

TEENS BAND: INSPIRING TEEN BIRD BANDERS AS AMBASSADORS FOR BIRD CONSERVATION

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Abstract. During the past five late summer seasons, members of the Puget Sound Bird Observatory have run a week-long banding workshop for high-school students in partnership with Seattle Audubon at five sites in Washington's Cascade Mountains. The data collected assesses the importance of montane meadows for supporting birds undergoing prebasic molt and how the resources the birds use are affected by late-summer desiccation. At the same time, the program has trained 32 teens from four states in bird-banding techniques. Camping on the edge of wilderness areas while collecting meaningful data instills in these teens a sense of wonder for Nature while using the scientific method to learn about it. Many of these students are now pursuing careers in conservation and wildlife biology. In 2009, PSBO expanded banding activities in order to sample additional sites and to better track meadow use by molting individuals, as well as to train more teen banders. Further, participants from Seattle Audubon Society's BirdWatch Student Naturalist Program for high school students, of which most of our trainees are members, translate their summer bird-banding experience into public outreach programming as banders and docents at a monthly bird-banding project in an urban park with high public exposure. The excited and skilled teens engage visitors effectively and are powerful ambassadors for bird conservation.

Key Words: bird bander training, bird banding, bird banding demonstrations.

BANDEOS ADOLESCENTES: INSPIRANDO A JOVENES ADOLESCENTS PARA BANDEAR Y SER EMBAJADORES DE LA CONSERVACIÓN DE LAS AVES

Resumen. En los últimos cinco veranos, miembros del Puget Sound Observatory en colaboración con la Sociedad Audubon de Seattle, han ofrecido talleres de anillamiento de una semana en las montañas de las Cascadas para estudiantes de secundaria. Los datos colectados evalúan la importancia de las praderas montañosas para aquellas aves que se encuentran en la muda pre-básica, y como los recursos que las aves usan son afectados por las sequías tardías del verano. Así mismo, este programa ha entrenado a 32 adolescentes de cuatro estados en técnicas de anillado de aves. Durante campamentos en áreas naturales en los cuales se colectan datos importantes, se promueve en estos jóvenes un sentido de apreciación de la naturaleza usando el método científico para aprender sobre ella. Muchos de estos estudiantes se encuentran actualmente siguiendo carreras profesionales en conservación y fauna Silvestre. En 2009, expandiremos nuestra actividades de anillamiento para muestrear adicionales sitios y monitorear mejor el uso de las praderas por los individuos en muda, así como entrenar mas anilladores jóvenes. Además, participantes del Programa de jóvenes naturalistas y observadores de aves de la Sociedad Audubon de Seattle, muchos de los cuales son entrenados en nuestro programa, tienen la oportunidad de aplicar la experiencia ganada en el verano y servir de anilladores y educadores en un proyecto mensual de anillamiento de aves en parques urbanos y con alta exposición pública. Estos dinámicos y entrenados jóvenes tienen éxito entusiasmando a los visitantes y son los mejores embajadores para la conservación de aves.

INTRODUCTION

Harnessing the excitement of teens can be an effective outreach technique at banding stations when those teens are both qualified and knowledgeable and fit into a framework designed specifically for them. Puget Sound Bird Observatory (PSBO), in conjunction with

Seattle Audubon's BirdWatch Student Service Corps, is developing a public outreach program in which trained youth naturalists band birds and interpret their findings to the public. For this task, the teen naturalists must be competent banders, effective public ambassadors, and conservation advocates. This paper focuses on training competent teen banders, detailing

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TABLE 1. SUCCESSFUL TEEN BANDER TRAINING CLASSES DEMAND KEY ELEMENTS. THE TRAINEE POPULATION SHOULD HAVE PARTICULAR CHARACTERISTICS.

