

Mist-netting with the public

A guide for communicating
science through bird banding



Melissa Pitkin

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Klamath Bird Observatory

In cooperation with the
North American Banding Council



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Introduction

The disconnect between humans and the natural world has been cited as a factor contributing to declining wildlife populations and the destruction of habitat. People are disconnected with the natural world in part because they lack understanding of and connection to science and scientists. The National Science Board (2002) reported that 70% of Americans do not have a basic understanding of the scientific process. Furthermore, public perception and understanding of scientists is poor; studies have shown that children and adults typically picture scientists as middle-aged white men who wear lab coats, glasses, and Einstein-like hair styles and work in laboratories filled with test tubes and bubbling potions (Mead and Metraux, 1957, Mirsky 1997).



In a recent paper, Nalini Nadkarni (2004) proposed the idea of scientists as “ambassadors of conservation” who can reach out to a variety of audiences and connect people with their natural world. Due to the passion and knowledge of their research, scientists are able to relate their science to the lives of the “scientifically unaware” (Nadkarni, 2004). To bridge the gap in understanding of science, scientists, and the natural world, scientists can incorporate public education programs into their research.

Effective education programs are those that provide participants with direct experience in the subject matter (Trombulak 2004). Inviting the public of all ages to observe, take part in, interact with, and learn from scientists gives participants direct experience with research and builds understanding of the scientific process. The capture of birds in mist nets presents a unique opportunity to demonstrate science-in-action to a wide variety of audiences while at the same time generating valuable scientific information on bird populations.

Scientists involved in mist-netting programs are often hesitant to engage the public in their work due to numerous challenges associated with collecting data on wildlife under the public’s eye. However, interest in combining educational programs with bird research programs is growing among ornithologists through the recognition that such programs increase awareness of birds and bird conservation issues, increase potential for funding and support of research, and improve the communication of results to land management partners (Riparian Habitat Joint Venture, 2004). Bird Conservation Plans also encourage those conducting research on bird populations to engage in public education programs. In the March 2005 *Memorandum to All Banders*, the Bird Banding Laboratory of the US Geological Service recognized the importance of teaching through banding

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and has begun issuing educational banding permits for stations whose sole purpose is education. These permits are issued to North American Bird Banding Council certified banders who are the “best possible ambassadors” for bird banding (BBL, 2005).

As a result of the growing interest in linking education programs with research, biologists and informal educators at various bird observatories and non-profits in the Americas have requested help in designing and implementing such programs. To answer this request, I have created this manual with two goals: to connect the public with science, scientists, and conservation and to improve the quality and quantity of education programs delivered in conjunction with bird research that uses mist nets. The guidelines contained in this manual are based on feedback through surveys from 25 organizations (Table 1, page 4) in North America, as well as nine years of professional experience conducting education programs with mist-netting at PRBO Conservation Science and the Klamath Bird Observatory. The goal of the survey was to establish a need for this of manual and gather information on how the organizations conducted mist-netting education programs.

Twenty-one of 25 respondents answered that this type of a manual would be useful. The remaining questions enabled me to identify the challenges of incorporating education programs with mist-netting and present ways to address these challenges. Challenges include; volume of birds caught, number of staff, site accessibility, funding, and stress to birds. Solutions and strategies for safely and effectively involving the public in mist-netting demonstrations include conducting extensive pre-visit planning, implementing staff hiring and training guidelines, developing a plan for bird and human safety, using interpretive tools, publicizing your opportunity, and evaluating your programs. It is my hope that this manual will achieve its goals of bridging the gap between science and the public while facilitating the delivery of education programs with mist-netting research.

History of Bird Banding

In 1595, one of King Henry IV's banded Peregrine Falcons disappeared in France, chasing a bustard. It turned up about 1350 miles away in Malta, an island in the Mediterranean south of Sicily, 24 hours later, and averaging 56 miles an hour! With this discovery, the fascination with understanding bird migration was born. Questions including where do birds go, how long do they live, how do nestlings know where to disperse (to name a few) were formulated and tested in the spirit of scientific inquiry. In 1899, a Danish school teacher, Hans Mortensen, developed the system of putting aluminum rings on the legs of pintail, teal, hawks, starlings, and storks. On the bands he included his name and address in the hopes they would be returned if found. This system was formalized in the United States in 1909 with the formation of the North American Bird Banding Council (NABBC) (www.pwrc.usgs.gov/BBL/homepage/history.htm).

Current Status in North America

Today, there are many organizations and individuals who band birds in North America. Table one contains a list of 45 bird observatories and organizations that band birds. This table is not

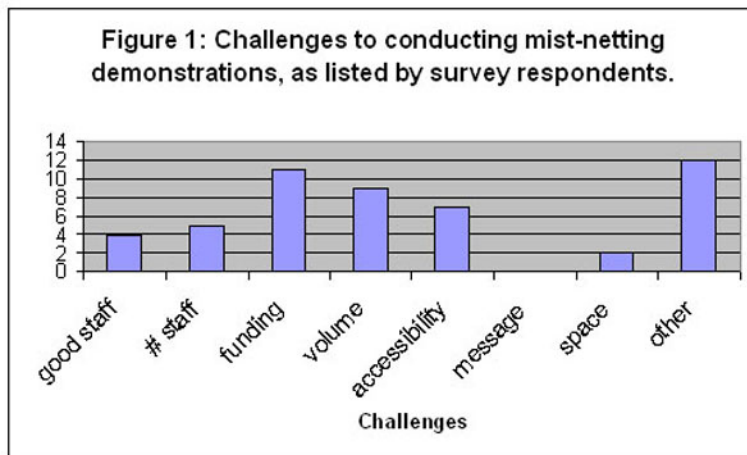
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inclusive of all organizations and individuals. There are many more, including biologists working for state and federal agencies and individuals permitted to band birds independently. In addition, many groups partner with biologists in Central and South America. Each year approximately 1.1 million birds are banded in North America. As of 2005, a total of 57 million birds had been banded (www.pwrc.usgs.gov/bbl/default.htm). With non-government organizations, agencies, and individuals studying birds throughout the Americas, this presents an excellent opportunity to teach people about birds, research and conservation, and the scientific process. Many groups are already utilizing this opportunity and currently implement education programs in conjunction with mist-netting. Each year, at least 47,000 people participate in mist-netting demonstrations (Pitkin 2005).

To use this manual, you must first be able to answer the question *Why invite the public to my mist-netting station?* Whether you work within an education or research organization, involving the public in mist-netting demonstrations presents several benefits. Most importantly it is an opportunity to bridge the gap between scientists and the public. Connecting people with birds through in-the-hand observation also helps build appreciation and understanding of birds among participants. Educators and researchers who observe this appreciation among visitors recount stories of amazement and wonder as people discover the diversity of bird species surrounding them. From a marketing point of view, it is a chance to raise funds, build organization memberships, and recruit volunteers due to the potential to reach large numbers of people each year. Based on survey feedback, the annual number of visitors to mist-netting stations ranged from 30 to 15,000 people with an average of 1,900 people reached annually. Every mist-netting demonstration presents educational, scientific, and organizational benefits.

Common Fears and Challenges

Despite numerous benefits, many fears and challenges exist when inviting the public to a research site. Common challenges include: adequate staff, funding, high capture rates, site accessibility, space needed to accommodate groups, and the ability to convey educational messages. Survey respondents were asked to list the challenges they face (Figure 1). Challenges listed in the 'other' category include low capture rates, public perception, stress to birds, and preservation of data quality. All documented challenges are addressed in this manual with specific recommendations for addressing them.



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Table 1. A Selection of Bird Observatories/Research Organizations in North America

* Indicates organizations which participated in the survey

Organization Name
Alaska Bird Observatory (Alaska)*
Atlantic Bird Observatory(Nova Scotia)*
Bainbridge Island Bird Observatory (Washington)
Beaverhill Bird Observatory (Alberta)*
Black Swamp Bird Observatory (Ohio)*
Braddock Bay Bird Observatory (New York)
Bruce Peninsula Bird Observatory (Ontario)*
Cape May Bird Observatory (New Jersey)
Big Sur Ornithology Lab/Ventanna Wilderness Society (California)*
Chipper Woods Bird Observatory (Indiana)*
Coastal Virginia Wildlife Observatory (Virginia)*
Cornell Laboratory of Ornithology (New York)
Deep Portage Bay Learning Center (Wisconsin)*
Derby Hill Bird Observatory (New York)
Fundy Bird Observatory (New Brunswick)*
Golden Gate Raptor Observatory (California)
Great Basin Bird Observatory (Nevada)
Gulf Coast Bird Observatory (Texas)
Holiday Beach Migration Observatory (Ontario)
Hornsby Bend Bird Observatory (Texas)
Humboldt Bay Bird Observatory (California)*
Institute For Bird Populations (California)*
Idaho Bird Observatory (Idaho)*
Innis Point Bird Observatory (Ontario)
Institute For Outdoor Education and Environmental Studies (Ontario)*
Klamath Bird Observatory (Oregon)*
Lesser Slave Lake Bird Observatory (Alberta)
Long Point Bird Observatory (Ontario)*
Manitoba/Delta Marsh Bird Observatory (Manitoba)
Manomet Center for Conservation Sciences (Massachusetts)
Ohio Bird Banding Association (Ohio)*
Old Myakka Bird Observatory (Florida)
Powdermill Bird Banding (Pennsylvania)
PRBO Conservation Science (California)*
Prince Edwards Point Bird Observatory (Ontario)*
Rio Grande Valley Bird Observatory (Texas)
Rocky Mountain Bird Observatory (Colorado)*
Rocky Point Bird Observatory (British Columbia)*
Rouge River Bird Observatory (Michigan)*
Southeast Arizona Bird Observatory (Arizona)
San Francisco Bay Bird Observatory (California)*
Starr Ranch Audubon Sanctuary (California)*
Sutton Avian Research Center (Oklahoma)*
Toronto Bird Observatory (Toronto)
Whitefish Point Bird Observatory (Michigan)

Pre-visit Planning

Prepare your site

It is important to consider your site when planning educational programs at mist-netting stations. Whether you are working at a permanent banding station with a facility or at field sites without facilities, you must have a plan for access, parking, safety, and interpretation.

