b>

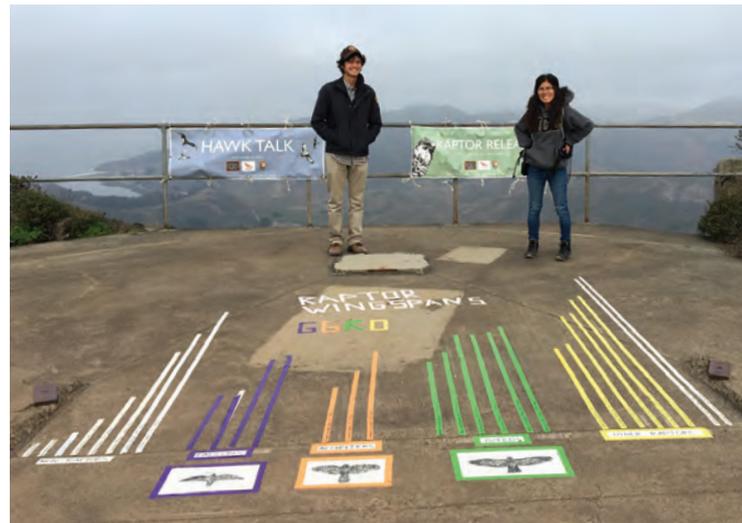
\* 2018 hawk count lost twelve days (November 9–20) due to hazardous fire smoke.  
\*\*2010 and 2013 data not included due to partial seasons.

# REMEMBERING THE INITIAL AWE

*Brian Tsuru & Olivia Wang*

The last Sunday of October was unusually foggy. With only about twenty-five feet of visibility, the hawkwatch team called it quits at 1 pm. After sadly putting up our “Hawk Talk Cancelled” signs, we Outreach Interns packed up our things and loaded up the car. Two hikers emerged from the fog and asked, “Are you the hawk people?” Yes indeed, we were the hawk people. These two had come up to Hawk Hill to see the birds despite the abysmal weather. Though we were all packed up and the rest of the team had long gone, we figured, “Why not?” and held an impromptu Hawk Talk with these two eager-to-learn visitors. At one point a color-banded juvenile Red-tailed Hawk burst through the fog and flew low over our heads, giving us a quick glance before vanishing into the clouds again. It was a beautiful look, and both the visitors and us interns were pleased that they got to see at least one raptor during their visit to Hawk Hill.

Fortunately, not all of our Hawk Talks were so sparsely attended. We averaged around thirty



GGRO Outreach Interns Brian Tsuru and Olivia Wang memorize raptor wingspans just before a foggy weekend Hawk Talk program on Hawk Hill. Photo: Olivia Wang

visitors at each of the weekend talks in September and October—folks of all backgrounds, interests, and bird experience levels. It was always great to see people of all ages get excited and even emotional about the raptors. One young boy started to cry as we put away the Cooper’s Hawk specimen at the end of a talk because he wanted to look at it just a little bit more. The raptor releases were popular as well. Most talks included a live raptor brought over from one of the blinds to release for the public, and some releases got



**BRIAN TSURU** joined GGRO as an Outreach Intern for the 2018 season. Before GGRO, Brian studied Biological Sciences at the University of Chicago, concentrating on ecology and evolution. Brian homed in on his passion for ornithology as part of a research group at the Chicago Field Museum studying birds from Eastern Africa.

**OLIVIA WANG** came to GGRO in 2018 after graduating from UC Davis with a degree in Animal Biology. Olivia used hawk count and banding data collected by GGRO for her senior thesis, looking at changes in the migration phenology of Sharp-shinned and Cooper’s Hawks.

the attention of more than fifty awed attendees.

In addition to the weekend docent talks and raptor releases, we worked with fourteen different elementary school classes as a part of the fourth year of Migratory Story—a joint venture between GGRO, the Crissy Field Center, and the National Park Service. Seven Title 1 elementary schools from San Francisco participated in the program, which brought the classes on a half-day field trip to Hawk Hill. On the trip, students practiced using binoculars, identifying raptors, and recording data just like our volunteers do every day of the season! This year, all participating classes were also treated to raptor releases of their own, courtesy of GGRO’s banding volunteers. We both really enjoyed releasing the raptors for these classes. Few of the students, if any, had seen raptors at all, and even

fewer had gotten that close. Even their reactions to the sight of the Golden Gate Bridge from Hawk Hill always brought joy to our hearts. It was a real treat to see these kids get excited about raptors, nature, even the simple act of data collection, and to help guide them into that new world.

As budding biologists, we sometimes focus so much on the science—on doing field work and research and answering unanswerable questions—that we forget the initial awe and wonder of nature that started us on this path in the first place. Being able to share the work of GGRO with the community, whether by swapping stories with a seasoned birder or by showing off a newly-banded Sharp-shinned Hawk to a wide-eyed fourth grader, was a reminder that what we do is incredibly special, and that not too long ago we were those wide-eyed children ourselves. ●



Brian Tsuru releases a Cooper’s Hawk for a group of students visiting Hawk Hill for a Migratory Story program—many of these children are seeing a raptor up close for the very first time. Photo: Alison Tagart-Barone

# MIGRATORY STORY: STUDENTS STRETCH THEIR WINGS

Audrey Yee



San Francisco students learn to soar with Ranger Rik Penn, GGRO Intern Olivia Wang, and Erik Zepeda-Flores of the Crissy Field Center, during a visit to Hawk Hill as part of the Migratory Story program. Photo: Audrey Yee

You can't help but smile to see fourth and fifth graders imitating the movement of an accipiter, or recognizing a buteo through binoculars at Hawk Hill, or in awe of a raptor gently being released. For four migration seasons, Crissy Field Center and GGRO staff and interns have provided meaningful experiences in the classroom and on Hawk Hill for young students to connect with the epic journeys of raptors, stimulate their curiosity for the natural world, and reflect on their personal migration stories.

Aligning Migratory Story with the Conservancy's dictum "Parks For All Forever," we partner with San Francisco Unified School District (SFUSD) public schools predominantly populated with students who identify as from a lower socioeconomic community, English Language Learners, and newcomers to the United States, who might not have easy access to parks and their educators. Our staff encourage the students to think critically, share their perspective, and bring their own voice to the



AUDREY YEE is in her fifteenth year at the Golden Gate National Parks Conservancy where she singly manages the planned and commemorative gifts programs. Audrey has worked very closely with Tom Meyer, Allen Fish, Step Wilson, and Crissy Field Center staff to bring the Migratory Story program to fruition.

*The best success was the connection the children learned about human and raptor migration...when they realize how cool [their migration story] really is.*

—SFUSD Teacher

table as we move through a thoughtful four-part curriculum in the classroom and on Hawk Hill.

We expose these impressionable young students to the beauty of hills rolling down to the ocean and the palpable amazement of spotting a hawk, and hopefully we can inspire the next generation of bird lovers, volunteers, rangers, community scientists, and caretakers of our earth.

We are deeply grateful for Tom Meyer's commitment to underwrite this program, for now and into the future, honoring his late wife Jennie Rhine's lifelong devotion to raptors and faithful volunteer commitment as a GGRO bander. ●



A young student counts hawks overhead with the help of Crissy Field Center instructor Erik Zepeda-Flores during a Migratory Story class field trip to Hawk Hill. Photo: Alison Tagart-Barone



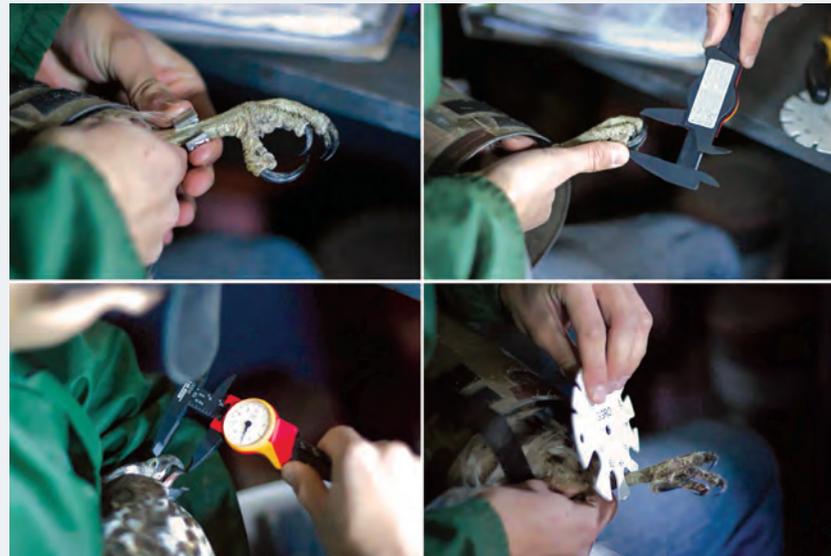
GGRO Donor and Migratory Story underwriter, Tom Meyer, visits Hawk Hill with the Parks Conservancy's Director of Planned Giving, Audrey Yee. Photo: Paul Myers

## MIGRATORY STORY BY THE NUMBERS 2015-2018

- 94% students of color
- 83% students who are categorized as socioeconomically disadvantaged
- 54% students who are English Language Learners (ELL)
- 845 students served
- 46 classes served
- 22 participating SFUSD elementary schools
- 5 Languages—English, Spanish, Cantonese, Mandarin and Tagalog

# LEADERSHIP IN MANY FORMS

*Teresa Ely*



A banding volunteer carefully processes a Red-tailed Hawk during the 2018 migration season.  
Photos: Olivia Wang

Golden Gate Raptor Observatory (GGRO) volunteers are a tough group—and by that, I mean they are one of the hardest working groups of volunteers that I have ever met. Our volunteers continue to impress their GGRO colleagues, including park staff, and partners at neighboring raptor migration organizations. We are a group that takes pride in maintaining high standards in all phases of our work. The GGRO intern program is where I first learned how to count and band raptors. The skills I developed during that internship are the skills I carried forward and applied to each successive job, and now it has come full circle.

In 2009, dedication and passion led the volunteer bander leadership to develop a formalized “siteleader certification” process. This was an enormous task that required volunteers to prepare a new banding manual, train new field evaluators, and certify 40-plus banders in one season. The certification process, based on the bander certification model developed by the North American Banding Council, is comprised of a written exam, a morphometric exercise, and a field evaluation.

The GGRO Siteleader Certification raised the bar and changed the culture, and our banding program is better because of this detailed process.



**TERESA ELY** was a GGRO Intern in 2008 and completed her master’s degree in Biology at the University of Nebraska, Lincoln, before returning to GGRO as Banding Manager in 2016.

The volunteers made a commitment to the program and to the next generation of leaders—they provided the framework for consistent training and data collection. Our interns rely on GGRO to train them in proper field techniques, so that they have the field skills to excel in their next job. And not only are these skills necessary for aspiring raptor biologists, they are achievable by our community scientists. GGRO is a place where you do not have to be a scientist in a lab coat to be able to conduct safe and meaningful research because we give the training and guidance for anyone to collect data that will be analyzed.

In 2016, GGRO encountered a new and very important hurdle—the Institutional Animal Care and Use Committee (IACUC). For those unfamiliar with IACUC, this is a working group that reviews all research protocols and provides guidance to promote animal welfare, human and animal safety, and scientific integrity. Our IACUC group is a team provided by the National Park Service. Many organizations such as universities, the US Forest Service, and US Fish and Wildlife Service, require an IACUC approval for conducting research activities, and it is becoming a requirement for many scientific publications as well.

## THE IACUC APPROVAL PROCESS ENSURES THE FOLLOWING POINTS ARE COVERED:

- Rationale for involving animals in research, and the appropriateness of the species and numbers of individuals used (example: why we band raptors, take feather samples or blood, why do we need to take samples from more than one bird—a larger sample size will yield more information than one individual out of a population)
- A complete description of the proposed use of the animals (example: how we trap and band the raptors and how we take each measurement)

- Procedures that avoid or minimize discomfort, distress, and pain to the animals, consistent with sound research design (example: we limit the amount of time spent holding a raptor to band and measure to reduce stress, we do not trap raptors in rain or hot temperatures)
- Researchers handling wild animals will be appropriately qualified and trained in correct and safe procedures (example: we require volunteers to learn basic data collection methods before handling wild raptors)

This list goes on. When I arrived at GGRO in 2016, Chris Briggs and Allen Fish had written the first draft of our research goals and procedures for IACUC. This was a massive task. First, we had to explain the specific objectives of our thirty-year study. Then we had to explain our rationale for the use of animals (why catch that hawk, and why we are still doing this thirty years later). We had to describe the types of nets we use, how we monitor the raptor’s health throughout the banding process, and how we minimize stress to the bird.

Not only does the IACUC committee examine how we study live animals, it also reviews our training procedures for new volunteers. Due to the GGRO Siteleader Certification process, and the development of our Bird Health Care Committee, we can provide the qualified personnel necessary for this type of work. We received our IACUC approval in 2018 after multiple phone interviews, email questionnaires, and two field inspections where IACUC representatives joined me for a trip to the banding stations. I showed them how we trap and band raptors, and the steps and guidance involved when training a new intern or volunteer. We have set the standard, and raised the bar once again, and we are the example for which other raptor migration stations will be compared.

