

A SYLLABUS OF TRAINING METHODS AND RESOURCES
FOR MONITORING LANDBIRDS

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Background.--A potential limiting factor in the development of the Neotropical Migratory Bird Program is the availability and quality of training in the three basic methods used in monitoring landbirds. These methods are: point counts, constant effort mist-netting, and nest searches, as contained in Ralph et al. (in press). The Western Working Group of the "Partners in Flight -- Aves de las Americas" Program met in Salt Lake City, September 10-11, 1992. Here, the Inventory and Monitoring Subgroup proposed that a document be prepared to help correct this problem. This syllabus is the result of that effort. We welcome corrections and suggestions of any section. Please direct all comments to the senior author.

Objectives.--This document is intended to be a guide to three week-long courses held between Monday at noon to Friday at noon. While it is possible, with an especially talented group, to do each course over as little as four days, we suggest five. In addition, a one-week introductory course could be adapted to cover all aspects of the program, with hands-on experiences in all the methods involved.

The document contains a syllabus for training and evaluation for each of the methods used. Each syllabus consists of a detailed training plan, containing methods of training, time schedule for training and implementation, and evaluation procedures. We include a preliminary list of institutions that would be capable of conducting training. We also provide sources of song tapes.

It is important to add that training does not stop at the end of the course, by any means. As outlined in Ralph et al. (in press), constant reevaluation must continue throughout the field season, as observers will drift off from their original standards quite readily.

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I. SYLLABUS

COURSE I -- POINT COUNTS

Point counts are central to all Partners in Flight recommended monitoring programs, they are the commonest method used, and provide a quick and repeatable index to density and species richness. However, they also require the highest degree of training and evaluation. Even a rank novice can, with a good training course, net birds or find nests, but some biologists will never be fully competent counters. Supervisors should accept this, and make arrangements for the productive use of the one in ten or twenty who have hearing or seeing deficiencies, or who can not retain vocalizations in their memory. It is the purpose of this course to train those who can, and to identify those who can't.

A. CENSUS METHODS AND LOCATING AND LAYING OUT OF CENSUS STATIONS

Introduction

The first, and often overlooked step in census training, is the location of the census stations. Also important is the smooth execution of the method, including estimating distances to birds to include those within and outside of a certain specified band around the observer.

Methods of Training

1. What to look for, and how to go about finding stations.

a. Demonstrate the use of topographic maps, compasses, and recent aerial photos to identify habitats, trails, secondary roads and other features that are important in your study.

b. Show how to use a random component in study design, such as systematically locating stations along transects with a random starting point.

c. Use stratification by taking a habitat map and practice allocating stations along roads and trails within the major habitat types.

d. Go out in the field and have each person lay out at least three stations, recording their location on a map and in a written description.

2. Estimating distances to birds. This should be done in conjunction with other training, such as identification.

a. Measure off the distances needed in the survey, and have each person pace these off three to five times, so that each individual can use their average.

b. Practice estimating birds in or out of the plot at 50 m (or the distance used in the study), while doing the group counts described below. Have the groups estimate the distance to a particular bird, and then measure it off to demonstrate the true distance. Use the data sheets to target any individual problems with distances.

c. Whenever a bird is encountered, make each participant estimate whether the bird is inside or outside of the 50 m radius. Immediately compare notes. Inconsistent observers should pace the distance to the bird.

Evaluation Procedures

1. Working in small groups of 2-4 people, using the written description provided, locate and evaluate the stations of the other two people.

2. The trainer should look especially for people who have problem with maps by asking everyone to draw a quick map of a complex of roads and to locate on a map a road intersection that you have selected. Very intelligent people can have great difficulty reading maps, and this can result in a substantial loss of censusing time.

3. Estimate the distance to a particular bird, and then the trio should pace it off to demonstrate the true distance. Use the data sheets to target any individual problem with distances.

4. The major problem in estimating distances to birds will be that people will differ in their opinion of how loud a particular vocalization is, in relation to a nearby observer. Then, allowing for attenuation with distance, they will over- or underestimate the distance. Close attention to data sheets in the "Learning Songs and Calls" section below can help reveal this problem.

B. VISUAL IDENTIFICATION OF SPECIES

Introduction

All participants using any monitoring method must have good identification skills. While people doing netting or nest searching can check with identification manuals, a counter must make rapid, accurate, and repeatable identifications based on a brief glimpse or a snatch of song. This high level of skill can usually only be obtained by a person with at least a moderate amount of previous experience, although many exceptions exist. This section involves the identification of birds using plumage characteristics, whether for point counts, mist netting, or nest searching.

When identifying birds in the hand, the lack of behavior and vocalizations can make an experienced birder confuse species. Descriptions in books are often inaccurate or confusing.

