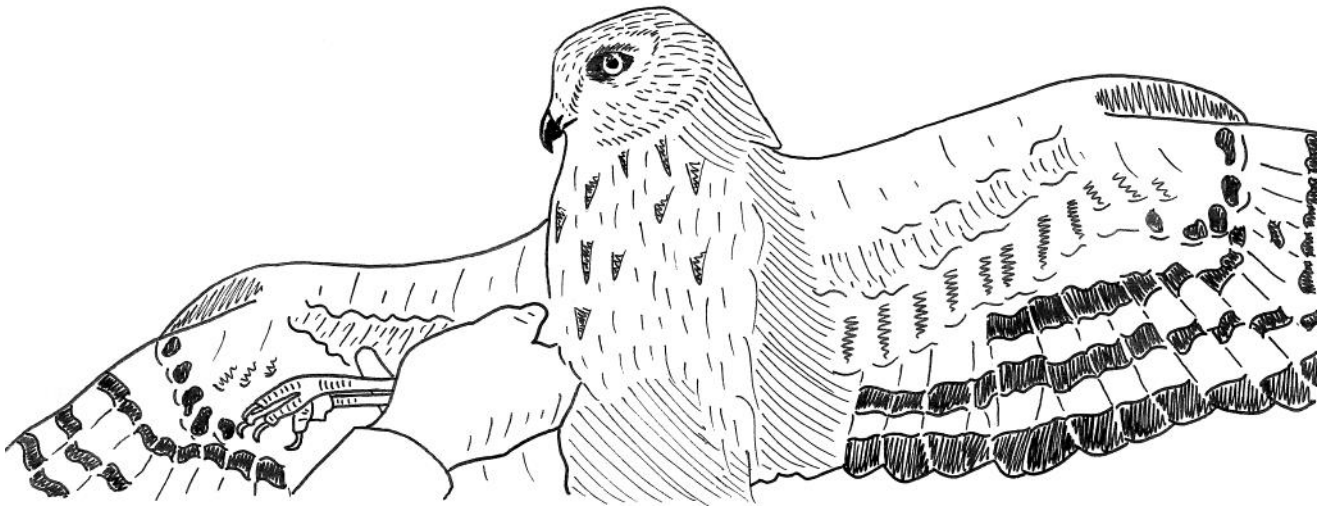


Golden Gate Raptor Observatory
Season Summary 2016



HAWKWATCH • BANDING • VOLUNTEERS • RADIOTELEMETRY
OUTREACH • RESEARCH • DONORS



*Northern Harriers are down by half from their historic average, across both count and banding data.
(Illustration by Violet Kimzey)*

GOLDEN GATE RAPTOR OBSERVATORY

The Golden Gate Raptor Observatory's mission is to inspire the preservation of birds of prey. Our business is to monitor and study the bird of prey migration along the central California coast, particularly at the Marin Headlands, part of the Golden Gate National Recreation Area. We are dedicated to the conservation of raptors both through careful data collection *and* through involving the public in every aspect of our research. The GGRO is a program of the Golden Gate National Parks Conservancy and the National Park Service, and is made up of 290 community volunteers and a small staff.

GGRO Season Summary 2016 written by Allen Fish, Teresa Ely, Step Wilson, and Laura Young.

Compiled and edited by Laura Young and published by

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Cover Illustration: Bald Eagle (*Pen and ink by Siobhan Ruck*)

G G R O S T A F F

ALLEN FISH, GGRO DIRECTOR • LAURA YOUNG, OPERATIONS MANAGER
TERESA ELY, BANDING MANAGER • STEP WILSON, HAWKWATCH MANAGER
BUZZ HULL, RESEARCH DIRECTOR EMERITUS
2016 INTERNS: ROBERT HEIM, VIOLET KIMZEY,
ISABEL LAWRENCE, CHASE O'NEIL, EMILY PIERCE

I N T R O D U C T I O N

*We dedicate the **GGRO Season Summary 2016** to Lynn Jesus who is retiring from her tenure as the Radiotelemetry Coordinator after some 15 years at the helm. Beyond being one of the hardest working volunteers in our history, Lynn is a steadfast and exuberant leader; a passionate and methodical raptor biologist; and a wonderful writer, teacher, and great friend. We owe Lynn a great debt of thanks for teaching us how unpredictable and extraordinary Pacific Coast raptor flights can be.*

We had a magnificent year of accelerated evolution at the GGRO in 2016 as we were able to bring two new staff aboard, research managers Teresa Ely (banding) and Step Wilson (hawkwatch and telemetry), raising our staff size from three to four. That may not seem like a big deal at first but consider that we have 290 volunteers; this brought our staff-to-volunteer ratio from 1:96 to 1:72. This is a huge boost, allowing us to deliver a higher quality experience to more volunteers. And beyond the numbers by themselves, we also triumphed on quality. Teresa and Step each brought an immense amount of raptor field experience from the US and abroad, and each had worked for the GGRO before, so have been able to share their worldliness with a community they each already valued.

This step-up in staffing was made possible by the support and encouragement of the Golden Gate National Parks Conservancy and the National Park Service, but also as a direct result of the Gregory Hind Endowment. The Hind Endowment's sponsors, Leslie and Troy Daniels, have given us a fantastic lift, an opportunity to even further advance the impact of citizen science on raptor monitoring, and for that we are deeply grateful.