Vehicle Access

Access is critical and applies to accessibility by vehicles as well as by people on-site. Stations located over an hour drive from major cities and towns may have a harder time securing participants, especially from the K-12 community who are confined by school hours. Nearby camping or other overnight accommodation may make accessing the site for school groups easier. In addition, more remote sites may offer multiple experiences for groups traveling long distances. If you are at a location farther from a city center, think about partnering with organizations or naturalists who may want to collaborate in offering multi-disciplinary field experiences as part of their existing programs. Once at the site, visitors will need ample parking. Larger groups may come on a bus or in multiple cars. Be sure to have adequate parking and bus turnaround. If parking is a problem, you may want to limit group size and number of vehicles or arrange a shuttle to and from a nearby parking area.

Human Access

On-site access to trails, mist nets, or interpretive sites must also be considered. Trails must be maintained, free of poison oak or ivy, nettle, thistle, downed trees or logs, and large holes. Tall grasses and other vegetation should be pointed out to visitors as possible sources of ticks or chiggers. Trail maintenance will need to be done throughout the year or season, especially in areas with vigorous plant growth. Be sure to plan time for staff, volunteers, or interns to maintain trails. Trails that encounter hazards such as steep or rocky slopes, creek crossings without a bridge, standing water, deep mud, or wet vegetation should be avoided, as they may be unsafe or uncomfortable for visitors, taking away from the educational experience. Also consider accessibility by handicapped people. The trail itself may be inappropriate for visitors in wheelchairs, but perhaps your banding site can be modified to accommodate wheelchairs. Blind visitors may also be unable to traverse difficult trails but can still participate in the experience by listening to bird sounds, handling study skins, touching tools and equipment, and listening to interpretation.



Interpretation Area

Designating an area for interpretation, or a speaking point, is a critical component of site preparation. Due to the nature of mist-netting sites, open areas may be limited. Limit your group size if you cannot accommodate large groups. It is important to address the entire group upon ar-

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visit: introduce them to the experience, and outline how the program will be structured. Maintain the interpretation area free of hazards as outlined above, to allow room for sitting or standing. At sites with a permanent facility, such as at PRBO's Palomarin Field Station, an interpretive deck was built to accommodate groups. This created seating opportunities that were dry and comfortable for a wide variety of ages of visitors.

Conveying the Message

It is critical that you determine the messages you wish to convey before you begin your mist-netting demonstrations. As with any educational program it is important to know your audience and tailor your message to your audience's age, background, and learning ability. Participants in mist-netting programs come from a variety of audiences including K-12 students, college students, community members, scientists, and habitat managers. Community members can include the public, Audubon groups, scout groups, naturalist groups, Elderhostel groups, and birding groups. From the survey participants, K-12 students were the audience type that most commonly participates in these types of programs.

Survey respondents listed the following as key messages they communicate through demonstrations:

- Value of long-term monitoring*
- The scientific process*
- Linking science and conservation*
- Appreciation for birds*
- Migration*
- Bird diversity and adaptations
- Bird population dynamics
- Birds as indicators
- Habitat loss or change
- Careers in wildlife biology

Items with * were listed by 20 or more out of 25 respondents. These messages are elaborated below with key points to consider when conveying these messages.

Long-term Monitoring

Long-term monitoring of bird populations is often the motivation for mist-netting birds. Monitoring is the continuous scientific study of an organism or population with the goal of detecting changes over time. Because these changes often take years to detect, monitoring is a component of science that is not often emphasized when studies that provide quick and interesting answers can be used instead. It is critical to stress the importance of long-term monitoring programs for understanding population changes in birds and other wildlife. The National Science Foundation states that long-term research is important because: changes occur slowly; effects of rare events can only be evaluated when ongoing studies have been conducted; ecological

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processes vary from year to year and can only be understood from a long-term view; and long-term studies allow us to interpret short-term studies (NSF, 2004). Because mist-netting stations exemplify long-term research and monitoring of bird populations, they provide biologists with an excellent opportunity to teach people about this component of science. The toolbox on page 25 contains a hands-on graphing activity where students investigate changes in population size and discuss the value of long-term studies. The activity was created by PRBO using Warbling Vireo data but can easily be adapted to your site.

Scientific Process, Science and Conservation, Scientific Research

To bridge the gap between scientists and the general public, mist-netting demonstrations should strive to communicate the scientific process, the value of scientific research, and the link between science and conservation. The scientific process can be summarized as a five-step process:

1. Identify a problem or question that is driving your scientific investigation.
2. Develop a hypothesis proposing the answer to the question or problem. A hypothesis must be testable.
3. Test the hypothesis.
4. Evaluate the data. Once you have finished testing your hypothesis, determine if the data collected support the hypothesis
5. Do your results cause you to ask further questions?

Every mist-netting station should be able to list the goals and specific questions being asked through the research and monitoring (Ralph et al., 1993). With mist-netting, the problem or question may have to do with declining bird populations, changing habitats, changing species composition in an area, timing of migration, bird species diversity, survivorship in birds, bird response to restoration, etc. There are numerous questions that can be answered by studying birds using mist nets. It is important to address the questions central to your research and monitoring, and explain why you are mist-netting birds within the framework of the scientific process.

How your organization utilizes data you collect is an important question to answer to visitors. Talk about the land managers and scientists your organization partners with. Share examples of how findings have been used to modify or inform management decisions or answer conservation related questions. This is a good opportunity to talk about Bird Conservation Plans and Partners In Flight.



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Partners In Flight and Bird Conservation Plans

Partners In Flight is an international coalition of land managers (public and private), non-government organizations, researchers, individuals, and lawmakers working together to reverse the decline of songbirds. To achieve this goal, Partners In Flight has created local chapters and Bird Conservation Plans for specific states, regions, or habitats. The goal of the Bird Conservation Plans is to prevent further habitat loss or degradation resulting in the decline of focal bird species. Conservation Plans identify **focal bird species** and associated habitat objectives important for maintaining stable populations of these species. For more information visit www.pif.org.

Appreciation for birds

A fascination with and appreciation for birds is also fostered during mist-netting demonstrations. Twenty-four of 25 participants selected appreciation for birds as a focus of their educational programs. The live bird in the hand is the hook or draw that gets people interested. Visitors of all ages are in awe of the brightly colored warbler or the sparrow resting calmly in your hand. Holding a live bird in your hand presents an easy and effective way to demonstrate relationships between natural history and adaptations including: bill shape and prey type, wing length and migratory or resident status, rictal bristles and flycatching, large eyes and low light conditions, etc.

Migration

Migration remains in part a mystery to scientists and the average person. Twenty-three out of 25 respondents said it was a key theme in their banding demonstrations. Knowing wintering and breeding ranges and distances traveled for commonly caught species and presenting that information during demonstrations is an excellent way to inspire people about bird migration. Studying bird migration also helps us answer conservation questions such as ‘What are important stop-over habitats that need to be protected?’ or ‘What are important bird migration routes?’ Survival estimates of birds on wintering vs. breeding grounds can be used to help explain bird population declines. Many researchers are now participating in DNA studies to determine migratory patterns of related populations. All of these topics are interesting components of a banding demonstration.

An excellent way to teach people about migration is to join in the celebration of International Migratory Bird Day (IMBD). Mist-netting demonstrations are an excellent addition to an IMBD celebration. If your organization bands birds, consider organizing an IMBD celebration, or partner with your local Audubon group or environmental education center to create a celebration. Mist-netting in a fair/festival situation is different than a scheduled group visit. Visitors may arrive constantly throughout the morning, in a steady flow. This may put a strain on your staff and volunteers, es-

Pre-visit Planning

pecially if your site receives a high volume of birds. Having guided trips to mist-netting posted at scheduled times is one way to limit continuous traffic to the banding station. It is also important to have additional staff on hand to accommodate visitors. Keep in mind that public perception of mist-netting is critical, especially in a widely publicized community event.

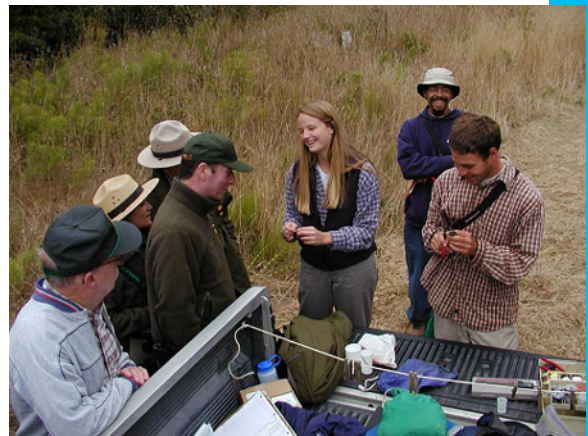
Connection with scientists and science as a career

Though this was not emphasized by a majority of the organizations surveyed, it is a topic that every banding demonstration should emphasize. Public perception of scientists is poor, and many youth don't consider being a scientist or biologist a career option. When you have a group at your site, tell them how you became a biologist and have your staff and interns do the same. Inviting the public to mist-netting demonstrations is an excellent way to broaden people's view of scientists and possibly open doors in a young person's life.