Methods of Training

1. A couple of weeks before training, send trainees:

a. list of the 20 most common species, so that they can familiarize themselves with the plumages of the birds.

b. provide an annotated list of birds with reminders of problem species and a copy of the best guide book for the area. Prepare a handout on descriptions of juvenile plumages of common birds from museum skins or reliable sources.

2. With a slide show, review breeding birds and more common migrants in the area. Particularly emphasize females and young birds.

3. Conduct a lab session with study skins (be sure some have spread wings). Make this a participatory exercise. The work stations might include (and can also be used in evaluation):

a. Make groupings of similar species.

b. In a grouping of male and female birds of 2 or 3 species, match the species pairs.

c. Ask for identification of juvenile birds such as thrushes, juncos, cowbird, and sparrows.

d. Identify birds in flight by wing pattern and rump patch using pictures or spread wing mounts at a distance.

4. Always provide useful alternatives for situations when observer can not identify a species. These can include taking time from the census to pursue the bird, recording descriptions of the song and call, and photographing captured birds.

Evaluation procedures

Give a test using slides and skins, showing birds likely to be encountered. Passing score should be generally in excess of 95% for species identification, depending upon the quality of the slides and obscurity of the skins (e.g. badly-worn females, etc.). Persons unfamiliar with bird identification will require additional evaluations later in the training. The first evaluation will provide a benchmark for their abilities.

C. LEARNING SONGS AND CALLS

Introduction

The ability to identify birds by sight and especially sound requires a great amount of training in the field with an experienced birder. Starting with accomplished birders can greatly shorten this process. Good field biologists, who have had some experience looking for birds and identifying vocalizations of any species, will have an easier time than people without these experiences.

Methods of Training

1. Obtain a tape of songs and calls from the geographic region where work is to be performed, if at all possible. Send trainees a list of the 20 most common species a couple of weeks before training so that they can familiarize themselves with the birds and the tapes.

2. Provide trainees with a annotated list of birds with tips for each species for remembering their songs and calls. Use phrases that may be associated with a particular song or call (e.g. "quick three beers" for Olive-sided Flycatchers). These will greatly enhance an observer's memory.

3. Train people in a small group of less than 10 people with a leader who is a true expert in sight and sound, but also in the birds' natural history. The more people know about behavior, breeding habitats, and foraging habits, the more likely they are to retain information on identification.

4. Using the regular data sheet, conduct as many simultaneous group counts of all participants as is possible. It is very ineffective for a leader to use the entire training period for only pointing out various songs and calls for the students. Immediately after the 5 minutes is up, discuss the birds observed. Have each person in turn name a bird until all birds are counted. As each person names a species, he or she should indicate the number of individuals detected. Ask if anyone has more or less of each species and then discuss the locations and types of detections. The trainer should be non-judgmental and supportive, and make people feel free to debate any observations. Take time to make this a learning exercise, and be careful to avoid folks with good imaginations or opinions taking over, or for shy people to be distressed.

5. Gather the group into a tight circle and ask each person to name one bird that they hear until all birds detectable are covered.

6. With the group, ask specific people to identify specific songs and calls that the trainer points out. Always cover a range from easy to hard vocalizations to reinforce the hard ones, and make sure people don't forget the easy ones.

Evaluation Procedures

1. Conduct group tests after trainer feels trainees have sufficient exposure to most songs, calls, and distance estimations. Announce that data sheets will be collected and have the group conduct a series of two or three simultaneous point counts with the trainer. Collect data sheets and evaluate each trainee as compared to the trainer, both publicly and privately, as appropriate. It is a good idea to keep test sheets for future reference to people's abilities.

2. In evaluating sheets, look for people hearing too much or going for rarities, due to excessive imagination or ego. Even good birders will often have "window" species, species that he or she will listen through. A special problem is the expert birder with "golden" ears who will pick up the faintest lisp or tseep at great distances. Make especially sure that they don't suffer from ego or imagination problems, and document well this ability. In censusing, be sure to rotate this person around to as many areas as possible. People with poor birding skills can be eliminated, but it is hard to do this to a great birder.

3. Observers should agree within 10% of the number of species. If one observer consistently has 12-15 species, while the rest have 8-10, you have a overachiever. A person with 6 has a problem with identification.

4. Observers should also be within 10% of the total number of detections, on the average.

5. Check repeatedly for persons putting a certain species into inappropriate distance categories. See the section above concerning "Estimating Distances to Birds".

D. TRAINING AND IMPLEMENTATION SCHEDULE FOR POINT COUNTS

DAY 1. LEARNING SONGS AND CALLS

13:00 Go over the songs and calls from the tapes, pointing out similar types of vocalizations.

14:30 Evaluate memory of the songs and calls.

15:30 Completion.

VISUAL IDENTIFICATION OF SPECIES

15:30 At an indoor location, present slide show of common species, go over skins.

17:00 Evaluate ability to identify from slides and skins.