GGRO staff and volunteers continuously strive to improve the organization, whether it is



GGRO Banding Manager Teresa Ely (center) demonstrates the Turkey Vulture tagging process for the 2017 GGRO Interns. Photo: Ben Dudek

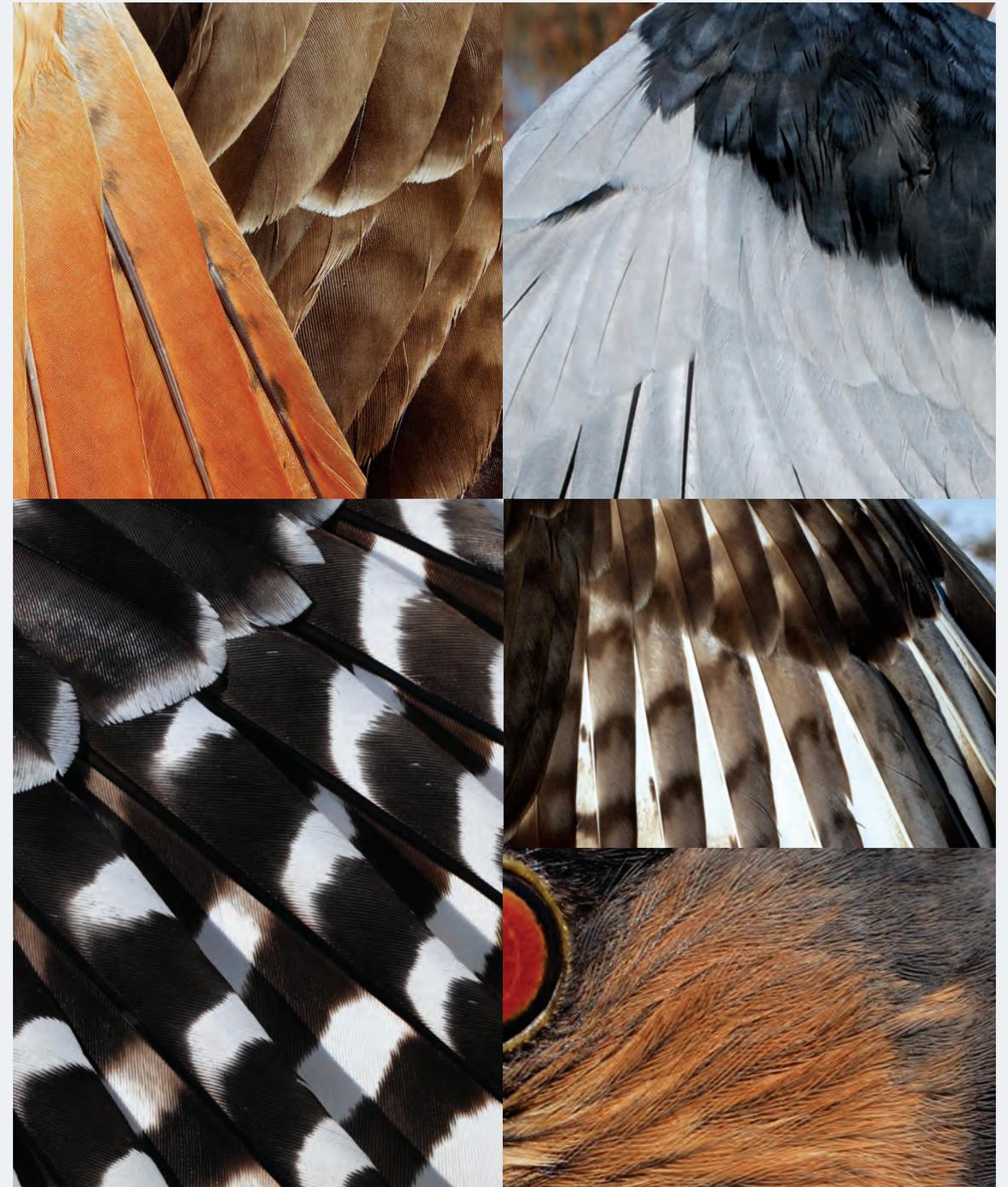
formalizing our siteleader certification, ensuring accurate data collection, or meeting the highest standards of animal welfare. We pride ourselves on being a community science organization that goes above and beyond. Recently, we faced a new challenge, one that was a long time coming: a self-

***We are a group that takes pride in maintaining high standards in all phases of our work.***

examination of ourselves in our leadership roles. This year, we invited all volunteer leaders and future leaders to attend a training focused on how to practice inclusivity within the organization and treat our fellow GGRO colleagues with respect.

While it is easier to focus on training skills and how to collect bird data, sometimes we need to take a step back and make sure that we are the organization that people will want to continue to be a part of twenty years down the line.

I recently went back to issue 31 of the *Pacific Raptor Report* and reread an article by former GGRO Research Director Buzz Hull titled “Banders Accept Recertification Challenge.” Many statements in this article resonate to this day, but one line stood out to me: “I watched attitudes move from apprehension and resistance, through acceptance, and finally arriving at a sense of fulfillment and accomplishment.” As we move forward in the GGRO banding program, we can only hope to improve and add to our foundation of knowledge, but with that comes change. As we strive to reach higher standards, there will inevitably be some growing pains, but I am confident we can embrace these changes to make ourselves better. ●



Clockwise from top left: Red-tailed Hawk, White-tailed Kite, Ferruginous Hawk, Sharp-shinned Hawk, Red-shouldered Hawk. Photos: Josh Hull.

# WHEN I WAS YOUR AGE

*Nancy Mori*



Longtime bander Nancy Mori pictured with a Red-tailed Hawk during her first year as a GGRO volunteer (left) and holding a juvenile Peregrine Falcon more than 30 years later in the same hills (right). Photos: GGRO (left) and Kaitlin McGee (right)

**M**y introduction to raptors was as a teenager while volunteering at a junior museum in San Jose. I helped care for display animals, including captive hawks and owls—I was hooked.

With hopes of studying wildlife biology, I enrolled at the University of California, Davis. Job prospects in wildlife biology were bleak so I eventually pursued a different major. However, I was still able to take some raptor courses and handle birds at the Raptor Center.

In 1985 I saw a flyer posted in the Berkeley REI store announcing a recruitment session for volunteers to study migrating raptors in the Marin Headlands. I was working in biotechnology and had free time, so I thought this would be a good

way to pursue my love of raptors on my weekends.

I was surprised to find that there were no requirements for a science background, raptor experience, or animal handling skills of any kind. There was no application or interview process, the only requirement was to show up. Volunteers were committed to one day every two weeks. That was the beginning of my years as a GGRO volunteer.

Our first training was at the San Francisco Zoo. I recall very little of that day except having to remove a baby Barn Owl from a net. Most of our training was in the field, where I learned proper handling of raptors. During my first year, processing a raptor involved banding, weighing, and gathering a handful of measurements. One person would hold the hawk while a second

person would band and take measurements. Weighing birds involved a drawstring bag, some Velcro, and a hanging scale. The total number of raptors banded in the 1985 season was less than 500 and I don't think I handled more than three birds during my first season.

Our early blinds were small plywood boxes, held down with rebar and cables that threatened to roll down the hills with every gust of wind. They were outfitted with government surplus office chairs which were later replaced with built-in benches. The blinds had low ceilings and were so small that standing upright wasn't always possible, and we had to sit outside on the ground to process our birds. I remember the "washing machine blind" that barely held two people, with a door that you didn't step through but rather fell out of. Every day we carried bands and tools up to the blind in toolboxes. Each site had only a few bow nets and some had a mist net.

Every year there seemed to be changes to our trapping sites. We had a number of sites that didn't make the grade: the Nude Beach Blind with its steep hike; Slacker East Wind Blind with a stunning view of the Golden Gate Bridge but little raptor activity; and a site on Wolf Ridge—where I trapped my first adult Cooper's Hawk—felt promising, but the drive up seemed endless. New sites were tested, old sites were reconfigured, and new traps were added, so I never know what to expect at the start of each season.

Much has changed over the years, including the name. I still have my Golden Gate Raptor Migration Observatory sweatshirt tucked away in a closet. We've moved twice, first from a small building in East Fort Baker to Building 1061 Fort Cronkhite and to our current location at Building 1064.

We've moved past the "see one, do one, teach one" method of training and now have a two-year training program for new banders. Apprentice banders attend orientation, banding technique trainings, and raptor ID classes. Returning banders

refresh their skills during a pre-migration training and throughout the season at morning meetings.

Our current blinds are more spacious—with real doors—and have an area for processing birds and equipment storage. There are more traps at each site to maximize our chances of success, and we've added more measurements and observations over the years. For every adult bird we record eye color, feather molt, and take pictures. We now collect feathers from every raptor we band. There is no telling where some of this information will lead. We have collaborated with graduate students, including former GGRO interns, and other researchers to collect data for numerous projects: we've collected blood for DNA and to look for blood parasites; and we've swabbed talons and beaks to look for prey remains. It is so satisfying to hear a lecture or read a research article presenting data that GGRO has collected.

Because of my GGRO connections, I've seen Great Gray Owls and Northern Goshawks in the Sierra, toured raptor centers, attended a raptor conference, helped with oiled bird rescue, and helped band nesting American Kestrels. My fellow bander, Mamiko Kawaguchi, taught many of us how to prepare raptor skins for the GGRO research collection and this eventually led me to a volunteer position preparing study skins at the California Academy of Sciences.

When I was twenty-something, I never imagined that I would be with the GGRO for so many years. My hair has become gray, I can no longer read the numbers off the bands without reading glasses, the hike up to the blinds takes a little longer, and the run down to the traps is a little slower. I have my collection of 5, 10, 15, 20, 25, and 30-year GGRO pins. After all these years as a raptor bander, I find that there is still something new to learn every day that I'm in the field and I am hoping that I have many more GGRO seasons left in me. ●



**NANCY MORI** joined GGRO as a bander in 1985, just one year after its beginning in 1984. This year, Nancy will receive her 35-year milestone pin recognizing her decades of service to the banding program and the GGRO volunteer community.

# COLOR-BANDING HAWKS

Teresa Ely

Redtails! This season was full of them. The 2018 field season ended with 342 Redtails banded—almost one hundred Redtails above our ten-year average. On any given day, an observer could regularly spot ten to fifteen Redtails riding the wind uplift on Slacker Hill. If you were a GGRO volunteer, you might have enjoyed this sight from Hawk Hill, or maybe you shook your fist in the air at them from a blind as they took turns stooping on each other in the wind.

In 2018, 197 of these Redtails received a color band along with the federal metal band. That is almost twice as many color bands as we put out in 2017. One of the reasons for this increase, besides the large number of Redtails moving through the Marin Headlands, was the focus on teaching all GGRO site leaders how to place color bands on birds.

In 2013, Chris Briggs started a two-year pilot study to examine the efficacy of using color bands on two species of hawks: Red-tailed Hawks and Cooper’s Hawks. The goal was to increase the recovery rate of banded birds, and to spur public interest in our local raptor populations. Color bands are easier to read than the metal bands, which increases the potential for information return.

Color bands, also known as auxiliary markers, are usually made from plastic or metal and placed on the leg opposite the one that receives the aluminum USGS band. GGRO coordinates with California Department of Fish and Wildlife (CDFW) and other raptor researchers in California to determine a researcher-specific

color and alphanumeric code. The goal is to avoid duplicating work by our colleagues across the state and to reduce the disturbance to the raptor. For our programs’ research, Redtails receive either a green with black code or lavender with white code color band, and Cooper’s Hawks receive a green color band. This means that a Red-tailed Hawk or Cooper’s Hawk encountered in California wearing one of these specific color bands was banded by GGRO volunteers during fall migration.

YEAR	Color-Banded Red-tailed Hawks
2013	80
2014	51
2015	102
2016	17
2017	100
2018	197
Total	547

A common question I get after explaining the benefits of color bands is, “Why don’t you just use color bands instead of the metal bands? Sounds like you only need color bands.”

The metal bands we use at GGRO are issued by the Bird Banding Laboratory (BBL), which is part of the US Geological Survey (USGS). BBL is a scientific government agency, established in 1920, that supports the collection, archiving, management, and distribution of information

	Total banded	Recovered/ Encountered* (dead or alive)	Recovery/ Encounter Rate*
All Redtails banded (metal band only, or metal and color-banded) between 1983 and 2018	10324	752	7%
1983 to 2012 all Redtails banded before color-banding started	8629	617	7%
2013 to 2018 all Redtails banded after color-banding started	1695	132	8% Rate will continue to increase with time

*\*Multiple sightings/encounter of the same bird were removed. The data reflected here use the sampling date. We wanted to compare sampling methods: pre and post color banding years. We realize that sampling year and recovery years will vary, and further analysis is beyond the scope of this article. Slight imperfections in math due to minor errors in recovery database need to be addressed.*

from banded birds in North America. BBL manages more than seventy-seven million archived banding records and more than five million encounter records. Each metal band receives a unique eight or nine-digit code—like a social security number, but for a bird. When it comes down to it, the metal bands issued by BBL are more important because they help us track birds banded all over North America through time, using a system common to all North American researchers, with the data collected and stored in a central location. The metal bands are more durable, whereas a color band can degrade over time and break off.

GGRO’s first documented band recovery was in 1984, of a Redtail found dead in north Manchester, CA. It wasn’t until 2003 that we received the first report of a band on a Redtail that was read while the bird was still alive. For the purpose of this article, I wanted to focus on bands that have been re-sighted by an everyday observer; I have removed band recovery data points where the bird was recaptured by other researchers, captured due to illness, disease, or starvation, birds with transmitters (since the location is known, it is easier to go out and look for specific individuals), and other miscellaneous sightings (example: a bird that



This Red-tailed Hawk is fitted with an easy-to-read green color band, in addition to the standard BBL-issued metal band placed on all birds processed during the migration season. Photo: Olivia Wang

was brought to a rehab center and the outcome was unknown). Between 1984 and 2012, eight Redtails were reported to BBL and documented as “band read by telescope while bird was free.” These birds were alive when they were re-sighted, which is valuable information.

Between 2013 and 2018, we banded 1695 Redtails, and of those, 547 (32%) also received a color band. There were 132 encounters of Redtails during this time, and 37% (50 individuals) of these encounters were wearing color bands. To date, 9% of the total color-banded Redtails have been encountered.

	Recoveries	Dead	Sighted by band alive	Other**
1983—2012 (federal bands)	617	328 (53%)	8 (1%)	281
2013—2018 (color bands)	50	14 (28%)	21 (42%)	15
2013—2018 (federal bands)	82	46 (56%)	5 (6%)	31

\*\*The data represented in this table were determined by the BBL “recovery how” code. The GGRO Band Recovery Team does an impressive job of tracking down more information from the people that report the band recoveries. Using these data would further separate dead and alive sightings, however that is beyond the scope of this article.



Color bands help increase the potential for re-sighting information. Photo: Teresa Ely

If we narrow it down to examine color band recoveries only, 42% (21 of 50) were sight-records of a live Redtail, 28% (14 of 50) were of birds encountered as dead, and the rest are a hodgepodge of other reasons including caught by another permitted bander, caught due to injury, outcome of bird is unknown, etc.\*\*

Raptors are considered valuable “biological indicators.” They are top predators and scavengers, their range extends over vast landscapes, they are sensitive to human-caused environmental changes, and people are intrigued by them. Banded birds provide us with information on dispersal, migration, life span, survival and productivity. GGRO’s early band encounters were referred to as “recoveries” because most often, a dead bird was recovered.

