Counting hawks and winning hearts

A quarter century of citizen science in the Golden Gate National Recreation Area

NPS / JESSICA WEINBERG

WALTER KITUNDU, GOLDEN GATE RAPTOR OBSERVATORY VOLUNTEER

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Left to right: GGRO interns Robyn Smith and Brittney Wendell teach a junior high school class how to identify raptors in flight. Misha Semenov sets a banded merlin back on its migration path. Bander Ari La Porte deftly extracts a young sharp-shinned hawk from a vertical net.

By Michelle O'Herron

IT IS ALMOST ALWAYS WINDY ON HAWK HILL. AND IT IS also often foggy. Really, really foggy.

But when it clears, you never know what you might see. These sunny moments of possibility—and the raptors that may choose that particular window of celestial clarity to go soaring past—sustain the more than 300 volunteer hawk watchers and banders of the Golden Gate Raptor Observatory (GGRO).

The GGRO is part of the Golden Gate National Parks Conservancy, the nonprofit partner of the Golden Gate National Recreation Area (GGNRA) in California. Now in its 28th year, the GGRO has only three full-time staff members, and so relies heavily on volunteers to meet its mission to study migrating birds of prey along the Pacific coast and to promote public awareness of the state of raptor populations.

The GGRO is now regarded as an international model of community engagement and citizen science. That's a long way from its humble beginnings in 1983 when National Park Service (NPS) natural resource specialist Judd Howell, longtime bander and falconer Will Shor, and a handful of volunteers trapped and banded enough hawks to show that Hawk Hill, a prominent point in the Marin Headlands just north of the Golden Gate Bridge, would be a good place for a long-term fall raptor migration study site.

Two years later, with a grant from the San Francisco Foundation, Judd challenged the volunteers to make the program their own and hired Allen Fish as director. They began their annual fall hawk count the following year. By 1991, the scientific potential of the GGRO was such that research director Buzz Hull was hired to help advance data collection and management, volunteer coordination, and training. The next year, Allen and Buzz launched a docent program to accommodate the skyrocketing public interest in the migration.

Combined, these efforts have contributed more than 25 years' worth of data on raptor health, numbers, and migration, as well as public outreach that the Golden Gate National Recreation Area would not otherwise have been able to afford. However, the initial decision to engage volunteers for this program was not entirely financial; Judd and Will also sought to create a constituency of informed and inspired supporters for the park, for citizen science, and for raptors.

It seems to have worked.

The citizen science of the GGRO

Counting

From mid-August to December, teams of volunteer hawk watchers spot and identify 19 species of raptors. Each year brings between 20,000 and 40,000 raptor sightings, for a grand total of 634,215 since the program began. These counts capture informa-

tion about species, age, sex, color morph, time, date, and weather that helps elucidate trends and patterns in hawk populations over time. These trends, in turn, are indicators of the health of the broader ecosystems in which the raptors live.

In 1989, GGRO hawk watchers created the Quadrant System—a consistent and systematic method that allows data from different years to be compared. Hawk counters standing within clear earshot of each other monitor a particular cardinal direction of the sky for an hour at a time. They call out information about the species and age of raptors spotted in their quadrant in as much detail as possible to a data recorder. The raptors are then "passed" to the hawk watcher in the next quadrant, who responds with a loud verbal confirmation if he or she too sees the same bird, thus minimizing double counting.

In the early years the GGRO struggled to find a methodology that would yield such reliable results. The technique they started with—basically just to look up and count—generated almost as many questions as answers. For example, how far away do you count a raptor? Should you wait until it gets closer? What if it never does? What if the Cooper's hawk you just counted flew behind a hill, and then a few minutes later a Cooper's hawk comes flying out from behind the other side? How do you know you haven't counted that hawk before?

Allen and the hawk watchers wrestled with this particular question until 1988, when they finally came upon the answer: you can't. However, they realized counting individual birds was not really what they were doing. They were actually measuring the rate of visible raptor activity in the area. Based on this new understanding they established guidelines about when to count a raptor, and set up their new methodology.

Certain aspects of this methodology have since been adopted elsewhere, like counting raptor sightings as opposed to individual birds, and focusing on raptors per hour rather than absolute numbers. However, few have managed to replicate the level of volunteer engagement seen at the Golden Gate Raptor Observatory.

Banding

Since 1983, specially trained GGRO volunteers have banded more than 33,000 birds of prey. They trap, band, measure, and then release hawks, working quickly to get as much information as possible while minimizing stress to the bird. Because of the raptors' migratory nature, samples taken at this one site provide data from much broader populations.