As you read through the pages ahead, please remember that the GGRO "works" first and foremost because of our awesome volunteers and volunteer leaders. Approximately a third of these citizen scientists have been with us for ten years or more. Without this kind of commitment, we could not hope to operate a long-term ecological study such as this. I would like to specifically acknowledge the volunteer banders, hawkwatchers, and telemetrists who reached their 25-year mark in 2016. For a quarter century of service to the National Park Service, a deep bow of thanks to Randy Breaux, Lew Cooper, Pat Overshiner, Ralph Pericoli, Libby Rouan, Marion Weeks, and Nick Whelan.

Finally, from all of us at GGRO, our great thanks to our Parks Conservancy and National Park Service colleagues who help us promote citizen science and wildlife monitoring in the Golden Gate National Recreation Area. Congratulations on the National Park Service centennial. We are proud to have been working alongside you for the past 34 years.

- Allen Fish



H A W K W A T C H

RAPTOR-SIGHTINGS IN THE MARIN HEADLANDS DURING AUTUMN

	2016 Season (443 Hours)		Past 10-Year Average (2004-2015)* (494 Hours)	
	Sightings	Raptors/hour	Sightings	Raptors/hour
Turkey Vulture	5,998	13.53	8,323	16.83
Osprey	67	0.15	88	0.18
White-tailed Kite	20	0.05	95	0.19
Bald Eagle	8	0.02	6	0.01
Northern Harrier	354	0.80	627	1.27
Sharp-shinned Hawk	4,138	9.34	3,893	7.87
Cooper's Hawk	1,998	4.51	2,543	5.14
Northern Goshawk	0	0	1	<0.01
Red-shouldered Hawk	265	0.60	491	0.99
Broad-winged Hawk	289	0.65	237	0.48
Swainson's Hawk	5	0.01	7	0.01
Red-tailed Hawk	5,676	12.81	9,250	18.70
Ferruginous Hawk	48	0.11	27	0.05
Rough-legged Hawk	4	0.01	6	0.01
Golden Eagle	13	0.03	20	0.04
American Kestrel	229	0.52	443	0.90
Merlin	178	0.40	186	0.38
Peregrine Falcon	199	0.45	236	0.48
Prairie Falcon	2	<0.01	7	0.01
Unidentified	862	1.94	1,226	2.48
Total	20,353	41.2	27,712	56.0

**2010 and 2013 data not included due to partial seasons*

The 2016 season was foggy and hot and observed by the best 14 dayleaders and teams anyone could ask for. I would like to personally thank everyone involved in the hawkwatch from August 15 to December 4. I was a part of 223 volunteers and five interns who counted 443 hours over 85 days and sighted 20,353 raptors from Hawk Hill. Do those numbers seem low to observant readers? They are.

D A Y L E A D E R S

JON ALTEMUS • TIM BEHR • CHRISTINE CARIÑO • LEWIS COOPER • DENNIS DAVISON
JOSHUA HAIMAN • MARY KENNEY • HORACIO MENA • KIM MEYER • BRIAN O'LAUGHLIN
BOB POWER • JAMES RAIVES • LAURY ROSENTHAL • STEP WILSON

H A W K W A T C H

We had 27 official “no count” days where we didn’t get on Hawk Hill to record sightings. This is the third highest amount of days without counting since 1992. Nineteen days this year were fogged out. Six days were lost to rain. And two days were a combination of both rain and fog. There were another five days where teams counted for about an hour before losing visibility and ending the count early. But the lack of count days doesn’t seem to be the driving factor.

We counted for a comparable number of hours in 2001 and 2012 but still logged 4,700 and 5,000 more sightings in these years, respectively.

So looking at raptor activity, which is what we’ve really been doing since 1992 (and the best way to measure our intricate raptor movements), this was the lowest year since 1995, when we averaged just



*For some, hawkwatching is a family affair.
(Illustration by Violet Kimzey)*

40.9 raptors per hour (rph). All species contributed to this low figure except Sharp-shinned, Ferruginous, and Broad-winged Hawks, which were comparatively up from their averages. Although Ferrug and Broadwing sightings were 78% and 22% higher than average, their combined numbers account for less than one percent of our total sightings. Redtails and Turkey Vultures, meanwhile, make up almost 64% of the total count. These two species were at 61% and 72% of their 10-year average. This gives me another reason to want to constantly observe common species.

The hawk sightings weren’t as numerous as previous seasons, but we’ve always got next year.

Dragonfly and butterfly sightings both increased from previous counts. Over 305 count hours in 2016, we tallied 1,097 butterfly sightings, with Monarchs and Red Admirals accounting for 59% of the total. Last season gave us just 851 sightings over 304 hours.

It was a breakout year for dragonflies, coming in at 675 sightings compared to 186 in 2015. Variegated Meadowhawks again constituted the majority, at 71% of the count. We also saw Flame Skimmers, Cardinal Meadowhawks, Blue-eyed Darners, Green Darners, Black Saddlebags, Red Saddlebags, and a solitary Spot-winged Glider.

