National Park Service
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Northeast Temperate Network Breeding Landbird Monitoring Protocol

2014 Revision

Natural Resource Report NPS/NETN/NRR—2014/816

ON THE COVER
Eastern Meadowlark.
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Natural Resource Natural Resource Report NPS/NETN/NRR—2014/816

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This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

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Revision History

Version numbers will be incremented by a whole number (e.g., Version 1.3 to 2.0) when a change is made that significantly affects requirements or procedures. Version numbers will be incremented by decimals (e.g., Version 1.06 to Version 1.07) when there are minor modifications that do not affect requirements or procedures included in the protocol. Add rows as needed for each change or set of changes tied to an updated version number.

Revision History Log

Version #	Date	Revised by	Changes
1.00	April 2006	Steve Faccio	Protocol narrative for the 2006 field season.
2.00	April 2007	Steve Faccio Brian Mitchell	Protocol narrative for the 2007 field season (except that data entry was into the USGS point count database). New sampling design for ACAD. Considered adding grassland point count stations for MIMA; this was not done because of the small grassland area and the fact that grasslands are scattered across the park (and may be difficult to sample by one person as a single study site). This decision may be revisited at a future time.
3.00	April 2008	Steve Faccio Brian Mitchell	Addition of SAIR to the monitoring program. Insert text emphasizing compatibility with GLKN and USFWS protocols. Minor edits throughout. Revised monitoring objectives to meet new I&M program guidance. Added information about new point count station marking methods at ACAD. Added information about end-of-season procedures Revised Appendix A and added SAIR
4.00	January 2009	Steve Faccio Brian Mitchell Penelope Pooler	Many sections significantly revised and updated; several sections added to comply with Oakley et al. standards. Revised Objective 3, and added information to the Data Analysis section pertaining to this objective Revised Data Management section to reflect use of USGS Point Count Database (since 2007). Added Data Archiving section Added section on Operational Requirements, including time, equipment, and budget. Revised power analysis information. Added Appendix B and renumbered appendices (A, B, C instead of I, II, III) to comply with NETN format. Other minor edits.
4.01	March 2009	Steve Faccio Brian Mitchell Penelope Pooler	Power analysis section revised. Minor edits.
4.02	April 2009	Steve Faccio Brian Mitchell	Incorporated comments from 3 independent reviewers as well as several NETN park staff.
4.03	August 2009	Sarah Lupis	Formatted and minor edits.

Revision History Log (continued)

Version #	Date	Revised by	Changes
4.04	December 2009	Steve Faccio Brian Mitchell	Incorporated comments from 3 additional independent reviewers. Removed Appendix B – reviewers of other protocols did not feel that the statistical summary was relevant.
4.05	February 2012	Brian Mitchell	Added safety information to Personnel Requirements and Training. Added Safety SOP to protocol.
4.06	May 2012	Brian Mitchell and Steve Faccio	Modified avian ecological integrity assessments to more closely match procedures of O'Connell et al. (2000). Limited to 5 avian groups, and updated guilds by adding EAPH to both assessments, and 18 new edge generalists and two grassland obligate raptors to the grassland assessment. Added MIMA grassland site info.
4.07	December 2012	Brian Mitchell and Steve Faccio	Revised grassland ecological integrity metrics to account for changes in guilds, and to match original intent (See SOP 9). Study site route markings enhanced in all parks. Data sheets will be uploaded to IRMA. Replaced Appendix A with updated (2012) version.
4.08	February 2013	Brian Mitchell	Numerous minor edits and clarifications after Regional Program Manager review.
4.09	April 2014	Brian Mitchell	Updated quality control description to discuss QC with audio recordings rather than independent double observer counts; independent counts were too logistically difficult. Removed references to project management by VCE, replaced with "Project Manager" and specified in the Personnel section that the Project Manager is typically hired through contract. Original data forms are now sent to NETN rather than retained by the contractor. Copies are not needed, since forms are scanned and placed on IRMA. The Point Count Database is now part of the Avian Knowledge Network rather than USGS. Updated SOP numbers due to insertion of SOP 6 (recorder QC procedures). Volunteers unable to enter data within a month should mail data sheets to Project Manager.

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Introduction

Background & Objectives

This protocol has been developed for long-term monitoring of forest and grassland breeding landbird populations within the National Park Service (NPS) Northeast Temperate Network (NETN) as part of the Inventory & Monitoring Program (IM). NETN consists of 13 parks, including the Appalachian National Scenic Trail (APPA). Excluding APPA, the parks total approximately 18,500 ha, with diverse cultural and natural resources. They range in size from just 4 ha at Saugus Iron Works National Historic Site (SAIR), located near densely populated Boston, Massachusetts, to over 15,800 ha at Maine's Acadia National Park (ACAD).

On a broad scale, most NETN parks are located within the temperate deciduous forest biome, and fall within two avifaunal biomes (the Eastern and Northern Forest) as defined by Partners in Flight (PIF) (Rich et al. 2004). At a finer scale, the parks range across four Bird Conservation Regions (BCRs) (Figure 1). BCRs, developed by the North American Bird Conservation Initiative (NABCI 2000), are ecologically defined units that provide a consistent spatial framework for bird conservation across North American landscapes. By employing broad scale units that are ecologically meaningful to bird populations, conservation efforts can be tailored to support groups of species throughout the heart of their ranges. Bird Conservation Regions are being used to help assign "conservation priority" scores for bird species. Each BCR has its own unique list of "priority" species ranked by conservation importance according to a standardized set of criteria determined by partners from Mexico, the U.S. and Canada.

Breeding landbirds are an important component of park ecosystems, and their high body temperature, rapid metabolism, and prominent position in most food webs make them a good indicator of local and regional ecosystem change. It has been suggested that management activities aimed at preserving habitat for landbird populations, such as for Neotropical migrants, can have the added benefit of preserving entire ecosystems and their attendant ecosystem services (Karr 1991, Maurer 1993). Moreover, landbirds are a high profile taxa, and many parks provide information on the status and trends of the park's avian community through their interpretive materials and programs.

In developing comprehensive long-term monitoring plans, landbirds (a general term used to describe relatively small, terrestrial birds, excluding raptors and upland game birds) are among the best taxonomic groups to monitor because: 1) they are the most easily and inexpensively detected and identified vertebrate animals, 2) a single survey method is effective for many species, 3) accounting and managing for many species with different ecological requirements promotes conservation strategies at the landscape scale (Hutto and Young 2002), 4) many reference datasets and standard methods are available (Ralph et al. 1993, 1995), and 5) the response variables are fairly well understood.

In addition, landbirds are a useful biotic indicator of the effects of habitat loss and fragmentation. While direct loss of habitat due to development is a primary threat to landbird populations, Neotropical migrants appear to be particularly vulnerable to habitat fragmentation (Robinson and Wilcove 1994, Faaborg et al. 1995, Rosenberg et al. 1999). Forest fragmentation increases the

prevalence of forest edges, resulting in higher rates of brood parasitism and nest predation within the remaining breeding habitat (Robinson et al. 1995). It is an ecological stressor that impacts all NETN parks due to the relatively small size of the parks and their land use histories. Although the NPS has some management control over fragmentation within the parks, fragmentation and habitat loss outside park boundaries is widespread throughout much of the Northeastern region.

Although NETN contains 13 park units (including APPA), implementation of this landbird monitoring protocol will be limited to the following 11 parks: Acadia NP (ACAD); Marsh-Billings-Rockefeller NHP (MABI); Minute Man NHP (MIMA); Morristown NHP (MORR); Roosevelt-Vanderbilt NHS (ROVA - which contains Eleanor Roosevelt Mansion NHS, Home of Franklin D. Roosevelt NHS, and Vanderbilt Mansion NHS); Saint-Gaudens NHS (SAGA); Saugus Iron Works NHS (SAIR); Saratoga NHP (SARA); and Weir Farm NHS (WEFA) (Figure 1).

The Massachusetts Audubon Society will continue to monitor birds at Boston Harbor Islands National Park Area (BOHA), and a separate coastal breeding bird monitoring program was initiated by NETN in 2007 for BOHA. Monitoring the 2,175 mile Appalachian National Scenic Trail (APPA) is beyond the scope of this protocol. Ten of the 11 parks in the landbird monitoring program are National Historical Parks or Historic Sites, and thus have a primary mandate to maintain historical features, landscapes, or practices. This mandate may have a substantial impact on ecological resources within these parks, as they are frequently managed to maintain early successional habitats, or incorporate agriculture or forestry.

Developing a uniform protocol for monitoring breeding landbirds across NETN parks will not only provide insights into the long-term trends of avian species composition and relative abundance, but will also provide a measure for assessing the ecological integrity of Northeastern temperate systems. Additionally, monitoring long-term patterns of breeding landbird composition and abundance relative to habitat change resulting from a variety of stressors (e.g., deer herbivory, invasive species, fragmentation, and silvicultural practices) will improve our understanding of their effects on breeding landbird populations and help guide management actions within NETN parks. This protocol will also contribute to greater understanding of breeding landbird population trends beyond NETN, since it is compatible with protocols developed by the Great Lakes Network (GLKN) and the U.S. Fish and Wildlife Service (USFWS; Knutson et al. 2008). This protocol is also compatible with methods used by the Mid-Atlantic Network (MIDN).