Motivated	Voluntary participation is essential
Mature	Ages 15-18, with at least one year of high school completed.
Prepared	Expert birding skills not required (a mix of skills is best); distribute a list of station birds in advance.
Experienced	Returning teens can be excellent peer mentors and still learn new banding and leadership skills their fourth time.

important logistical aspects of a teen training and our instructional pedagogy.

Over the past five years, through PSBO's Cascades Banding Camp, we have taught 32 teens from four states about ornithology and conservation by training them in bird banding. The training program was started by Seattle Audubon as an element of their BirdWatch program for teens. Experienced banding trainers, including one with North American Banding Council trainer certification, were contracted to adapt a banded training for teens. The team of trainers, program managers and volunteers who began the banding program have since incorporated the Puget Sound Bird Observatory (www.pugetsoundbirds.org), and the program is now run as a partnership between the two organizations.

PROGRAM OVERVIEW

Seattle Audubon's BirdWatch program is a voluntary, out of school, science and service-learning program for high school students interested in birds and nature. There is no fee to participate and members come from throughout the Puget Sound region. BirdWatch members participate in a series of meetings, field trips, and service events throughout the year. The Cascades Banding Camp is a five-day summer training camp that was created to teach BirdWatch students how to band birds. The goals of the training are two-fold: to develop skills that can help launch a career in conservation science, and to prepare trainees to participate in outreach events throughout the year. Active BirdWatch members receive priority for the training. If space is available after the enrollment period reserved for BirdWatch members, registration is open to any high-school-aged teen. The Cascades Banding Camp is one of the few BirdWatch activities with a fee.

TRAINEE POPULATION

A program like this would not be possible without a population of teens interested in birds. Seattle Audubon's unique BirdWatch program for teens provides an excellent source of

participants (Seattle Audubon Society Website 2009); in recent years, though, the training has been open to all teens and has drawn participants from across North America. Having a population with interests to draw from is helpful but not necessary. A number of trainee characteristics, though, are important (see Table 1).

MOTIVATED

The teens must be motivated. One identified goal of the program is to develop and support future conservation scientists. Lau *et al.* (2002) found that among high school students choosing science majors and careers, motivation was a more predictive factor than aptitude. We have learned from experience that a non-motivated participant will not get as much out of the program, may detract from others' experience, and can be a hazard to the birds. One way to make sure you have motivated trainees is to make the program voluntary. Some parents believe such an experience would be great for their child, even when the child itself is not all that interested. Have a conversation with the teen, or require a written statement by the teen, to gauge motivation level. Be supportive of parents who are trying to spark an interest in birds in their teen. It is a worthy goal, but this is not an appropriate venue. Such families may be steered to public banding demonstrations.

MATURE

Maturity is difficult to measure, and age is no absolute indicator. Your participants must be mature enough to work well in a group, handle the setting (especially remote settings), handle direct instruction, and have the ability to handle birds. Our experience suggests that teens that have completed the ninth grade are better able to handle the training than eighth graders, although there are exceptions. We set an age range of 15-18, and will allow 14-year-olds to participate on a case by case basis if they show sufficient maturity. If you do not have the benefit of a known population, maturity can be assessed through open-ended essays on the registration form, an in-person or telephone

interview, or recommendations from teachers or other non-family member adults that know the applicant.

PREPARED

Participants do not need to be expert birders. In any group of teen birders, a hierarchy of birding skills is quickly established. However, the experiences and aptitudes that translate into an accomplished bander are different than those of an accomplished birder. We have found that a wide range of birding skills among the participants provides opportunities for student-to-student teaching that differ from those characteristic of their shared birding experiences. Providing all participants with a list of the ten to twenty most common birds at the banding site in advance gives them an opportunity to start the program from a shared basis.

EXPERIENCED

Returning teens can be excellent peer mentors; even teens participating in their fourth summer of the training program still learn new skills. This mentoring has been so effective that we have formalized a Teaching Assistant (TA) position. Select returning students are offered reduced tuition; in return, they serve as official mentors for other trainees. Teaching Assistant positions are limited to older students, 16 and above. TAs head to the banding site two days early with the advance team to help set up, brush up on their banding skills, and work with the trainers to identify banding and leadership strengths and weaknesses. Identifying strengths allows trainers to know which elements of the training the TAs can be most helpful with, while identifying weaknesses allows both TAs and trainers to focus on those areas to promote their development as leaders and banders.