Common causes of death include window, turbine, or car strikes; being shot; killed or injured by domestic pets; rodenticide poisoning; and natural causes such as disease or starvation. Before 2013, encounters were largely due to the reasons listed above. However, after we added color bands in 2013, the information we receive from BBL frequently reports the raptor as “sight record, bird alive.” We now refer to these sight record “recoveries” as “encounters”. Reports of live bird encounters can give us more information on winter ranges, site fidelity, and survivorship.

Other reasons I think our band recoveries and encounters may be on the rise are increased awareness, better optics in the field, and the ease of reporting an encountered band to the BBL. More and more, bands are reported to BBL online, which can even be done through a smart phone. I have even noticed that members of the public with no other ties to the birding community post their color band sightings on social media. I have seen posts on sites like Facebook, Nextdoor, and Twitter, from people who were never interested in birds, but saw a Redtail with a color band and want to know, “why does this bird have a bracelet?” Color-banding has increased the public’s interest in local raptor populations. It is great to see responses from other social media users directing the original poster to the BBL ReportBand.org website. Other



Though this zoomed-in image may be grainy, it’s a great example of the role color bands play in increasing encounter rates. The large, bold, alphanumeric code from the color band on this juvenile Red-tailed Hawk is—unlike the code printed on the metal band—easily read from a distance, and allows us to identify this individual, photographed from Hawk Hill during the 2018 season. Photo: Lisa Morse

websites like iNaturalist and eBird receive posts from novice and experienced birders alike.

I believe this is what Chris Briggs envisioned. We are increasing our knowledge of individual raptors, with the bonus of encounters of living birds, and we continue to increase public interest in California raptors. I want to thank Chris for piloting this project in 2013 and I want to thank the people that help make the plastic color bands— Carmen DeLeon, Ben Dudek, and Chris Vennum—they have spent many hours in front of an oven or sander shaping each plastic color band. I want to thank the Band Recovery team — Marion Weeks, Nancy Brink, and Eric Lynch for their hard work. I am excited to continue to use color bands, to be able to teach more and more siteleaders how to properly apply them, and to learn more about Redtails. ●

## RECOVERY VS. ENCOUNTER

For many years, a band recovery was GGRO’s primary tool for learning where a raptor had flown. We banded all raptors with a small government-issued metal leg-band, and if that raptor was ever found—usually killed or incapacitated—the finder would read the band number, hopefully report it to BBL, and BBL would report the details back to us. These metal bands are very difficult to read on a wild hawk, so nearly always, the band number was read with the hawk or the band itself in hand. In other words, the band was *recovered*.

Today there are color bands, wing-tags, geolocators, and satellite transmitters—the systems of pinpointing the location of a hawk have broadened considerably and for many of the methods, nothing is physically recovered. As Teresa Ely explained in her previous article, color bands—with their bright hue and large alphanumeric codes—may be read at a distance without any physical contact between bird and human. These are *encounters*.  
—Editor



## RAPTORS BANDED - MARIN HEADLANDS

	Autumn 2018* (8/13/2018 - 12/20/2018)	Annual Average** 1993-2017***	Totals 1983-2018
Northern Harrier	6	10.5	323
Sharp-shinned Hawk	413	472.4	13,074
Cooper's Hawk	468	560.2	16,192
Northern Goshawk	1	0.2	7
Red-shouldered Hawk	12	16.3	465
Broad-winged Hawk	5	1.4	46
Swainson's Hawk	0	0.4	11
Red-tailed Hawk	342	305.6	10,324
Ferruginous Hawk	0	< 0.01	3
Rough-legged Hawk	0	0.2	6
Golden Eagle	0	0.04	2
American Kestrel	26	53.3	1483
Merlin	21	31.4	817
Peregrine Falcon	5	4.2	117
Prairie Falcon	1	1.8	50
Eurasian Kestrel	0	< 0.01	1
<b>Total</b>	<b>1300</b>	<b>1458</b>	<b>42,921</b>

\*Missed November 9–20 due to hazardous fire smoke. Missed December 21–January 3 due to government shutdown.

\*\*2013 data are not a complete season; missed October 1-16 due to government shutdown.

\*\*\*1993–2017 are used for this comparison due to similarity of methods and effort between those years and 2018.

# THE LINES DRAWN BY BANDED RAPTORS

Nancy Brink

Between 1960 and March 2019, the Bird Banding Laboratory (BBL)—the US Geological Survey (USGS) program headquartered in Patuxent, MD, responsible for issuing bands and maintaining data on all bird species banded in North America—received records of 2,369,367 raptors, including owls. While banders collect data that contributes to knowledge about individuals, populations, and species, they also hope that someone will encounter and report those banded raptors in the future, to piece together the stories of raptors that breed, migrate, and move through our skies.

As Intern Kirsti Carr learned this year, GGRO's banders are in an exciting position to be part of those stories at their beginning as they place new bands on hawks, but also to contribute to research by the larger community of raptor biologists. Kirsti seemed to have a knack for being in the right place at the right time in the Marin Headlands to encounter banded raptors, starting on August 29, 2018 at one of GGRO's banding blinds.

While Kirsti banded a Cooper's Hawk, long-time bander Mamiko Kawaguchi watched for incoming hawks. The field radio came to life, announcing the presence of a Peregrine Falcon nearby. "It's so exciting to see a Peregrine fly," said Mamiko. "Sometimes you are so



Peregrine chick "11 AM" is pictured far right in the Campanile Tower nestbox. Photo: Mary Malec

busy watching its skill and the drama of its flight, you forget you're trying to trap it."

But soon, Mamiko rushed out of the blind. Kirsti remembers, "she came in with this beautiful, big Peregrine in her hand. I'd seen so many pictures of Peregrines, but this was the first time I'd actually seen one face to face."

Mamiko had also shared a blind with a Peregrine—for the first time in more than thirty years of GGRO banding—just two weeks earlier at the same blind. "It's something I'll

always remember," Mamiko said. "You see close-up the compact, strong, tight feathers—you can understand the way they fly when you see how the feathers are constructed."

Kirsti and Mamiko soon realized they would not get to put a band on this Peregrine, as the bird in Mamiko's hands already had a USGS metal band on one leg, and a color band on the other. White letters and numbers on a black background read "11 AM". GGRO had put its first color band on a Peregrine in 2018, so Mamiko thought perhaps it was that bird banded two weeks earlier. "Nope, not our numbers," said GGRO's banding manager Teresa Ely, when she arrived to check out the falcon.

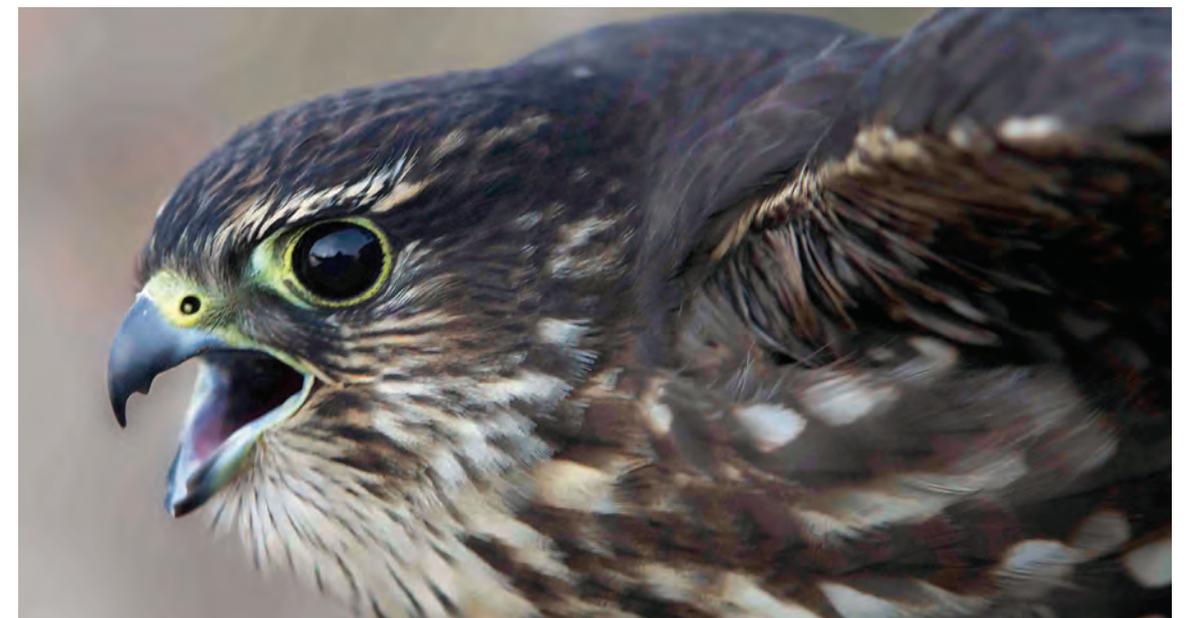
The banders set about to gather information that could be invaluable to the original bander; many pictures were taken. "It's easy to assume a banded bird is one of ours," Kirsti noted, "but sometimes it's not. In this case, we had a rare opportunity to fill in this bird's story." She took careful measurements, hoping to shed light on the bird's health and well-being. "The Peregrine

*"I like to think about how from a scientific perspective our data will help these birds, but there's also an emotional component."*

— GGRO Intern Kirsti Carr

was unlike any other raptor I'd handled. The morphology stood out, how big and chunky the beaks are, the tomial tooth, the blue on the beak. It bit me very hard. I think I still have a little scar on my thumb. I was enraptured!"

GGRO reports a recaptured hawk's band numbers to the BBL. But the code on the color band provided a shortcut for finding out which of the limited number of permitted raptor biologists had banded the falcon. Two days later, after making some calls, Kirsti learned that Peregrine "11 AM" was banded on May 17, 2018



Falcon species have a tomial tooth—a sharp triangular ridge on the outer edge of their upper beak—as seen on this Merlin. Photo: Jeff Robinson



NANCY BRINK is a filmmaker and writer who assists with band recovery follow-up, and has enjoyed fall migrations as a GGRO bander for nearly twenty years.



Bander Mamiko Kawaguchi holds Peregrine 11 AM for a photo outside of a GGRO blind approximately 3 months after the bird was first banded at UC Berkeley's Campanile Tower. Photo: Kirsti Carr

in a nest box on the Campanile Tower on the UC Berkeley campus by Zeka Glucs, director of the Santa Cruz Predatory Bird Research Group—and herself a former GGRO intern.

To quote Zeka, “The Campanile was just the second nest of Peregrine Falcon chicks that I banded myself with the Predatory Bird Research Group (SCPBRG). ‘11 AM’ was the only female in the three-chick brood, so I remember her well. She was bigger than her brothers, and whiter and fluffier since her pin feathers hadn’t started coming in yet. The Campanile is an excellent site for raising Peregrine chicks with its long views and abundant prey. But it’s also an excellent site for banding. We get to take an elevator up most of the way before crawling up a narrow staircase right to the nest box. No ropes or harnesses needed. The chicks are fairly polite, but the adults buzz you. That’s why we wear helmets.”

One of the sub-plots in band recovery stories is the connection between the people who band birds, and the people who encounter them—a connection that in this case brought together a new GGRO intern with her predecessor from ten years prior, now well-established in the field. “There’s a line of GGRO people following that Peregrine,” Kirsti said, noting that “11 AM” was also spotted a few months later on November 2 on Alcatraz Island by GGRO hawkwatcher Bob Blumberg.

“I felt such a connection to a former intern who held the same bird in its first year of life, which can be such a hard year for juvenile birds.”

Zeka echoed her feelings. “I was so glad to hear that this bird turned up at GGRO in good health. The first-year survival rate for fledged Peregrine Falcons is thought to be around forty to fifty percent, so seeing her doing well was a hopeful sign that she could be one of the successful ones. I have to admit I was also excited that some GGRO banders got to spend time with her. First-year Peregrines are such beautiful creatures.”

The report “was also a reminder of the intrepid network of bird researchers and bird watchers in the Bay Area that make color and VID [visual identification] banding so much more productive.” Zeka noted that SCPBRG’s encounter rate for VID-banded peregrines is approximately eighteen percent for the past ten years. “It’s not jaw-dropping, but respectable. And when you also consider the amount of longitudinal data we get from repeat recoveries from breeders we can really learn a lot about this population from year to year. Our banded chicks have been observed on breeding territories for up to six years.”

Zeka pulled up records showed four Peregrines banded by SCPBRG since 2010 that had later visited GGRO blinds:

**U 55** trapped by GGRO on August 30, 2017; this was an eyas (the biological term for a young falcon) from the San Francisco PG&E building banded in 2017

**02 R** trapped by GGRO in 2016 as a second-year bird; this falcon was banded in Moss Landing in 2015

**00 Z** trapped by GGRO in October 2015; banded as an eyas earlier that spring at San Jose City Hall

**87 P** trapped by GGRO in 2011; this was also hatched on the San Francisco PG&E building

All four of these had initially been banded by former SCPBRG director Glenn Stewart. Zeka notes, “the reintroduction and recovery of Peregrine Falcons in North America is one of the great conservation stories of our time. It is one of the few success stories we have in wildlife conservation, a lesson that there’s still a lot of resilience in species.”

Kirsti first heard the Peregrine story as a college student studying wildlife biology. “It’s such a compelling story. Coming out here, I was seeing and experiencing it first-hand—talking with GGRO staff and volunteers, learning about the Santa Cruz Predatory Bird Research Group, and others who loved Peregrines. Their effort was quiet, persistent, and personal. Without them, the reintroduction wouldn’t have been as successful. Getting to be part of that story is inspiring.”

Over thirty-five years, GGRO volunteers have reported increased sightings of Peregrines in the Marin Headlands: Eighteen sightings were made in the 1984 autumn migration compared to 205 in 2018. For another perspective, in 2018, there were twenty-three Peregrines banded in California, with eighteen reported encounters. In 1970, there was only one

Peregrine banded, and no band encounters. In a statewide nesting survey that same year, only two nesting pairs were located. Nearly fifty years later, biologists estimate more than three-hundred nesting Peregrine pairs in California.