Monitoring Objectives

Because landbirds are an important natural resource and they are a robust indicator of ecosystem integrity, the overall goal of landbird monitoring is to track the status and trends of breeding landbirds within the dominant matrix forest habitat at each NETN park. Breeding landbird monitoring will also support and inform management decisions that may affect avian populations. Additional programmatic goals are to increase the visibility of the NETN Inventory & Monitoring Program (I&M) and to involve the public. Due to the small size of the majority of NETN parks, combined with the fact that this is a volunteer-based monitoring program, the ability to detect meaningful trends for individual species at each park will be limited. However, by aggregating data into species groupings, such as guilds or PIF priority species, the ability to detect trends will be increased. Additionally, NETN landbird monitoring will be partnering with the Vermont Center for

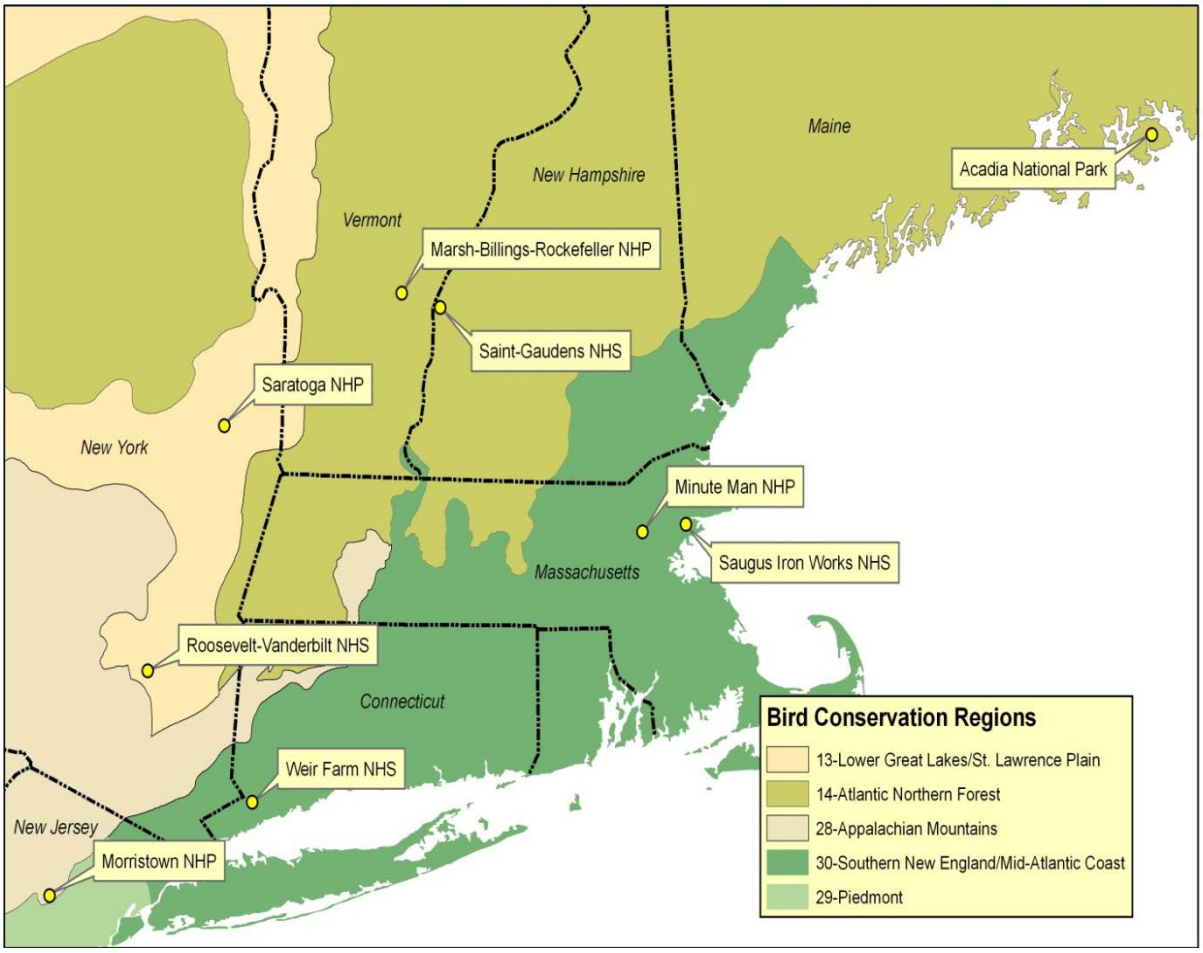

Figure 1. Distribution of National Park units in the Northeast Temperate Network where breeding landbird monitoring protocols will be implemented and their associated Bird Conservation Regions.

Ecostudies (VCE) 'Vermont Forest Bird Monitoring Program', a regional landbird monitoring project initiated in 1989 (see Faccio et al. 1998). This will allow data from some network parks (MABI, SAGA, and SARA) to be combined with data from the VCE's 28 Vermont study sites for more powerful estimates of population trends, thus providing an opportunity to make inferences related to changes beyond park boundaries.

Data from NETN parks can also be compared with data collected by GLKN and the USFWS in order to explore regional trends. With that in mind, the protocol described here addresses the following specific, measurable monitoring objectives:

> Objective 1: Determine long-term trends in species composition of native and non-native landbirds in dominant, forest matrix habitat during the breeding season at 11 NETN parks (listed above). The focus will be on forest and woodland sampling, except at SARA, where grasslands will also be sampled; potential species, listed by park, can be found in Appendix A.

Objective 2: Determine changes in relative abundance of:

a) the 10 most commonly detected species at each park; and

b) the combined suite of PIF Priority Species at each park, as determined by BCR.

For each of these species groups, the sampling objective is to be able to detect a minimum 5% annual population change over 10 years with at least 50% power at each park.

Objective 3: Provide correlational data that will be used to improve our understanding of breeding landbird/habitat relationships and the effects that management actions, such as silvicultural practices, mowing regimes, invasive plant controls, etc., may have on landbird occupancy and relative abundance. Where sufficient data exist, periodic analyses will correlate changes in landbird communities with site-specific information about park management activities (e.g., silvicultural treatments, timing of mowing, and exotic species management) and with changes in habitat metrics collected at co-located forest condition plots (see SOP-7 Data Analysis).

Sampling Design

Introduction

Numerous sampling approaches have been used to quantify the status and trends of breeding landbird populations and many different monitoring programs are currently in place throughout North America to determine local, regional, or national trends in bird numbers. Most survey methods allow simultaneous collection of information about species that share a common life history or habitat type, but no single method will adequately sample either the diversity of habitats that birds occupy, or life history groups such as seabirds, songbirds, raptors, and shorebirds.

The sampling design described in this protocol involves a series of point count stations laid out on a systematic grid that is sampled during 10-minute point counts. For landbirds, point counts are the most widely used quantitative method of monitoring populations (Ralph et al. 1995). This technique involves using a standardized methodology to record all birds seen or heard during a fixed amount of time at many widely spaced point count stations. Recently, many papers have suggested that unadjusted point counts do not provide accurate estimates of abundance or density (see overview by Thompson 2002) because some birds may not be detected due to: 1) observer variability (experience, hearing); 2) environmental factors (wind, vegetation); and/or 3) physical and behavioral aspects of birds (plumage coloration, singing rate). As a result, several methods have been advocated as a means for incorporating detection probabilities in order to adjust occupancy and abundance (or density) estimates derived from point counts. These include occupancy modeling (MacKenzie et al. 2002, 2003), distance sampling (Buckland et al. 2001), removal models (Farnsworth et al. 2002), double observer sampling (Nichols et al. 2000), and double sampling (Bart and Earnst 2002).

Occupancy models are robust, but they generally only predict species presence or absence instead of abundance. The estimated probability of occupancy can be used as an index of abundance or (with some assumptions) to develop estimated abundances (Royle and Nichols 2003), but it is often preferable to attempt to estimate abundance directly. Of the methods available for estimating abundance, double sampling and double observer sampling are both labor intensive. Use of either methodology in a large-scale volunteer-based bird monitoring program would result in significantly reduced sample sizes. In addition, removal models present problems because the simplifying assumption of equal probability of detection throughout a 10-minute count is rarely met, and models without this assumption require much more data (Mitchell and Donovan, in prep).

The use of distance sampling also has its detractors due to difficulty in meeting the assumptions of this method (e.g., Bart et al. 2004) and recent papers suggesting that most observers cannot estimate distance accurately (Alldredge et al. 2007, Simons et al. 2007). Since each method outlined above has its short-comings and detractors, there may not be a “best” method of calculating detection probabilities for purposes of avian monitoring in NETN parks. This protocol collects data in a way that allows for removal modeling, distance sampling, and occupancy modeling, while trying to keep the total amount of data collected reasonable for volunteer birders.

As a means of evaluating both removal and distance modeling to determine if one of these methods should be dropped from the protocol, we compared the abundance estimates and 95% confidence

intervals produced by both approaches using data from the first 2 years of monitoring at NETN parks (2006-2007). Results showed strong overlap in several of the 95% confidence intervals, improving our confidence that we have accurately estimated the number of individuals in the vicinity of our point count stations (Mitchell et al. 2008). Therefore, both modeling approaches will be used to adjust data for detection probability prior to testing for temporal trends in species abundance.

In distance sampling, the horizontal distance from the observer is estimated for each bird seen or heard during the count period. However, accurately estimating distance is difficult when neither the bird nor its location can be seen, which is common in forested habitats of the Northeast. Although training and experience help, the volume of sound produced by a singing bird is highly variable, and can be dramatically affected by the bird's singing position, as well as site-specific characteristics including vegetation density and topography. Thus, training at one or a few locations may lead to more accurate distance estimates at those sites, but not at others (Bart et al. 2004). Therefore, when the majority of detections are of unseen birds, it is preferable to collect data in distance groups or "bands" rather than estimating exact distances (Rosenstock et al. 2002). With distance bands, the assumption concerning measuring accuracy is relaxed and the observations need only to be placed into the correct distance band (Buckland et al. 1993), greatly increasing accuracy and consistency among and within observers (Rosenstock et al. 2002). For the protocol described here, bird detections will be placed into four distance bands; 0–10 m, > 10–25 m, > 25–50 m, and > 50 m. Additionally, each 10-minute point count will be divided into 1-minute listening periods, and observers will record the minute in which they heard each bird. This will facilitate analysis by removal modeling using five 2-minute time intervals. Removal models use the decreasing numbers of new birds counted in each time interval to estimate the number of birds missed during the count (Moore et al. 2004). Collecting time of first detection data will also enable us to group the data for direct comparisons to other monitoring programs using 3-minute or 5-minute point counts, such as the North American Breeding Bird Survey (BBS).