MARKETING

It may seem like a daunting task to find up to ten teens who are interested in learning how to band birds, but the following marketing strategies help to attract the desired audience.

INTERNET PRESENCE

Teens all over the country and world use technology to meet, network and stay connected. Find a teen or young adult, such as former or potential participants, to reach teens through these media. We have marketed the Cascades Banding Camp through interest groups on Facebook, the American Birding Association's

website, and a number of email lists set up by and for young birders.

PICTURES AND TESTIMONIALS

Pictures are invaluable in helping with marketing and development. Direct quotations from the participants are also important. It is generally best to solicit testimonials at the end of the training or shortly afterwards. Signed image releases from participant parents before you use identifiable photographs of anyone in any publication, online or in print, ensure good will and limit liability.

TRAVEL ASSISTANCE

Participants from outside the area bring new perspectives to the group and enhance everyone's experience. They can also fill out your group if insufficient local participants have registered. Out-of-towners require extra support at either end of the program. BirdWatch members have hosted teens visiting from outside the Seattle area on either end of the training. If you do not have an existing youth group to work with, there are usually many adult birders who are eager to help young birders (after undergoing a background check).

KEEP IN TOUCH

Maintain a connection with your trainees—long-term data are just as important for educational assessment as they are for bird monitoring. About half of the BirdWatch graduates are now either studying wildlife or conservation in college, or pursuing conservation-related fields. Having such information is invaluable when looking for financial support for your program. Word-of-mouth is also a powerful marketing tool. Staying in touch with your trainees helps you market future trainings to their contacts.

STAFFING

Involving the right number and type of adults can make or break your program. At a minimum we recommend one experienced banding trainer who is in charge of instruction and the banding (bird safety, scientific rigor, etc.) and a separate youth educator who acts as a group coordinator, overseeing logistics, group dynamics and risk management. All staff should appreciate, respect and be comfortable working with teens. Student teacher ratios should be lower for youth trainings than for adult trainings. The staffing and group size we recommend is two lead banding trainers,

TABLE 2. KEY STAFFING CONSIDERATIONS FOR A SUCCESSFUL TEEN BANDER TRAINING CLASS.

Staff Roles	
Experienced Banding Trainer	In charge of instruction, bird safety, scientific rigor, data integrity.
Youth Educator	In charge of logistics, group dynamics, risk management.
<i>Other Considerations</i>	
Teen-friendly	All staff should respect, appreciate and be comfortable working with teens.
Low ratio	Student-teacher ratio should be lower for teen training than for adult training.

one youth educator, one apprentice trainer or intern (an experienced bander who is learning to train), two returning students as teaching assistants, and up to ten new students.

COURSE LOCATION AND CAMPING

The particulars of the training location are very important. After offering training as a day camp one year, we realized that for our purposes a residential program is far more effective. Five days of camping continuously alongside birds without the distractions of home is preferable to five weeks of a weekly class (Parrish and Phillips-Fain 2007). The intensity of the training helps build the skills and confidence necessary to safely and efficiently band birds, while at the same time providing an opportunity for the group to bond and learn from one another. Experiencing the same environmental challenges as the birds—cold nights, hot days and exposure to inclement weather—helps trainees understand the stressors the birds must contend with on a daily basis.

A residential program brings with it additional concerns. Residential youth trainings should be separated in time or space from adult trainings. While keeping these populations separate minimizes potential risks associated with unsupervised adult contact with minors, there is also an important social consideration. Often, young people interested in birds already spend much time with adults. They are generally excited about an opportunity to connect with other teens that share their passion. A further benefit of a residential setting is that it can draw on interest from beyond local groups. This is particularly important when a critical mass of teen participants is difficult to reach.