- Step Wilson

B A N D I N G

RAPTORS BANDED IN THE MARIN HEADLANDS DURING AUTUMN

	2016 (Aug 15, 2016 - Jan 5, 2017)	Annual Average* 1993-2015**	Totals 1983-2016
Northern Harrier	3	11	314
Sharp-shinned Hawk	463	479	12330
Cooper's Hawk	503	565	15226
Northern Goshawk	0	0	6
Red-shouldered Hawk	12	17	450
Broad-winged Hawk	2	1	40
Swainson's Hawk	0	0	10
Red-tailed Hawk	229	313	9770
Ferruginous Hawk	0	0	2
Rough-legged Hawk	0	0	6
Golden Eagle	0	0	2
American Kestrel	24	56	1434
Merlin	34	31	759
Peregrine Falcon	9	4	101
Prairie Falcon	2	2	48
Eurasian Kestrel	0	0	1
Total	1,281	1,481	40,499

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

***1993-2015 are used for this comparison due to similarity of methods and effort between those years and 2016.*

The season started off with few birds and an above average number of foggy days. Even though the weather was chilly, we trapped more adult birds in the beginning of the season than in previous years. By September 15, we banded 12 adults (mostly Redtails, and a few Coops), compared to four in 2015 and six in 2014. The peak of the season never really hit that “peak” day everyone hopes for. Instead, birds flowed in waves—high banding days followed by low days and then back up. The season total came in at 1281, just slightly below the ten year average.

Late September brought diversity. The Big Day this year was September 23 with 62 raptors banded of six species. In fact, four days tied for species diversity, each reaching six. This included a Broad-winged Hawk and Peregrine Falcon in the same blind.

D A Y L E A D E R S

ANNE ARDILLO • MIKE ARMER • EDDIE BARTLEY • MARC BLUMBERG
 NANCY BRINK • RUSS DeLONG • TERESA ELY • CLAIRE GALLAGHER • BUZZ HULL
 JOSH HULL • DAVID JESUS • MAMIKO KAWAGUCHI • JOHN KEANE • CRAIG NIKITAS

B A N D I N G

October started off strong with many days trapping >20 birds, but the rain arrived mid-month and Hill 88 blind closed by late October. November brought more rain. The second Redtail peak was more of a bump with 102 Redtails banded after October 15, for a total of 229.

In spite of the low numbers, we saw some notable captures. We banded nine Peregrines this season, the second highest record for GGRO—ten were banded in 2008. (Note: We did trap a tenth Peregrine early in the season, but the bird had old injuries on its legs such that we decided to release the bird unbanded.)

We had one color-banded recapture from another banding site. An adult Peregrine was caught on October 5 wearing a black color band that was originally banded as a nestling at Moss Landing in Monterey County on May 13, 2015.

Nineteen of our own color bands were sent out on late season Redtails.

We also had two of our own bands return this season. On September 3, a second-year Redtail was caught carrying a lavender color band. It was originally banded a year earlier, on September 4, 2015. An older adult female Cooper's Hawk was trapped on November 14, 2016. It was originally banded on September 23, 2010. She was about 30 grams lighter than when she was originally banded.

This year we took on 22 new apprentices. We have three new site leaders (four if you include me) and a number of journey level banders starting their site leader training and certification. An amazing amount of time and energy went into this year's Apprentice and All Bander Trainings, as well as equipment maintenance, blind construction, and trapping. Thanks for a wonderful first season at the helm!

- Teresa Ely



*A Broad-winged Hawk in hand is a rare and special experience for banders
(Illustration by Laura Young)*

V O L U N T E E R S

Emily Abernathy	Randy Breaux	Belle Davis	Jack Gedney
Rosa Albanese	Lucy Breslow	Jim Davis	Angelo Gilbert
Sylvia Algire	Nancy Brink	Dennis Davison	Maria Girard-Smith
Jon Altemus	Jim Broadstreet	Deanna de Castro	Dan Gottsegen
Abdullah Arakozié	Johnny Brown	Carmen DeLeon	Maureen Grabowski
Anne Ardillo	Mallory Brown	Russ DeLong	Jill Grant
Jenn Armer	Courtney Buechert	Janine DeMartini	Alane Gray
Kendra Armer	Nicholas Buechert	Darby Dolan	David Gregoire
Michael Armer	Ellen Burroughs	Michael Dolan	Keith Gress
Stefanie Arthur	Ryan Byrnes	Monina Dolan	Edith Grosbellet
Patricia Bacchetti	Christina Cambie	Ben Dudek	Tess Gundogdu
Michelle Bain	Ruth Cantwell	Laura Duffy	Aaron Haiman
Lynn Bantley	Phil Capitolo	George Eade	Joshua Haiman
Ryan Bantley	Christine Cariño	Kathy Eagle	Mike Hall
Kathleen Barker	Koby Cariño	Wade Eakle	Jim Hallisey
Bill Barnaby	Caryl Carr	Richard Eliason	Mike Hammer
Eddie Bartley	Sally Cedarblade	Nancy Elliot	Mary Ellen Hannibal
Don Bartling	Linda Chambers	Catherine Elliott	Michael Harkins
Carie Battistone	Richard Cimino	Anastasia Ennis	Katie Harrington
Nicole Beadle	Jim Clausen	James Fahlbusch	JJ Harris
Tim Behr	Terry Coddington	Julia Farber	Robert Heim
Katrina Belanger-Smith	Kay Conneely	John Farnsworth	Melissa Hero
Maxine Berg	Tom Conneely	Richard Ferris	David Herrema
Ronald Berg	Meghan Cook	Erin Fisher	Katie Herrmann
Ardith Betts	Jason Cooper	Sarah Flaherty	Cheri Hinkley
Alan Bleiman	Lewis Cooper	Dan Foldes	Jennifer Ho
Marc Blumberg	Sandra Corzantes	Ross Forman	Lynn Hoerle
Robert Blumberg	Alma Counselman	Brian Fukushima	Ruth Holbrook
Jeff Boissier	Deborah Crooks	Jessa Gabriel	Nora Holmes
Robyn Boothby	Chris Cruz	Kathleen Gadway	Ryan Holmes
Carroll Botvinick	Nevin Cullen	Jen Gale	Tom Holmes
Ryan Bourbour	Susanna Czuchra	Claire Gallagher	John Holson
Herb Brandt	Candace Davenport	Juan Garcia	Calvin Hom