More than 1,100 bands have been recovered, some from as far away as British Columbia and southern Baja California. Each band has a unique identification number and a phone number for the U.S. Bird Banding Laboratory. The lab sends periodic band recovery reports to GGRO, whose staff and volunteers then follow up with the person who located the bird to learn more about where it was found and under what circumstances. Unfortunately, most recoveries come from birds that are injured, sick, or dead, but the information they provide helps answer questions about the geographical ranges of Bay Area raptor populations, and offers insights into the causes of injuries and deaths.

None of the 19 monitored raptor species is clearly declining, although American kestrel numbers (a species of concern in the Northeast) have dipped during the last five years.

How are these data used?

Research

Research director Buzz Hull works closely with volunteers and researchers at local universities and agencies to collect, analyze, and synthesize GGRO data. Monitoring and research results are also used by a variety of state, federal, and private wildlife agencies. As of 2011, the GGRO had produced 82 scientific articles and presentations, a third of which had a volunteer as primary author.

Examples of research projects the GGRO has cooperated on:

- Population genetic studies of red-tailed, red-shouldered, and sharp-shinned hawks
- Using genetic analysis to verify sexes of red-tailed, red-shouldered, and Cooper's hawks based on measurements
- Documentation of molt cycles in raptor species
- Size relationships and human misidentification of forest hawks
- Raptor disease research on avian malaria, West Nile virus, and avian influenza

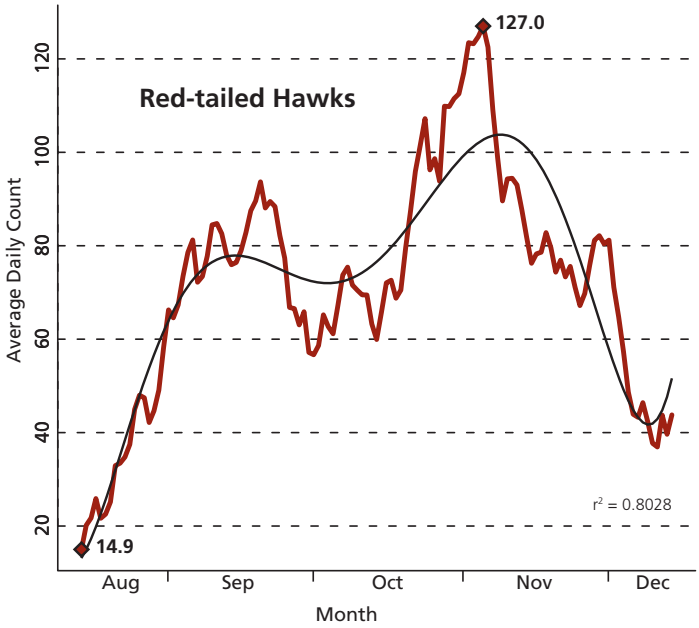

Figure 1. Red-tailed hawks move in two waves. One innovative GGRO analysis incorporated hawk counts, banding, radiotracking, and genetics to study differences between the red-tailed hawks of the two peaks of fall activity seen here. It was determined that the September peak is primarily central California redtails, and the November peak contains a larger proportion of the Great Basin genetic type. Also, more of the early-peak hawks move south for the winter than do the later-peak hawks. (Hull, J. M., et al. 2009. Differential migration between discrete populations of Red-tailed Hawks. Auk 126:389–396.)

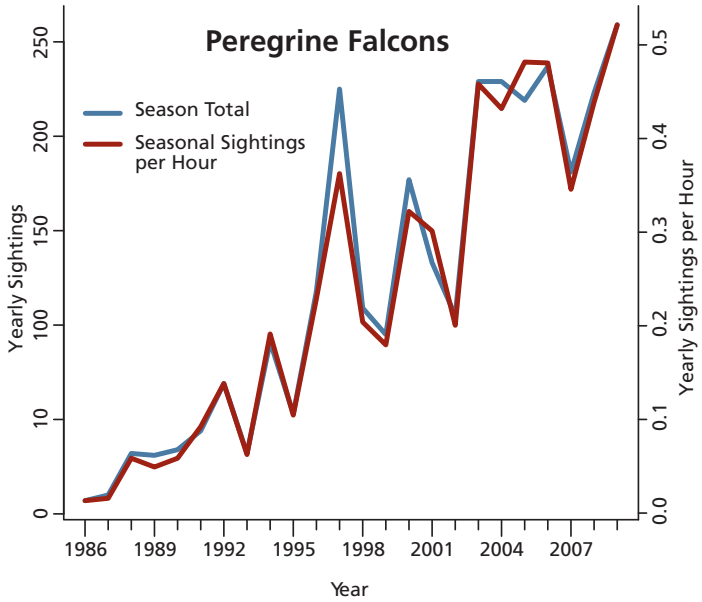

Figure 2. Peregrine falcons rise tenfold at the Golden Gate, reflecting the population trend for nesting peregrines in the Pacific states. In spite of numerous local biases such as wind, visibility, and observer ability, raptor migration counts have been shown to capture population trends if made consistently over a long period. By the late 2000s, it was clear that GGRO counts had tracked the known post-DDT increase in peregrines.