17:30 Completion.

DAY 2. LEARNING SONGS AND CALLS (CONT'D)

06:00 Practice a few 5-minute counts with data forms, using data sheets.

07:00 Group counts, and evaluation.

10:30 Break and evaluation.

11:00 Completion.

13:00 Review of problem species of individual counters.

15:00 Completion.

DAY 3. LEARNING SONGS AND CALLS (CONT'D).

06:00 Group counts, and evaluation.

10:30 Break and evaluation.

11:00 Completion.

LOCATING AND LAYING OUT CENSUS STATIONS

13:00 Meet at indoor location for introduction

113:30 Show aerial photos and describe use. Discuss randomness in choosing stations.

14:30 In field, use aerial photos to locate sites. Lay out sample station. Check people's pace for estimating distances.

15:00 Divide into small groups, each person lay out stations separately, recording all information. Compare with partner.

16:30 Conduct evaluation.

DAY 4. LEARNING SONGS AND CALLS (CONT'D).

06:00 Group counts and evaluation.

10:30 Break and evaluation.

11:00 Completion.

VEGETATION ASSESSMENT

13:00 Describe and discuss objectives of assessment.

13:30 Carry out measures at single points with all trainees present and taking data. Compare results.

16:30 Discuss and evaluate results.

17:00 Completion.

DAY 5. LEARNING SONGS AND CALLS (CONT'D).

06:00 Group counts and evaluation.

10:30 Break and evaluation.

LEARNING SONGS AND CALLS AND VISUAL IDENTIFICATION OF SPECIES.

11:00 Final Evaluation.

12:00 Completion.

COURSE II -- CONSTANT EFFORT MIST NETS

A. DETERMINING LOCATION FOR NETS

Introduction

The proper location of nets will determine the success of a monitoring station. Generally, the objective is to maximize the number of birds captured. While experience is always a good teacher, close attention to the various factors of sun exposure, vegetation configuration, and bird movements will increase netting success. Each site must be configured with consideration of the time it takes to complete a round of the nets.

Methods of Training

1. If possible, take trainees out to an operating station. Otherwise, present a detailed map with photos of a station. Discuss the different net sites and get their ideas as to which would produce the most birds. Then present data on capture rates at the different sites. This will show that deciduous plants, vegetation edges, shade from sun, narrow constrictions in vegetation, and a varied background will generally produce the maximum number of birds.

2. Take the trainees to an area with no nets. Divide into groups of 2-4 trainees and have each group locate five potential net sites, marking them with flagging. Discuss the likelihood of capture at each site, and the problems associated with each choice of net arrays in regards the difficulty of terrain and time of a net round.

Evaluation Procedures

Evaluation takes place during the field session while setting up potential new net sites. The major problem is likely to be the focusing on a single criterion by a trainee, such as avoiding morning sun, to the exclusion of other, equally important, criteria. As the trainees tell you the reasons for each site's choice, make sure that all criteria are given more or less equal weight.

B. ERECTING AND TAKING DOWN NETS

Introduction

Once a net site is established, the biologist will usually have to put up and take down the net each day it is operated. The efficiency used in setting up nets will play a large part in determining their ability to carry out the program. If it takes, for example, more than an hour to erect ten nets each day, their lost time lowers their efficiency and interest.

Methods of Training

1. Present the various methods of erecting and taking down nets. Do not present only a single method, as different people will find different methods more suitable for their situation. The basic methods all involve essentially permanent sites with fixed locations for the poles. The differences usually involve the method of rolling up the net onto a spool, into a bundle for a cloth bag, or around a pole. Methods of fixing a pole in place will also vary depending upon site. Poles can be shoved into soft sand, rebar can be in place for at least one end in reasonably soft soils or gravel, and rock cairns must be used for the more firm substrates. Methods of tying guy ropes will also differ.

2. Have each group set up a net using each of the major methods discussed, and using various knots that are easy to untie for guy ropes.

Evaluation Procedures

The major evaluation involves the observation of the net erection. Each trainee should be able to tie appropriate knots, at least the square, bowline, and half-hitches. The trainer should also be aware of people that seem to have problems choosing between sites and lack facility in tying knots or handling poles.

C. REMOVING BIRDS FROM NETS

Introduction

The ability of a biologist to rapidly remove a bird from a net is critical to the well-being of the birds, and the morale of the biologist. Some people have great facility for this and dexterous hands. Others seem to be all thumbs with no innate ability for the delicate work necessary. Even these latter can usually be trained, but the trainer must decide if the effort would be too great for the return likely.

Methods of Training

1. Discuss overall methods and responsibilities. This would include the fragility of birds and what happens if a bird is removed too roughly, left in the net too long, or goes into shock. Emphasize that each bander is responsible for making sure the bird is removed, uninjured, in a reasonable length of time. Discuss what to do if a bird is so tangled that it seems impossible to take out. Go over emergency procedures if bird goes into shock or is injured. Discuss guidelines on how often nets should be checked and how long a bird can be worked on before help must be attained.