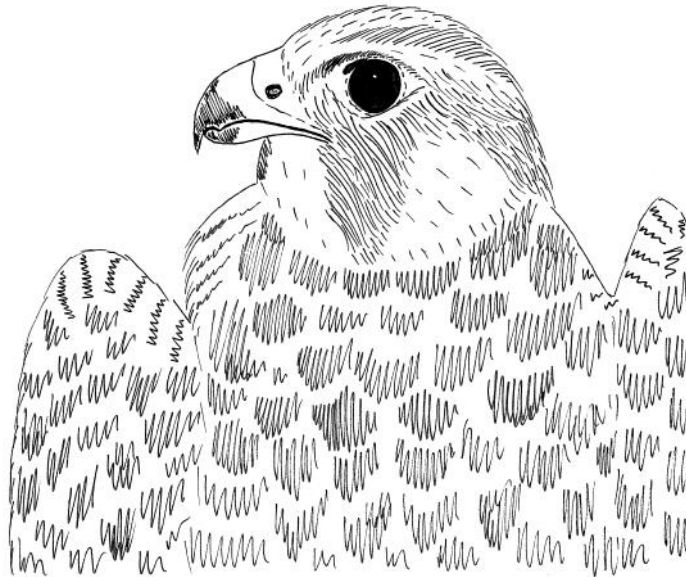
V O L U N T E E R S

Sam Hontalas
 Diane Horn
 Dick Horn
 Kimberly Horrell
 Kate Howard
 Heather Hoyles
 Buzz Hull
 Josh Hull
 Sara Hurley
 Julian Hyde
 Angie Ippolito
 David Jesus
 Lynn Jesus
 Debbie Kahn
 Kanani Kauka
 Mamiko Kawaguchi
 Beth Kean
 John Keane
 Mary Kenney
 Violet Kimzey
 Melissa Kohner
 Ann Kositsky
 Doris Kretschmer
 Shelby LaMotte
 Joan Lamphier
 Dian Langlois
 Isabel Lawrence
 Natasha Lekach
 Cheryl Lentini
 Patricia Lessard
 Allison Levin
 Ann Linder

Patrick Lindley
 Cathy Loewen
 William Ludan
 Tom Luster
 Eric Lynch
 Mary Malec
 Audrey Martin
 Robert Martin
 Megan Mayo
 JoAnn McAllister
 Cindy McCauley
 Tara McIntire
 Paul Meadow
 Horacio Mena
 Mona Mena
 Kim Meyer
 Lisa Michl
 Jennifer Miller

Rachel Miller
 Steve Miller
 Sue Morgan
 Nancy Mori
 Tani Myers
 Jennifer Nazzal
 Joey Negreann
 Elizabeth Ng
 Jeanette Nichols
 Craig Nikitas
 Maureen Noon
 John Odell
 Christine Okon
 Brian O'Laughlin
 Ana Olivar
 Rebecca Olsen
 Chase O'Neil
 Claire O'Neil

Steve O'Neill
 Kenn Osborne
 Pat Overshiner
 Dana Owens
 Ron Parker
 Phoebe Parker-Shames
 Jean Perata
 Ralph Pericoli
 Jenni Peters
 Sean Peterson
 Ryan Phillips
 Emily Pierce
 Roy Pisetsky
 Janice Podoll
 Bob Power
 Ann Prentiss
 Bill Prochnow
 James Raives
 Katherine Raspet
 Tyson Read
 Michael Reese
 Don Reinberg
 Theresa Rettinghouse
 Nick Rettinghouse
 Eileen Richey
 Beverly Riehm
 Jeff Robinson
 Steve Rock
 Paul Romanak
 Diane Rooney
 Will Rose
 Laury Rosenthal
 Libby Rouan



Volunteers trapped 11 Peregrines in 2016 (but only banded eight!). See the banding summary for details (Illustration by Violet Kimzey)