Zeka and Kirsti both emphasize that the story isn’t over, that vigilance for this and other species is critical. But Peregrines have recovered adequately to be removed from state and federal endangered species lists; in California, they are a still species of special concern. Bands and band recoveries continue to help researchers keep track of the Peregrine’s numbers and population health, and to add chapters to their story.

During the 2018 season, GGRO banders placed USGS and color-bands on five Peregrines. And Kirsti got to put bands on one of them. “Putting a color band on a Peregrine, given their history, was a big deal,” she said. “I like to think about how from a scientific perspective our data will help these birds, but there’s also an emotional component. I just love birds so much. When I released the second Peregrine, I still felt the same amount of awe. That moment when I let it go—my heart was full!” ●

**On September 20, 2018, Intern Kirsti Carr was experiencing a peak accipiter day in a GGRO blind, when the banding team recaptured the first of two Cooper’s Hawks banded at an Oregon banding station called Bonney Butte, and managed by Hawkwatch International. GGRO’s 2017 intern Ashley Santiago was working at Bonney Butte in 2018. Ashley told us they had banded the Cooper’s Hawk on September 14, the female bird weighing 350 grams. At the GGRO blind, the Coop weighed 397 grams, after having flown more than 500 miles in just six days. Once again, Kirsti connected to a migrating intern through a banded hawk. As Ashley said, “these Coops made me appreciate how incredible migration is and how grateful I am to be a witness and part of this community. How amazing is it that that Coop could travel so far so fast and still gain weight along the way?”**

# RECENT RECORDS

## Marion Weeks

**1467** Juvenile female Cooper's Hawk banded on 8/23/12 by Bill Prochnow; found injured and without tail feathers after likely collision with a motor vehicle, was running around on a street on 11/7/17 at Morgan Hill, Santa Clara Co., CA. Wildlife Education and Rehabilitation Center (WERC) diagnosed a broken keel. Since there is no surgical repair or bandaging possible for this injury, they had to keep her for the long haul. Anna Pasqual notified us that she was released 2/19/18; keel healed and all lost feathers regrown.

**1470** Juvenile female Red-tailed Hawk banded on 9/21/15 by Brian Smucker; found injured on 11/9/17 at Walnut Grove, Sacramento County, CA; reported by Amando Carrillo who kept the hawk overnight, and then took it to Wildlife Care Association (WCA) near Sacramento. On 11/14/17 WCA transferred the Redtail to the California Raptor Center (CRC) at



Encounter 1476. Photo: Mary Malec

UC Davis. This bird had multiple injuries including gunshot or pellets in the right and left carpals (wrists) and back to tail, severe swelling, and respiratory distress. The hawk was sent to their hospital for surgery but eventually euthanized 11/28/17 after much supportive care; reported by Bret Stedman of the CRC.

**1476-A** Juvenile male Red-tailed Hawk banded with both metal and color bands on 9/14/17 by Bill Prochnow; was photographed on 10/21/17 by GGRO volunteer Mary Malec from a trail that leads up the back-side of Hawk Hill, Golden Gate National Recreation Area, Marin Co., CA.

**1476-B** Juvenile male Red-tailed Hawk banded with both metal and color bands on 9/14/17 by Bill Prochnow; was photographed on 12/17/17 by Matthew Chaney at Hawk Hill, Golden Gate National Recreation Area, Marin Co., CA. The Redtail was perched on a stump apparently not afraid or particularly wary of the people and "looked healthy."

**1477** Juvenile female Sharp-shinned Hawk banded on 11/29/17 by Buzz Hull; found dead five days later on 12/4/17 under a tall pepper tree at a railroad easement at Santa Cruz, Santa Cruz Co., CA; reported by Lynne Cooper who found "no wounds [and] no evidence of what killed it; it was perfectly intact, extremely light, and beautiful."

**1478** Juvenile female Cooper's Hawk banded on 9/21/17 by Eric Lynch; sighted on 1/11/18 by GGRO Intern Lara Elmquist and other GGRO Interns throughout the 2017 season at Battery Townsley, Marin Headlands, Golden Gate National Recreation Area, Marin Co., CA. They also observed her "chasing off a couple of Redtails."

**1479** Juvenile male Red-tailed Hawk banded with both metal and color bands on 9/9/17 by Laura Young; photographed while sitting atop a wooden pole at Mussel Rock Park, Pacifica, San Mateo Co., CA on 10/26/17; reported by Dave Rogers who stated, "the hawk appeared healthy."

**1480** Juvenile female Cooper's Hawk banded with both metal and color bands on 9/30/14 by Steve Rock; found freshly dead on 1/21/18 in backyard at Shelton, Mason Co., WA; reported by Robert McCoy who believes its neck was broken after flying into a window. "It was fresh. It was cold out and the bird was not as cold as the weather."

**1481** Adult female Peregrine Falcon banded on 10/15/08 by Helen Davis; found on 1/16/18 in a duct at Daly City, San Mateo Co., CA. The Peninsula Humane Society (PHS) speculated that it may have chased some prey into the duct and noted that it had some broken primaries and head injuries. The Peregrine was kept for treatment and evaluation and released on 1/23/18; reported by Ashley Damm of PHS.

**1482** Juvenile female Sharp-shinned Hawk banded on 9/11/17 by Teresa Ely; its body was found on 2/3/18 in a creek behind a community center at Mill Valley, Marin Co., CA; reported by Stephanie Thornton. Stephanie's niece was exploring, found it, and ran back to tell her about it. They believe it was freshly killed.

**1483** Juvenile female Red-tailed Hawk banded on 8/23/16 by Lief Gallagher; found dead on 12/30/17 in a wooded area leading up to Laguna Honda Hospital at San Francisco, San Francisco Co., CA; reported by Nick Bear who believes it was freshly dead as there were no ants, maggots, or signs of deterioration of the carcass.

**1484** Juvenile female Red-tailed Hawk banded with both metal and color bands on 11/25/15 by Elizabeth Wommack; found freshly dead on 2/8/18 under a large oak tree close to a house at Bella Vista, Shasta Co., CA by Lisa Dice. Lisa noted there were no obvious injuries, no evidence of its being shot, no broken neck or wings. She then spoke of a same day coincidence: she found a toad, the size of her hand, that was still alive but without any limbs and a "deformed mouth...its mouth gone." She wondered if perhaps the hawk had eaten it and been poisoned by the poison sacks behind the eyes. She checked the internet and found that toads can be Red-tailed Hawk prey.

**1485** Juvenile female Red-tailed Hawk banded with both metal and color bands on 9/12/17 by Katherine Rasket; found dead on 11/19/17 at Mill Valley, Marin Co., CA and reported by Rachel Dalton of Marin Humane Society (MHS). Unable to reach Rachel and with no record that other personnel could find, I sent a letter to the occupant at the address the Bird Banding Laboratory (BBL) provided. Resident Cody responded that he found the hawk dead "next to where [he parks his] car every day." He stated it had "no bugs or ants on it; [he] did not see any injury, it looked like it just died."

**1488** Juvenile female Cooper's Hawk banded on 9/15/17 by Brian Smucker; Ricardo saw this hawk fly into his window on 2/28/18 and called the Monterey County



**MARION WEEKS** has been banding with GGRO since 1992. Marion has taken the initiative to dig deeper into band recoveries by reaching out to band reporters and rehabilitation facilities for encounter details and rehabilitation updates.

SPCA. The hawk was unable to fly and had sustained a compound fracture of the humerus/radius and ulna; this is a hopeless prognosis thus the bird was euthanized that day; reported by Tami Decker of the SPCA.

**1489** Juvenile male Red-tailed Hawk banded on 8/22/17 by Cindy McCauley; found dead on 12/4/17 on Highway 35 at Pacifica, San Mateo Co., CA and brought to PHS. Tani Meyers of PHS (also a GGRO volunteer) said it was likely hit by one or more vehicles.

**1490** Juvenile male Red-tailed Hawk banded with both metal and color bands on 9/7/14 by Claire Starks; found dead on 2/1/18 at a ranch about two miles north of Willits, Mendocino Co., CA. Though the BBL reported the hawk was killed or caught by a predator other than a cat, the finders, Shannon Turner and Nancy Pereta, described the hawk as having no visible injuries, though they believed its neck was broken, body intact and clean with no ants or maggots.

**1491-A** Juvenile male Red-tailed Hawk banded with both metal and color bands on 11/12/17 by Kaela Schnitzler; sighted and photographed 12/25/17 by Robert Hinz eating a rodent at one spot and later perched on top of a century plant at Mill Valley, Marin Co., CA.

**1491-B** Juvenile male Red-tailed Hawk banded with both metal and color bands on 11/12/17 by Kaela Schnitzler; sighted again on 2/23/18 by Robert Hinz from a trail along San Francisco Bay at Strawberry, Mill Valley, Marin Co., CA.

**1493** Juvenile female Cooper's Hawk banded on 11/2/17 by Jack Schofield; found dead on 3/10/18 on a roof at San Francisco, San Francisco Co., CA; reported by Michael Isard. Cause of death unknown.

**1494** Juvenile male Red-tailed Hawk banded on 11/14/12 by Kayli De Saussure; reported by Michelle Morris-Hammers on 3/11/18; found 2 miles east from Ivanhoe, Tulare Co., CA. The hawk was severely injured standing at the roadside. Michelle's husband took the bird home and "Hawkeye" (as they named him due to an obvious injury to one eye) stayed in their room while they searched for a place or someone to help him. They were able to give him water. After locating a Critter Care volunteer, the Redtail was taken to a veterinarian and euthanized as he was barely alive, with severe head injuries, severely emaciated, and dehydrated.

**1495** Juvenile male Red-tailed Hawk banded on 8/27/16 by Nicole Beadle; carcass found by a member of the public at the water's edge at low tide at the Hayward Regional Shoreline on 2/27/18; reported by Park Supervisor Mark Taylor of East Bay Regional Park District.

**1496** Juvenile male Cooper's Hawk banded on 9/18/16 by Laura Young; dead hawk was brought to owner's door by his Pomeranian on 3/19/18 at Douglas City, Trinity Co., CA. Dave DeLange stated that the bird was probably somewhat fresh as there was no rigor mortis, it was still pliable.



Encounter 1505. Photo: Isabella Wheeler

**1497** Juvenile female Cooper's Hawk banded on 9/13/13 by Craig Tewell; found alive on 3/17/18 on side of the road at Redwood City, San Mateo Co., CA after apparently being hit by a car. By the time an officer arrived to pick up the bird, it had died; reported by Tani Meyers (GGRO volunteer) of PHS.

**1498** Juvenile female Cooper's Hawk banded on 10/6/15 by Steve Rock; reported by Ken Hofer, a retired game warden, after his neighbor told him about a bird killed when it flew into a window while chasing quail on or about 2/15/18 at Manchester, Mendocino Co., CA.

**1499** Juvenile male Red-tailed Hawk banded on 10/20/12 by Sarah Sawtelle; found headless on 1/6/18 at Montecito, Santa Barbara Co., CA; reported by Ralph Barajas. The bird was found by his partner and had been dead 8-10 hours on a pathway at the house.

**1500** Juvenile male Red-tailed Hawk banded with both metal and color bands on 12/1/17 by Jeff Robinson; found dead on front lawn at Belvedere, Marin Co., CA on 2/19/18; reported by Steve Silberstein.

**1501** Juvenile female Sharp-shinned Hawk banded on 9/21/17 by Claire O'Neil; found on 3/26/18 after being hit by a car and then attacked by crows at a vineyard at Geyserville, Sonoma Co. CA. The hawk was taken to the Santa Rosa Bird Rescue Center (BRC) and diagnosed with multiple injuries including a butterfly fracture of the humerus and respiratory issues; the veterinarian decided it should be euthanized; reported by Katie Miller and Brad Marsh of BRC.

**1502** Juvenile female Merlin banded on 10/3/17 by Brian Smucker; died instantly after flying into a window on

1/24/18 at Paso Robles, San Luis Obispo Co., CA; reported by Alfred Leadbeater.

**1503** Juvenile female Cooper's Hawk banded on 11/5/17 by Dian Langlois; found dead under a stand of trees at the Presidio at San Francisco, San Francisco Co., CA on 3/30/18; reported by Patrick Horn who described the remains as "at least a couple weeks old...desiccated, feathers, beak, skull there and had been predated upon."

**1504** Adult female Cooper's Hawk banded on 12/6/17 by David Jesus; reported as "already deceased" when found at the Santa Rita Jail at Dublin, Alameda Co., CA on 12/19/17; reported by Animal Control Officer Staci McPherson.

**1505** Juvenile female Cooper's Hawk banded with metal and color bands on 9/2/14 by Brian Smucker; photographed by Isabella Wheeler by a creek on 3/29/18 at Petaluma, Sonoma Co., CA; reported by Jennifer Wheeler, Isabella's grandmother.

**1506** Juvenile female Cooper's Hawk banded on 9/28/17 by Nancy Brink; reported by Cindy Moreno on 3/30/18. The hawk apparently flew into a mirrored window at Cindy's workplace and broke its neck at Carmichael, Sacramento Co., CA.

**1507** Juvenile female Sharp-shinned Hawk banded on 9/25/17 by Josh Hull; found in a permitted Brown-headed Cowbird trap on 1/14/18 at De Jong's Dairy at Wildomar, Riverside Co., CA; reported by Bonnie Jackson.

**1508** Juvenile female Cooper's Hawk banded on 9/14/16 by Susanna Czuchra; injured on 3/28/18 after striking a basketball backboard; the bird remained alive for one day but did not survive. This hawk was found between Santiago and Agua Caliente

at Guamuchilar, Baja California Sur, Mexico and reported by Osiel Alejandro Flores Rosas, a conservation agency employee.

**1509** Juvenile Red-tailed Hawk banded on 9/24/04 by Eric Jepsen; injured after being hit by a car almost 16 years later on 5/16/18 at American Canyon, Napa Co., CA. The bird was taken to Napa Wildlife Rescue where it died over night; reported by Linnea Furlong who noted: it was found by a child who stayed with the injured Redtail until help arrived.

**1510** Juvenile female Northern Harrier banded on 8/17/04 by Wen Hsu; two legs, a few feathers, no other bones, and no blood or flesh remaining found on 4/22/18 near Inverness Park, Marin Co., CA.