Logistics of a visit

Dedicating one person to interpretation and group management is critical to a successful mist-netting demonstration.

Your site and resources will determine many of the logistical concerns. Program length varies based on group size and site accessibility. A typical visit will last just over an hour with a maximum group size of 30 people. This hour assumes visitors will tour the nets in addition to the banding station. If groups will not be taken to check the nets the visit may be shorter. The majority of organizations surveyed took people to at least some of the mist-nets (18/25) and on average, 9 people at a time were taken on a net run. The largest group size taken on a net run was 20, however, I recommend that the number of people touring the nets not exceed 15 (typically half a normal school class size). Sites with narrow, heavily vegetated trails lend themselves to smaller group sizes. With groups approaching 30 people, splitting the group into two or more smaller groups (~15 students) is critical. To split groups, you must have enough staff and activities to simultaneously occupy each group. With a split group, one half accompanies at least two banders to check the nets and then observe the banding process. The other group is engaged listening to a talk, observing birds in the field, examining study skins, watching a video, etc. Then the groups switch. Splitting the group will extend the length of a visit because both groups engage in the full program.



Mist-netting demonstrations are generally offered in the morning, as constant effort mist-netting

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follows the protocol outlined in the Handbook of Field Methods for Monitoring Landbirds (Ralph et al, 1993). Having groups arrive mid-morning is best for higher capture rates, as more birds tend to be caught at this time . However, it is best to have groups arrive no earlier than after the first net run, allowing banders ample time to get organized. Realistically, most groups can't arrive at a site before 8:30 a.m., due to site location and limitations of the school day. The seasons and frequency of programs offered depends upon the monitoring protocol. Stations following the Monitoring Avian Productivity and Survivorship (MAPS) protocol are operated once every 10 days, during the breeding season only, and are thus limited in the number of groups that can be scheduled. Stations that mist net birds daily and/or year round can schedule more group visits. Scheduling visits in the winter is discouraged due to low capture rates and weather-related cancellations. In my experience, scheduling more than 3 visits a week may also result in staff burnout.

Another consideration is whether to offer your programs free of charge or for a fee. Of the 25 survey respondents, 12 charge some sort of fee. Fees were charged either per person (\$3-\$5 each) or a flat rate (\$35-\$125). Some groups ask for a donation of an unspecified amount. Consider your costs and funding sources, and if you will create a sliding scale or fee waiver for groups without sufficient funds.

Depending on the resources in your community, transportation costs for school groups may be prohibitive. You may be able to secure grants from education groups to cover bus fees. Check with your local school districts, Rotary clubs, local Audubon chapters, National Audubon Society and other natural history or conservation organizations for eligibility and availability.

Summary of logistic considerations

- Visit length 1–1.5 hours,
- Maximum group size—30 people
- Maximum number of people checking nets—15
- Program start time-between 8:00–10:00 am
- Offer visits spring, summer and fall
- Fees optional- \$3—\$5 per person or \$35—\$125 per visit

Staff Hiring and Training Guidelines

Hiring Guidelines

It is absolutely critical that biologists who operate your mist nets are good with people and are trained to talk with the public. Job, internship, and volunteer postings should list working with the public as a component of the position. In addition, it is extremely helpful to have one person dedicated to interpretation and managing the group, in addition to at least two people whose primary duties are to band birds. The North American Banding Councils' Banders Study Guide recommends that at least two people, preferably three, are necessary when groups are visiting (NABC, 2001, pg. 48-49). Twelve out of 25 organizations have a dedicated educator in addition to banding staff when a group is visiting, and 15 out of 24 organizations felt it necessary or preferable. Having enough people is key to keeping birds safe and maintaining a positive perception of mist-netting.

Training Guidelines

It is critical to have well trained and prepared staff, volunteers, and interns. The North American Banding Council has produced three publications relevant to banding passerines:

- The North American Banders' Study Guide (English and Spanish)
- The Instructors' Guide to Training Passerine Bird Banders in North America (English and Spanish)
- The North American Banders' Manual for Banding Passerines and Near-passerines (English and Spanish)

Information on how to obtain these publications is available at www.nabanding.net/nabanding/pubs.html. Certification with the North American Banding Council is also recommended.

Conducting practice runs prior to a group visit will prepare your staff for the visit. In addition, the outline for conducting a visit, pages 20-23, is a good training tool.

Visitors always want to know answers to a few key questions, such as 'Why are you doing this?', 'Who is your organization', and 'Where do you get your funding?' These and other commonly asked questions and answers can be found in the toolbox, page 33. Distribute or go over these with your crew. Make sure staff, interns, and volunteers can answer the big-picture questions about bird conservation and your organization. It is also important to know how to answer questions about injuries to birds. For more on this topic, see the *Bird and Human Safety* section.

Bird and Human Safety

Human Safety

Human safety is an important consideration when you bring people to an outdoor setting. As

Human safety checklist

- ✓ maintain trails
- ✓ assess visitor abilities
- ✓ warn about hazards
- ✓ communicate bathroom options when scheduling visits

described in the pre-visit planning section, rough terrain, creek crossings, and poisonous plants and animals could jeopardize human safety. Prepare your site for visitors, anticipate hazards, and be prepared with appropriate first-aid. For some groups, this may be the first time out of a city or urban area. Assess the condition of visitors before heading out on the net trail. If you have a question about a person's ability to navigate the

trail, describe the conditions and suggest they wait at the banding area for the rest of the group to return. If no restrooms are available, let people know ahead of time so they can make other arrangements.

Bird Safety

Bird safety should always be the number one priority after human safety. The North American Banding Council has published the Bander's Code of Ethics (see page 15) as a guide for safe bird banding. In addition, the North American Banding Council's *North American Banders' Study Guide* (NABC, 2001), addresses bird safety and injury prevention. All personnel should adhere to the code of ethics when banding birds and be familiar with bird safety considerations. Even when banders adhere to the code of ethics, situations may arise when a bird becomes injured or dies. If this happens when the public is present, their support and perception of bird banding is at stake. Therefore, it is important that banding presentations do everything possible to ensure that visiting groups do not interfere with bird safety.

Preventing injury is done by following the code of ethics, minimizing the time birds spend in nets and in hand, adhering to protocol, paying attention to weather conditions and the needs of individual birds, and knowing which species are vulnerable to stress, wing strain, or other injuries. When a group is visiting, it is important that these same guidelines are followed, despite the additional distraction. Follow these steps to prevent harm to birds:

1. Attend to sensitive bird species first and with the special attention they need.
2. Always have qualified, highly-trained banders handling and processing birds when groups are visiting.
3. Have the materials on hand to deal with stressed or cold individuals, such as a "hospital box" or other dark quiet container to put birds in until they are calm and warm enough to fly away.
4. Have sugar water on hand for hummingbirds and other first-aid items such as medical tape for splinting and styptic powder to stop bleeding.

For more on bird safety, please refer to the *Mist-netter's Bird Safety Handbook* (Smith et al., 1999) and the *North American Banders' Study Guide* (NABC, 2001)

Bird and Human Safety

System of communication

Banders should communicate with each other and education staff or volunteers about what they need in order to focus on the needs of the bird at

Bird safety checklist

- ✓ train staff in bird handling protocols
- ✓ monitor weather
- ✓ pay attention to sensitive species
- ✓ communicate with each other
- ✓ have a hospital box, or equivalent

all times. For example, difficult extractions from the net may be easier without a group watching. A good idea is to work out some phrases such as “Would you mind taking the group on to the next net? This bird is going to take a lot of concentration for me to untangle it” or “Why don’t you move on with the group to see what other birds we caught, and I’ll focus on this bird?”

Avoid displaying injured or dead birds to the public. If

asked directly about injuries and death it is important to answer truthfully and calmly. Calculate the injury rate for your site. It will likely be less than 1%. Knowing this will help you answer the tough questions about bird mortality. The following are some scenarios and suggestions for handling difficult situations with the public.

Scenario 1— Injured/dead bird at net

When checking nets, if you come across an injured or dead bird in a net, the bander who discovers it first should signal to the other bander to take the group on to another net while they attend to this bird.

Scenario 2— Injured/dead bird at banding station

When bringing birds back to the banding area, banders should be aware of the condition of the bird in the bag. If it is dead, don’t pull it out in front of the group; instead, move on to another bird and discreetly alert other banders of the situation so they can attend to the needs of that bird without the stress of people watching. If a bird shows signs of stress during processing, address it by placing it in the hospital box and explaining to the group what you are doing.

Scenario 3— Bird won’t fly away after processing

When a bird doesn’t fly off after banding, the bird should be picked up and placed in the hospital box if re-catching it won’t increase the bird’s stress. Let people know that the dark, warm, quiet box will help birds calm down, enabling them to fly away. At this point it is best to continue processing another bird or move the group on to another activity. If possible, have one bander release the bird when it’s ready, out of the public’s eye. Once it flies off, the bander can report back to the group if they are still present.

Scenario 4— Bird dies during processing

If a bird dies during processing in front of the group it is important to remain calm. Discuss possible reasons for the death: hatch-year birds are generally not as healthy, extreme heat or cold, prior injury, or unknown reasons. Talk about the mortality rate for your site, the precau-

Bird and Human Safety

tions you take, and the symptoms you look for to prioritize bird safety. Compare the mortality that results from mist-netting to that which may result from other causes. For example, survival estimates of wintering birds suggest that as many as half of the young birds caught in the fall will die of natural causes by the following spring. If you contribute dead birds to a study skin collection, mention that the bird becomes a valuable scientific specimen contributing to the knowledge of the species.