V O L U N T E E R S

Siobhan Ruck	Traci Tsukida
Jane Rudebusch	John Ungar
Dede Sabbag	Brad Valentine
Peter Sapienza	Kris Vanesky
Juta Savage	Doug Vaughan
Sarah Sawtelle	Jennifer Velasquez
Linda Schneider	Nick Villa
Kaela Schnitzler	Jack Vognsen
Bob Schoettle	Jessie Vogt
Julia Schoettle	Kristin Vorhies
Jack Schofield	Megan Walla-Murphy
Lynn Schofield	Noreen Weeden
Terrie Schweitzer	Marion Weeks
David Sexton	Kenneth Weidner
Amanda Shafer	Emily Weil
Shannon Skalos	Carol Weinstein
Kate Skelly	Jill Weinstein
Brian Smucker	Dave Wells
Virginia Snider	Barbara Westree
Curtis Snyder	Nick Whelan
Tate Snyder	Lisa Whitaker
Ed Sotello	Daphne White
Christine Steck	Nelia White
Tim Stoddard	Jeff Wilcox
Linda Sudduth	Ken Wilson
Candace Swimmer	Beth Wommack
Natalie Tan-Torres	Pat Wong
Michelle Tattersall	Claire Woolf
Craig Tewell	Jim Yampolsky
Holly Thomas	Pauline Yeckley
Laura Thomas	Laura Young
Nickolas Thurston	Sabrina Young
Laura Tracy	



*Volunteer telemetrists focused on one juvenile Cooper's Hawk in 2016, to continue a study begun in 1994.
(Illustration by Laura Young)*

R A D I O T E L E M E T R Y

RAPTORS RADIOTRACKED IN 2016

Bird Name	Species/Age/Sex	Tracking Season	Net Direction	Last Known Location	Net Distance from Headlands
Paula	Cooper's Hawk, juvenile female	Oct 17-19	Southeast	Marin Headlands	Unknown

In 2016, the radiotelemetry program revisited tracking Cooper's Hawks as a continuation of the study conducted between 1994 and 1997. During that time, 15 juvenile Coops were tracked and all but two flew north and/or east. Would these 'migrating' birds ever read a map and head south? Unfortunately, this study was discontinued after discovering that six birds pulled out the feather carrying the transmitter. Given the negative impact, we suspended further tracking of Coops until a lighter transmitter was found.

We finally obtained a smaller transmitter in early 2016. These have less power, so the signal doesn't travel as far. Initial field-testing suggested the signal may only reach a few miles at best. Given that, the tracking teams would need to be much closer to the bird while in the field.

Our first candidate to test the new device was a juvenile female Cooper's Hawk trapped on Monday, October 17 and released at 2:37 pm. Dubbed Paula, the bird immediately flew into Kirby Cove, the forested canyon just southeast of Hawk Hill, and spent the remainder of the day there. Around mid-day on Tuesday, Paula flew over Hawk Hill into Rodeo Valley and moved near the Point Bonita Lighthouse in the afternoon. She likely roosted in the Gerbode Valley that night.

On Wednesday morning, October 19, the teams took up tracking positions in and around the high-points of the Marin Headlands. Our 1990s study had prepared us to expect a north- and/or eastward flight, so one team positioned themselves at Mount Tamalpais. But that afternoon, Paula gave trackers the slip by suddenly crossing the Golden Gate heading south! Caught in the wrong positions for such a major deviation, the trackers scrambled and scoured points south for the next two days, hoping to find Paula. To no avail.

Alas! The small transmitter beat us, as did the weather. Teams scheduled to follow a second bird were thwarted by a series of unusually early winter storms. If birds don't fly, trackers don't track.

C H A S E L E A D E R S

LYNN JESUS • LIBBY ROUAN • BARB WESTREE

O U T R E A C H

GGRO outreach wasn't just on top of Hawk Hill in 2016. Through event tabling, docent programs, and informal outreach, we ranged from Mount Tamalpais and Sausalito to San Francisco and Sonoma. GGRO staff, interns and volunteers, along with our collaborators in the National Park Service (NPS), Parks Conservancy, and Crissy Field Center (CFC), reached more than 10,000 people in 2016. We talked with school kids, seniors, people from other states and countries, classrooms whose first language is not English, and visitors who didn't know the birds in their front yard but left naming Red-tailed Hawks, Turkey Vultures, and Common Ravens.

For a second year, we teamed up with CFC educators and Education Director Francis Taroc, NPS Ranger Kelsi Ju, and GGRO interns Isabel Lawrence and Violet Kimzey to visit Title 1 schools for the "Migratory Story" program. Fourth-graders from five schools participated in classroom-based learning before joining us on Hawk Hill for real-time migration observation.

"Migratory Story" continues to be funded thanks to the inspiration and incredible generosity of Tom Meyer, whose donation in memory of his spouse, GGRO bander Jennie Rhine, began this partnership two years ago.

This year also brought a new educational venture in the form of *Hawk Identification Field Classes* through the Conservancy's Park Academy, which offers professional development and personal enrichment opportunities to park staff, interns, volunteers, and donors. Participants in our class spent three hours on Hawk Hill learning about raptor migration and ID right from the source.



*There is no height minimum for being a great hawk-spotter
(Illustration by Laura Young)*

A giant thank you to everyone for taking time to hear about our efforts and to see the migration, among them: Albany Senior Center Birding Class; Audubon Canyon Ranch; Children's Day School; Chinese Education Center; Galileo High School's Wilderness and Literary Collective; Grand Lake Montessori; Golden Gate Audubon Society; Head Royce School; Hillcrest, John Muir and Longfellow Elementary; the home-schoolers of Morgan Hill; Marin Horizons School; Marin Open Space; Mission Education Center; New Village School; Prospect Sierra School; San Francisco Bay Bird Observatory; San Francisco Jewish Community Center; St. Andrews Episcopal School; St. Vincent de Paul High School; UC Berkeley Neuro-Zoology class; and the Western Bird Banding Association.