Ensuring that the site is suitable for your population and that all participants are fully informed of the accommodations in advance prevents unpleasant surprises. Most of the youth that join our program are comfortable tenting without running water and can handle the semi-remote aspects of our training location. Populations too challenged by camping can be served with alternatives, such as improved campgrounds (with running water

and bathrooms) or rustic cabins. Staying in cabins lessens the immediacy of the experience, but a camping program may limit accessibility. We support teaching banding to youths from a variety of backgrounds and acknowledge that if participants are too uncomfortable, they will not be able to focus on learning and bird safety. In circumstances under which more sheltered accommodations than tents are indicated, we suggest camping on at least one night.

OTHER CONSIDERATIONS

We recommend considering a few other logistics when planning a residential training, for adults or youth. Make sure someone on your staff has achieved the appropriate level of First Aid or CPR certification for the site. Ensure you have a way to contact the outside world. One of our camping sites does not have cell phone coverage, so we rent a satellite phone in case of emergencies. All partner organizations carry liability insurance and all attendees and parents sign medical release forms, explicit conduct agreements, and photo releases.

In summary, a well-planned and well-executed residential program clears the way for effective and powerful teaching.

INSTRUCTIONAL PEDAGOGY

Banding is a complex activity deploying specialized tool and skill sets in the handling of charismatic minifauna. It is tempting to focus banding demonstrations on illustrating such specialized techniques as bird handling, banding pliers function, wing measurements, pneumaticization assessment, etc. Indeed, the mechanics of bird-banding serve as an important gateway to curiosity about the meaning of information gleaned with complex gadgetry and specialized skills (Pitkin 2006). Effective banding demonstrators also benefit from substantive grounding in the history, goals, and findings of ornithological study in order to attract and hold the interest, understanding and support of the observing public. The following components of a bander training enhance the ability of future banders to engage with the public.

SCIENTIFIC METHOD AS CONTEXT

In designing our youth bander training curriculum, our goal is to provide a broad context for understanding both the mechanics involved as well as the scientific significance of banding, the better to prepare them for the variety of questions the students may face as banding demonstrators. The first step toward becoming comfortable with answering questions from the public about banding is to understand the nature of the knowledge they are asking about. Some questions are mechanistic on how to band; answers to these questions need not be explicitly developed, since the bander training is designed to offer the students sufficient banding experience to be able to draw on it for such questions. Other questions are of a personal nature; such questions provide students an opportunity to develop their own narratives based on their experiences at banding stations. Being able to answer such questions from the public validates the teens' sense that they are doing something important. Unstructured time at banding camp offers the students opportunities to explore and build their own repertoire of experiences that they can call on in their answers. But many questions probe the why and what for of banding. These are the questions that can quickly stump students, where they may feel that their experience is inadequate. The ability to communicate the social value of scientific understanding relies on trainees' commitment to banding as a legitimate method for furthering understanding by acquiring needed data and prepares them for addressing concerns expressed by unsympathetic members of the public or for those rare but inevitable occasions when banding operations fail to run flawlessly (Pitkin 2006).

In order to build student confidence in this area, we focus our teaching on the gaps in our knowledge rather than on the factoids of past discoveries. What we don't know is more startling than what we know. The idea of the discoverable focuses attention on the ontology of bird information, how we know and trust what we know. The scientific method, an approach to knowing based both on the accumulation of repeatable observations and on hypothesis-testing for identifying causal relationships by disproving alternative explanations, serves as the cornerstone for this understanding (Kosso 2009).

Our knowledge of the sex of a bird is a good example. It is unremarkable that some birds have different male and female plumages. And yet, it always remains an interpretation, drawing on the transmitted experience of generations of hunters and ornithologists who, in

countless bird dissections, progressively associated particular plumage characteristics with the presence of testes or ovaries. We take this information for granted, but it represents a powerful opportunity to clarify the fundamental role that the scientific method plays in informing our understanding of the world.