Other considerations

Many people are concerned about the impact to the bird from the weight of the band and the process of banding and measuring the bird. Explain that lightweight aluminum bands are negligible: bands increase most birds weight by less than 0.5%. In comparison, many birds increase their weight by 75-100% in preparation for migration. It is also good to point out that many healthy birds are recaptured, year to year, day to day, and even within a day, showing that banded birds are able to resume their lives after the brief banding process. Having examples of long-lived banded individuals demonstrates that banded birds can survive many years with bands. Know how long it takes you or your staff to process a bird, from start to finish (when a group is not visiting) as a way to illustrate the minimal impact to the bird. Always emphasize that bird safety is your first priority. Finally, be able to talk about the benefits of studying birds using mist nets.

Safe release techniques

Releasing the bird is often the favorite part of the program for visitors. Twenty of 25 organizations allow visitors to release the bird once it is banded. However, it is not always as simple as opening your hand and watching it fly away. If you band birds at a banding laboratory, be sure you are releasing birds well away from the building, windows, and parked cars. Birds may turn back when released and hit the window. It is also important to release birds close to the ground in an open area to allow for quick and easy recapture of a bird that immediately lands on the ground instead of flying off (NABC 2001, pg 26). Chasing a bird through shrubs or vegetation adds extra stress to the bird. Always assess the birds condition before you hand it to someone to release. If it looks stressed at all, release it yourself and away from visitors. A bird that does not fly away may leave the group feeling uneasy about the process of mist-netting. Finally, selecting one student in a large group of kids to release a bird may cause unnecessary disappointment among students.

Visitors often want to take photographs of birds prior to release. Photographs may increase handling time and delay processing of birds waiting to be processed. Holding a bird in the photographer's grip may also result in injury to the bird if it is agitated and flapping its wings wildly. It is OK to politely say no to visitors, explain why, and continue processing birds. However, if you have the time and staff to allow this, it can be an advantageous experience. Some people have speculated that the flash may be harmful or disorienting to birds. I have not found any evidence to support or disprove this. Some organizations ask photographers to turn off the flash as a pre-

Bird and Human Safety

caution. Remember, people who want to touch and photograph birds are doing so because they are amazed and excited about what they are seeing. When denying requests to touch and photograph birds, always do so in a kind and respectful manner.

Banding in a facility

Banding inside a facility raises another bird safety issue. Birds that escape during processing run the risk of hitting windows or walls or becoming difficult to re-capture. Be sure you have a long handled net for capturing birds from the ceiling or other means for safely capturing birds in an enclosed space. Opening doors and windows and asking the group to wait outside will help minimize stress and injury to the bird.

The Bander's Code of Ethics– North American Banding Council (NABC, 2001)

1. Banders are primarily responsible for the safety and welfare of the birds they study so that stress and risks of injury or death are minimized.

Some basic rules:

- handle each bird carefully, gently, quietly, with respect, and in minimum time
- capture and process only as many birds as you can safely handle
- close traps or nets when predators are in the area
- do not band in inclement weather
- frequently assess the condition of traps and nets and repair them quickly
- properly train and supervise students
- check nets as frequently as conditions dictate
- check traps as often as recommended for each trap type
- properly close all traps and nets at the end of banding
- do not leave traps or nets set and untended
- use the correct band size and banding pliers for each bird
- treat any bird injuries humanely

2. Continually assess your own work to ensure that it is beyond reproach.

- reassess methods if an injury or mortality occurs
- ask for and accept constructive criticism from other banders

3. Offer honest and constructive assessment of the work of others to help maintain the highest standards possible

- publish innovations in banding, capture, and handling techniques
- educate prospective banders and trainers
- report any mishandling of birds to the bander
- if no improvement occurs, file a report with the Banding Office

4. Ensure that your data are accurate and complete.

5. Obtain prior permission to band on private property and on public lands.

Preserving Data Quality

Preserving data quality was listed as another challenge when conducting educational programs with mist-netting. As with promoting bird safety, preserving data quality starts with making sure your banding crew members are well trained in the methods of bird banding and data collection. The North American Banding Council (NABC) has produced three publications relevant to banding passerines (see page 11). Banders can also be certified by NABC, which is a good way to ensure your banders are highly trained in bird banding techniques.



There are a few other tips for managing groups that can help maintain data quality. With large groups or busy capture sites, the extra time it takes to interpret banding can slow down processing. Having a dedicated educator trained in bird banding and handling birds makes a huge difference. The dedicated educator can take the group aside with one bird, data sheets, and banding equipment and go through the process slowly for the group. This enables the banders to continue processing birds without the extra time and focus required when interpreting banding. Splitting the group into two smaller groups also reduces the time it takes to interpret banding, as smaller groups are easier to manage. In addition, banders feel less crowded and pressured with fewer people. If you band at an extremely busy site, you may need additional staff, volunteers, or interns on days when groups are visiting. Keep this in mind and plan accordingly.

Developing Interpretive Tools

Using interpretive tools and materials will enhance your program by enabling you to reach all types of learners. If you are using a banding laboratory or visitor center, there are more options for permanent displays and multi-media tools but visual aids can be created and used in a field setting as well. The interpretive tools listed in the box below are used at bird observatories in North America. The most commonly used tools are band recovery statistics, field guides, and information on commonly caught species. Having these prepared as posters, handouts, student worksheets, or displays will enhance your banding demonstration.

Interpretive Tools Used in Mist Netting Demonstrations

Field guides

Student-created field guide to commonly caught birds (prepared prior to a visit)

One-page laminated field guide of common species for people to take home

Commonly caught species profiles and posters

Banding tools and/or extra banding kit with tools for people to touch

Binoculars

Mounted birds, study skins, and nature center displays

Overheads

Long-term bird monitoring activity (Toolbox page 30)

Skull ossification diagram (Toolbox page 25)

Illustrations of the banding process

Migration maps and band recovery maps (Toolbox page 32)

Video of banding process

Demonstration net or piece of mist net for people to touch

Aerial photos of research site and nets

Bird nests

White board for group data collection

Birds In Hand and Field (Toolbox page 27)

Longevity records (Toolbox page 28)

Many of these tools can be easily and inexpensively made with a printer and laminating machine. Some organizations offered their examples for inclusion in this guidebook to be adapted, duplicated, or purchased as indicated in the Toolbox section, pages 25-37.

Publicizing Your Opportunity

If you are going to spend the time and energy preparing for and offering mist-netting demonstrations, it is important to advertise it. How you advertise and recruit participants depends upon your audience. The most common audience type participating in mist-netting demonstrations is the kindergarten through 12th grade category (K-12), followed by community groups, college groups, and managers. Community groups include members of the public and special interest groups such as Audubon Societies, Boy and Girl Scouts, naturalists, birders, visiting scientists, and Elderhostel groups.

K-12 Audience

If you are trying to encourage participation from the K-12 audience, contacting local schools is the best place to start. Distribute flyers to local school districts or schools that include contact information and critical notes about scheduling. More effective than sending flyers is to make personal contacts with the school principal or teachers. Specifically targeting science teachers in middle and high schools is also effective. Finally, linking this opportunity with school science standards, both federal and state, will encourage school participation as well (see page 37 for National Science Education Standards for the U.S.).

Community groups

Distributing flyers and making presentations at community meetings is a good way to get the word out to your local community. Announcements in weekend editions of newspapers, travel magazines, and newsletters of similar organizations are excellent ways to draw people in. Make sure you clearly state that group visits must be scheduled in advance, and include appropriate contact information. If you have a site that is open to drop-in visitors, consider setting a size limit for what constitutes a group versus a family stopping by. Usually, groups of 5 or less can be easily handled in a drop-in situation.

Managers and partners

Encouraging managers and partners to visit mist-netting stations is an excellent way to translate scientific findings to conservation planners and partners and secure continued support and funding. A personal invitation is the best way to involve managers and partners. When working on publicly or privately managed land where research on other taxa may be occurring, consider inviting other biologists to learn about the bird research and share findings. This will help avoid conflicts in research methods as well as to encourage collaborative research programs.



Publicizing Your Opportunity

Partnerships

If you do not have education staff available to conduct program promotion, consider partnering with other environmental or conservation education groups. Offer a banding demonstration as a component of existing programs. For example, local Audubon groups often have dedicated volunteers or staff members conducting educational programs and could add your mist-netting demonstration to their programs. This would raise exposure for your organization, educate people about science and conservation, and increase the diversity of program offerings for the partner group. The partner could handle publicity and advertising.

Media visits

Inviting the media to observe mist-netting may be a good way to promote your message or to raise the profile of your organization. However, media representation may be misleading as technical terms are often not presented accurately. To prevent this, it is critical to have the following items ready during each visit with a media representative:

- mist-netting fact sheet (Toolbox, page 25-37)
- a handout with the main points you want to emphasize
- commonly caught bird list with bird names spelled accurately to prevent articles about 'miss nets' and 'olive sighted' flycatchers
- contact sheet with your contact information as well as the names spelled correctly, of all staff, interns, or volunteers present that day

It is also a good idea to ask to review the final article, though it is very rare that a writer will grant you this request. Understand that media representatives work under tight schedules and odd hours, often finishing a story the evening before it goes to print. Ask about the printing deadlines and offer to help answer questions. If a printed article has mistakes and inaccuracies contact the author and politely point out the mistakes. Creating a good relationship with one or two media contacts will improve the quantity and quality of your media exposure pieces in the future.



Conducting a Visit

Now that you have prepared your site, hired and trained enough staff and developed a plan for bird and human safety, you are ready to host a group. Based on my experience conducting mist-netting demonstrations, I present the following outlines and some specifics on terminology and interpretation.