2. If available, show the video of the methods used to remove a bird from the net, and discuss the removal methods.

3. Pair a trainer with no more than two or perhaps three trainees for the remainder of the session. With frozen birds that have died hitting windows or found along the road, put them in realistic positions in the net. Allow the trainees to practice taking them out. This allows the trainee to be relaxed with no danger to a live bird.

4. Once some of the trainees have mastered the above, open mist nets for capture of live birds. First, the trainer should demonstrate bird removal with a couple of birds. Then, in turn, each trainee should attempt to remove a bird for something like 10-30 seconds or until the trainee stops making progress. Then, the trainer takes over, completing the next step, and then turns it over to the trainee. The trainee then continues, starting the next step. This procedure is repeated until the bird is completely out. The trainer should completely take over if the bird becomes stressed or if the procedure takes longer than 5 minutes.

5. If a trainee shows ability at this point, continue #4. With those trainees that seem to be having problems, return to the use of frozen birds for as long as necessary.

6. Demonstrate how to handle birds after removal from the nets, including normal processing and methods of handling stressed or injured birds.

7. Unless a trainee is especially adept, he or she will probably require a follow-up session after the initial 3-day training session. In the interim, if it is at all possible, the trainee should practice on birds, perhaps using a net next to a feeder where several birds can be caught rapidly.

Evaluation Procedures

Practical Ability to Remove Birds:

Evaluating the ability of someone to remove birds is difficult because each bird presents a unique challenge. A person who consistently removes a bird in less than a minute with no assistance

from the trainer is clearly well qualified. A person who hesitates at each step, who is too careful or too careless, clearly needs more work.

Between these extremes, we suggest that the trainer grade each bird's entanglement, the trainees extraction ability, and the time of removal of at least 5, and preferably 10 birds that are being removed by each person on the following scales:

Bird entanglement status:

- 1 - Bird passive in net with wings and feet unentangled.
- 3 - Bird moderately active, with some entanglement of bend of wings and net firmly grasped in its feet. A clear pocket made by the bird's entry.
- 5 - Bird very badly entangled, with no clear pocket of entrance.

Intermediate values of 2 and 4 should be assigned to those birds with intermediate status of entanglement.

Bird extraction ability:

The trainees efforts to remove bird should be evaluated on this scale:

- 1 - Bird is firmly, decisively, and rapidly removed.
- 3 - Some hesitation in approaches to removal. Sometimes starts on one entangled part of bird, then moves to another, then back. Considering the bird's entanglement status, takes a moderate time to remove.
- 5 - Much hesitation in removal. Usually starts on one part of bird, then moves to another, then back. Does not approach removal systematically and by the type of entanglement, but by rote. Considering the bird's entanglement status, takes a very long time to remove, or be unable to remove it.

If the trainee does not pass the evaluation, then he or she must continue to practice taking live birds from the net with trainer supervision.

A suggested range of evaluation scores and the potential grades for each would be as follows, although the trainer's judgement should be followed:

<u>Grade</u>	<u>Entanglement Status</u>	<u>Extraction Ability</u>	<u>Time Necessary For Removal</u>
Top	1	1	:10
	3	1	:30
	5	2	1:00
Pass	1	2	:30
	3	2	:45
	5	3	2:00
Marginal	1	3	1:00
	3	4	2:00
	5	5	5:00+
Fail	1	4	5:00+
	3	5	not removed
	5	5	not removed

A person should have at least a "pass" score on 80% of all birds removed, and no lower than "marginal" on the others. The evaluation procedure should be repeated for those who did not pass the first time.

If the trainee still does not pass on the second attempt, then the trainee's ability to carry out constant effort mist netting must be reevaluated.

Oral Examination:

During the evaluation a trainer should also give an oral exam asking questions such as how often the nets should be checked, how long a bander should spend attempting to remove a bird before getting help, and what to do in case of an emergency. Trainees should answer all questions completely and accurately.

D. DATA PROCESSING

Introduction

Ability to accurately age and sex birds and to determine their condition is essential to monitoring. Monitoring done without these data, especially age, are of very limited value. In addition, all participants involved in mist netting should successfully complete the session covered in the point count section above, to visually identify species and use reference materials such as guide books and skins.