In order to compute reliable detection probabilities and correct for the abilities of individual observers, 80-100 detections per observer for each species are needed (Bibby et al. 1998). It is possible to calculate estimates from smaller samples, but these will be less precise. Furthermore, while it is possible to pool data from multiple surveys to obtain adequate sample sizes for development of these detection functions, resulting estimates may still be an unreliable measure of differences in the actual number of birds present. However, it is still valuable to collect the data, and pooling of data over time or across observers with similar skill levels may allow certain limited analyses. Interpretation of survey data requires sensitivity to these extra-statistical limitations of the estimation procedures. Additionally, the distance categories will be important covariates in occupancy and removal modeling analyses, which do not require absolute accuracy in distance estimation.

Site Selection

Point count stations are selected as described in SOP 4 - Establishing and Marking Point Count Stations. In locating point count stations, four basic criteria were established: 1) point count stations must be spaced approximately 250 m apart to avoid duplicate sampling while permitting observers to

move efficiently between points; 2) points must be located at least 50 m from forest edges in order to maximize sampling effort on focal species and avoid fragmentation effects; 3) points must be located within the dominant, mature forest cover types found in each park; and 4) at least one long-term forest vegetation monitoring plot (see Tierney et al. 2009) per study site must be co-located within 50 m of a point count station (and within the same broad vegetation type, such as deciduous forest) so that future changes in breeding landbird populations can be compared with broad changes to forest structure, composition, and other variables. A "study site" is defined as a group of point count stations that was stratified by general forest cover type into a discrete sampling unit, each consisting of 3 - 12 points depending on park size and the spatial configuration of major habitats within each park.

Precise co-location of breeding landbird point count stations and forest vegetation plots must be avoided to reduce trampling of vegetation due to multiple visits to the same point. In addition, point count stations should be located at least 15 m away from hiking trails and interpretive signs, and at least 50 m from park boundaries, roads, buildings, and other areas frequented by the public. To meet these criteria, point count stations were selected in three ways.

Judgment Sampling Frame: At SAIR, the small size of the park prevented us from using a statistical sampling approach. Two point stations separated by 250 m were established along the Saugus River and within the park boundary in consultation with the park's resource manager. A third station was established between the two in order to provide a chance to record additional species, although most analyses will exclude this point due to the potential for double-counting individuals recorded at the two other points. At MIMA, the park staff requested a grassland site in 2011. Six point count stations were established in 2012 using expert judgment due to the small size of the MIMA grassland patches.

Systematic Grid Sampling Frame: Point count stations for nine parks (MABI, MIMA forested habitat, MORR, ROVA sites, SAGA, SARA, and WEFA) were selected by first overlaying a 250-m grid onto park boundaries, vegetation types, forest vegetation sampling plots, and other data layers in ArcGIS 9.2. Point counts were then selected at grid intersections that occurred within mature forest habitat. In some cases, points were moved slightly (ca. 10 - 50 m) in order to avoid park trails, boundaries, steep slopes, wetlands, and other sensitive or otherwise inaccessible habitat features, or to co-locate points within 50 m of long-term forest vegetation sampling plots. Groups of point count stations were then stratified by general forest cover type into discrete study sites, each consisting of 5 - 12 points depending on park size and the spatial configuration of major habitats within each park. Smaller habitat patches that could not accommodate at least five point count stations were excluded from the sampling frame. At SARA, three study sites were also established within grasslands in 2006 since this habitat type represents a significant component of the natural communities at that park.

ACAD Sampling Frame: A sampling frame based solely on a systematic grid was deemed inappropriate for ACAD due to the amount of forested habitat (ca. 13,000 ha) and excessively steep terrain which can be difficult and often dangerous for volunteers to access. Therefore, our sampling frame for the park was defined in ArcGIS 9.2 by first identifying areas of the park within 1.5 km of roads and with slopes less than 30% (Figure 2). We then overlaid the long-term forest vegetation

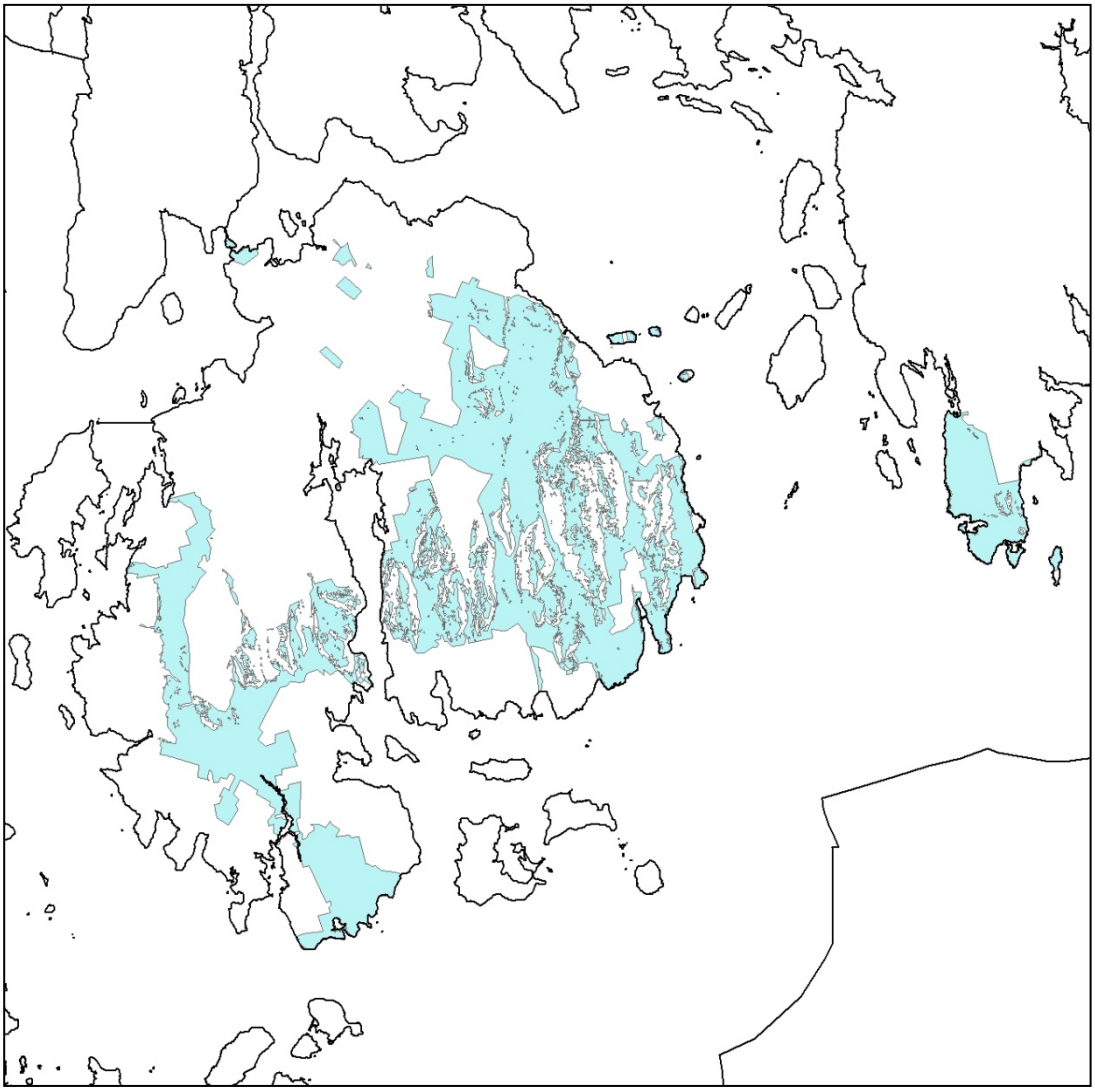

Figure 2. Sampling frame for Acadia NP; blue shaded areas are within 1.5 km of roads and have slopes less than 30%.

sampling plots, which were selected using the Generalized Random Tesselation Stratified (GRTS) algorithm (Stevens 1997, Stevens and Olsen 2004) and identified those that fell within large blocks (> 100 ha) of contiguous habitat. Habitat was contiguous if adjacent polygons were within the same broad habitat class (e.g., upland coniferous forest), based on the phys_hydr field on the park vegetation map. Beginning with the lowest-numbered site (as determined by the GRTS algorithm), we established point count stations around the forest vegetation plots. A central point count station was offset from the forest vegetation plot by 50 m towards the center of the forest patch (or in a direction to make it possible to establish four sites near the vegetation plot), and additional point count stations were placed on a regular 250-m grid to be as close as possible to the vegetation plot. A minimum of five point count stations and a maximum of 10 were established around at least one vegetation plot, and points were located > 15 m from a road or trail. Points that fell within a different habitat type (as defined by the phys_hydr field of the park vegetation map) were excluded. This

approach at ACAD generates a cluster of point count stations near a central, randomly selected station that is co-located with a forest vegetation plot.

Sample Sizes

Whenever possible, study sites will consist of 10 point count stations in order to maximize the amount of data collected per volunteer visit. The number of point count stations per park varies, primarily depending upon park size and amount of forested habitat (Table 1), but at ACAD the number of stations is also affected by the availability of suitable volunteers. In order to reach the target number of point count stations, additional points can be added at ACAD in the future should the pool of volunteers be larger than anticipated. Because this protocol relies on the participation of volunteers, it is likely that in some years not all study sites will be surveyed. The Project Manager will make every effort to ensure that sufficient numbers of volunteers are recruited and retained to meet the needs of the program, but it is important to recognize that reliance on volunteers will result in occasional data gaps if volunteers drop out of the program without surveying their assigned site.