Visit Outline for groups of 15 or fewer, times are approximations

- 9:00 Group arrives, greet group at parking area, welcome, introductions, and program outline—what can the group expect: restrooms, backpacks, time, terrain.
- 9:10 Check the nets—go over the rules prior to departing for trail
- 9:40 Banding site—interpreting banding process and questions
- 10:10 Other activities: birding, visitor center, nature writing etc. if time
- 10:30 Both groups together: wrap up, conclusions, review what they learned and departure

Visit Outline for groups larger than 15, times are approximations

- 9:00 Group arrives, greet group at parking area, welcome, introductions, and program outline—what can the group expect: restrooms, backpacks, time, terrain. Split group.
- 9:10 Group 1—Check the nets and band birds—go over the rules prior to departing for trail
Group 2—begin alternative activity: birding, visitor center, nature writing, bird specimens, etc.
- 10:00 Switch groups—Group 2—check nets and band birds Group 1—alternative activity
- 10:50 Both groups together: wrap up, conclusions, review what they learned and departure

Conducting a Visit

Checking the Nets

The following are some tips and suggestions for checking nets with the public. These may need to be adapted for your site. This section could be copied and given to staff, interns, and volunteers as a training tool.

Notes for Banders

The following are considerations for taking groups to check mist nets:

Work in pairs: Always have at least two people who can comfortably extract birds from nets when taking a group on the net trail.

Help each other out: Partners should be aware of how the bird being extracted is caught. If it is really tangled, one person should take the group to the next net, giving the person extracting the bird the time and space needed for difficult extractions. This also eliminates fears for bird safety among the participants.

Know your group: Walk slowly; be aware of the age of your group. Very young and old visitors may have trouble keeping up with the fast pace of young field biologists. Stop periodically to let people catch their breath, and assess the group's ability. Don't let the group get spread out.

Enjoy the surroundings: Point out birds flying overhead to the group, take time to talk about the habitat and listen to bird songs.

Leave extra stuff behind: Have participants leave all backpacks in a safe location at the banding site. Backpacks and extra stuff may get tangled in mist nets or slow people down along the trail.

Try to make sure everyone sees a caught bird: If you have a split group and you catch a bird with one group, show the bird to the group engaged in another activity. This can be as brief as holding the bird for the group engaged in another activity to see. This is particularly important for sites with low capture rates.

Rules for Visitors

Before you begin the hike to check the nets, it is important, especially with young students, to go over the rules for your site. How you talk about these rules and what rules you institute will vary by site. I have summarized some concerns into three rules. The corresponding text is how I introduce them to children:

1. Stay on the trail: Who knows what poison oak is? Poison oak is an important part of the habitat for many bird species. Some birds choose to nest in poison oak and even use the bark to build their nests. We keep the trails clear of poison oak so if you stay on the trail you won't get poison oak. (People often ask if birds get poison oak. No they don't, but they can spread it to banders who handle them.)

2. Keep voices down and walk: Remember, we are about to enter a study area. Who wants to catch birds today? Great, me too, and we will have a better chance of catching them if we are walking and talking quietly while we go on the net trail.

3. Keep out of the nets: The nets are very delicate and can tear easily. If you have any backpacks you can leave them at the banding area, and as we walk close to the nets, try to keep

Conducting a Visit

your arms in (demonstrate how) to make sure your watches or jewelry don't get caught. (Remember, some kids and adults will always touch the nets, it's inevitable. I like to let people touch a net that does not have birds in it at the beginning of the trail to get it out of their system. Avoid spending the entire hike telling kids to keep their hands out; there are many more interesting things to focus on.)

A journey along the trail

Starting at the first net, have the participants stand a few feet away from the net to view it. Explain how the net is hard to see by having them look through the net and focus on the vegetation. When you do this, the net becomes nearly invisible. Using a rolled up bird bag, toss the bag into the net to show how a bird gets caught. This is a good time to talk about when you open and close the nets, how often you band birds at this site, and to answer any questions.

Proceed along the trail, again stopping to see how the group is doing. I like to stop at certain points along the way to point out changes in habitat or interesting notes about the surroundings. Stop somewhere along the way and have them stand quietly to listen to how many different birds they can hear.

If you did not get any birds, take the group back to the banding area and show them the bands and pliers and talk a bit about what you would have done if you had a bird. Some organizations have a video they play of the mist-netting and banding process. This would be an excellent tool for sites with a low volume of birds captured.

If you did get birds, take the group to the banding area, and go through the steps of banding with them.

Interpreting the banding process

Once gathered, wait for the group to quiet down before taking the bird out of the bag. I find it works well to have one person band and process the bird while I narrate. It is important to use basic terms or clearly define unfamiliar terminology. Terms such as brood patch, ossification, and even wing chord will need explanation. Here are some ways to talk about the different terminology of the banding process.

Brood patch— When birds have eggs in the nest that they need to keep warm or incubate, they lose the feathers on their belly so that their warm skin comes in contact with the eggs. This featherless area on a bird's stomach is called the brood patch. In most cases, only females develop a brood patch so it is very useful for determining males from females. Show diagrams if possible.

Conducting a Visit

Cloacal Protuberance — This is something that males develop in the breeding season only. The cloaca is the main organ for fertilization for birds and, when males are ready to breed, it becomes enlarged. The size of the cloaca can help determine a male from a female. Show diagrams if possible.

Molt — We also look at how a bird is molting or changing its feathers. We can sometimes determine a bird's age by looking at how it molts its feathers. The specific information we need to determine a bird's age from feather molt is outlined in this guide: *Guide to Ageing and Sexing Passerines*, Peter Pyle. This is an amazing resource for scientists who mist-net birds, but not something you would want to take birding with you (let people have a chance to see the guide if interested).

Skull ossification — When birds first hatch from an egg they have one thin layer of bone over their head. You can see right through the first layer and it looks pink. Then when the second layer grows over the top the bone becomes ossified or fused and it appears white. We look through the birds' skin to see if there is a contrast between white bone and pink. If we find a contrast we know that the bird is less than one year old. If it is solid white bone then it is at least one year old. You can use the skull poster as a tool for this (Toolbox, page 25).

Wing Chord — This is a measurement we take on all birds. It is sort of the equivalent of measuring someone's height. For some birds the length of a bird's wing can also help us tell males from females.

Body Weight— We record the weight of each bird, teaching us about the health of a bird and sometimes to help us tell males from females. (Describe your weighing process — if using a canister, explain that the birds are OK as they go head-first into the cup. If using a paesola, this may be a good opportunity for a student to have a hands-on experience. Let them hold the paesola and read the weight. Make sure you talk about weighing the bag first.

When finished, let the group watch you release the bird if possible. Please follow the guidelines for releasing birds with a group outlined in the Bird and Human Safety section, page 14.

Program Evaluation

As with all educational programs, it is critical to evaluate your ability to successfully conduct and deliver your message. Program evaluation is important for accountability to a funding agency. However, program assessment is important for much more (Thomson and Hoffman, 2005). Assessment is a way to check for understanding and determine if ideas or concepts are being taught (Colburn, 2003). Assessing your ability to meet the goals of your program enables you to revise your methods and programs to focus on areas where understanding gaps exist.

Traditional evaluation methods often take the form of written tests, evaluations, and tracking number of participants. Tracking the number of participants is a good way to determine participation but may not tell you much about what your audience learned. Written evaluations are an effective way to capture what people learned, but it can be difficult to encourage participants to fill out an evaluation on-site after a program. Alternative assessment tools are more appropriate for informal education programs. Student groups often write thank you letters or send drawings; these are useful for demonstrating what they learned. Having a post-visit activity for teachers to conduct in the classroom and asking teachers to share results is another good idea. Verbally asking students to describe what they learned or enjoyed at the end of a program is a valid form of evaluation and allows you to immediately address misconceptions, but this method is difficult to document. Sign-in books can be used to capture comments from people as they leave your site. Regardless of your specific program goals, some form of evaluation technique should be used in conjunction with your program.

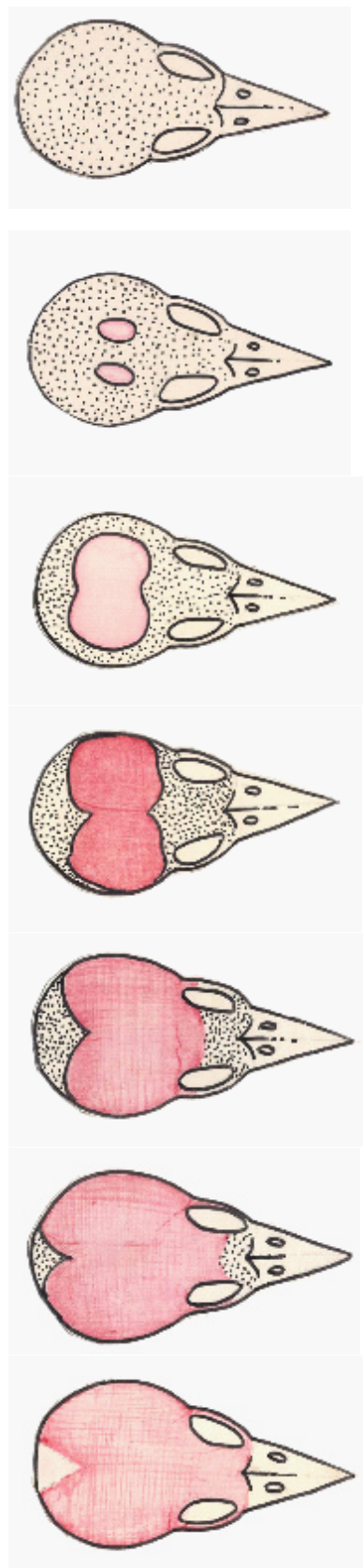
Toolbox

The following pages contain a set of interpretive materials you may find useful when conducting mist-netting demonstrations. You may copy materials right out of this manual for use at your site, modify them to meet your needs, and in some cases purchase copies from the organization that created them.