All our observations in the field can be contextualized in terms of the scientific method, from the simplest observational association like plumage and sex to complex interactions such as climate change and avian demographics. As an ontological system, the scientific method does no better than disproving hypotheses; it never proves anything. The tangible world, when informed by the scientific method, is counter-intuitive: scientists know the world as a range of possibilities, namely those that have not yet been excluded. For the students, there is no need to discuss approaches to ontology explicitly; it suffices to practice the scientific method as a way of knowing.

This approach is reinforced when the data collected during the training session are part of an ongoing study. By examining patterns in the data the students are collecting, the progression from individual observation to inference becomes apparent to them as well. Raw data sets can intimate patterns that become great generators of hypotheses, a more formal version of "spinning yarns," but vital to scientific inquiry. Diurnal patterns of fat increase or the proportion of adults in full molt at our training site highlight the significance of adequate food resources and the role that meadows play in sustaining these birds through this critical period of their lives. The sites we use are in montane meadows, the significance of which for post-breeding molt and pre-migration is neither well-documented nor sufficiently understood in order to assess the possible impacts of climate change. Having the opportunity, as a teen, to collect data that contribute to an actual study is a unique and valuable experience. We bring a laptop with a car charger along with past banding records to enter and summarize data in the field and to compare seasons and identify recaptures.

Distractions in the field are more than teachable moments; they are the key to comprehending the avian world around us. Waking up after an alpine night, testing the low end of our sleeping bags' thermal ratings, offers a poignant lesson in interpreting body fat scores in the first captures of the day. Swatting mosquitoes while extracting birds from mountain meadow nets in an otherwise desiccated and mosquito-hostile landscape emphasizes the role these meadows play in supporting insectivores by holding

TABLE 3. EACH BANDING SKILL TAUGHT DURING BANDING TRAINING SERVES AS A TEACHING LESSON ON ORNITHOLOGICAL RESEARCH GOALS AND FINDINGS. STUDENT OBSERVATIONS WHEN LEARNING PARTICULAR BANDING SKILLS OFFER AN OPPORTUNITY TO DEEPEN THEIR UNDERSTANDING ABOUT THE LESSON BY DISCUSSING RESEARCH METHODS AND RESULTS OF RELEVANT STUDIES.

This banding skill...	...translates into... ..a lesson on:
Placing productive nets	Habitat Use: Where do birds occur, what part of the habitat do they use, and how do they travel through it.
Recording data meticulously	Ontology and the Scientific Method: What we understand about the world is only as accurate as the data this understanding is based on.
Identifying species	Speciation: The role of heritable variation and population differentiation, hybridization and hybrid zones, niche partitioning, island biogeography and constraints on sympatric speciation are all illustrated by local species.
Assessing feather condition	Locomotion and Evolution: Feathers wear down from use; feather wear illustrates trade-offs between investing in better feathers and the risk of degradation.
Scoring cloacal protuberance	Mating Systems and Sperm Competition: CP size is related to degree of sperm competition while sperm competition is a function of the degree of polygyny in the species.
Scoring brood patch	Mate Choice and Parental Care: Degree of parental care is variable in birds and illustrates the trade-offs between parental care and productivity.
Evaluating fat level	Habitat Quality: Variation in diurnal patterns of fat deposition, hyperphagy and weight gain in migrants at different sites lends itself to comparisons and testing what characteristics are relevant. Feeding Dynamics: discuss weight gain as a function of feeding strategy, i.e., foraging costs, success rate and prey quality.
Assessing molt	Life History Scheduling: Assessing molt rate and strategy provide insight into constraints regulating when, where and how fast birds molt.
Determining sex and age by plumage	Status Signaling and Delayed Plumage Maturation: Plumage cues used by us to age and sex birds serve similar functions for birds with evolutionary social implications.
Skull pneumaticization	Development and Maturation: Development is a multi-faceted physiological process.
Measuring wing	Sexual Size Dimorphism: Birds show great variability in size dimorphism illustrating a variety of trade-offs in sexual selection.

moisture well into the dry season. We are not watching a nature movie or observing a controlled experiment—these are real organisms making life or death choices in their effort to eke out an existence from their surroundings. We construct a bird's daily life by considering the decisions it makes to produce the observations we witness at the banding station. You think you've got it hard as a teenager—imagine being a bird!