D O C E N T S

EDDIE BARTLEY • CARMEN DELEON • ALLEN FISH • VIOLET KIMZEY • ISABEL LAWRENCE
CRAIG NIKITAS • BILL PROCHNOW • SIOBHAN RUCK • SARAH SAWTELLE
NICK VILLA • DENISE VILLA • STEP WILSON • LAURA YOUNG

R E S E A R C H

Most of what we do at the GGRO constitutes research. Our hawkwatch, banding, and telemetry numbers and stories get their own focus, but we also collaborate extensively so that we can learn about the lives of migrating hawks. In spite of our staff changes, 2016 was a great year of research productivity. Along with the projects below, we are cooperating with the US Geological Survey on a large study of mercury poisoning in birds; and with the Peregrine Fund, Hawkwatch International, and others on a continent-wide study of American Kestrel genomics.

Several years ago, we formed a California Raptor Research Consortium with biologists at UC Davis: Dr. Joshua Hull of the Animals Sciences Department, and Dr. Michelle Hawkins of the Vet Med Teaching Hospital, and director of the California Raptor Center. Both Drs. Hull and Hawkins have supervised graduate students working with us to learn more about the raptor populations that migrate past the Golden Gate. Read about their work below!

Completed Research

Before becoming our banding manager, Teresa Ely completed her master's degree at the University of Nebraska-Lincoln studying body condition of American Kestrels found across North America. She used data spanning many decades from seven banding sites including ours. Teresa presented her results at the Raptor Research Foundation (RRF) conference at Cape May, NJ, in October 2016. Her analysis of changes in kestrel body weight and wing chord suggests that the causes of population declines are multifactorial and regional: climate change, habitat degradation, food availability, increased predation, rodenticides, and West Nile virus were all implicated.

Kat Tomalty finished her dissertation with Dr. Hull and published her findings in the *Journal of Raptor Research*: "Differential migration and phenology of adult Red-tailed Hawks in California." Kat's work showed that although juvenile Redtails show a two-wave migration through the Marin Headlands, their adult counterparts showed a single peak of migration (in mid-November). Adult female Redtails also migrated several days earlier on average than adult males—a temporal separation known as differential migration. Reasons for differential migration can be tricky to tease apart, but seem to be related to each gender's role at the nest site, and the larger size of female hawks.



Juvenile Red-tailed Hawk
(Illustration by Laura Young)

R E S E A R C H

Charlene Luján-Vega, one of Dr. Hawkins' students, worked with GGRO studying *Chlamydia* in hawks of the genus *Buteo*. Charlene found a prevalence of about 1.4%, or four hawks out of almost 300 hawks sampled. She presented her results at the 2016 conference of the American Association of Zoo Veterinarians: "Chlamydiaceae in free-ranging hawks (*Buteo* sp.) in Northern California."

UC Davis student (and former GGRO intern) Emily Abernathy worked with GGRO volunteers in 2014 and 2015 to collect 100 blood samples from Red-tailed Hawks to measure the exposure of migrating birds to anticoagulant rodenticides (AR). Eight per cent of the samples came back positive for some amount of AR, including diphacinone, brodifacoum, bromadiolone, and chlorophacinone. Emily presented the results at the RRF conference in Cape May, "Secondary Rodenticide Exposure of Red-tailed Hawks".

UPDATES ON RESEARCH IN PROGRESS

"The Prey of Migrating Sharp-shinned Hawks and Merlins"—During the 2015 and 2016 migration seasons, UC Davis graduate student Ryan Bourbour enlisted GGRO banders to swab the beaks and talons of Merlins and Sharp-shinned Hawks. The goal was to collect trace prey DNA leftover from a previous meal. In 2016, Ryan designed laboratory techniques to identify trace DNA on the swabs, and has since started processing the samples after successfully extracting quantifiable DNA. His work was presented in September 2016, at the Western Field Ornithologists annual conference in Fortuna, CA.

"Cooper's Hawk Population Genetics"—Fellow UC Davis graduate student Breanna Martinico collected DNA samples from migrating and breeding Cooper's Hawks across their range, working with GGRO, other banding sites, and wildlife rehab centers. She is currently preparing the samples to be sequenced at the UC Davis Genome Center. The information gathered from the quill of a feather will enable her to investigate how genetic structure differs across landscapes, and to learn more about the origin and timing of the populations that move through the Marin Headlands.