Toolbox

Skull Ossification Chart (PRBO Conservation Science)-ok to use at your site

Skull Ossification in Young Birds A tool for ageing birds



Complete
Skull

First hatched
from egg



Toolbox

Banding Station Scavenger Hunt, (Klamath Bird Observatory)

Ok to use/modify for your site.

Scavenger Hunt



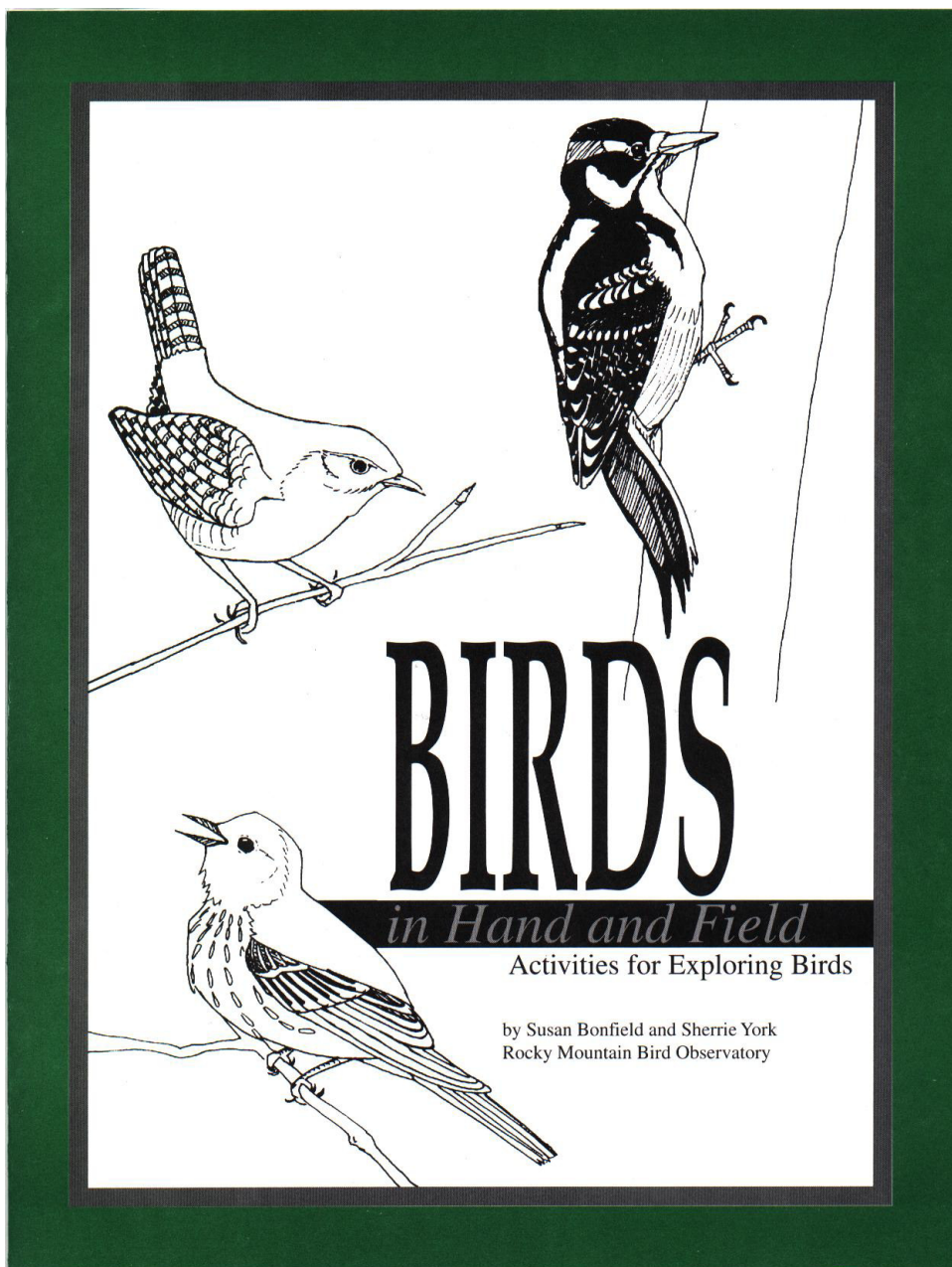
Welcome to Klamath Bird Observatory! Our scientists use many tools to help them collect data. They also use many observation skills to find birds. Today during your visit at the banding station, see how many things you can observe on the list. Good luck!

- Cloth bags
- Mist nets
- Clothespins
- Bands
- Banding pliers
- Band removers
- Gauge
- Calipers
- Optivisors
- Wing rulers
- Data sheets
- A hotbox for birds
- Flashlight
- Radios
- Camera
- A bird that still has juvenile feathers
- A bird caught with a band showing it has been previously caught
- Tabular Pyle Guide

Toolbox

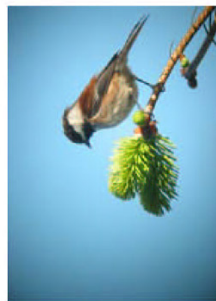
Birds in Hand and Field, (Rocky Mountain Bird Observatory)

Biologists the world over use banding to study bird migration, populations, and habitat use. This 16-page booklet is filled with activities for learning about this important research method. Topics include basic bird identification, migration, data collection, and more. Suitable for grades 1-7, and used in training adults at bird banding stations. Available in English and Spanish. Cost: \$5 plus \$2 shipping and handling. To order, contact Shelly Morrell, Education Division Director, Rocky Mountain Bird Observatory, 230 Cherry Street, Fort Collins, CO 8052, 970-482-1707 www.rmbo.org



How Long Can Birds Live?

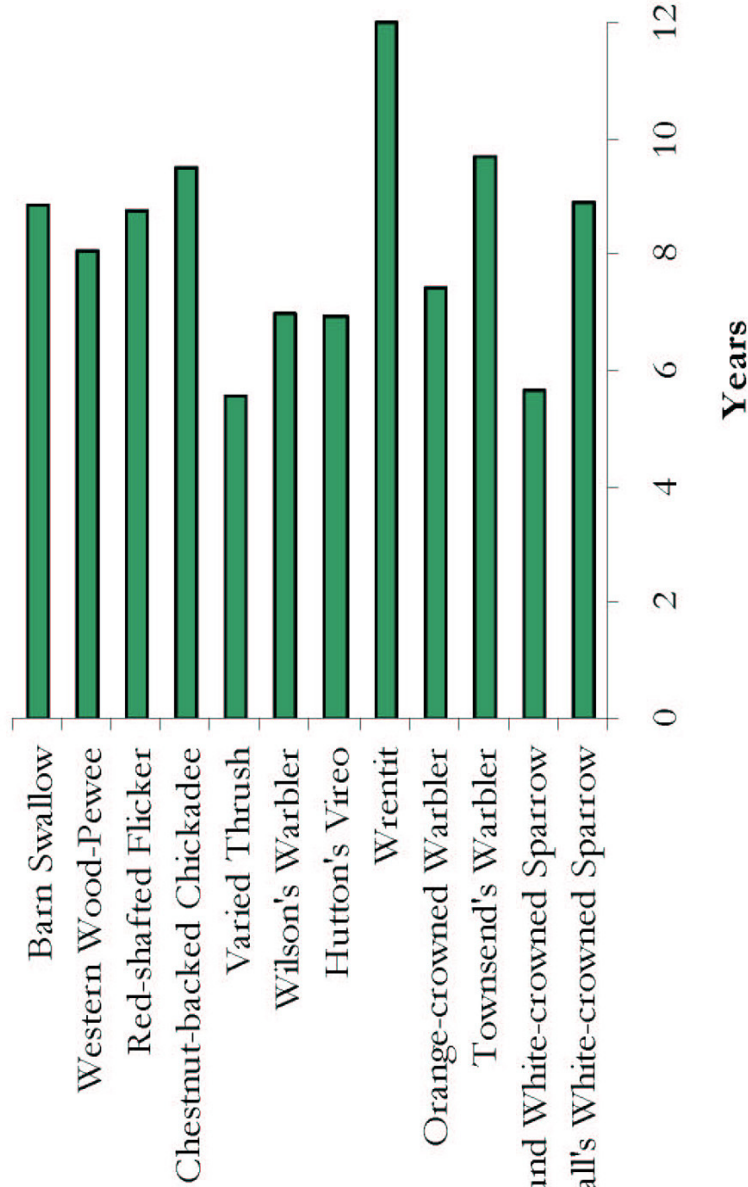
Here at PRBO, our long-term mist-netting program allows us to recapture many birds. These data contribute to numerous findings about our birds, including longevity records for several species.



Chestnut-backed Chickadee



Orange-crowned Warbler



Toolbox

Toolbox-Bird Banding Fact Sheet, (Klamath Bird Observatory)

OK to use for your site.

Bird Banding Fact Sheet



What is bird banding?

Bird banding is a method used by scientists to study birds. Birds are safely caught by scientists and given an identification band. A band is a small aluminum ring that fits around the bird's leg like a bracelet. The band is engraved with a unique number, allowing scientists to keep track of each individual bird. No other bird will have the same number.

Why do scientists band birds?

Putting a band with a unique number on a bird allows scientists to keep track of each individual bird when it is caught again. This is important for answering questions (testing hypotheses) about birds. Some of the questions bird banding allows scientists to answer include: How long do birds live? Where do birds go? What birds are present at this site? How are bird population numbers changing over time? and How many baby birds were born each year? Answering these questions provides information useful in protecting birds and their habitats.

How do scientists catch the birds?