Methods of Training

1. In a classroom situation, outline significant events in a bird's year, including the events, plumage used, state of sexual organs, flocking behavior, singing rate, fat levels, migration timing, egg laying, incubation, and fledging of young.
2. Review bird topography, plumage sexual dimorphism, brood patch, cloacal protuberance, skull ossification procedure, and commonly retained feathers between molts.
3. Work through ageing and sexing with museum or frozen specimens of selected birds using a references, such as Pyle et al. (1987).
4. Work through identification, ageing and sexing of at least four birds. We suggest including one Empidonax flycatcher. With a local species, discuss common mistakes and how to avoid them, such as young males and adult females that look alike, red crowns on juvenile woodpeckers, and the use of "unknown" when recording data. Use all given characteristics in making age and sex determinations.
5. As the birds are processed and positive conditions encountered (e.g., brood patches and molt), make sure all the trainees see the condition. Skulling is the skill that will take the longest time to learn, so encourage trainees to practice frequently on all birds, unless a bird is looking stressed.
6. Wing Chord.--Have trainee measure and record the value, then do it again. Have more than one person measure the same bird. Repeat measurement at least five times or until all trainees are within 2 mm. While appearing relatively easy, proper wing chord measurements are difficult.
7. Breeding Condition.--Check each trainee with several birds, and be especially looking for good examples of extremes, such as a newly defeathered female abdomen and a juvenile's bare belly.
8. Skulling.--Make sure each trainee does several birds, especially those with thick skins, molting heads, and small windows.
9. Molt.--Check each trainee with birds that have light molt or adventitious molt.

Methods of Evaluation

The major factors in processing are accuracy and speed. During the evaluation, in order to pass, the error rate should be taken and generally be quite low. Watch the trainee process several birds.

Check their evaluation of various characteristics by repeating the process on the same birds yourself and evaluating their results.

1. Measurement data, such as wing length or weight should differ, on the average, by no more than 3% from the trainer's measurements.

2. In qualitative measures (e.g. the class or degree of brood patch development), a top rated trainee would agree with the trainer in 95% of the measures. A trainee just passing should differ by no more than one class 4 times out of 5. A passing trainee would never differ by more than a single class.

3. The time to process a bird, including identification, placing the band on the bird's leg, and assessing its physical condition should be approximately a minute when fully trained, unless supplemental data are taken. During evaluation, the time should be noted as a trainee takes data on each bird, and the error rate noted. Then, average for each trainee for at least 10 birds. We suggest an evaluation on the following scale:

	Time to Process	Error rate Measurement	Qualitative Errors	
			Agree	Disagree 1 class
Top	<1:00	< 1%	>95%	<5%
Pass	<1:30	< 3%	>80%	<20%
Marginal/Fail	<3:00	< 5%	>50%	20-40%
Definite fail	>5:00	> 5%	<50%	>50%

In addition, evaluation should include notes on their ability to comfortably handle the birds without undue stress to the birds.

A written test at the end of the training period will be a valuable way to see if the trainees understand what they are looking at on the bird. Questions could include items such as: What does a skull of 0 mean? Describe what a brood patch of 3 would look like. If a bird's skull value was 1 and it had a BP of 1, what does this mean?

E. TRAINING AND IMPLEMENTATION SCHEDULE FOR CONSTANT EFFORT MIST NETS

DAY 1. REMOVING BIRDS FROM NETS

13:00 Discuss the fragility of birds and problems associated with removing birds from mist nets.

14:00 If available, show the video of removal methods. Discuss emergency procedures for injured birds.

15:00 Use frozen birds to practice methods of removal.

16:00 If appropriate, depending upon evaluation of trainer, at least some trainees can begin to remove live birds.

17:30 Complete day's session.

DAY 2. REMOVING BIRDS FROM NETS (CONT'D)

06:00 Set up nets and continue to remove live birds for all personnel. Those needing more practice with frozen birds should be allowed this.

11:30 Take down nets, and discuss problems and solutions and procedures for handling of stressed or injured birds.

DATA PROCESSING

13:00 Classroom material, going over life cycle of a bird.

14:00 Review video of data processing.

14:30 With a couple of nets open, the trainer should process a bird completely. After release, detail each topic.

15:30 Open more nets and the trainees start to process birds.

17:30 Completion.

DAY 3. REMOVING BIRDS FROM NETS AND DATA PROCESSING (CONT'D)

06:00 Set up nets and continue to remove live birds and process captures for all personnel. Evaluate performance of trainees.

11:30 Take down nets, and discuss results of evaluation.

DETERMINING LOCATION FOR NETS

13:00 At an indoor location, go over the considerations necessary for the placement of nets.

13:30 Using photos and maps, or an actual array, evaluate potential capture rates at each net site.

14:30 Locate new net sites in an area and evaluate the potential for capture.

16:30 Completion.

DAY 4. REMOVING BIRDS FROM NETS AND DATA PROCESSING (CONT'D)

06:00 Set up nets and continue to remove live birds and process captures for all personnel. Evaluate performance of trainees.

11:00 Take down nets, and discuss results of evaluation.

ERECTING AND TAKING DOWN NETS

13:00 Discuss and describe the methods. Show the commonly used knots used and the different types of ropes.

13:30 Demonstrate each method with very experienced personnel.