*A Sharp-shinned Hawk gets swabbed for prey remains.
(Illustration by Laura Young)*

D O N O R S

Anonymous	Richard Chambers	Natalee Ernstrom	Melissa Hero
Cheryl Abel	Helen & Paul Chapman	Norval Fairman	David Herrema
Lorne Abramson & Elana Lieberman	Shelley & John Chesley	Tom Felts & Robin Mitchell	Ann Heurlin
George & Stephanie Almeida	Marshall Clark	Richard Ferris	Jan Hintermeister
Leslie Andrews	Terry & Zeo Coddington	Jeanne Fidler	Jennifer Ho
Caryn & Joe Ansel	Sarah Cole	Virginia Fifield	Lynn Hoerle & Jeff Wilson
Kendra Armer	Ron Colwell	George & Patsy Fish	Ruth Holbrook
Mike & Jenn Armer	Huguette Combs	Robert & Donna Fivis	Calvin Hom
Loretta Armstrong	Kay & Thomas Conneely	Gayle Fuetsch	Sam Hontalas
Lee Aurich	Jason Cooper	Theresa Gabel & Timothy Zumwalt	Dick & Diane Horn
Marylou Avanzino	Lewis Cooper	Kathleen Gadway	Buzz Hull
Paul Babwin & Karen Bell	Marilyn Cooper	Leo & Jane Gaspardone	Sara Hurley
Diane Bahr	Chris Cottrell	Kris Geiger	Jennifer Hyypio
Chloe Banks	Deborah Crooks	Valinda Gillis	John Irwin
Reginald & Katherine Barrett	J.R. Crumpler	Morey Goldstein	Cheryl Ishida & Dale Berner
Don & Mai-Liis Bartling	Reese & Kathleen Cutler	Cindy Goral & Jerry Scharf	Victoria Jackson
Linda Becker	Ludek Dadok	Alane Gray	Kathy Jarrett
Sandra Berggren	Leslie & Troy Daniels	Wayne & Else Greenstone	Marcine Johnson
Anne Bernstein	Anne Darragh & David Ford	Dorothy Gregor	Craig Jones
Carl & Jean Blom	James & Drusie Davis	Earl Gress	Peter & Lindsay Joost
Marc Blumberg	Pamela Dayton	Keith Gress	Mamiko Kawaguchi
Robert & Marion Blumberg	Deanna de Castro	Jeffrey Gualco	Susan Kelly
Olive Borgsteadt	Tom Delebo	Mary Haack	John Knox
Dix & Marilyn Boring	Carmen Deleon	Mike Hall	Allison Kozak
Heather Borman	Janine DeMartini	Lora Haller	Cheryl Kraywinkel
James & Patrice Britain	Karen DeMello	Mike Hammer & Patricia Meadows	Joan Lamphier
James Broadstreet & Cheri Hinkley	Leslie & Charles Dicke	Barbara Hamrick	Barbara Lancaster
Phyllis Browning	Barbara Duncan	John Harris	Lamar Leland
Lorraine Bruno	Karen Duncan	Judy Harris	Cheryl Lentini
Diane Caliva	Steve Dykes	George Hartzell	Peter Leveque
Hugh & Pearl Champion	Wade Eakle	Hugh & Rosita Harvey	Allison Levin
Lynn Carew	Peter Ehrlich	Steve Hayashi & Judy Winn-Bell	Ann Linder
Sally Cedarblade	Nancy Elliot	Pete Heller	Marie & Barry Lipman
	Catherine Elliott & Tom Luster		David Loeb
	Marian Erdelyi		Cathy Loewen
			Chris Macintosh

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 Mary Malec
 Nancy Martin
 Charles Massen
 JoAnn McAllister
 Kirk & Jane McAllister
 Maureen McCormick
 Mary McFadden
 Peter McGuire
 Ewen McKechnie
 John & Leslie McQuown
 Terry Mead &
 Lois Reynolds-Mead
 Andrew Melomet &
 Diane Rooney
 Amy Meyer
 Thomas Meyer
 Karla Miller
 Rachel Miller
 Nancy Mori
 Alida Morzenti
 Kathleen Mugele
 Heidi Munzinger
 Suzanne Murphy
 Martha Murray
 Mikiye Nakanishi
 Soo-Hi & Alan Nayer
 Gregg & Sharon Niceley
 Jeanette Nichols
 Maureen Noon
 Ed & Marcia Nute
 John Odell & Gloria Kemp
 Steven O'Donnell
 George & Martha Oetzel
 Brian O'Laughlin
 Rebecca Olsen &
 Ken Wilson
 Claire O'Neil

Jessica O'Neill
 Kenneth Osbourne
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 Elizabeth Palmer
 Diane Parish &
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C. John Ralph
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 Donald Reinberg
 Gail Richardson
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Walter Sakai
 Serena Salomon
 Ivan Samuels
 Peter Sapienza
 Charles & Susan Savage
 Michael Savino
 Rolf & Charlotte Scherman
 Birgit Schilling
 Linda Schneider
 Leslie Schroeder
 Terry Schweitzer
 James Shea
 Katrina Sherman
 Carrie Sherriff
 Martin Sidor
 Sandra Slichter
 Mary & David Smith
 Ronald Smith
 Sharon Solomon
 Sheila Sousa
 Patricia Spencer
 Philip Steiner
 Deborah Stratmann



*Easy to read at a distance, color bands mean more data
 (Illustration by Chase O'Neil)*

Ruth & Ron Parker
 Katherine Pattison
 Ruth Ann Pennell &
 David Doneux
 Sean Peterson &
 Lynn Schofield
 Allan Plumb
 Bob Power
 David & Cay Pratt
 David Presotto &
 Caryl Carr
 William & Karin Rabin

Beverly Riehm &
 Randy Borcharding
 Duane & Barbara
 Robinson
 Jeff Robinson
 Steve Rock & Nancy Brink
 Jason Rosenfeld
 Elizabeth Rouan
 Maggie Rufo
 Siobhan & Bill Ruck
 Leonard & Elizabeth Rush
 Dede Sabbag