The birds are gently caught in soft, fine nets called mist-nets. These nets are stretched between two poles, usually among trees and bushes. The birds cannot see the nets, so they fly into them. Scientists carefully remove the birds from the nets so they can be banded and released unharmed.

Who bands birds?

Scientists from bird observatories, government agencies, research organizations, and graduate schools band birds as part of their research programs. In order to band birds you must have a permit and be trained to safely handle and band birds. All the data collected on birds banded in North America is kept by the Bird Banding Laboratory of the US Department of the Interior and is available for any scientist to access.

How many birds are banded each year?

Each year approximately 1.1 million birds are banded. In total, 57 million birds have ever been banded.

What do I do if I find a banded bird?

If you find a banded bird report it to **1-800-327-BAND** or on the web at www.pwrc.usgs.gov/BBL/homepage/call800.htm.

Toolbox

Warbling Vireo Graphing Activity

(PRBO Conservation Science) - ok to modify for use at your site.

Grades 3 and up (the information and questions can be adapted to the audience)

1. Introduce Banding / Mist-netting

- What is banding and mist-netting?
- Why study birds? (Birds are indicator species, etc.)
- What can we learn from banding birds? (i.e. productivity and survivorship)

2. Introduce Warbling Vireos

- What type of bird is a Warbling Vireo?
- What time of year do we catch them in our nets (get them thinking about Warbling Vireos' life cycle, breeding, migration, etc.)?
- Why would we want to study them using mist-nets?

3. Break into groups of 2 students (or keep them together)

- Each group (or individual) will receive a special card containing actual data from PRBO's Palomarin Field Station mist-net study, including number of Warbling Vireos captured in the nets during a specific year.
- Call on students (or groups) to plot each point (you can also choose select points to plot to save time)
- They must use their card to plot the data point on the white board graph.
- After all points have been plotted, ask a volunteer group to complete the graph by connecting the data points with a line.

4. Discuss Results

- Ask for volunteers to interpret the graph; What do they think is happening with the Warbling Vireo population; Do they think having many years of data is important (compare looking at only a few years versus all years on the graph)?
- What can we do with the data? (i.e. find out more about the problem by nest searching, use information for recommendations to land managers, etc.)
- Draw on importance of long-term data by talking about up-down cycles in population numbers.

Suggested Items to Use for Activity:

- Dry erase white board with markers, with a blank graph with grid lines and years on the x-axis and numbers on the y-axis drawn on in permanent marker, This makes it easier for the students to find and plot their data points)
- 28 PRBO Warbling Vireo Data Cards (laminated)
- Yard Stick (to help students with plotting points)

There are a total of 28 laminated cards for students in this activity. Each card represents a data point and allows students to plot each point on the graph, as explained in the activity outline above.

Toolbox



38

Warbling Vireos

caught in

1997

at Palomar



19

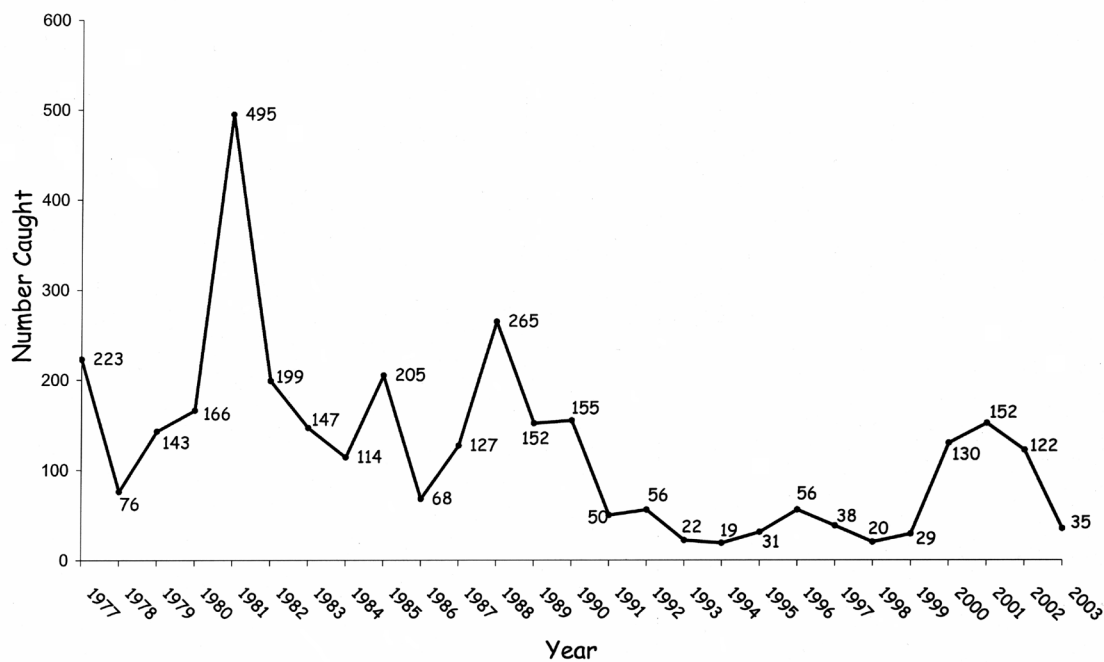
Warbling Vireos

caught in

1994

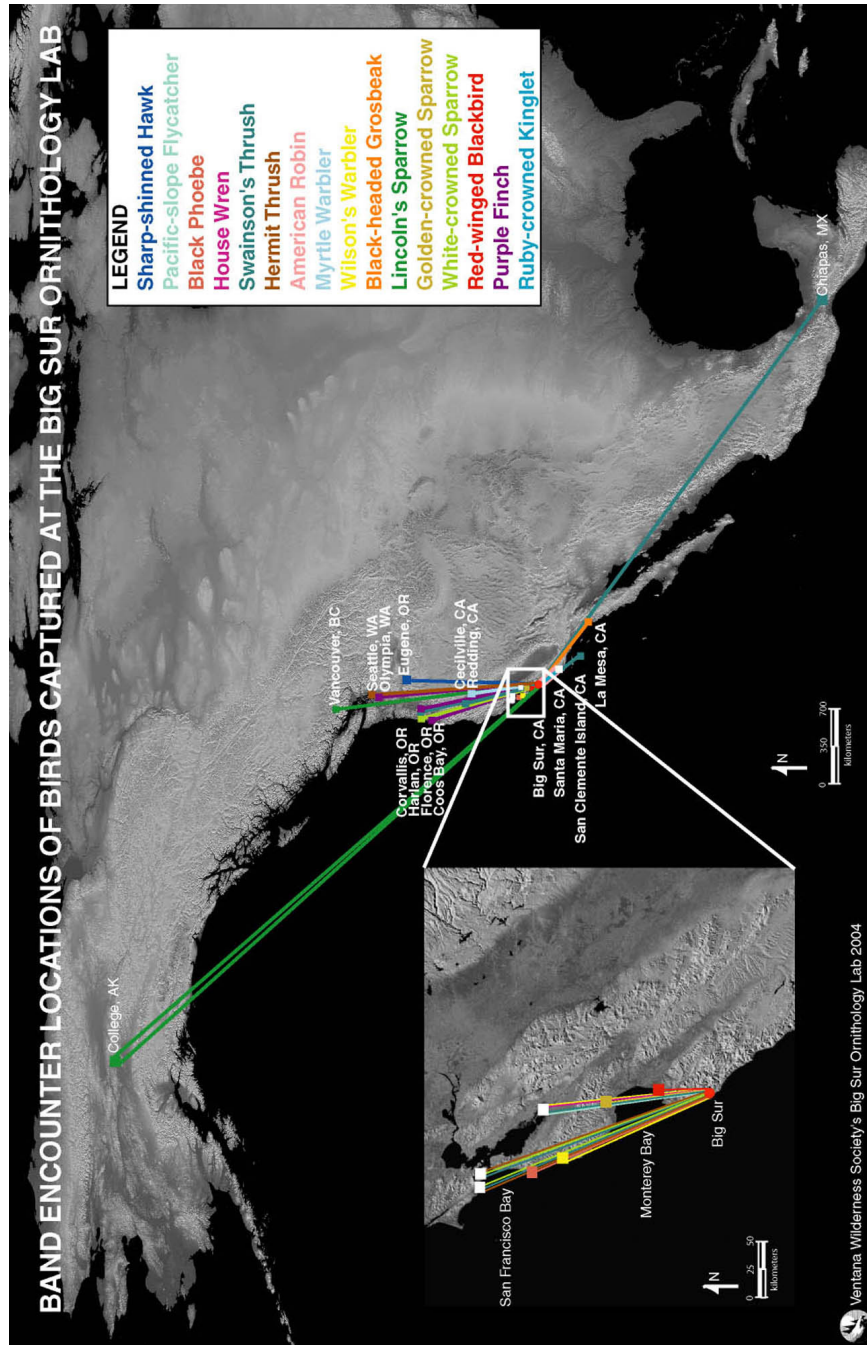
at Palomar

Number of Warbling Vireos Caught at Palomar Field Station



Toolbox

Band Recovery Map, (Big Sur Ornithology Lab)



Toolbox

Commonly Asked Questions, (PRBO Conservation Science)

Created by PRBO Conservation Science - ok to modify and reproduce.

Commonly asked questions and answers for bird banding demonstrations.