**1512** Juvenile female Cooper's Hawk banded on 10/22/17 by Deanna de Castro; mostly skeletal, pretty decayed remains, and lot of feathers found in yard on 4/27/18 near the Pescadero Marsh Nature Preserve, Pescadero, San Mateo Co., CA; reported by Andy Carl.

**1513** Juvenile female Cooper's Hawk banded on 9/15/13 by Diane Horn; found dead on 3/15/17 at Yountville, Napa Co., CA; reported by Michael Jordan whose neighbor saw the hawk fly into a wall of Michael's house as it chased a dove. Michael described the Coop as "such a beauty, it was gorgeous."

**1514** Juvenile female Red-tailed Hawk banded on 9/21/07 by Craig Nikitas; viewed on the Presidio nest camera, San Francisco, San Francisco Co., CA by several GGRO volunteers who took screen shots and eventually pieced together all nine numbers on the band; reported on 4/15/18 by Siobhan Ruck, Chris Briggs, and Walter Kitundu, of GGRO.

**1515** Juvenile male Red-tailed Hawk banded on 8/27/12 by Buzz Hull; was "hit by a golf ball" on 7/5/18 according to a witness. The bird had a badly broken wing and was taken from the Presidio of San Francisco, San Francisco, San Francisco Co., CA to WildCare and was euthanized; reported by Jonathan Young of the Presidio Trust.

**1517** Juvenile Red-tailed Hawk banded on 8/22/90 by Jim Mills; remains found 28 years later on 8/6/17 "maybe a week or so old...worms had digested most of it, it was basically a feathered shell;" reported by Curt Coffin. He has a sheep ranch at Petaluma, Sonoma Co., CA and found the hawk's remains by a roadside fence.

**1518** Juvenile female Cooper's Hawk banded on 12/4/17 by Ashley Santiago; found dead on 4/29/18 at the historic F-Ranch operating at Point Reyes National Seashore, Marin Co., Ca; reported by Cathian Summa-Wolfe who almost stepped on the intact body. She also found a dead but "ripped up" Great Horned Owl carcass nearby.



Encounter 1522. Photo: Michael Berndt

**1519** Juvenile female Cooper's Hawk banded on 9/17/14 by Chris Briggs; reported by Toby Tebo on 3/17/18 who lives at Bremerton, Kitsap Co., WA. "We were sitting in our house and something hit it and it shook, we have glass around the deck and the bird was lying dead on the grass."



Encounter 1526. Photo: Victor Brouk

**1520** Juvenile male Red-tailed Hawk banded on 11/25/06 by Julia Camp; found on 7/8/18 freshly dead from a head wound: "very small hole above the right eye...the blood had not coagulated yet." Jeremiah Kaufman found the bird on his property at Tualatin, Washington Co., OR.

**1521** Juvenile female Red-tailed Hawk banded on 12/1/17 by Robert Martin; brought by a dog to its owners on 6/24/18 at San Jose, Santa Clara Co., CA. The bird was admitted to WERC and found to have no evidence of any broken bones or concussion, though was missing all of its tail feathers, and many primaries were either broken or missing as well. WERC kept the bird until all the missing feathers had grown back and molt completed before being released on 9/27/18; reported by Sue Howell.



Encounter 1528. Photo: Carrie Fisher

**1522** Juvenile female Red-tailed Hawk banded with both metal and color bands on 12/26/16 by Steve O'Neill; photographed on 8/26/18 at San Francisco, San Francisco Co., CA by Michael Berndt.

**1524** Juvenile male Cooper's Hawk banded on 9/23/13 by Chris Briggs; found with multiple injuries on 9/22/18 in a field at Rohnert Park, Sonoma Co., CA; reported by Taylour Stephens of BRC of Santa Rosa and ultimately put down on 10/21/18.

**1525** Juvenile female Sharp-shinned Hawk banded on 9/22/18 by Marc Blumberg; found dead on 9/23/18 after striking a window at San Francisco, San Francisco Co., CA; reported by Jeff Hutchinson.

**1526** Juvenile male Red-tailed Hawk banded with both metal and color bands on 8/14/18 by Teresa Ely; sighted on 8/16/18 by Victor Brouk while hiking near Battery Godfrey at the Presidio at San Francisco, San Francisco Co., CA. He took photos of it as it hovered overhead.

**1527** Juvenile male Cooper's Hawk banded on 10/6/18 by Steve Rock; found dead on 10/23/18 at Hollister, San Benito Co., CA; reported by Deanna Barth. She described the bird as "extremely thin and with no apparent injuries."

**1528** Juvenile female Cooper's Hawk banded on 9/20/18 by Nancy Brink; found dead on 10/5/18 in front yard of Carrie Fisher at Half Moon Bay, San Mateo Co., CA.

**1529** Juvenile Red-tailed Hawk banded on 8/21/92 by Dan Gottsegen; found alive 27 years later on 11/9/18 in a backyard at San Francisco, San Francisco, CA. According to SF Animal Control Officer Canez the resident said it had been there a day or two. Officer Canez transported the Redtail to PHS. This elder bird was found to be "severely emaciated, in extremely poor body condition, hypothermic, dehydrated, and with no specific injuries." The hawk eventually was unable to stand, became unresponsive, and was

euthanized a few days after admission; reported by Kendra Jabin of PHS.

**1530** Juvenile male Red-tailed Hawk banded with both metal and color bands on 8/10/17 by Teresa Ely; sighted on 11/16/18 by Tara McIntire (GGRO volunteer) atop a telephone pole near the Law Library, Marin Civic Center, San Rafael, Marin Co., CA.



Encounter 1533. Photo: Edward Kimball

**1531** Juvenile male Red-tailed Hawk banded with both metal and color bands on 9/15/17 by Rosa Albanese; found “injured and unable to fly” near a roadside on 11/24/18 by a citizen near Sweet, Gem Co., ID; reported by James McKinley. It was dead

by the time it was brought to him. James felt the bird had been hit by a vehicle.

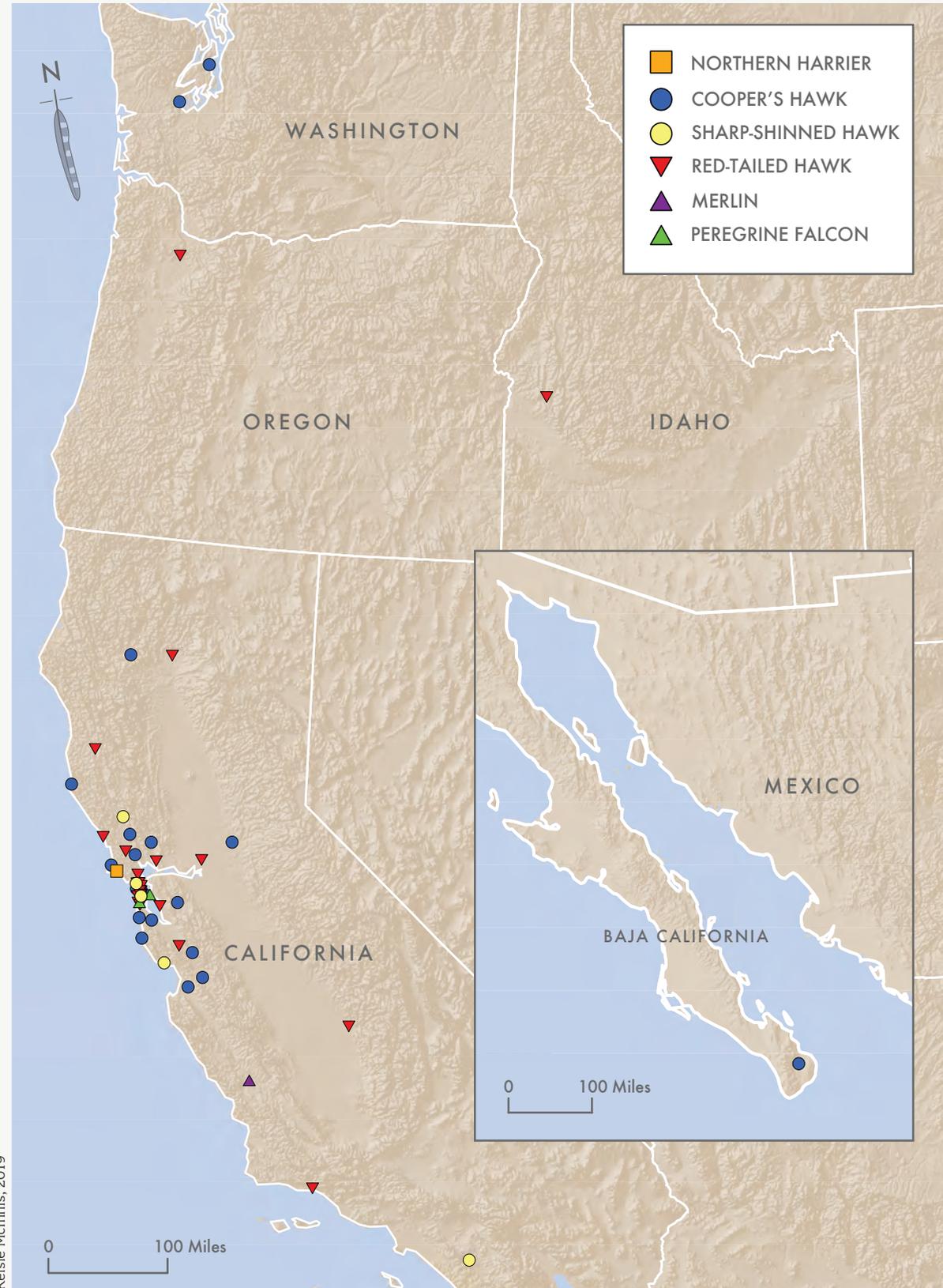
**1532** Juvenile male Cooper’s Hawk banded on 8/30/18 by Marion Weeks; skeletal remains and a bunch of feathers only found by GGRO on 12/4/18 near Battery Cavallo, at Sausalito, Marin Co., CA; reported by GGRO Intern Kirsti Carr. It was “clearly a freshly predated bird.”

**1533** Juvenile male Red-tailed Hawk banded with both metal and color bands on 8/31/18 by Anne Ardillo; photographed on 10/19/18 by Ed Kimball about two miles south of Jenner, Sonoma Co., CA. He saw the Red-tailed Hawk hunting in a field near Goat Rock Beach. When he viewed his pictures, he realized the bird was banded.

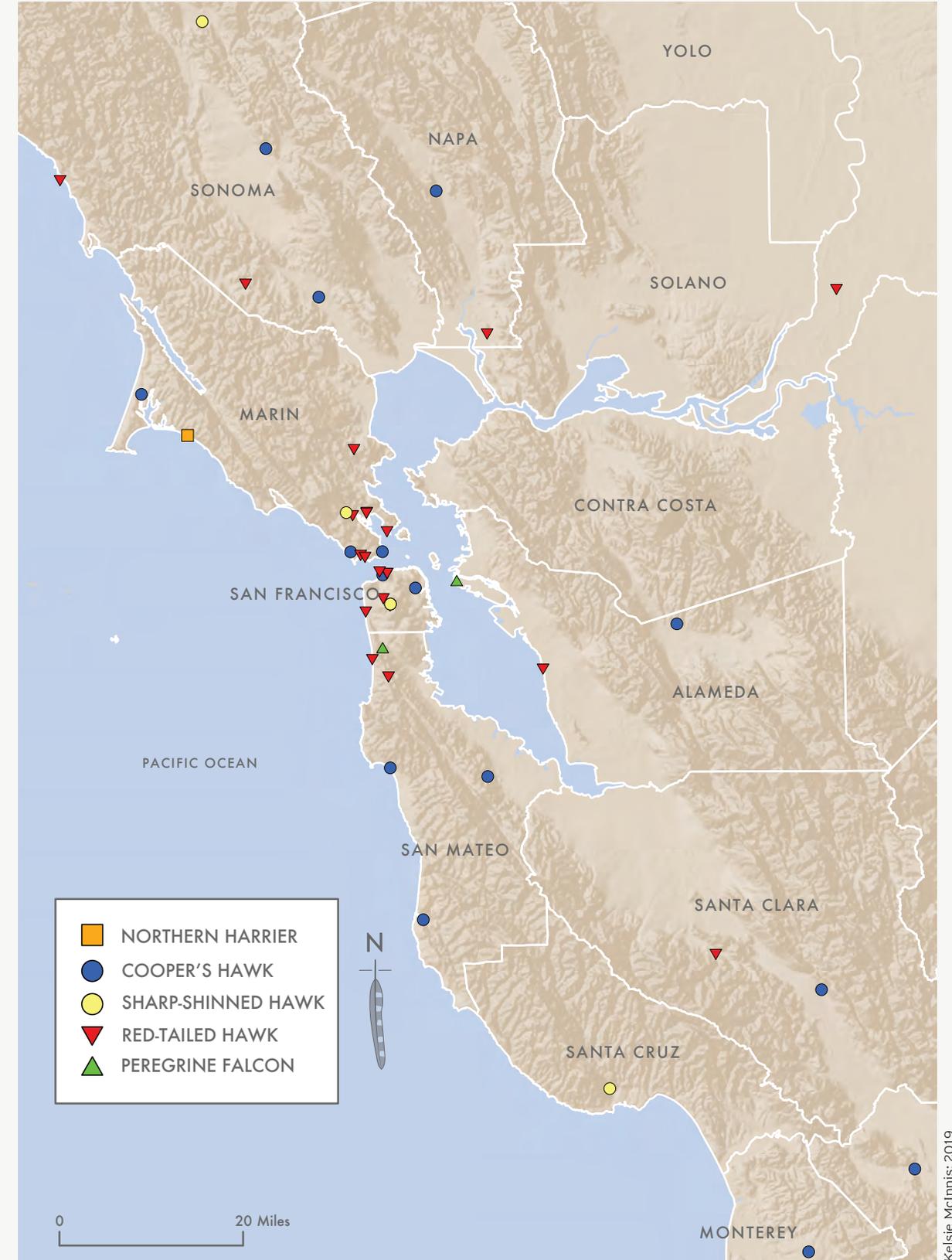
**1534** Juvenile male Peregrine Falcon banded 12/13/17 by Jeff Wilcox; trapped on 6/27/18 by Mark Bigelow, Animal and Plant Health Inspection Service (APHIS), as the Peregrine was killing Least Terns at the Alameda Naval Air Station, Alameda, Alameda Co., CA. “A decision was made with US Fish and Wildlife Service to trap and relocate the bird to try and prevent further depredation.” As a result, he took the falcon to the California-Oregon border off Highway 97 and released it at Indian Tom Lake in the hope that it would not return. ●

This adult Harlan’s Hawk (*Buteo jamaicensis harlani*) is told by its whitish tail, the granular spotting in the wings, and more black tones than typically seen on Redtail subspecies. Unlike most Red-tailed Hawks, where dark morphs are less common, light morph (as seen here) is the lesser seen plumage in the Harlan’s subspecies of Redtail. Great thanks to George Eade for this exquisite photo of a Harlan’s over the Marin Headlands on October 16, 2018.