BANDING AS AN ORNITHOLOGICAL TOUCHSTONE

In this framework, banding is a remarkable activity, because every technique deployed in banding serves to illustrate fundamental concepts of ornithology. By contextualizing each

aspect of banding and data collection within relevant research topics, avian natural history is brought to life. Questions that remain unanswered stimulate the imagination and discussions about how to test these ideas. This broadens the material teens can draw on once they are ready to talk about their banding skills. Two examples of how we use this framework suffice to illustrate this approach (Table 3).

When we teach students to "skull" birds, we are not just teaching an esoteric ageing technique (Pyle 1997). Instead, we're observing an aspect of development, seeing directly how an individual that may no longer look like a chick still has some growing-up to do. Dents in the skull become evidence of possible run-ins with branches—or even windows. Immaturity in

skull development offers an opportunity to discuss immaturity at all levels and how growth and learning are encumbered by the risks and challenges posed by disease, predators, food shortage, and social environment. Unanswered questions, for example, why skulls of cuckoos and shorebirds never seem to completely ossify (unpub. data), remain mysteries to be solved by future ornithologists.

Plumage characteristics for sexing and ageing serve as object lessons in status signaling and delayed plumage maturation. Rigorous tests of the social enforcement of dominance hierarchies in birds and the role of plumage variability through phenotypic plasticity are few; examples include studies of plumage variability in winter flocks of Harris' Sparrow (*Zonotrichia querula*; Rohwer 1975). The idea serves as a useful model for understanding variability in plumage coloration, suggesting that variable plumages in flocking species signal variation in social status within the flock. Similarly, whether distinctive first-year plumages represent adaptations to the breeding season or constraints on molting during the wintering season are unresolved evolutionary questions with important implications for our understanding of why birds look the way they do (Froehlich *et al.* 2005). Many aspects of birds' appearance have not received sufficient testing, though sex- and age-specific patterns in plumage characteristics have been identified. Thus, Townsend's Warblers (*Dendroica townsendi*) may be sexed by differences in the white on median coverts (Pyle 1997). Yet whether the wear on the white edging of these and so many passerines' dorsal plumage plays a role in social status signaling, based on the susceptibility of white dorsal edging to wear through UV light damage and abrasion, has not been tested, though it makes an interesting hypothesis.

Familiarity with each of the research fields listed in the lessons in Table 3 serves to deepen profoundly the understanding banding demonstrators bring to the interpreting of birds, their natural history and the role that banding plays in illuminating their lives. Weaving this background into a tapestry of understanding and mystery, facts and wonder, without overwhelming the intimate moments that banding station visitors experience when they release a wild bird for the first time is a further skill that requires sensitivity and practice.

CONCLUSION

Members of the public are not accustomed to being taught by teens, but teens with demonstrable banding skills and a deep context for

their skill serve as effective ambassadors for conservation. By ensuring that logistical hurdles are well-managed for a teen bander training, we set the stage for an effective learning environment. By focusing our instruction on the significance of the skills they are learning at banding camp, not just on the skills themselves, we provide teens the opportunity to deepen their understanding and appreciation of the techniques and build the context they need in order to become effective communicators with the public. Local teen participants in our program have a wintertime opportunity to practice and refine their banding and interpretive skills at monthly banding demonstrations at an urban city park, as part of an urban winter bird study. This involvement also provides them an important opportunity to hone their banding skills while following changes in maturation and plumage in the birds themselves and our ability to identify their ages and sexes.

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