14:00 Have each pair set up a net, with each using at least three different methods.

VEGETATION ASSESSMENT

15:00 Describe and discuss objectives of assessment.

16:30 Carry out measures at single points with all trainees present and taking data. Compare results.

17:00 Discuss and evaluate results.

17:30 Completion.

DAY 5. REMOVING BIRDS FROM NETS AND DATA PROCESSING (CONT'D)

06:00 Set up nets and continue to remove live birds and process captures for all personnel. Evaluate performance of trainees.

10:30 Take down nets, and discuss results of evaluation.

11:00 Written evaluation.

12:00 Completion.

COURSE III -- NEST SEARCHING

1. LOCATING AND LAYING OUT PLOTS

Introduction

While most people have had some experience with map and compass, this portion may be difficult for a few people.

Methods of Training

1. Familiarize observers with habitat type and species breeding in

the area. Use a 10' USGS map to locate areas of suitable habitat. Scout habitat looking for uniformity, accessibility, and avoiding problem areas (campgrounds, marshy areas, private property).

2. Mark the plot, using a variety of methods (wooden tomato stakes, rebar, fence posts, or metal tags in trees). Use mirrored compass, 20 to 50 m fiberglass tapes (or measured rope) and 2 teams of 2 triangulate every other point moving in the cardinal directions. Place stakes so they are visible from one another. Be wary of hills and other natural landmarks that may confuse distances. Make sure at least some stakes will be permanent and visible in heavy snow.

3. Practice compass reading and pacing to fictitious nest sites from established points.

4. All participants should sketch their own plot map using established grid points and natural landmarks.

5. Talk about clever ways to discourage human visitors and domestic cats.

Evaluation Procedures

The major problem in this section would be people who have had no experience using compass or maps. It should be relatively easy to identify these folks and to spend extra time working with them.

2. NEST SEARCHING METHODS

Introduction

The methods involved in finding nests are highly intensive and should be patterned for the local vegetation types.

Methods of Training

1. In a classroom situation, familiarize all observers with species occurring in the area, life history strategies of each (i.e. number of broods), how to determine when nesting has started, and average nest cycle. Use references to determine each species preferred nest location and habitat type. Provide tables of references describing behavior to the extent possible.

2. Prepare a handout and discuss a table with the following information on common breeding birds: nest type, clutch size, incubation, and nestling period. If local information is not available, use reference sources.

3. In the field demonstrate:

a. The use of audible cues rather than sight to find birds.

b. Finding females and recognizing the female calls.

c. Go where the action is; do not waste a lot of time trying to find secretive or inactive birds.

d. Finding an individual of each species, show species-specific behavior and define "normal" behavior. Help interpret nesting behavior (e.g., rapid, time-constrained foraging and food carries) or behaviors that often suggest a nearby nest (e.g. distress calls or displacement behavior).

e. Help trainees learn to think like a bird: choosing the nest patch and developing a search image for nest sites. It is very useful to visit last year's nests. Describe micro habitat choice (e.g. grass covering nest).

f. Describe and show how to approach a potential nest site. Tap vegetation and listen carefully for a flush from the nest,

one step at a time. Look for the bird, not the nest, to verify that a nest is near. Nests are easy to overlook or look through. Check a site 4 or 5 times if clues persist. Never assume that a nest is not in a specific location because you have already checked it.

- g. Listen for and try to locate a bird giving distress calls. If the bird appears to be responding to the observer, demonstrate backing off or hiding until the bird is silent. Practice watching the bird without eliciting distress calls. Distress calls may attract predators. Watch for other predators that elicit calls. The movements immediately after distress calling may reveal a nearby nest.
- h. Show how to minimize disturbance to adults and vegetation when looking for nests.

Evaluation Procedures

A written test of the various aspects of nest finding would probably be useful. Specific questions on the behavior of common species would provide information on the trainees retention of facts.

During field work, observers should find at least one nest per four-hour period on their own. Less than that warrants direct work with the person by the trainer.

The following procedure can help identify a nest finder who is causing too much disturbance. After locating a nest, assign the number of days between 1 and 4 at random when the nest will be checked again.

Then check the nest at the assigned day. If a higher proportion (greater than 25%) are failing on day 1 than day 2, 3, or 4 from the first nest check, the observer may be influencing the results. Nests checked 4 days after would fail at a greater rate because they have been exposed to predators 4 times longer, assuming that the predation rate is equal between days. If an observer is losing more nests on first day checks than other days, he or she should be observed and cautioned not to create excessive disturbances.

3. NEST MONITORING METHODS

Introduction

The skills necessary in the accurate monitoring of a nest may seem less difficult to acquire than finding the nests themselves. However, the problems involved with any method can be alleviated by proper training.