Kelsie McInnis; 2019



Kelsie McInnis; 2019

# OSPREY OF SAN FRANCISCO BAY: A 2018 UPDATE

*Anthony J. Brake*

The last decade has seen a rapid expansion of Osprey nesting along San Francisco Bay, after initially being established along the Mare Island Strait in Vallejo in the early 1990s. Almost all the nests are built on anthropogenic structures such as cranes, light towers, utility poles, and channel markers. This presents a conservation challenge in accommodating this highly productive population, but one that can be easily resolved by providing nest platforms to divert Osprey pairs from problematic structures.



The Osprey's yellow eyes stand out as the species lacks the bony supraorbital brow that other raptors have. Illustration: Chris Grogan

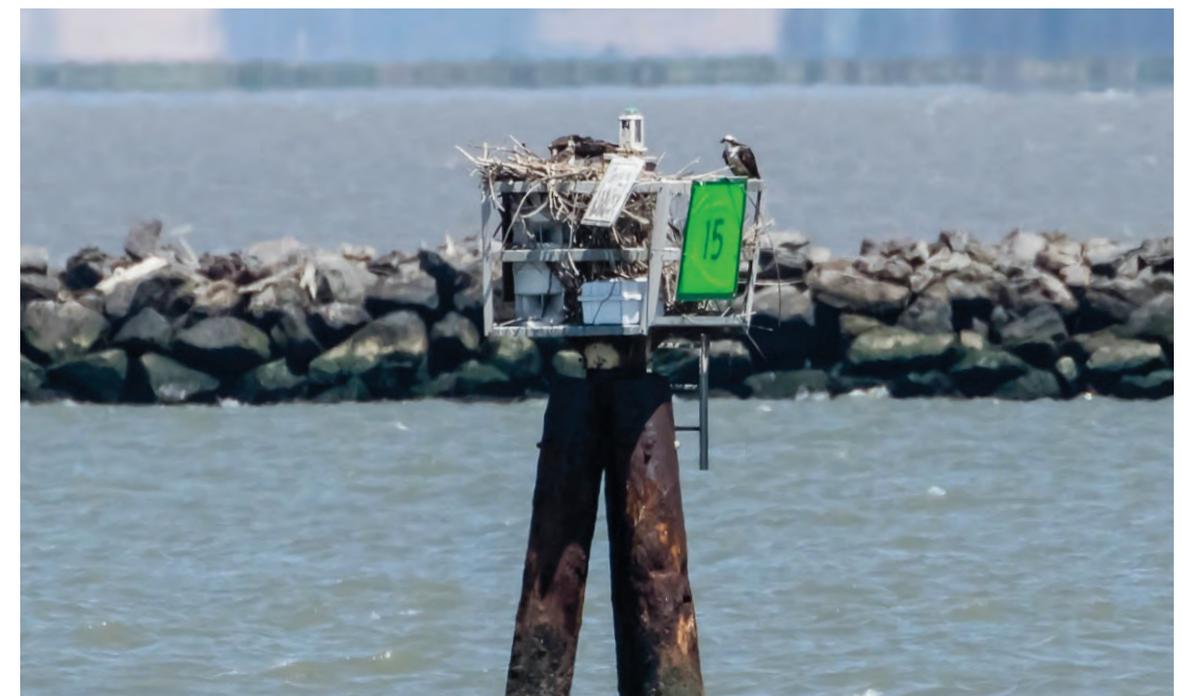
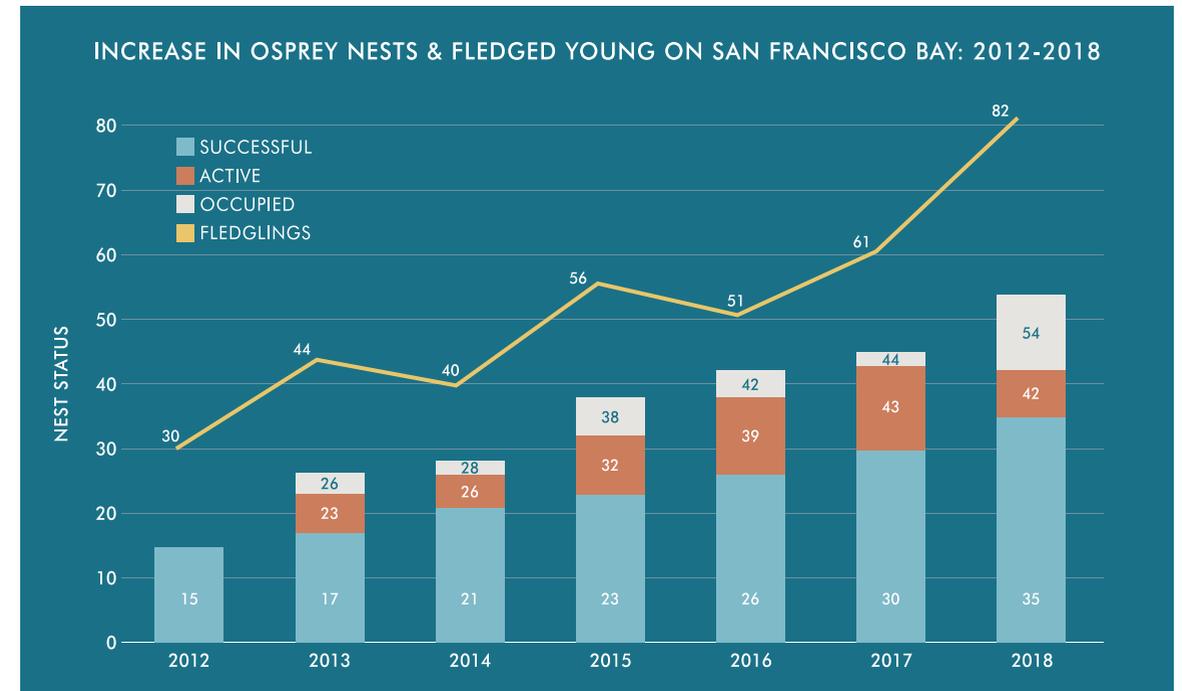
pairs, who can be expected to be successful in subsequent years.

I also predict that, as more Ospreys recognize channel markers as good nest substrates, their utilization could further facilitate expansion. In 2018, there were three successful nests on such markers, and a couple more are in use this year. Thousands of nests can be found on such markers in Chesapeake Bay, in Oregon, etc., though it may take some advocacy with the US Coast Guard (USCG) and harbor masters to allow this. It

The steady rise in nesting Osprey pairs continued in 2018. The number of successful nests increased to thirty-five from thirty in 2017. This amounts to a doubling of nests in only five years, from 2013 to 2018. There are currently high densities of nesting Ospreys both along the Mare Island Strait and along the Richmond shoreline, with fifteen active nests in each area. There is also a nexus currently developing in the Oakland-Alameda area. Expansion of Osprey nesting usually develops in clusters, so I expect further increases in the areas only recently populated, such as San Francisco, the Marin shoreline, and the South Bay. A number of new pairs were observed to make late nesting attempts in 2018—typical of inexperienced

used to be standard operating procedure for the USCG to remove Osprey nests along the Atlantic coast, but now they often leave them or make modifications to mitigate problems with navigation. Nest material was removed from two 2017 nests, but the Ospreys unsurprisingly rebuilt this season. It is encouraging that, in one case, USCG delayed servicing one of those markers to avoid nest disturbance. I hope we can work with USCG to coordinate the timing of navigation aid maintenance with Osprey nesting phenology specific to our local population, which is different from the Atlantic Osprey population, where there is the most experience. ●

**ANTHONY BRAKE** worked as a nest-finder for GGRO's Berkeley Cooper's Hawk study in the 1990s. In the early 2000's, he turned his attention to Ospreys. Tony saw more and more Ospreys near his home in Point Richmond, so in 2013, he gathered up a few key GGRO volunteers, and started tracing the Bay's edge, by foot, car, and boat looking for Osprey nests.



Osprey nest on channel marker in San Pablo Bay; this marker holds a foghorn operating between October and April. The US Coast Guard refrained from deactivating the foghorn in April 2018 as this Osprey pair was already actively nesting. As a result, the pair proceeded to successfully breed with the horn sounding every 10 seconds! Photo: Anthony Brake



Osprey nest on a power pole at the Chevron refinery facility in Richmond; Note in the lower image that the pole has been modified to accommodate this nest by adding a lower set of crossbars and relocating the wires. This nest has been in use since 2015. Photos: Anthony Brake



Osprey nest on power pole in Rodeo; This nest was seen to have collapsed on June 11, 2013 (upper photo). Pacific Gas & Electric workers added an artificial nest structure and modified the wiring later that year. In each subsequent year, it has hosted an active Osprey nest. Photos: Anthony Brake



# INTER-INTERN INTERVIEW: ZEKA GLUCS '09

*Kirsti Carr*

When Allen approached me to ask if I was interested in interviewing Dr. Zeka Glucs, former GGRO intern and recently-appointed director of the Santa Cruz Predatory Bird Research Group (SCPBRG), I immediately agreed. Although I had only briefly met Zeka, I knew we had an avian connection; she banded the UC Berkeley Campanile Peregrine Falcon nestlings in spring 2018, and during the second week of the banding season I was in the blind when we serendipitously recaptured one of them, a female whose color-band code was “11 AM.” Feeling bonded by knowing we had both handled the same bird at such different developmental stages in its first year of life, I went into the interview with high hopes, and they were exceeded. Our conversation was thought-provoking and inspiring. For all she has accomplished, Zeka also has a firm commitment to helping others and



2009 Intern Zeka Glucs poses with her first banded hawk at the GGRO. Photo: Zeka Glucs

increasing accessibility for aspiring biologists. She even started off the interview asking me what my hopes and dreams are, so she could better align our conversation to my interests.

One of my favorite parts of my conversation with Zeka was hearing about her visions for the SCPBRG. She talked about increasing undergraduate involvement, developing a more interactive website, piloting a research project

on the effect of human development on owls, and even launching a raptor-themed podcast. For those wanting to learn more about the group, the website is: [pbrg.pbsci.ucsc.edu](http://pbrg.pbsci.ucsc.edu).

## WHAT WAS YOUR PATH TO GRADUATE SCHOOL LIKE?

I always knew I wanted to go to graduate school because I loved being an undergrad and I love learning, so after graduating it was just a



**KIRSTI CARR** joined GGRO as a 2018 Intern after graduating from the University of Vermont with a degree in Wildlife Biology. Before heading to the West Coast, Kirsti had the opportunity to work with a variety of wildlife including Spiny Softshell Turtles, Common Loons, Bicknell's Thrush, and other high-elevation passerines. In addition to field biology, Kirsti has a passion for education and enjoys communicating the purpose of our work and the importance of wildlife conservation.

matter of getting the experience I needed to be competitive as a student. I was pretty raptor-focused by the time I finished as an intern at GGRO and because I worked in lead toxicology as an undergraduate, I was really set on working with California Condors. I started volunteering for Pinnacles National Monument while I was working other jobs and then finally got an internship with Ventana Wildlife Society. That internship was how I started talking to the researchers at UC Santa Cruz, including my advisor Dr. Myra Finkelstein. I first met Myra delivering samples from Ventana Wildlife Society to her lab at UCSC. I would always sign up for this “chore” since I would often be coming up to Santa Cruz on the weekends to visit my family and my boyfriend (now husband). So, Myra knew me when I formally applied to her lab. I was Myra's first graduate student. I didn't want to work with anyone else. It had become very clear that I wanted to study lead poisoning in condors, and she was the top toxicologist studying the topic. Because of her soft-money

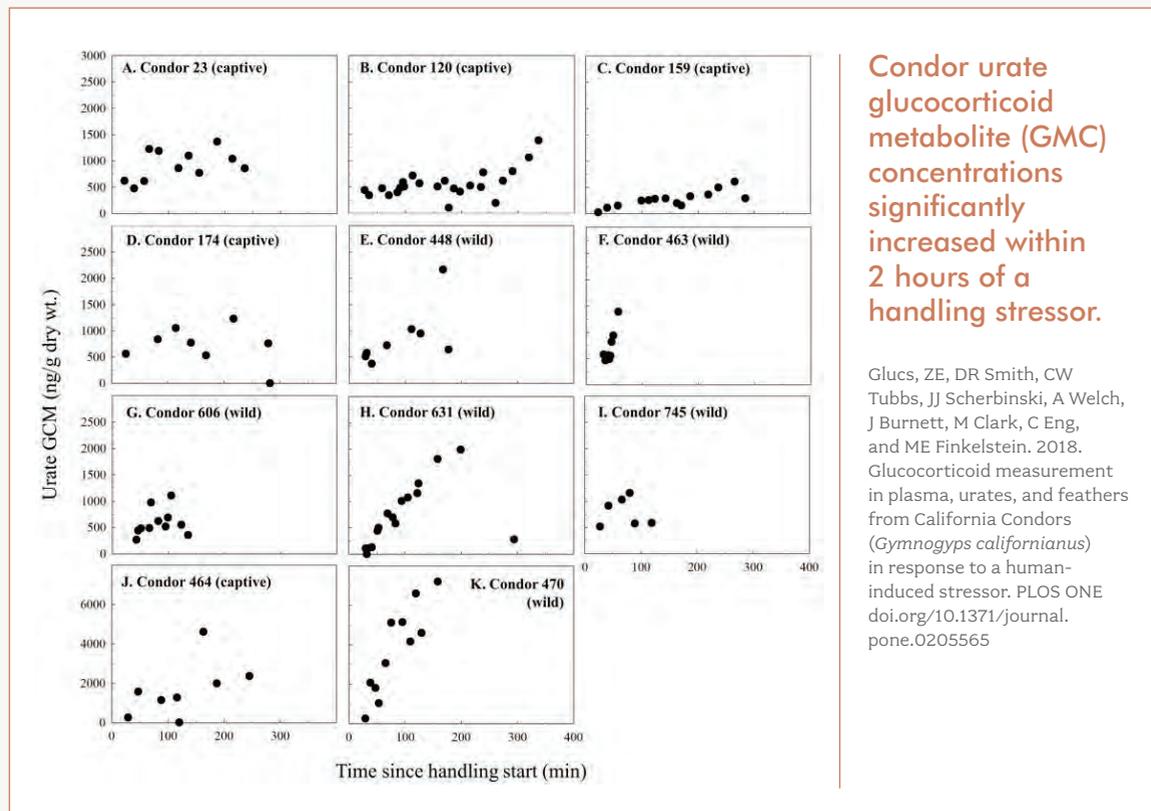
position at UCSC, she could only take me on as a student if I could acquire my own funding. I applied to the NSF Graduate Fellowship Program and was awarded a three-year scholarship and got another year of funding from the UC Regents. I was co-advised by Dr. Don Smith, a heavy-metal toxicology professor, who gave me a spot in his lab. Having co-advisors ended up being a great fit for me because I appreciated having multiple perspectives on my work. Plus, they are both excellent writers, so I always had an awesome editing team on my manuscripts!