Candace Swimmer
 Craig & Elise Tewell
 Sally & George Thomas
 Nicole Travers
 John Ungar
 John & Janet Upton
 Richard Vanderlugt
 Nick & Denise Villa
 Jerry Vitenson
 Wendy Warrington
 Noreen Weeden &
 Eddie Bartley

D O N O R S

Marion Weeks &
Stephen Blossom

Carol Weinstein

Jill Weinstein

S. Paul Welles

David Wells

Virginia & Richard Welsh

Gretchen Whisenand

Nelia White

Peter White

M.K. & Karen Whyte

David Wiechers

Vicki Wilhite

Edwin Williams &
Joan Halverson

Katie Winslow

Elizabeth Wommack

Pat Wong

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**THE GREGORY HIND
ENDOWMENT:**

Leslie & Troy Daniels

**IN MEMORY OF
BEATRICE BERTANA:**

Jean Perata &
Dennis Davison

**IN MEMORY OF
THOMAS CORSIGLIA:**

Jean Perata &
Dennis Davison

**IN MEMORY OF
NICK GARRIBO:**

Jean Perata &
Dennis Davison

**IN MEMORY OF
JENNIE RHINE:**

Tom Meyer

NUMBER OF RAPTORS BANDED 1983-2016, MARIN HEADLANDS*

	1983-2009	2010	2011	2012	2013**	2014	2015	2016	Total
Northern Harrier	256	1	2	16	10	18	8	3	314
Sharp-shinned Hawk	9,213	362	494	730	173	414	481	463	12,330
Cooper's Hawk	11,469	524	444	762	390	485	649	503	15,226
Northern Goshawk	5	0	0	0	0	0	1	0	6
Red-shouldered Hawk	300	2	15	42	21	25	33	12	450
Broad-winged Hawk	22	0	0	9	3	1	3	2	40
Swainson's Hawk	8	1	0	1	0	0	0	0	10
Red-tailed Hawk	7,984	115	188	348	433	222	251	229	9,770
Ferruginous Hawk	2	0	0	0	0	0	0	0	2
Rough-legged Hawk	5	0	0	0	1	0	0	0	6
Golden Eagle	2	0	0	0	0	0	0	0	2
American Kestrel	1,064	82	56	81	37	49	41	24	1,434
Merlin	470	52	60	36	24	33	50	34	759
Peregrine Falcon	74	2	3	7	2	2	2	9	101
Prairie Falcon	34	1	2	2	2	2	3	2	48
Eurasian Kestrel	1	0	0	0	0	0	0	0	1
Total	30,909	1,142	1,264	2,034	1,096	1,251	1,522	1,281	40,499

*Data compiled by Teresa Ely. 2016 data are through January 5, 2017.

**Not a complete season; missed October 1-16, 2013, due to government shutdown

NUMBER OF RAPTOR-SIGHTINGS 2005-2016, MARIN HEADLANDS*

	2005	2006	2007	2008	2009	2011	2012	2014	2015	2016
Hours	456	492	524	525	497	439	442	488	540	443
Turkey Vulture	7,877	9,211	9,228	7,529	8,060	6,447	6,622	8,433	9,692	5,998
Osprey	110	108	90	88	81	57	62	79	83	67
White-tailed Kite	66	130	71	74	93	74	129	73	36	20
Bald Eagle	6	2	2	6	10	9	8	9	8	8
Northern Harrier	460	1,090	1,002	454	614	335	523	394	442	354
Sharp-shinned Hawk	4,407	5,244	4,636	4,091	3,332	2,622	3,149	3,539	4,652	4,138
Cooper's Hawk	2,427	3,367	3,717	1,956	1,738	1,805	2,695	2,169	3,106	1,998
Northern Goshawk	1	0	4	2	1	0	0	0	2	0
Red-shouldered Hawk	149	612	512	559	529	248	604	578	574	265
Broad-winged Hawk	146	184	70	131	180	203	756	310	344	289
Swainson's Hawk	4	7	12	1	1	13	11	10	6	5
Red-tailed Hawk	7,278	11,390	11,869	6,862	8,297	7,530	8,601	7,559	10,017	5,676
Ferruginous Hawk	33	25	13	15	11	18	32	19	73	48
Rough-legged Hawk	4	21	10	4	2	0	19	1	1	4
Golden Eagle	13	24	38	18	11	9	13	32	18	13
American Kestrel	627	611	378	377	458	358	396	380	297	229
Merlin	198	230	140	184	149	166	180	183	257	178
Peregrine Falcon	219	237	181	224	259	264	246	279	225	199
Prairie Falcon	5	8	4	7	9	2	8	7	6	2
Unidentified	1,441	1,436	1,382	904	991	1,011	1,084	1,159	1,381	862
Total	25,471	33,937	33,359	23,486**	24,826	21,171	25,138	25,213	31,220	20,353
Raptor Activity (raptors per hour)	55.9	69.0	63.7	44.7	50.0	48.2	56.9	51.7	57.8	41.2

* 2010 data are not included here because two count sites were used and data are not directly comparable; 2013 data not included due to incomplete season caused by government shutdown

** Total includes 1 Mississippi Kite.

Golden Gate Raptor Observatory

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Sausalito, California 94965

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GGRO Season Summary 2016

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