- 1. Do the bands hurt the birds?** No, the band fits around their leg, loose like a bracelet, not as tight as a watch.
- 2. Does the band impede their flying?** No, studies on captive birds have shown no effect. The bands for small birds are made of aluminum (the same material soda cans are made from), and they are very light.
- 3. Do birds ever die or get hurt in the net?** Very rarely. We are very careful to always put the birds' safety first. By watching how the birds are behaving we can tell if the bird is under stress and we would let a stressed bird go or put it in our hot box to warm up before letting it go.
- 4. The birds you are holding seems so calm, why is that?** The way I am holding it keeps it from struggling. Its wings are pressed against the back of my hands and my fingers are actually on its shoulders.
- 5. Do you ever catch the same bird twice, or twice in one day?** Yes, about 1/3 of the birds we catch are re-captured. It is really our hope to re-capture birds. That way we can learn things such as how long birds live (survivorship) and how birds change as they age. When we re-capture migratory birds from season to season we are able to tell that that individual survived the winter and migration. We do also catch the same bird in one day usually this occurs in the breeding season when birds are very distracted and are busy defending territories and feeding young. Some individuals may learn where the nets are located, but the fact that we catch them repeatedly even in a day suggests that learning to avoid the nets is not a major factor in the population declines we notice.
- 6. If you catch a bird again, do you just let it go or do you still band it?** If we catch a bird with a band already, we still process it, or take all the data, because this can teach us about how the bird has changed since we last captured it. If we catch the same bird twice in one day then we weigh it again and release it.
- 7. Why are you banding birds here?** Mist-netting and bird banding allows us to monitor long-term changes in bird populations and relate them to factors such as weather, restoration, and habitat change. Banding allows us to determine how long birds live (survivorship) and how successful the population is at producing young. By understanding these factors we can better conserve bird populations.
- 8. Are you part of the National Forest, or Audubon?** Fill in answer for your organization/affiliation
- 9. Do you receive government funding?** Fill in answer for your organization/affiliation.
- 10. Where do you get your funding?** Fill in answer for your organization/affiliation.
- 11. Can I hold the bird?** No, we can't let you hold the birds, it takes time to learn to safely hold birds and we need to quickly finish the banding process so we can let the bird go.

Toolbox

Bird Banding Brochure, (Rouge River Bird Observatory)

**Bird
Banding
Frequently Asked
Questions**



Rouge River Bird Observatory
University of Michigan-Dearborn
Dearborn, MI 48128
www.rtrbo.org

You can help

Ecological research of this nature requires a long-term commitment to data-gathering. RRBO is supported entirely by donations. UM-D provides facilities and extensive support services. But all of our operational funding comes from external sources. Only with continued outside funding will the data and information we are compiling make a valuable contribution to bird conservation and ornithological research.

For more information or to make a donation, please contact:

Orin Gelderloos (313) 593-5339

About our logo

UM-Dearborn is located on property that was once the home of Henry Ford. Ford was not only an industrial leader, but a great nature and bird lover – he was instrumental in convincing Congress to pass the Migratory Bird Treaty Act. Throughout Ford's estate, Fair Lane, there are carvings and other representations of birds. The bird in our logo is taken from a copper ventilator cover in the powerhouse at Fair Lane, and reflects the historic nature of our location.

Who can band birds?

The banding of birds in the United States requires a federal banding permit, issued by the U.S. Department of the Interior. Banders are a select



group. There are currently only 4000 permit holders in the United

States. Applicants who are at least 18 years of age and are able to identify all of the common birds in their different seasonal plumage may apply for a bird banding permit. Persons who want to apply for a banding permit must be able to show that they are qualified to safely trap, handle, and band the birds. Only those persons who are well qualified and have a well-defined research project are issued banding permits. You can visit the federal Bird Banding Lab web site at: <http://www.pwrc.usgs.gov/bbl/>

If you would like to learn more about the Rouge River Bird Observatory, call (313) 593-5338, or visit our web site at: www.rtrbo.org

Toolbox

Bird Banding Brochure, (Rouge River Bird Observatory)

What is bird banding and how are birds banded?



Bird banding is a tool that enables biologists to obtain information about birds, much of which they couldn't acquire in any other way. Birds are captured in fine, nearly invisible nets called mist nets. They are fitted with a special, lightweight aluminum leg band that is inscribed with a unique, nine-digit number. They are identified to species, age, and sex, and measurements are taken. The birds are handled for about 15 minutes, and released unharmed.

Isn't it stressful for the birds?

No, in fact, while in the nets most birds are very calm when they are left alone. That's why it is so important that the birds are not approached except by experienced, trained staff who can immediately and safely remove the birds from the nets. We monitor the nets at least once every hour. After removal, birds are then placed in individual cloth bags, which keeps them safe and calm.

What can we learn from bird banding?

Bird banding is necessary to gather data about:

Population dynamics

- ◆ Survival rates and longevity
- ◆ Annual productivity
- ◆ Establishing population trends
- ◆ Delineating separate populations

Bird movements

- ◆ Migration routes
- ◆ Tracking range expansion and new colonizations
- ◆ Dispersal between and within populations



Ecology of birds

- ◆ Territory size
- ◆ Habitat requirements
- ◆ Social structure
- ◆ Annual cycles (nesting, molting, migration)
- ◆ Importance of migratory stopover areas via individual stopover times and weight gains



Occasionally, predators may find the birds, or accidents may occur. The injury rate for bird banding across North America is less than 1% of all birds banded. This would roughly equal 11,000 birds annually. Compare this to some other human-related casualty rates:

Outdoor pet cats: Tens (perhaps hundreds) of millions of birds per year (39 million in Wisconsin alone, according to a recent study)

Glass windows: Tens of millions per year

Television towers: Nearly 5 million per year

And none of these human-related sources of death contributes to a further understanding of birds in the way that bird banding does.



Toolbox

Sample

~ Feedback Form-Teachers~

Your feedback is important to us! We intend to improve the quality of our programs by incorporating feedback from participants in our mist netting demonstration. We welcome **all** comments and suggestions for change.

Do you feel this program contributed something to your science education programs? Please state why.

What did you and your students enjoy most about the mist netting demonstration?

What did you and your students enjoy LEAST about the mist netting demonstration?

Is there anything you would add or change?

Please place any additional comments on a separate page.

Name (optional): _____

Affiliation: _____

Thank you! Please return this form to us, either via fax or email.

Add your contact information here

Other Useful Information

National Science Standards

The full content standards for life sciences can be found online at the National Science Education Standards webpage in chapter 6: <http://books.nap.edu/html/nses/6a.html>.

Peer reviewed literature on effects of bird banding

Ishida, Ken Safety of Ringing Techniques: Load of Ring Weight to Small Birds. Strix, Vol. 11. p. 293-298. 1992. In Japanese with English summ. WR 240 ISSN: 0910-6901

Berggren, Asa; Low, Matthew. Leg problems and banding-associated leg injuries in a closely monitored population of North Island robin (*Petroica longipes*) Wildlife Research, 31(5): 535-541; 2004 ISSN: 1035-3712

Haas, William E.; Hargrove, Lori A Solution to Leg Band Injuries in Willow Flycatchers. Studies in Avian Biology, (26): p. 180; July 2003 ISSN: 0197-9922

References

Bird Banding Laboratory (BBL). 2005. Memorandum to all banders, MTAB87. USGS Patuxent Wildlife Research Center, Bird Banding Laboratory, Laurel, MD.

Caduto, Michael J.. (1985). A Guide to Environmental Values Education. Environmental Education Series #13, UNESCO-UNEP International Environmental Education Programme.

Gardali, T., G. Ballard, N. Nur, and G. R. Geupel. 2000. Demography of a declining population of Warbling Vireos in coastal California. *Condor* 102: 601-609 (www.pwrc.usgs.gov/BBL/mtab/mtab87.htm#permit)

Mead, M., and R. Metraux. 1957. "Image of the Scientist among High School Students: A Pilot Study," *Science* 126: 386-87.

McNamara, C. (1999). Basic Guide to Outcomes-Based Evaluation in Nonprofit Organizations with Very Limited Resources. www.managementhelp.org/evaluatn/outcomes.htm

Nadkarni, N. 2004. Not Preaching to the Choir; Communicating the Importance of Forest Conservation to Nontraditional Audiences. *Conservation Biology* 18(3): 602-606/

National Science Board 2002. Science and Engineering Indicators 2002. US Government Printing Office, Washington, D.C.

National Science Foundation (NSF). 2004. Environment, Taking the Long View. Report. www.nsf.gov/about/history/nsf0050/environment/environment.htm

North American Banding Council (NABC) 2001. The North American Bander's Study Guide. The North American Banding Council. Point Reyes Station, CA. (www.nabanding.net/nabanding/pubs.html).

Pitkin, M. 2005. Useful products for forest bird conservation: A session summary. *in* California Partners in Flight, Flight Log Newsletter 15, Summer 2005. 9pp

Pitkin, M. 2005. add thesis citation here.

Rahm, J. and P. Charbonneau. 1997. Probing stereotypes through students drawings of scientists *American Journal of Physics* 65, 774

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of field methods for monitoring landbirds. Gen. Tech. Rep. PSW-GTR-144. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 41 p.

RHJV 2004. Version 2.0. The Riparian Bird Conservation Plan, A strategy for reversing the decline of riparian associated songbirds in California. California Partners In Flight. www.prbo.org/calpif/.

Smith, H., J. McCracken, D. Shepnerd, and P. Velez. 1999. The Mist-netter's Bird Safety Handbook. Institute for Bird Populations, Pt. Reyes Station, California. 105 pp.

Thomson, G. and J. Hommfan. 2005. Measuring the success of environmental education programs. Canadian Parks and Wilderness (CPAWS) www.cpawscalgary.org/education/evaluation/

Trombulak, S., K. Omland, J. Robinson, J. Lusk, T. Fleischner, G. Brown, M. Domroese. 2004. Principles of Conservation biology: Recommended Guidelines for Conservation literacy from the Education Committee of the Society for Conservation Biology. 18(5): 1180-1189.

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