## DID YOU GO IN KNOWING WHAT YOUR DISSERTATION RESEARCH WOULD LOOK LIKE?

I had the blessing and curse of being able to design my own project for my main thesis chapters. Originally, I thought I would be doing GIS work looking at spatial behavior in relation to lead exposure over time. The GIS technology wasn't there yet, however, so I had to adapt.



Zeka Glucs examines lead isotopes in California Condor feathers as part of her doctoral dissertation at UC Santa Cruz. Photo: Zeka Glucs



I ended up studying the stress response in California Condors, which was an exciting new frontier, but strayed beyond the expertise of my lab and the university. I experienced a long period—years—of literal trial and error trying to figure out how to accurately measure stress hormones in samples from this species. I was ultimately saved by a wildlife endocrinologist at the San Diego Zoo Institute for Conservation, Dr. Chris Tubbs, who showed me the ropes and got my project into gear. He had contacted my advisor to collaborate on a study of xenoestrogens in condors and came to give a talk at UCSC. I met with him, and he generously offered to host me in his lab. After that, it was a relatively quick race to the finish. I also received crucial help from Dr. Victoria Bakker from Montana State University who coached me through some new statistics I hadn't worked with before. It took a village.

### WHAT FINDINGS FROM YOUR DISSERTATION DID YOU FIND PARTICULARLY INTERESTING?

The first project I worked on was what we refer to as our "Condor CSI" paper, where we investigated three condor shooting events. Our lab specializes in using lead isotope ratios to track sources and fates of lead in the environment and in organisms. Isotope ratios are similar to fingerprints but not quite as unique. So first we verified that the ammunition found in condor tissues were from very similar sources, and that the shooting events likely occurred at a similar time point. We determined the latter by looking at lead isotopes incorporated into condor feathers over time from embedded lead shot in muscle tissues and ingested lead ammunition. We also established that ingested

lead-based ammunition induced significantly higher blood lead levels than ammunition embedded in tissues. Not a huge surprise, but a great opportunity to determine this in-situ! Quick note: none of the condors in our study were killed by the shooting event, however one died of lead toxicosis soon after from lead ingestion.

In the fourth chapter of my dissertation, I investigated variables that influence condor stress physiology. While I didn't find any significant effects of current blood lead levels on condor stress responses, I did find that certain "high-risk" behaviors for lifetime contaminant exposure were associated with elevated hormonal stress response to handling. These behaviors were the amount of time a condor spends at risk for lead poisoning by foraging outside the management area and the annual frequency of a condor feeding on marine mammals, which often contain high levels of hormone-disrupting chemicals because of ocean pollution.

### IS THERE ANYTHING YOU WOULD DO DIFFERENTLY?

Sometimes I wonder if graduate school is necessary to achieve your dreams. So many folks who I really admire and who are doing great work never went to grad school. I am curious about staying in species management or monitoring and learning on the job; but we always wonder about the road we didn't travel. Otherwise, I can't think of anything. I'm a strong believer in things unfolding for you as you go and waiting for a door of opportunity to open and going through it. I feel grateful that those doors opened at the times when I was ready for them and I was able to take advantage of them. There are probably other cool paths I could have taken and ended up in different places, but I am happy with the one I've ended up on.

### CAN YOU TALK A BIT ABOUT YOUR EXPERIENCE AS A GGRO INTERN?

I consider the GGRO internship one of the best jobs I have ever had. It challenged me and I felt—and still do feel—supported in my growth as a biologist by the staff and the entire community. Throughout each stage of my career (student, recent grad, aspiring grad student, actual grad student, early career raptor researcher) Allen, Buzz, Chris and Teresa were there providing crucial guidance or help when needed. The Marin Headlands and the whole GGRO volunteer family have really been a place of home for me whenever I've been able to return as a volunteer. I've gotten my best life advice and technical training in those blinds and on Hawk Hill!

The year after my GGRO internship I stayed on as a volunteer bander, and once I started grad school, I briefly joined a hawkwatch team. I ended up taking five years off, and now I am in my fourth year as a bander.

### HOW HAS IT BEEN BECOMING THE NEW DIRECTOR OF THE PREDATORY BIRD RESEARCH GROUP?

Taking on the directorship of the Predatory Bird Research Group has been really exciting. It's given me a sense of awe and trust in the process of following my passion and whatever opportunities came my way. My goal is to bring the group's mission into balance between research, and a strong education and mentorship program. One of the projects I've started this year is an undergraduate internship for students in the Monterey Bay Area to gain skills in raptor ID and field techniques. By providing a local raptor internship I've been able to make the opportunity for mentorship more accessible to all interested students, regardless of access to personal vehicles, and without having to take as much time off from their full class schedules. We've increased the number of student interns and volunteers

to about eight this quarter and I am so proud of their improvement over the last ten weeks!

When it comes to research, I am excited to continue the annual monitoring of breeding Peregrine Falcons in the greater San Francisco area. With the help of a network of skilled volunteers, SCPBRG has been recording the nest site choice, productivity, and movements of this Peregrine population for multiple decades. It was this foundational dataset that moved me to do whatever I could to make sure this dataset was maintained and continued. My experience at GGRO and other long-term monitoring programs has ingrained in me the importance of these kinds of data to understanding long-term trends and identifying emergent threats to ecosystems. During my tenure as director, we will finally analyze these data that have been sitting patiently on hard drives and in field notes, and hopefully shed light on new information on Peregrine Falcon biology!

### WHAT EXCITES YOU ABOUT THE RAPTOR BIOLOGY FIELD TODAY?

When I was coming up in raptor biology (though I guess I still am), it was a really interesting landscape where the vast majority of my co-interns and students were female, and aside from an odd field crew leader or two, all the directors or program managers were men. It was kind of strange and made me wonder what was happening to female biologists. I think in some ways I was watching a shift occur, and we are now achieving more gender parity at higher levels; it's happening at GGRO, it's happening in the condor program, and it's exciting to watch. I hope that it is encouraging more women to stay in the field and to see that they have opportunities at those levels, and that they can be leaders in this field where nearly all the black and white photos of historically famous raptor biologists are men. I feel positive this trend will continue and would like to see more people of

color supported in this field as well. There is so much genius that we are missing out on!

In grad school, it was a huge plus to have a female advisor and a department with good gender balance. There were a lot of women in leadership roles, so as a student I felt like I belonged there just as much as the men. There is something to be said about having a mentor or leader that has had similar experiences to you in your life, who understands your specific challenges, your life planning and your career goals. Considering this, it is really rewarding to get to pay forward the strong female mentorship I received to my undergraduate interns at the Predatory Bird Research Group.

### WHY CONDORS?

In my college years I was very much a bleeding-heart environmentalist and was really grabbed by stories of species recovery, especially species that declined due to human impact, like the Peregrine Falcon. But the condor story felt personal to me; it felt like my generation's challenge. I read my first paper about California Condor lead poisoning in Allen Fish's Raptor Biology class at UC Davis and was fresh out of interning for a lead toxicology lab at UCSC in my summers. We studied lead in seawater and lichen and other environmental samples, but we were doing the same isotope work, on the same lab equipment, that was in the paper that Allen had the class read. After reading it I was like "Oh my God, this is a sign! This is what I am supposed to do!" I found out that lead ammunition is the reason California Condors are not recovering. I thought of it as the sole reason, and if we just did the research and made the change, they would recover, like the falcons with DDT.

It turns out it is not that simple. But I knew I wanted to be part of the solution, and I want to observe their comeback, which I still think will happen, so I knew now is the time.

I was set on condors and raptor biology in general after taking Allen's class and became obsessed with getting the GGRO internship. It seemed like the perfect stepping stone for where I wanted to be. I was so nervous for the interview, because I thought they'd think I was a freak for wanting it so bad! After having my GGRO experience, I wanted to apply for condor jobs, and it ultimately worked out with a few twists and turns along the way.

I did feel some spiritual and emotional connections with condors as well. My mother, who actually passed away while I was a GGRO intern, had heard I was getting into birds, and took me to see condors. We didn't see any condors, but she got me this picture of a California Condor soaring near Nepenthe in Big Sur and I had it on my wall all through college and while I was at GGRO. I felt like she had this instinct that I should work with them.

With condors, data collection is a very different kind of process than other raptors. You are watching a small tribe of birds, just a few family groups. You know who everyone's parents were, and you know their individual personalities. There were 60 birds in the flock when I was an intern and not too many more when I was a graduate student, and there are about 100 now. Because of the small size of the population, you get to know each bird individually and, in addition, get to witness a fascinating social hierarchy. It's a more intimate story than watching raptors fly by on their migration route, and it is just as profound. This part of working with condors has really resonated with me.

### PEOPLE WHO HELPED ALONG THE WAY?

I have been blessed with a string of hero mentors in my life: My mom who followed her passion and became a surgeon in a time when gender quotas were still in place in medical schools; A thespian high school biology teacher that ignited my own passion in science; A playfully insulting, brilliant toxicology professor that somehow coaxed me into the field through tantalizing field work trades (who can say no to a research cruise in the Gulf of Alaska, I ask you?!); An Ecuadorian entomologist who modeled for me and my classmates a powerful feminine embodiment of a field biologist as she tromped through Costa Rican cloud forests with her handmade leaf umbrellas and a growing pregnant belly; A gifted storyteller and raptor researcher who got me hooked on birds of prey and gave me my first bird job at GGRO; And an activist scientist that has literally put her life on the line to protect threatened species. And there were even more folks in between because that's just how it is: we can't achieve anything alone, or at least it is way less fun to go that route. Now I do my utmost to help form links in the career chain for today's up-and-coming environmental scientists, because I know how important these personal connections and hands up were for me in my experience. ●



2018 Intern Kirsti Carr prepares to release a hatch year Peregrine Falcon after banding. Photo: Teresa Ely

# ELKHORN SLOUGH AND THE SAN MATEO COAST

*Olivia Wang*

After a hectic 2018 migration season, GGRO interns were met with equally frenzied conditions in the office. We had many tasks to complete—proofing hawkwatch and banding data, organizing field equipment, and planning the annual GGRO banquet. On top of that, rainy weather meant we couldn't spend any free time outside, and we all began to feel a little too cramped and cranky for comfort. So, when longtime GGRO volunteers Steve Rock and Nancy Brink offered to take us kayaking in Elkhorn Slough, a tidal estuary just north of Monterey, we jumped at the opportunity.



Northern Harrier. Photo: David Jesus

Nancy and Steve promised views of dozens of bird species in addition to Sea Otters and seals—an offer we could not refuse. We decided to make it a weekend trip—spending one day at Elkhorn Slough and one day making our way back north along Route 1 while stopping at various parks and wildlife areas along the way. Laura's (Kwas's) aunts generously offered to let us stay at their home in Santa Cruz for the weekend, so on Friday morning we said goodbye to the Marin Headlands and set off towards the south.

Our raptor sightings began before we even left—a sleepy Great Horned Owl perched on a building in Fort Cronkhite bade us goodbye as we packed our car. Driving through San Francisco, we spotted Red-tailed and Red-shouldered Hawks perched on streetlights and telephone poles—a pleasant reminder of the ability of these birds to adapt and integrate into urban environments. As the buildings of the city morphed into rolling hills and farmland, we saw more Redtails and Turkey Vultures dotting the skies. Soon we arrived in Santa Cruz and spent a relaxing evening gazing at hummingbirds on the balcony of Kwas's aunts' home and cooking tasty homemade pizzas.

We woke up Saturday morning to warm and sunny skies, which boded well for our kayaking adventure. Our plan was to make an eight-mile loop through the slough, starting closer to the mouth of the channel near the ocean and going inland towards tidal marshes and agricultural pastures. After meeting with Steve and Nancy,



The 2018 Interns hit the water with GGRO volunteers Steve Rock and Nancy Brink at Elkhorn Slough. Photo: Nancy Brink

we geared up in a parking lot next to the docks. Within minutes of arriving, we spotted a Northern Harrier floating over the hills and a raft of Sea Otters drifting lazily in the water just a couple yards away. Soon, we were off the shores and on the water, eager to see more. Gulls, pelicans, and cormorants flew low over our heads as we made our way up the slough. Harbor Seals and Sea Otters popped up around us, checking out our bright kayaks briefly before sliding back into the water. Waterbirds of all sorts, such as Common and Red-throated Loons, Pied-billed, Clark's and Western Grebes, Northern Pintails, and Bufflehead all bobbed in the waves. In the distance, Turkey Vultures and Northern Harriers (including a stunning adult male) soared over the pastures.

We ended up at a small beach where we took some time to stretch our tired arms and eat a quick lunch. As we munched on peanut butter and jelly sandwiches, we noticed rain in the distance. Eager to avoid the storm, we hopped back in our kayaks and continued our adventure.