Population Being Monitored

Sampling will be limited to the breeding season of migratory landbirds (mid - May through late - June, depending on latitude), and will include those species that may potentially breed in the park (see Appendix A). Thus, the population being sampled includes breeding landbird species within the park boundary that use large blocks of forested habitat (plus grasslands at MIMA and SARA) and are present during the time that the survey is being conducted. At ACAD, the sampled population is further limited to sites that are within 1.5 km of a road and that have slopes below 30%. At SAIR, in addition to breeding landbirds the population being sampled includes marsh birds and water birds that can be detected from the three point count stations.

Table 1. Area of forested habitat (and grassland habitat at SARA and MIMA), and number of point count stations and study sites established at NETN parks. For ACAD, numbers in parenthesis indicated the target number of points and sites.

NETN Park		Forested Habitat (ha)	Number of Point Count Stations Established	Number of Study Sites Established
Acadia NP		12,876	44 (120)	6 (12-15)
Marsh-Billings-Rockefeller NHP		197	25	3
Minute Man NHP	- Forest	325	27	3
	- Grassland	72	6	1
	- Total	397	33	4
Morristown NHP		465	30	3
Roosevelt-Vanderbilt NHP		192	30	3
Saint-Gaudens NHS		43	5	1
Saratoga NHP	- Forest	860	30	3
	- Grassland	325	25	3
	- Total	1,185	55	6
Saugus Iron Works		--	3	1
Weir Farm NHS		21	5	1

Sampling Frequency and Replication

For reducing within-year variability, studies indicate that sampling multiple point count stations within a site is preferable to repeat visits to a single station (Link et al. 1994, Carlson and Schmiegelow 2002). In addition, variability is further reduced by limiting the number of observers conducting surveys. Therefore, each study site will be surveyed at least once annually, and volunteer observers will be encouraged to survey two study sites each. In addition, one or two follow-up, replicate surveys within two weeks of the initial visit will be encouraged, but not required. The exception to this will be at the three smallest NETN parks (SAGA, SAIR and WEFA), which can only accommodate one study site each. In order to reduce within-year variability at these parks, study sites will be surveyed twice annually, with replicates occurring about 7 - 14 days apart. In order to keep the effect of time of day consistent for each point, study sites will be surveyed in the same order each time (e.g., the order in which point counts are surveyed will never be reversed). While more repeat visits would clearly enhance this monitoring protocol, this sampling design does allow for estimation of the probability of detection for each species via removal, distance, and occupancy modeling approaches. Requiring volunteers to sample on more days, even with decreased numbers of points per sample, would make it harder to recruit and keep volunteers.

It is important to recognize the significance of maintaining observer consistency and continuity across survey years. The precision of population trends derived from data collected using this monitoring protocol will be increased if the same observer conducts the same survey(s) consistently each year for as many years as possible (Bart et al. 2004). Changes in observers or missed survey years reduce the precision, and therefore utility, of the data. In addition, because changes in observers are inevitable, NETN, GLKN, and the USFWS are actively supporting a web-based birder certification tool that should provide a consistent evaluation of observer skills.

To provide a degree of quality control (QC) on volunteer observers, three volunteers will be asked to record their point counts each year (SOP 6 - Field Quality Control Recordings). A professional biologist highly skilled in both bird identification and point count protocols will review the recordings and assess the quality of the volunteer data. This approach, while not as good as a second observer, is less expensive and logistically simpler than sending a skilled observer into the field with a volunteer.

Power of Monitoring Protocol to Detect Change

Due to the relatively small size of most NETN parks and limited number of volunteer observers available at larger parks such as ACAD, this protocol is not expected to have sufficient power to detect trends in population size for more than a few individual abundant species. However, by aggregating data into species groupings, such as guilds or PIF priority species, our goal is to be able to detect a 5% annual population change at individual parks over 10 years with at least 50% power. We also intend to supplement the point count data collected through this protocol with additional data (e.g., eBird sightings within parks and data from Vermont's Forest Bird Monitoring Program) to gain a better understanding of trends for individual species.

Using the freeware program MONITOR (Gibbs 1995) and pilot data from the NETN 2006 and 2007 field seasons at 10 of the 11 parks (SAIR was not surveyed until 2008), we estimated the power of

the monitoring protocol to detect -10%, -5%, 5%, and 10% population changes over five time periods (5, 10, 15, 20, and 25 years) for each of the 10 most abundant species in each park, as well as for any PIF priority species. The analysis was conducted assuming a linear trend and using 1000 iterations, a two-tailed test, and an alpha level of 0.10. In addition, we estimated the power of the monitoring program to detect changes in species composition, using the Shannon diversity index, for four groups of species: interior forest specialists, residents, single-brooded species, and PIF priority species. Because MONITOR requires multiple observations within each year, the multiple points at each park were used for the Shannon diversity analysis. Therefore, the mean Shannon index was the mean of the Shannon indices for each of the points within a park. At parks where there were multiple study sites, the power analyses were conducted in two ways: 1) treating the whole park as one site, and 2) treating each study site as its own site and weighting those data accordingly. This resulted in more precise estimates and lower coefficients of variation (CVs), so the analysis was conducted using alpha levels of both 0.05 and 0.10 and annual Shannon diversity changes of 1%, 2%, 3%, 5%, and 10% (both increases and decreases) over the same five time periods as above. For the species groupings, the analysis was conducted using an alpha level of 0.05 and the same population changes as the Shannon analysis over 10 and 20 years.

Power Analysis Results

Individual Species: As expected, the protocol's power to detect population changes of individual species was quite low. For many species with low and moderate to high CVs, the power to detect a 10% annual change over 25 years was at least 40% (Figure 3). For all but the most abundant species with low CVs (e.g., Ovenbird, Red-eyed Vireo, etc.), the power to detect a 10% change over 25 years was less than 80%. However, these results varied depending on the number of individuals detected and their variance between point counts within a park, sometimes resulting in reduced power, especially for species with relatively high CVs. It is important to note that for species detected at rates of 0.40 birds per point or less, results were unreliable (power decreased as time span increased); so power to detect population changes for rare species was not calculated.

Species Groups: The protocol's power to detect changes in groups or guilds of species was significantly greater than for individual species. The goal stated above (detecting a 5% annual change over 10 years with 50% power) was met for all guilds with the exception of two (PIF priority and interior forest species) at parks with 5-7 point count stations, and PIF priority species at parks with 10-12 point count stations (Figure 4). In these cases, mean birds per point was low and CVs were relatively high. After 20 years of monitoring, a 2% annual change could be detected with at least 50% power for all guilds, with the exception of PIF priority species at parks with fewer than 12 points (Figure 4). At parks with 25-28 point count stations, power for all guilds was quite high, with nearly 70% power to detect a 3% annual change over 10 years.

Shannon diversity: The power to detect change in the Shannon diversity indices at each park was similar to that for species guilds. At each park, using an alpha of 0.05, a 5% annual change in the Shannon index could be detected over 10 years with at least 40% power, while a 10% annual change could be detected with at least 74% power (Table 2). Power to detect a 3% annual change dropped off considerably, although it remained high for 10 forest point counts at SARA.

Because NETN park data are being incorporated into the Vermont Forest Bird Monitoring Program (FBMP), and the data are also compatible with GLKN and USFWS data, power to detect regional population trends can be improved in some cases. As an example, for three NETN parks in or near Vermont (MABI, SAGA, SARA), combining data with those from FBMP sites will increase sample sizes and reduce CVs for many species, thereby increasing power.

Table 2. Power to detect 3%, 5%, and 10% declines in the Shannon diversity index at each NETN park over 10 years using an alpha of 0.05. The power to detect increases was always equal to or greater than the power to detect decreases.

		Power		
Park	**Points Surveyed**	**-10%**	**-5%**	**-3%**
WEFA	5	0.994	0.785	0.446
VAMA	7	0.869	0.482	0.241
SAGA	8	0.743	0.411	0.241
SARA-Forest	10	1.000	0.993	0.821
ELRO	11	0.974	0.681	0.365
HOFR	12	0.879	0.482	0.250
MORR	19	0.995	0.809	0.469
MIMA	23	0.941	0.596	0.304
MABI	25	0.971	0.674	0.352
SARA-Grassland	25	0.975	0.662	0.348
ACAD	28	0.785	0.408	0.203