Illuminating trends

Only a long-term monitoring program such as this can provide enough raptor migration data to allow trends to emerge. After a quarter of a century, it appears that each raptor species has a unique migration profile with distinct peaks and troughs (fig. 1). Data have also reflected at least one known trend: the rise in peregrine falcon numbers in California (fig. 2). Merlins and red-shouldered hawks have also increased over the past 25 years. None of the 19 monitored raptor species is clearly declining, although American kestrel numbers (a species of concern in the Northeast) have dipped during the last five years.

Costs and benefits

Time commitment and cost

According to Allen, it's a mistake to think of volunteers as cheap labor. "Quite the opposite," he says "Volunteers are costly, but what you are buying is community engagement, which in turn buys you an intelligent, passionate, local constituency." Indeed, GGRO staff spends much of its time managing volunteer programs, but because volunteer day leaders also run their own teams, this staff time investment is multiplied many times over. The park provides office and storage space, a vehicle, overhead, and other operating costs, and in return gets the equivalent of roughly 22 full-time employees' time.

Public outreach

In addition to research publications, the GGRO has helped the park meet its goals of communicating science to the public through local media coverage as well as newsletters, brochures, Web sites, docent talks, banding demonstrations, and the continuous recruitment and education of citizen scientists.

Volunteerism and passion for park resources

Since 1983, GGRO volunteers have contributed nearly 1 million hours of raptor counting and banding, as well as data entry and docent programs that the GGNRA has received for free. They have also generated new methods and approaches for studying birds of prey.

While helping with wildlife research in a stunning natural setting has its appeal, the reality is that the weather on Hawk Hill can be harsh and changeable and the time commitment is significant. Volunteers also have to be able to concentrate on raptor-shaped specks in the sky while simultaneously listening to the shouts of other counters—no small feat when raptors are ripping by at

a rate of one per minute during peak migration. When things are slow, it can be hours on end of waiting in the cold for even a glimpse of a few hawks.

Yet hundreds of people come back for more every year. Ron Berg is one of them. He describes why as he recalls seeing two peregrine falcons pirouetting in front of the Golden Gate Bridge. "They swooped up and dove down, frolicking in the breeze for at least 30 minutes. Then they were gone. When I was a boy, I hoped in my lifetime to someday spot a peregrine. Never in my wildest imagining did I ever think I'd see such a thing as this, but you never know at Hawk Hill."

These are the passionate park stewards and raptor advocates Judd and Will were hoping for.

However, despite their best intentions, even the keenest volunteers may not be the best scientists. The GGRO has instituted multiple levels of quality control to ensure that the data being collected are reliable and accurate.

Oversight and quality control

Supervision

Highly trained volunteers called day leaders run volunteer teams, reducing the burden on GGRO staff. Less experienced volunteers are partnered with more experienced counterparts. Banding teams also have site leaders, who are in charge of a banding blind on a particular day. Site leaders and day leaders are in turn closely supervised by Buzz and Allen through special meetings and trainings. Finally, lengthy "Experiential Checklists" track what new volunteers have mastered in the field and what they have not yet encountered.

Training

Rigorous trainings prepare both novice and experienced volunteers for the fall migration. Hawk-watch apprentices receive exhaustive training manuals and attend classes on raptor identification, data recording, team communication, scanning for hawks, and equipment use. Occasional live-release identification studies of banded raptors give volunteers extra practice, and also provide GGRO with a better estimate of identification error rates. Banders go through additional intensive hands-on trainings, and site leaders have a training and certification process that includes field and written evaluations.

Limits on what a volunteer can do

Only experienced hawk watchers record data, and data are double-checked as they are collected, again during data entry, and yet again afterward. Because they are handling live animals, banders have even stricter limits. Banding apprentices are constantly supervised, and their methods and data are double-checked until everyone is comfortable with their skill level.

Is it worth it?

The consensus is that the benefits of this citizen science program have far outweighed the costs to the park. GGNRA chief of Natural Resources Daphne Hatch agrees: "What the GGRO has provided the park in terms of data and research has been impressive, but their ability to channel the energy of people who are dedicated and passionate about wildlife in the park is truly priceless."

For more information about GGRO, please see http://www.parksconservancy.org/programs/ggro/.