As we resumed our journey, we spied more Forster's and Least Terns flying overhead and dropping into the slough for fish. Nancy and Steve suggested we take a quieter and smaller side



White-tailed Kite. Photo: Mary Malec

channel on the way back, so we veered right into a shallow waterway lined with grasses. Not long after entering the side slough, we heard a Belted Kingfisher's distinctive rattling before it streaked across the water ahead of us. As we worked our way up the channel, we flushed Willets and Long-

billed Curlews from the vegetation just a few feet ahead of our kayaks. We also had a close-up encounter with a young Red-tailed Hawk on an old post, watching us from its perch as we paddled by. As we left the side channel, we were pleasantly surprised to see a beautiful adult Red-shouldered Hawk wing its way across the slough to perch in a tree. Perhaps the greatest bird sighting of the return trip was a trio of Rock Pigeons clinging to the support beams of a waterfront building. Soon after, we arrived back at the docks, hauled our kayaks out of the water, and changed into dry clothes for a quick dinner in Watsonville and warm showers to end our Saturday in Santa Cruz.



The 2018 GGRO Interns visit Wilder Ranch State Park during their Peregrinations trip. Photo: Laura Kwasnoski

At the suggestion of some GGRO folks, we made a rough plan of locations along Route 1 to visit on Sunday. Our first location was Wilder Ranch State Park, a former dairy ranch turned wildlife area that offered views of dramatic seaside cliffs and lush green pastures. While scanning the fields, Brian spotted our first White-tailed Kites of the trip. As we excitedly peered at the pale white spots perched in some low brush, a couple of Turkey Vultures teetered in the ocean breeze and drifted over our heads. Further along the trail, we watched an American Kestrel hover and then drop down into the grass, unfortunately rising empty-taloned. Double-crested and Pelagic Cormorants perched precariously on the

wave-splashed cliffs, and Western Sandpipers, Sanderlings, and Black Turnstones foraged on the rocky shores. We considered walking further north along the beautiful coastline but felt it better to return to the car and make our way to the next raptor-watching site.

After driving a few more miles north and stopping for a quick lunch of some fresh, locally made artichoke bread, we headed for Pescadero Marsh Natural Preserve. Not a second after parking, we heard high-pitched calling coming from the beach below the parking lot. Erin immediately knew what she was looking for, and sure enough, a small group of Black Oystercatchers were running around on the rocks below us—a lifer bird for many of us, and a great start to our walk through the marsh. Leaving the beach, we quickly noticed that the preserve encompasses a variety of habitats, including the freshwater and brackish marshes where we spent most of our time. Within minutes of starting along the main trail into the marsh, Kirsti called out, “Peregrines!” and we all turned to see two adult Peregrine Falcons chasing a group of shorebirds around a small pond. Mesmerized by their agile movements, we watched as the falcons made some half-hearted swoops towards the shorebird flock before flying overhead and into a distant grove of trees. Happy dancing ensued.

We continued down the trail and were checking out some Common Goldeneyes when another group of visitors heading out of the preserve asked us if we’d seen the eagle: “An eagle?! What kind?” They pointed off towards some eucalyptus. “It’s definitely a Bald Eagle.” And sure enough, there was an adult Bald Eagle perched in a eucalyptus across the marsh, tearing away at some freshly-caught prey. More happy dancing followed, and we spent some time admiring the bird as it ate its dinner. Our time at Pescadero Marsh had exceeded expectations for raptor sightings, so we decided to head to the final stop along our journey back north.

That final stop was Wavecrest Open Space Preserve, a spot renowned for its overwintering raptors. We arrived late in the afternoon, so with limited daylight remaining, we ventured out into open fields filled with Coyote Brush, groves of Monterey Cypress, and oceanside cliffs. We noticed a couple of Red-shouldered Hawks perched on the fencing around the baseball field. The brush around the field was also dotted with White-tailed Kites, closer and in greater numbers than we had seen all weekend. Continuing on, we came across a dense grove of Monterey Cypress. Some broken trees are just meant to be climbed, and some also hold other surprises. Working her way up the tree, Kirsti peered inside to find something incredible. Out of the old cypress came most of a raptor skull, with a few white feathers still attached to the beak—the remains of a Barn Owl! The skull was packed away for safekeeping, to later join the GGRO’s specimen freezer.

The sun was beginning to set, so the five of us began our walk back to the car, reflecting fondly on the weekend. The day had been long, but filled with many different species of birds and

lots of great raptors! With a full week of banquet prepping and data-proofing ahead, we were glad to have had such a fun excuse to spend some time outside of the Marin Headlands.

All told, our weekend featured nine species of raptor (ten if you count the Barn Owl skull) and over seventy-two species of birds—raptor and non-raptor alike. We had similarly good fortunes with the weather all weekend long; plenty of sun and balmy temperatures prevailed for most of our journey. We were also lucky to have lots of help and good company from staff, volunteers, and even Kwas’s family! Special thanks to Nancy Brink and Steve Rock for their hospitality at the Elkhorn Slough and for their recommendations along Route One. GGRO Director Allen Fish and hawkwatch dayleader Mary Kenney also gave us good suggestions for other sights to see on our drive home. This trip was the perfect way to end a season of pursuing our passion for raptors, which we hope is only the beginning of a lifetime devoted to conserving the birds we love. ●



The 2018 GGRO intern cohort poses with a juvenile Red-tailed Hawk before release. From left to right: Laura Kwasnoski, Olivia Wang, Erin Barry, Kirsti Carr, and Brian Tsuru. Photo: Teresa Ely

# HOW TO READ A REDTAIL WING

**Buzz Hull**

*Photo by Pamela Rose Hawken*

This is an interesting photo since photographer Pamela Rose Hawken was able to capture details of molt, revealing the Red-tailed Hawk's age as being in its second calendar year of life. This hawk hatched in 2015, molted from juvenile plumage to mostly adult plumage in 2016, and started its first full calendar year with a brick-red tail in 2017.

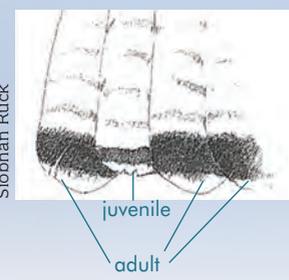
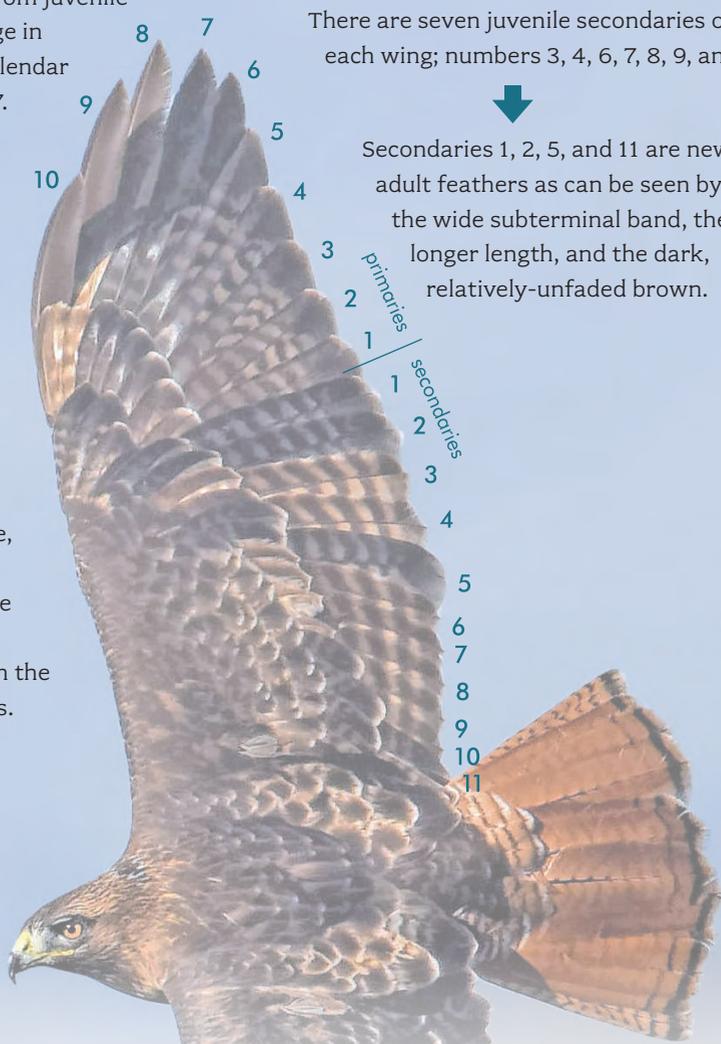
“Retained juvenile” feathers describes feathers that grew in when the hawk was a nestling, but now—more than a year later—have not molted out yet.

The trick here is to train your eye to see the older feathers from the newer feathers. Older feathers, both adult and juvenile, have faded brown color, but the retained juvenile secondaries are slightly shorter in length with a narrower subterminal band than the adjacent, new, adult secondaries.

Primaries 1 through 7 are new and dark. In contrast, numbers 8, 9, and 10 are faded, retained juvenile feathers—a year older than 1 through 7.

There are seven juvenile secondaries on each wing; numbers 3, 4, 6, 7, 8, 9, and 10.

Secondaries 1, 2, 5, and 11 are new adult feathers as can be seen by the wide subterminal band, the longer length, and the dark, relatively-unfaded brown.



Siobhan Ruck

**BUZZ HULL** joined GGRO as a volunteer bander in 1984 and was soon hired onto the staff as the GGRO's first Research Director. Buzz just completed his 35th year as a GGRO bander and continues to serve as Research Director Emeritus, providing critical research support and training for GGRO staff and volunteers.



“Photographing hawk flybys from elevated locations such as Bodega Head allows me to capture eye-level shots—the perfect vantage point for interesting photos that would not be possible to get from below. I was really happy when this hawk suddenly banked and gave me such a great view of its wingspan and gorgeous feathers!” — Pamela Rose Hawken

The success of the Golden Gate Raptor Observatory rests on the shoulders of many people: the staff of the Golden Gate National Parks Conservancy and the National Park Service; the donors who provide a critical budgetary boost for our research and operation; and an exceptional, creative and dedicated volunteer staff. GGRO volunteers give a minimum of 70 hours a year to the National Park Service, often closer to 100 hours. Double that is not unusual. But whether you give sweat, donations, or moral support, we deeply appreciate your sponsorship, your stepping up for raptor conservation. Great thanks to all of you, our volunteers, and donors, and colleagues.

## GOLDEN GATE RAPTOR OBSERVATORY GRATEFULLY ACKNOWLEDGES:

### 2018 VOLUNTEERS

Emily Abernathy  
Jeff Acuff  
Cat Acuff  
Sylvia Algire  
Jon Altemus \*  
Jan Ambrosini  
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Marcia Budarf  
Courtney Buechert  
Sage Bylin  
Ryan Byrnes  
Vanessa Cabrera  
Misty Cain  
Diane Caliva  
Christina Cambie  
Jo Campo  
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Sally Cedarblade  
Daniel Chelsky  
Rich Cimino  
Conner Cimmiyotti

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Jack Gedney  
Alison Gee  
Brianna Gerard  
Theresa Gibbens  
Angelo Gilbert  
Jan Gostlin  
Maureen Grabowski  
Kathleen Grady  
Alane Gray  
Susan Greef  
Keith Gress \*  
Chris Grogan  
Joshua Haiman  
Mayu Hanabusa  
Kris Handwerk Wiskes  
Julie Hanft  
Michael Harkins

A GGRO docent introduces Hawk Hill visitors to a newly-banded Sharp-shinned Hawk during a weekend Hawk Talk program. The shorter tail feathers indicate that this individual is still in mid-tail molt—unusual for the fall migration season. Photo: Dennis Davison

The GGRO would not be able to function without the support of the program's unpaid middle management team—our dedicated dayleaders. Thank you to all of the 2018 dayleaders for guiding their teams through another excellent migration season. Dayleaders are marked with an asterisk (\*).

JJ Harris  
Erica Harris  
Melissa Hero  
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Cheri Hinkley  
Lynn Hoerle  
Nora Holmes  
Tom Holmes  
Calvin Hom  
Sam Hontalas  
Kimberly Horrell  
Heather Hoyles  
Serena Hubert  
Buzz Hull \*  
Josh Hull \*  
Bill James  
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Hawkwatcher George Eade homes in on a bird in the distance. Photo: Nelia White

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Bander Michele Unger holds a juvenile Red-tailed Hawk. Photo: Michelle Unger

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GGRO volunteers explore hawkwatch ergonomics in the north quadrant. Photo: Patricia Bacchetti

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Herb Brandt scans the east quadrant from Hawk Hill.

Photo: Jessica Weinberg





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# WHEN MICE FLY

CONTINUED ON BACK COVER

*Pamela Rose Hawken*

NOVEMBER 15, 2018

After an early morning drive to a coastal area in San Mateo County, and a couple hours spent walking through fields photographing the local raptors, I was rewarded by this encounter.

I had seen the female Northern Harrier in the area and had taken several photos of her as she dove for voles (sometimes called meadow mice) in the field. Later, the White-tailed Kite caught my attention from afar because it looked like it had captured prey and was flying toward me. My camera was aimed at the kite while I waited for it to get close enough for a decent photo, when suddenly the harrier attacked the kite, attempting to snatch the vole! I didn't see it coming from behind me, as I was completely focused on the kite while looking through the viewfinder.

When I first started photographing birds, I might have been so stunned by the unexpected event that I would have stopped shooting momentarily and missed the shot, but fortunately, years of experience have taught me to keep shooting no matter what!

As I reviewed my photos, I saw that the vole captured by the kite was in the frame of several shots as it fell to the ground! This was such a fortunate opportunity for me and my camera—captures like this don't happen often—when they do you treasure them!



Above and back cover: White-tailed Kite and Northern Harrier as seen before attack. Photos: Pamela Rose Hawken.



**PAMELA ROSE HAWKEN**, a Bay Area native and retired entrepreneur, is an avid wildlife photographer—particularly raptors and other birds. Her work has been published in *The Breeding Birds of Solano County Atlas*, *Pacific Raptor*, and *Bay Nature*; and used by Napa Valley Vine Trails, Golden Gate Audubon Society, Raptors are the Solution, Golden Gate Raptor Observatory, and other non-profit organizations for educational and fundraising purposes. View more of Pamela's photos at [PamelaRoseHawkenPhotography.com](http://PamelaRoseHawkenPhotography.com).