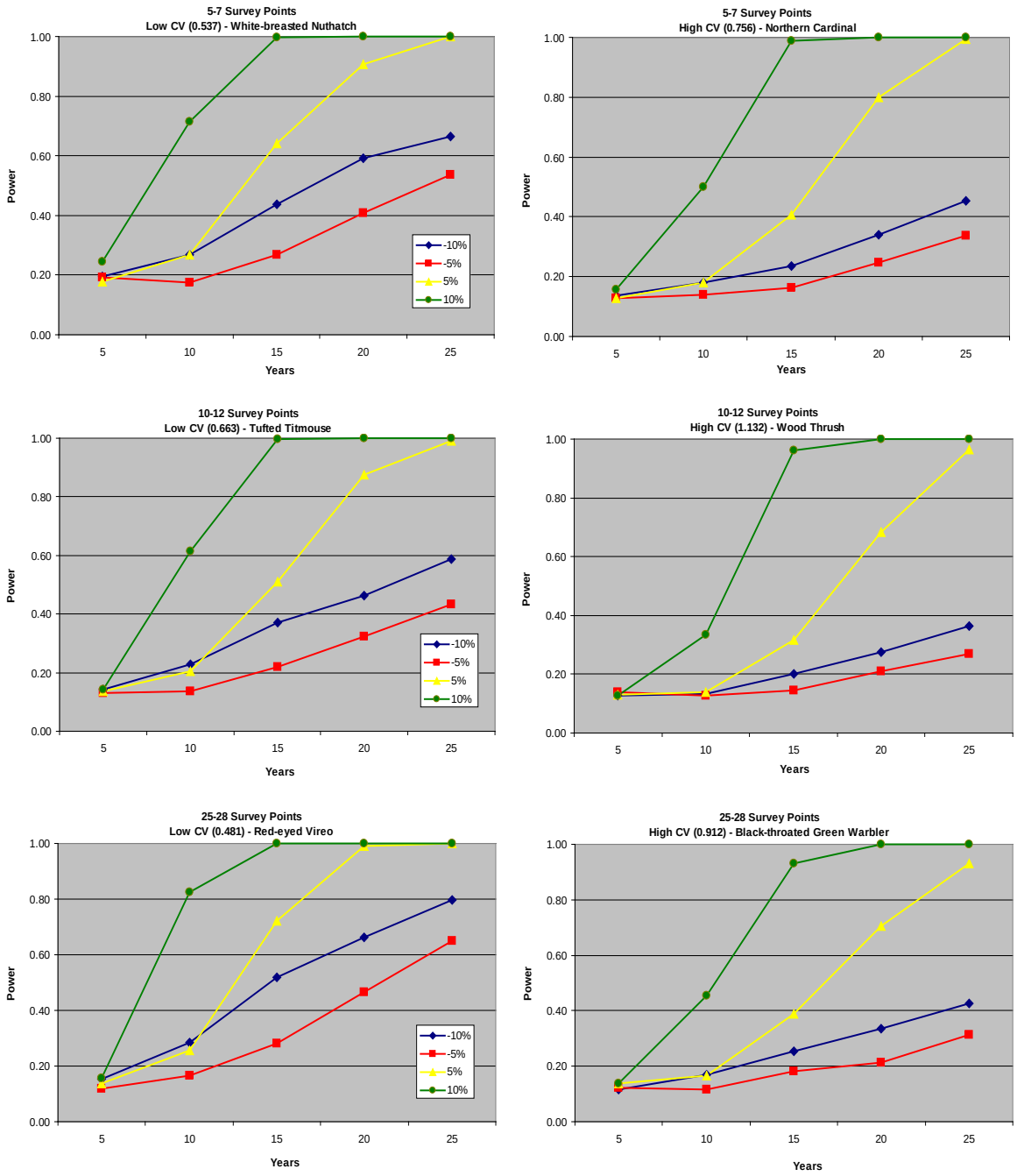

Figure 1. Power to detect 5% and 10% population increases and decreases over 25 years for species with low and high CVs at sites with 5 - 7 point count locations (top), 10 - 12 point count locations (middle), and 25 - 28 point count locations (bottom). Results based on 2006/2007 pilot data analyzed using program MONITOR. Note that power to detect a 10% population decline over 25 years was less than 70% in all cases, with the exception of study sites with 25 - 28 point count stations and species with low CVs.

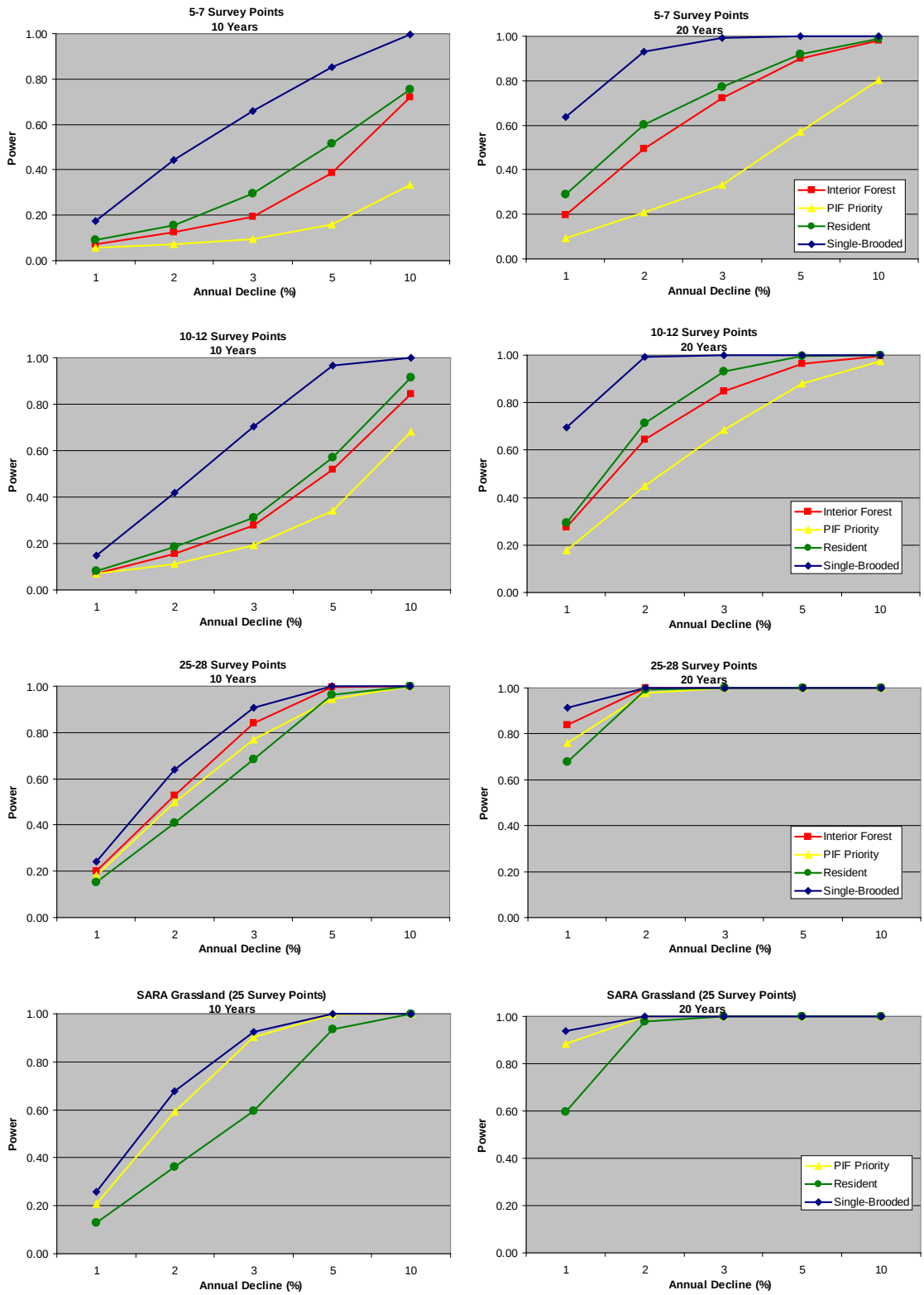

Figure 2. Power to detect 1 - 10% annual declines of four guilds based on number of point count stations over two time periods (10 and 20 years). Results based on 2006/2007 pilot data analyzed using program MONITOR. Note that bottom charts are for grassland surveys at SARA, and that annual increases (not shown) were always detected with equal or higher power than declines.

Field Methods

Field Schedule and Preparations

The monitoring described in this protocol is implemented annually during June, although late-May surveys are suitable at MORR and WEFA. The ability to successfully complete the annual monitoring will hinge on thorough advance preparation. Because this is a volunteer-based monitoring program, the most important preparation is ensuring that skilled volunteer personnel are trained and available to accomplish the field work. Volunteer recruitment and training will be coordinated by the Project Manager with support from available staff at individual NETN parks, preferably a Resource Manager or Park Ranger familiar with park resources and the local birding community. Volunteers will need to be recruited well in advance of the field season, and survey materials and protocols mailed during the month prior to the start of the field season. In addition, any research permits or clearances necessary to gain access to park grounds during early morning hours (ca. 0400 - 0430) must be arranged (see SOP 2 - Field Season Logistics).

Sampling Methods

Permanent point count stations will be located as identified above (see Site Selection) and marked with aluminum tree tags and blue flagging so they can be easily located by volunteer observers. Starting in 2007, several study sites at ACAD were marked with aluminum trail markers and “fire tacks” to aid navigation by volunteer observers. These more permanent markings were expanded to other parks in 2012. SOP 4 - Establishing and Marking Point Count Stations provides details about locating and marking point count stations, and SOP 5 - Conducting Variable Circular Plot Point Counts provides detailed instructions on the procedures for counting breeding landbirds and examples of completed data sheets.

End of Season Procedures

After the field data is collected, the Project Manager will follow up with volunteers to ensure they enter their data on-line in a timely manner. He or she will also perform quality assurance and quality control (QA/QC) checks of the data, comparing field mapping cards with data coding sheets, and data coding sheets with the database. The biologist will also follow up with volunteers and park staff to thank them for their support, and to provide summaries of data when they are available.

Data Management

Overview of Database Design

Breeding landbird monitoring data will be archived into the Bird Point Count Database that is part of the Avian Knowledge Network (AKN) and managed by Point Blue (http://data.prbo.org/science/biologists/index.php). This web-based, publicly accessible, and searchable repository for point count data collected in North America is a collaborative project between the USFWS, the NPS, the American Bird Conservancy, and Point Blue. Requests for NETN breeding landbird monitoring data should be directed to either the Project Manager (sfaccio@vtecostudies.org) or the NETN Data Manager (Adam_Kozlowski@nps.gov). Each request will be reviewed on a case-by-case basis, and any data on sensitive species (as defined by each park's Resource Manager) will be removed before data are provided.