Methods of Training

1. Emphasize how to approach a nest without giving away the location, never leaving dead end trails to the nest. Have naive observers watch a person make a nest check and then ask the observers to guess where the nest was. Demonstrate proper use of a stick to move vegetation.

2. Show how to check nest from a distance, using behavior of adults to ascertain nest activity and/or if fledglings are present.

3. Demonstrate and practice how to fill out the nest check form or card. Make sure that an observer immediately writes down all information about the nest and adults immediately after checking.

4. Go over proper recording methods for closing out the nest and determining success or failure. Describe adult behavior when the nest

has failed or was successful.

5. Explain carefully nest substrate measurements, and conduct simultaneous measurement of the same variables by different observers. It will require numerous comparisons of subjective measurements (e.g. shrub cover).

Evaluation Procedures

Comparison of simultaneous measurements will be the major method of evaluation. Scores should be within 5% of the trainer for a passing grade.

4. TRAINING AND IMPLEMENTATION SCHEDULE

DAY 1. NEST SEARCHING METHODS

13:00 Orientation and discussion of methods and species likely to be encountered.
14:00 Field work following birds around describing individual species differences.
15:00 Begin group work finding and describing nests.
16:00 Discuss results of day's work.
17:00 Completion.

Day 2. NEST SEARCHING METHODS (CONT'D)

06:00 Begin solo practice in vicinity of roving trainer.
11:30 Discuss and critique every trainee's work and results.
LOCATING AND LAYING OUT PLOTS
13:00 Begin discussion of methods.
13:30 Set up practice plots in pairs, sketch plot, and practice recording nest sites.
15:30 Discuss and evaluate results.
16:00 Completion.

DAY 3. NEST SEARCHING METHODS (CONT'D)

06:00 Do group and solo work comparing notes frequently.
11:00 Evaluation.
12:00 Completion.
VEGETATION ASSESSMENT
13:00 Describe and discuss objectives of assessment.
13:30 Carry out measures at single points with all trainees present and taking data. Compare results.
17:00 Discuss and evaluate results.
17:30 Completion.

DAY 4. NEST SEARCHING METHODS (CONT'D)

06:00 Do group and solo work comparing notes frequently.
11:00 Evaluation.
11:30 Completion.
NEST MONITORING METHODS
13:00 Discuss and show methods.
13:30 Begin field demonstrations and have trainees perform various tasks. Upon completion of task, evaluate each by simultaneous measurements, if appropriate.
16:30 Review procedures and discuss problems.
17:00 Completion.

DAY 5. NEST SEARCHING METHODS (CONT'D)

06:00 Do group and solo work comparing notes frequently.
11:00 Written evaluation
12:00 Completion.

SECTION ADDED TO ALL OF THE ABOVE: VEGETATION ASSESSMENT

Methods of Training

1. The most important method of training is to determine that all measurements and estimates are taken in a similar fashion. Simultaneous observations and recording at each vegetation station will provide information on the trainees' abilities.

2. Clearly describe the methods used in estimation and benchmarks for these. Have examples of items such as "percent cover".

Evaluation Procedures

The primary evaluation will be comparison of data sheets between the trainees and the trainer. No estimation should be more than 10% different from the trainer.

II. RESOURCE PEOPLE AND INSTITUTIONS

We seek to provide here the names, addresses, phone numbers, costs, and other details of people and institutions that are able and willing to conduct training on methods. To date, only two have indicated interest. Others will undoubtedly come to our attention.

Colorado Bird Observatory

Training at regularly scheduled workshops. For information, contact (303) 659-4348 FAX: 659-6005.

Point Reyes Bird Observatory

Conducts intensive 2-week training workshops throughout the year. Costs are \$800-900, depending on class size. All methods are practiced on a well-studied color-banded population of landbirds. The workshops include an overview of avian conservation and demographics, as well as data management, analysis, and interpretation of results. In addition 3-month, paid internships are available throughout the year. Telephone 415 868-0655 for more information.

III. SOURCES OF TRAINING MATERIAL

Most of the materials and sources needed are given in Ralph et al. (1992). In addition, some other material, especially song tapes are variously available. All of the recordings listed are available on cassette tape. Some are also available on compact disk and LP. American Birding Association (ABA) Sales, P.O. Box 6599 Colorado Springs, CO 80934, carries many of the published titles. These are indicated by an asterisk (*) in the list below, or they can be ordered through some bookstores. We welcome additions or corrections to this list.

North and South America

D.J. Borror. and W.W.H. Gunn. Songs of the Warblers of North America. 57 species. North and South America. Cornell Laboratory of

Ornithology, Ithaca, NY 14850.