Data Entry and Verification

Data are entered into the Bird Point Count Database via an online data entry system that allows volunteer observers to enter data once they have created a user account and been assigned to the NETN landbird monitoring project. Only the Project Manager and NETN Data Manager have the ability to edit data once they have been entered. Data are coded as "raw" in the database and will not show in the public search area until the Project Manager reviews data and marks them as "available." Data verification is necessary to ensure that values recorded on the field form and keyed into the database are correctly entered (i.e., the entered value is the "correct" value). Evaluating post-acquisition data is a potentially difficult but necessary task, regardless of the data source. Several steps are taken during and after data entry to verify that data are correct and logical, including:

- Visual review at data entry: At time of transcription, volunteers are asked to carefully compare the date, time, species, and observation codes recorded on the Field Mapping Card with those transcribed onto the Data Coding Sheet to make sure they are consistent. In addition, they are asked to verify each record after input into the database and immediately correct any errors;

- Visual review after data entry: Data entered into the database are compared visually to the original records; discrepancies are identified and reconciled by the Project Manager once the original data sheets have been received. Only then will data be marked as "available" in the Bird Point Count Database.

Additionally, the database entry form itself has features that reduce data entry errors. These include dropdown menus for site name, observer, and species and observation codes. For more detailed information on data flow and data management roles and responsibilities, See SOP 7 – Data Management.

Data Archiving

After data QA/QC, completed original data forms will be sent to the NETN office each year. NETN will maintain at least five years of data in the network office; older data sheets will be periodically archived. Data sheets will also be scanned and uploaded to irma.nps.gov as pdf files.

Data Analysis

Data Summaries and Statistical Analysis

For each park, annual summaries of breeding landbird monitoring data will consist of relatively simple statistical tabulations providing a "snapshot" of the avian community. At SARA and MIMA, grassland and forested habitats will be summarized separately. Annual results will also be compared to the mean values of previous years in order to gauge whether they are above or below "normal." Data summaries will consist of the following metrics: total abundance, species richness, species diversity (Shannon-Wiener index), relative abundance, and frequency of occurrence (Table 3). These metrics will be calculated for each study site and each park (at SARA and MIMA, forest and grassland sites will be reported separately). Results for both total abundance and species richness metrics will also be broken down into native/non-native and resident/migrant categories. In addition, after three years of data collection, annual time series graphs of relative abundance by year will be plotted for the 10 most abundant species at each park and for PIF priority species as determined by BCR (see Appendix A).

Periodically, perhaps every 5-10 years depending on perceived need and funding, a more detailed analysis will be conducted that will include estimates of population densities and trends, focusing on the most abundant species and those of management or conservation concern (i.e., the PIF priority species). Such an analysis will involve more sophisticated statistical modeling, and may include procedures such as estimating equations (Link and Sauer 1994), repeated measures ANOVA, hierarchical modeling, and methods for detecting non-linearities in trend data (e.g., piece-wise linear regression or Bayesian change-point analysis). In addition, volunteer surveys will be compared with duplicate QC surveys conducted on a rotating basis at the same points by a professional biologist to identify discrepancies and model observer effects.

Table 3. Breeding landbird monitoring metrics and calculations from raw data.

Metric	Variable Type	Units	Calculation
Total Abundance	Index	Mean number of individuals/point	Total number of individuals of all species/total number of point count stations surveyed
Species Richness	Index	Number of species	Sum of all species detected
Species Diversity (Shannon-Wiener)	Index	NA	$-\sum_{i=1}^{n} p_i \ln(p_i)$ where p_i = proportion of the total abundance for the ith species, n = species richness, and ln = natural log.
Species Relative Abundance	Index	Number of individuals/point	Number of individuals of a given species/number of points surveyed
Frequency of Occurrence	Percent	% of points where the species was detected	Number of points on which species was detected/total number of points surveyed

Data will be adjusted for detection probabilities using occupancy modeling, removal modeling, distance sampling, or other appropriate methods. Population trend analyses will likely compare trends from NETN parks to those produced by the BBS or other regional programs such as the VCE

FBMP or USFWS bird monitoring efforts which use similar point count methodologies. Additionally, in order to produce more robust estimates of trend, species may be grouped into habitat/foraging guilds and network parks may be grouped together by BCR, forest ecosystem, or other biologically appropriate groupings. The specific analyses will vary by park in order to make maximum use of the variations in sampling design across the network. In general, occupancy and removal analyses will use a "robust design" approach, where there are multiple seasons (or years) and multiple visits during a season (visits may be repeat visits to the same point count station or visits to multiple spatially distinct point count stations within a site).

Estimates of population densities that adjust for detection probability will be derived from distance sampling methods using the program DISTANCE 5.0 (Thomas et al. 2005), and/or using removal modeling methods in the program MARK (Moore et al. 2004). Because a minimum of 80-100 detections of each species per observer are needed in order to calculate detection probabilities (and particular observer effect on detection probability) with sufficient precision, several years of data collection will be needed for all but the most common species. The tradeoff between precision of estimates and the ability to detect trends in a reasonable length of time will need to be carefully evaluated. Once these detection minimums have been accumulated, data will be input into DISTANCE and analyzed to estimate species density per unit area and effective detection radius (EDR). The EDR is the distance from the observer beyond which the number of birds missed equals the number detected within the EDR. Comparisons of EDR values between species and habitats may justify combining data from different sites in order to increase sample size and produce more precise population estimates.

Explanatory variables for statistical modeling effort will come from a variety of sources, including long-term weather data from nearby meteorological stations, forest monitoring data, information provided by the parks on ongoing management activities, as well as landscape level data such as road density, forest fragmentation, etc. Table 4 includes metrics that could be useful in helping to explain breeding landbird/habitat relationships and how management activities at NETN parks may affect breeding landbird populations. At NETN parks where any of these management activities are practiced or environmental sampling occurs, it would be useful to collect the metrics listed, document the procedures, and archive the data. NETN is developing an SOP to govern collection of ancillary data from the parks, which will be included or referenced in this protocol once developed.

This protocol is not designed to test for the effects of management activities or other variables occurring at a scale smaller than the park as a whole; the main objective is species and community trend information. The correlational analyses for Objective 3 will be park-wide at most NETN parks; we will use data from multiple vegetation plots in the same habitat type as the breeding landbird counts, and we will use data from multiple count stations to look broadly at whether trends in forest data are correlated with the breeding landbird data. Smith et al. (2008) discuss why it is impractical to sample a small vegetation plot near or at a point count station, since the birds are using a very different scale. Using a larger area that encompasses multiple forest plots and breeding landbird point count sites will produce a more reliable match of spatial scales, and may also allow us to incorporate spatial variability into the analysis (since many breeding landbirds prefer habitat variation). Ideally,

there would be 3 - 4 forest plots within every point count radius (about 200 m), but such an intensive vegetation monitoring effort is beyond NETN's resources. We believe that having multiple forest plots within the radius of point count stations within each site is a good compromise, and this occurs naturally from the sampling designs of the two protocols. The exception will be ACAD, where there is a much lower density of forest plots and very localized breeding landbird survey sites; in this case we acknowledge that any effort to correlate breeding landbird data with forest data will be somewhat weak.

Table 4. Specific metrics of various explanatory variables that may be used in statistical modeling efforts to better understand effects on breeding landbird populations.

Explanatory Variable	Specific Metrics
Mowing/brush hogging	Locations, schedule, frequency, cutting height, whether hay is removed or left
Invasive plant control	Locations, methods used (including type of herbicide), schedule (when, how often), target species, intensity (a few plants or widespread), structural level (tree/shrub/herb)
Animal control	Removals of cats, rats, mesopredators, dogs, beavers, humans (limits on activities in certain areas), forest pests and pathogens, mosquito control
Controlled burns	Locations, schedule, frequency, intensity
Restoration activities	Locations, methods, dates
Toxic cleanups	Locations, methods, dates
Deer density estimates	Methods, sampling dates and area covered
Silvicultural treatments	Locations, methods, schedule, intensity of removal
Weather	Precipitation, low/high/mean temperatures, wind, humidity
Acid deposition	Wet deposition and soil sampling
Mercury data	Wet deposition, soil, and biological sampling
Invertebrate surveys	Index of prey abundance (especially lepidopteran larvae)
Landscape context	TBD: The national I&M program is developing a protocol that will provide NETN with landscape context data for such analyses

Data Reporting

Ecological Integrity Assessment and Scorecard

The NETN I&M program recognizes the importance of effective communication and reporting to transform field data into a format that is both useful and clearly understood by park managers, scientists, the public, and policy makers. This will be accomplished by developing standard statistical summaries of vital sign measurements (see SOP 8 - Data Analysis), as well as developing an ecological integrity scorecard that provides basic interpretation of the status and trends for the breeding landbird vital sign. Following each field season, an annual report will be prepared summarizing the year's work. This will include routine summaries for each measure at each sampled park and individual study sites. The measures will be presented in a general framework that reflects the underlying conceptual model that the vital signs and measures are based upon. Periodically, perhaps every 5 - 10 years depending on perceived need and funding, a more detailed analysis will be conducted that will include estimates of population densities and trends, focusing on the most abundant species and those of management or conservation concern (i.e., PIF priority species).

Forest Breeding Landbird Assessment

An assessment of the biotic integrity of the avian community based on an assemblage of behavioral and physiological response guilds (Table 5), similar to O'Connell et al. (2000), will be utilized for forest breeding landbirds (an assessment and scorecard ranking for the grassland breeding landbird community at SARA and MIMA is discussed below). Such a biotic integrity scorecard will help elucidate changes in a broader, landscape context and indicate in which direction the park may be moving along a disturbance gradient from "highly disturbed" or "urban," to "pristine" or "natural." Croonquist and Brooks (1991) demonstrated that response guilds (groups of species that require similar habitat, food, or other elements for survival) are effective indicators of habitat disturbance. Changes in availability of specific resources are manifested as population responses in the species dependant on that resource. For example, the loss of snags in a forest stand can result in the decrease in the guild of bark-probing insectivores. As O'Connell et al. (2000) indicate, an assessment of response guilds functions like an index of biotic integrity (Karr 1991, Karr and Chu 1999), providing a system-specific framework in which species assemblages can be ranked on a qualitative scale. This type of avian integrity assessment provides a means to estimate condition that, unlike species richness or Shannon diversity, is not confounded by intermediate levels of disturbance as demonstrated by Blair (1996).

The guild-based avian integrity scorecard is based upon O'Connell et al. (2000) and consists of 13 guilds in eight guild categories (Table S9.2, SOP 9 - Data Reporting). Individual guilds were broadly categorized as "specialist" or "generalist." A specialist can be a species with a narrow range of habitat tolerances, or one that exhibits a low intrinsic rate of population increase. For our purposes, specialist guilds may be thought of as "guilds indicative of a high-integrity ecological condition" while generalist guilds are "guilds indicative of a low-integrity ecological condition." Guilds were selected to reflect different aspects of each species' life history traits. Therefore, species may belong to several guilds simultaneously, including both specialist and generalist guilds.

Table 5. Biotic integrity elements, guild categories, response guilds, and guild interpretations used in avian biotic integrity scorecard.

Biotic Integrity Element	Guild Category	Response Guild	Specialist	Generalist
Functional	Trophic	Omnivore		X
Functional	Insectivore forager	Bark prober	X	
Functional	Insectivore forager	Ground gleaner	X	
Functional	Insectivore forager	High Canopy forager	X	
Functional	Insectivore forager	Low Canopy forager	X	
Compositional	Origin	Exotic		X
Compositional	Migratory	Resident		X
Compositional	Number of broods	Single-brooded	X	
Compositional	Population limiting	Nest predator/brood parasite		X
Structural	Nest placement	Canopy Nester	X	
Structural	Nest placement	Shrub Nester		X
Structural	Nest placement	Forest-ground Nester	X	
Structural	Primary habitat	Interior Forest Obligate	X	

With species assigned to guilds (see SOP 9 - Data Reporting), the proportional species richness of each guild is calculated, resulting in a rank of Good, Caution, or Significant Concern (Table 6). "Good" represents acceptable or desired conditions; "Caution" indicates a problem may exist; "Significant Concern" indicates undesired conditions that may require management action. The proportional species richness is calculated as the number of species in the guild divided by the number of species in the breeding landbird community. Following O'Connell et al. (2000), the breeding landbird community is limited to species in five groups: Passeriformes (perching birds), Piciformes (woodpeckers), Cuculiformes (cuckoos), Apodiformes (swifts and hummingbirds), and Columbiformes (doves). For example, a breeding landbird community at a given park in which 20% of the species are omnivores receives a rank of "good" for the omnivore guild (Table 6). The proportional species richness thresholds and ranks are largely based on those derived by O'Connell et al. (2000) for birds in forested habitats in the central Appalachians, as well as from those derived by Glennon and Porter (2005) for New York's Adirondack Park. Considering the wide geographic range over which the network parks are distributed, the threshold values listed in Table 6 may need to be adjusted by bioregion, forest type, or BCR, rather than network-wide. Additionally, these threshold values can be refined over time. The ratings' threshold values also assume that all breeding landbirds present in each park are detected; this assumption will not necessarily hold true when only one year of data is analyzed. Park resource managers should not be concerned about the results of the avian integrity analysis unless several (more than 3) guilds are rated "Significant Concern" for multiple years of data.

Some ecological integrity reporting efforts have developed point-based indices to aggregate information describing integrity of individual metrics into overall ecosystem scores (Karr 1981, O'Connell et al. 2000). The success of those efforts relies upon a subjective understanding of the relative importance of individual metrics in determining overall ecosystem integrity, and in some cases may obscure individual ecosystem components that are in need of attention. Thus, this avian

integrity scorecard attempts to concisely convey information on each individual response guild metric, and provide summary information only on the number of metrics classified as "good",

Table 6. Avian ecological integrity thresholds for 13 response guilds (based on O'Connell et al. 2000, and Glennon and Porter 2005). Percentages are proportional species richness.

		Ratings (% Species Richness)		
Biotic Integrity Element	**Response Guild**	**Good**	**Caution**	**Significant Concern**
Functional	Omnivore	< 30%	30-50%	> 50%
	Bark Prober	> 11%	4-11%	< 4%
	Ground Gleaner	> 9%	4-9%	< 4%
	High Canopy Forager	> 12%	7-12%	< 7%
	Low Canopy Forager	> 22%	14-22%	< 14%
Compositional	Exotic	< 0.5%	0.5-7%	> 7%
	Resident	< 28%	28-41%	> 41%
	Single-brooded	> 68%	50-68%	< 50%
	Nest Predator/Brood Parasite	< 10%	10-15%	> 15%
Structural	Canopy Nester	> 35%	29-35%	< 29%
	Shrub Nester	< 18%	18-24%	> 24%
	Forest-ground Nester	> 18%	5-18%	< 5%
	Interior Forest Obligate	> 35%	10-35%	< 10%

"caution", and "significant concern" in each park. We recognize that NPS may need to aggregate this information at higher levels (such as by Vital Sign) for reporting at the national level. For that reason, this scorecard adheres to NPS Vital Signs reporting conventions, and should provide NPS with the necessary information for aggregation. We also recognize that the scorecard is based on ecological criteria, and that park management goals may not seek to attain "ecological integrity". It would be possible to develop a management scorecard in concert with park staff that reflects park progress towards avian and ecological management goals.

Grassland Breeding Landbird Assessment

The integrity of the grassland breeding landbird community at SARA and MIMA will be assessed with metrics based on the abundance and proportional richness of grassland obligate species, shrub-dependant species, edge generalist species, and exotics (Table 7). The calculations use the same methods as the forest breeding landbird assessment, except that two raptors are included in the grassland obligate guild. In addition, for both the grassland and shrubland groups, we will report the proportion of PIF priority species for BCR 13 that are detected out of the total number of PIF priority species for each group (e.g., the number of PIF Priority grassland species detected divided by the total number of PIF priority grassland species). This will help us measure the overall value of grassland and early successional communities at SARA to rare or declining species that are dependent on these habitats within the region (see Table S9.3 in SOP 9 - Data Reporting). The threshold values for these metrics were determined from Browder et al. (2002) and Coppedge et al.

(2006), and using data from the pilot season of grassland surveys at SARA. These values may be refined over time as additional regional and park-specific data are accumulated and analyzed.

Table 7. Avian scorecard metrics for grassland breeding landbird surveys at SARA.

	Ratings (Abundance or % Species Richness)		
Metric	**Good**	**Caution**	**Significant Concern**
Abundance (birds/point)			
Edge generalist species	< 15.0	15.0-30.0	> 30.0
Shrub-dependant species	< 1.0	1.0-5.0	> 5.0
Grassland obligate species	> 4.0	1.5-4.0	< 1.5
Exotic species	< 0.1	0.1-1.0	> 1.0
Proportional Species Richness (%)			
Edge generalist species	< 35	35-70	> 70
Shrub-dependant species	< 10	10-25	> 25
Grassland obligate species	> 10	5-10	< 5
Exotic species	< 0.1	0.1-3	> 3
Proportion of PIF Priority Grassland Species	> 70	50-70	< 50
Proportion of PIF Priority Shrubland Species	> 75	50-75	< 50

Personnel Requirements and Training

Roles and Responsibilities

The Project Manager, typically hired through a competitive contract, will coordinate the volunteer-based breeding landbird monitoring program. Coordination will involve contacting resource managers at NETN parks to discuss the role that they want to play in the program. The Project Manager will take the lead in advertising and recruiting for volunteers, and will welcome support from park resource managers or volunteer coordinators with knowledge of potential participants. Other coordination activities will include evaluating volunteers to ensure they have the skill level needed to identify breeding landbirds by sight and sound; providing training materials, data sheets, and other equipment (e.g., timers, clipboards); responding to volunteer concerns; and soliciting feedback from the volunteers on the protocol. The Project Manager will also be responsible for either conducting the annual duplicate QC survey if time allows, or hiring a qualified field technician to conduct the survey. The Project Manager and NETN will work together to ensure that there is sufficient follow-up with volunteers, including initiating a volunteer appreciation program. For additional information, see SOP 3 - Recruiting and Training Volunteers.

At each NETN park, the resource manager or other designated staff will provide support to volunteer observers on park-specific issues, such as access, trail or area closures, rare species documentation, etc. At ACAD, the NETN Plant Ecologist will also provide logistical support.

All staff are responsible for ensuring that monitoring is conducted as safely as possible. Any safety concerns should be brought to the attention of the Project Manager and NPS staff. Everyone conducting field work is responsible for reviewing and signing an acknowledgement that they have read the Job Safety Analysis; they are also strongly encouraged to review the information in SOP 1 - Safety. It is particularly important that park resource managers know when volunteers are surveying, and that volunteers use check-in and check-out procedures with designated NPS staff for the park they are surveying. For additional information, see SOP 1 - Safety.

Volunteer Qualifications

Volunteer observers participating in the NETN Breeding Landbird Monitoring Program must be capable of identifying the majority of breeding landbirds ($\geq$ 80%) likely to be encountered by both sight and sound. This cannot be overemphasized. Various studies have shown that observer bias is one of the most noteworthy bias factors in trend analyses of songbird populations (Kepler and Scott 1981, Baker and Sauer 1995). The network and the Project Manager are actively pursuing tools for ensuring birder skills, including supporting the extension of a web-based birder certification program to the Northeast. Additionally, volunteers must be proficient at estimating abundance of birds detected and their horizontal distance from the observer. Volunteers must also be capable of hiking from 2 - 5 km over variable terrain (depending on park and study site route), and arriving at their study site(s) by 0500 hrs on survey mornings. Volunteers are also encouraged to obtain certification in basic first aid and CPR.