- J.W. Hardy et al. Voices of New World Species. Eleven separately published cassettes of many species groups recorded from Canada through South America. Available from the ABA.
- Cornell Laboratory of Ornithology. Library of Natural Sounds, 159 Sapsucker Wood Rd., Ithaca, NY 14850 (607) 254-2404. They have songs of birds from all over the world. Regional tapes and compact disks can be made from their collection for a fee based on the time it takes to research and make the recordings.
- W.V. Ward. Recorded Species and Completed Local Tapes for the U.S. Forest Service. Northwestern, Northeastern United States, and international. 321 SE Rogue View Lane, Grants Pass, OR 97526.

Western North America

- California Department of Fish and Game. Willow Flycatcher Surveys and Related Species. Sacramento, California.
- R. LeValley. Forest Birds of Northwest California. U.S. Forest Service, Redwood Sciences Laboratory, 1700 Bayveiw Dr., Arcata. CA 95521.
- T.C. Sander. Bird Songs of California. 71 species. Wilderness Recordings, Berkeley, CA.
- T.C. Sander. Common Breeding Bird Songs of the San Francisco Bay, v. 1. 25 species. California. Fantasy Records, Berkeley, CA. This recording uses numbers instead of titles, and is an excellent testing tape.
- T.G. Sander. Raptors. California. Fantasy Records, Berkeley, CA.
- E. A. Pugh. Birding By Ear. Southern Oregon. Lichen Coop Corp., Box 25, OR 97497. Includes a pretest for twenty common species to evaluate beginning levels.
- E. A. Pugh. Birds of the Wetlands. Southern Oregon. Lichen Coop Corp., Box 25 OR 97497.
- E. Bull. Pileated Woodpecker Forest Bird Surveys. Eastern Oregon. USFS, LeGrande, OR, and the Cornell Laboratory of Ornithology.
- B. Woodbridge. Northern Goshawk Forest Bird Surveys. California and Oregon. USFS, Gooseneck Ranger District, OR.
- E. Foresman. Spotted Owl and Barred Owl Surveys with Some Related Owls. Pacific Northwest and Eastern North America. USFS, Region 5 and 6. Corvallis, OR.
- *R.K. Walton and R.W. Lawson. Birding by Ear: Western. Peterson Field Guide Series. Cornell Laboratory of Ornithology and Houghton Mifflin Co.
- *R. T. Peterson. Western Bird Songs. 522 species. Peterson Field Guide Series. Cornell Laboratory of Ornithology, and Houghton Mifflin Co.
- S. Jones. Birds of Colorado and Wyoming. USFWS, P.O. Box 25486, Denver, CO 80225 (303) 236-8676.
- *G.A. Keller. Bird Songs of Southeastern Arizona and Southern Texas. Southwestern United States.
- J. Sedgewick. Nebraska Breeding Bird Surveys. Midwestern United States. USFWS. 4512 McMurry Ave., Fort Collins, CO 80525.
- *D.J. Borrer. Songs of Western Birds. Midwestern United States. 60 species; mixed. Dover Publications, Inc., New York, NY.
- *D.J. Borrer. Common Bird Songs. Midwestern United States. 60 species; mixed. Dover Publications, Inc., New York, NY.

Eastern North America

- *R.K. Walton and R.W. Lawson. Birding by Ear: Eastern and Central. Peterson Guide Series. Cornell Laboratory of Ornithology, and Houghton Mifflin Co.
- *D.J. Borror. Songs of Eastern Birds. Midwestern United States. 60 species; mixed. Dover Publications, Inc., New York, NY.
- *L. Elliot. Know Your Bird Sounds, V 1-2. Northeastern United States.
- *L. Elliot. Wild Sounds of the North Woods. Northeastern United States and Canada.
- *R. T. Peterson. Eastern and Central Bird Songs. 267 species. Peterson Field Guide Series. Cornell Laboratory of Ornithology, and Houghton Mifflin Co.
- E. Foresman. Spotted Owl and Barred Owl Surveys. Pacific Northwest and Eastern United States. Forest Service Region 5 and 6, Corvallis, OR.
- *R.K. Walton and R.W. Lawson. Birding by Ear: Eastern and Central. Peterson Guide Series. Cornell Laboratory of Ornithology, Ithaca, NY 14850, and Houghton Mifflin Co.

IV. GUIDELINES FOR DESCRIPTIVE ANALYSES

It is not in the scope of this version of the training syllabus to give suggestions with illustrative examples, of first-level, descriptive analyses of data taken in the program in order to allow participants to get feedback from their efforts. Among the many possible examples could be species lists, average dates, relative abundances, and proportion young. We suggest that this aspect of the program be approached with the help of any of the several introductory texts on descriptive, biologically-oriented statistics.

LITERATURE CITED

- Pyle, P., S.N.G. Howell, R.P. Yunick, and D.F. DeSante. 1987. Identification guide to North American passerines. Bolinas, CA: Slate Creek Press, P.O. Box 219, 94924.
- Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. in press. Handbook of field methods for monitoring landbirds. Gen. Tech. Rep. PSW-GTR. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.