Training Procedures

As noted above, volunteer observers must already possess a high degree of skill in breeding landbird identification in order to participate. Therefore, little training is needed in this area, but volunteers will be provided with a list of breeding landbird species likely to be encountered at the park in which they will be surveying so they can familiarize themselves with the identification of any problematic species prior to the start of the survey period. Although observers will be experienced in the identification of breeding landbirds, many will have little or no experience in estimating distances to vocalizing birds. Because it is not realistic to expect volunteers from all parks to be able to attend a training session on estimating distances to vocalizing birds, and it is not economically feasible to offer training sessions at each NETN park, volunteers will be provided with written training procedures and asked to practice distance estimation at their study site or in a habitat similar to the one in which they will be surveying. These procedures are outlined in SOP 3 - Recruiting and Training Volunteers.

Operational Requirements

Annual Workload and Field Schedule

Annual implementation of the landbird monitoring plan involves several people, including the Project Manager, NETN staff, park resource managers, and volunteers. Annual workload responsibilities vary widely, ranging from approximately 30 - 40% of one FTE for the Project Manager (who is responsible for the day-to-day operations of the project), to 10 - 20 hours for volunteers and most Park Resource Managers. This section details the annual workload and schedule by breaking them down into the following pertinent phases — Volunteer Recruitment, Volunteer Training, Field Season, Data Entry/QA/QC, and Reporting.

Volunteer Recruitment

Recruiting volunteer observers is the responsibility of the Project Manager (for details, see SOP 3 - Recruiting and Training Volunteers). However, assistance from park resource managers, who may have knowledge of local birders with the necessary skills to participate, is welcome. Volunteer recruitment should occur primarily in early spring (March - April), with the goal of filling any observer vacancies. This will involve prior communication with participating volunteers to determine the number and location of vacancies, as well as assessing the bird identification skills of interested observers. The time commitment for volunteer recruitment can range widely, from approximately 2 - 3 days up to 3 weeks annually, depending on the number of vacancies that need filling, and the amount of correspondence with volunteers and potential observers.

Volunteer Training

Volunteer training responsibilities are divided between the Project Manager, park and Network staff, and the volunteers themselves (for details, see SOP 3 - Recruiting and Training Volunteers).

The Project Manager is responsible for providing volunteers with the necessary training materials to prepare them for conducting point count surveys in the field, navigating by map and compass, and entering field data into the online database. The Volunteer Training Manual (available as a PDF on the NETN and Project Manager's websites) and other materials should be distributed well in advance of the field season (March - April) in order to give volunteers enough time to familiarize themselves with the protocols and conduct training exercises in distance estimation. The estimated time commitment for providing these materials, keeping them updated and available for download on the Project Manager's website, and communicating with volunteers is between 1 - 2 weeks annually.

Individual park and NETN staff are responsible for ensuring that volunteers are familiar with the proper use of navigation (GPS units) and communication (e.g., park radios or cell phones) equipment that are available for their use at most parks. Time commitment for this is expected to be less than 2 hours annually.

Volunteers are responsible for training themselves in distance estimation, point count survey methods, use of map and compass, and data entry procedures. In addition, new volunteers should familiarize themselves with the list of breeding landbirds previously detected on their study site or park (provided by the Project Manager), and visit their study site to locate point count stations prior

to conducting the survey. For new volunteers, the training process (including a field visit to locate point counts) may take 4 - 6 hours, but in subsequent years an annual review of the methodologies should be completed in an hour or less.

Field Season

Field Season responsibilities are divided between the Project Manager, individual park, and NETN staff, and volunteer observers (for details, see SOP 2 - Field Season Logistics).

The Project Manager is responsible for preparing a mailing to all volunteer observers that includes the necessary field equipment and materials needed to conduct their surveys, a cover letter, and any park permits (for complete list, see SOP 2 - Field Season Logistics). The mailing should go out by 10 May to ensure volunteers receive materials prior to the survey window of 1 to 30 June. The time commitment to prepare mailing and respond to field season-related questions is estimated to be between 10 - 40 hours annually. If a volunteer cannot be found to survey a given study site despite significant effort on the part of the Project Manager, NETN staff will be notified and the Project Manager will attempt to either conduct the monitoring himself/herself (if time allows), or hire an appropriately skilled sub-contractor, provided sufficient funds remain in the budget for this task.

Park staff are responsible for acquiring any necessary clearances for volunteers, notifying park security if need be, or otherwise ensuring that observers have access to park property during early morning hours (ca. 0400 - 0430 hours) in order to start surveys at approximately 0500 hours. NETN staff will be responsible for obtaining a research permit for each park. Most NETN parks have issued 10-year permits to cover monitoring activities, but the permit for ACAD must be renewed each year. This annual time commitment for both park and network staff is expected to be minimal (e.g., ≤ 1 hour annually). At ACAD, the NETN Plant Ecologist is available to provide logistical support to the Project Manager and volunteers. This may include marking point count stations and study site routes, providing GPS units and training on their use, or responding to volunteer inquiries specific to the park. In most years, the time commitment for these responsibilities should be minimal (1 - 2 hours), but could range up to 25 hours if new point count stations need to be established. Establishing and maintaining point counts at parks other than ACAD is the responsibility of the Project Manager, which will require periodic visits to parks (~ 5 - 10 days approximately every 5 years).

Volunteer observers are responsible for conducting breeding landbird surveys during the month of June (for details, see SOP 5 - Conducting Variable Circular Plot Point Counts). Depending on the number of points on a given study site, surveys should take 2 - 2.5 hours to complete (not including travel time to and from park). Shortly after completing the survey (preferably the same day) observers should transcribe data from field cards to data coding sheets. This task takes less than an hour.

Data Entry and QA/QC

Data entry into the web-based, Bird Point Count Database is primarily the responsibility of the volunteer observer who collected the data in the field. The Project Manager will provide support and guidance as needed, responding to questions about the data entry website, establishing deadlines for completing data entry, and sending out periodic reminders to observers who have not met the

deadlines. Once data have been entered, volunteers should mail original data sheets to the Project Manager for QA/QC. If volunteers are unable to enter data within a month of data collection, they will be asked to mail their data forms to the Project Manager for data entry.

Quality assurance/quality control is primarily the responsibility of the Project Manager (see Data Entry and QA/QC, above). This time consuming job consists of comparing original field mapping and coding sheets with data entered online to look for discrepancies, and once corrected, marking records in the database as "verified." Additionally, data should be error checked annually prior to conducting any analyses or preparing reports. This includes reviewing the current year's raw data for unusual species that may have been entered incorrectly, checking species/subspecies with multiple common names (e.g., Slate-colored/Dark-eyed Junco, Yellow-rumped/Myrtle Warbler, etc.) to be sure the correct name (and alpha code) is used throughout, and generally reviewing fields for wildly incorrect data. Upon completion of QA/QC, completed field mapping cards and data coding sheets will be sent to the NETN office each year.

The time required for each observer to complete data entry should be 30 - 60 minutes, depending on the number of point counts that were completed, speed of internet connection, and familiarity with web-based data entry forms. The time commitment for the Project Manager to provide data entry support and complete QA/QC responsibilities is approximately 2 - 3 weeks, annually.

Reporting

The Project Manager is responsible for preparing two different summary reports annually describing the year's monitoring results. The first report, due in early October for the NETN annual administrative report and work plan, is a brief (approximately one page) summary of accomplishments for the previous fiscal year (1 Oct - 30 Sept), including public interest highlights and any significant findings. The second, more substantive report will contain summaries of breeding landbirds found in each park, highlighting observations of PIF priority species (broken down into forest and grassland sites for SARA), comparisons with results from previous years, and calculation (and explanation) of an index of biological integrity for breeding landbirds, based on the collected data. The final report is due to the NETN Inventory and Monitoring Project Manager on 15 January each year. The time commitment for the Project Manager to complete and disseminate both reports is approximately 3 - 4 weeks.

Facility and Equipment Needs

Equipment needs are minimal and include supplies for volunteers to conduct surveys, and point count station marking supplies. Volunteers are supplied with a count-down timer (Polder digital kitchen timer, Product No. 219442), data field cards, and data coding sheets (for examples, see SOP 5 - Conducting Variable Circular Plot Point Counts). At ACAD, it is important to maintain NETN GPS units and Personal Locator Beacons available for volunteer use. Point count station marking supplies include aluminum tree tags and nails and aluminum breeding landbird study site route signs; see SOP 4 - Establishing and Marking Point Count Stations), and flagging tape.

Startup Costs and Budget Considerations

Project startup costs are approximately $2,000, and include the cost of printing field data cards, purchasing supplies for volunteers (digital timers, etc.) and point count station marking, and establishing study sites.

Example Annual Operating Budget (2008)

Project Manager Salary (400 hours)	$9,600.00
Travel (Mileage, lodging, meals)	$1,300.00
Supplies and Equipment	$300.00
Field supplies for 20-40 volunteer observers (field cards, timers, etc., $200)	
Shipping / postage ($100.00)	
Total Direct Costs	$11,200.00
Indirect and Other Costs	$2,500.00
Grand Total	**$13,700.00**

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Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority.

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Northern Bobwhite	*Colinus virginianus*	X	X	CBSD RC IM	CBSD RC IM
Gray Partridge	*Perdix perdix*	X	X		
Ring-necked Pheasant	*Phasianus colchicus*	X	X	X	X
Ruffed Grouse	*Bonasa umbellus*	CBSD	CBSD	CBSD	X
Spruce Grouse	*Falcipennis canadensis*	X	X		
Sharp-tailed Grouse	*Tympanuchus phasianellus*	X			
Wild Turkey	*Meleagris gallopavo*	X	X	X	X
Black Vulture	*Coragyps atratus*			X	X
Turkey Vulture	*Cathartes aura*	X	X	X	X
Osprey	*Pandion haliaetus*	X	X	X	X
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X
Northern Harrier	*Circus cyaneus*	RC MA	X	X	X
Sharp-shinned Hawk	*Accipiter striatus*	X	X	X	X
Cooper's Hawk	*Accipiter cooperii*	X	X	UCS PR	X
Northern Goshawk	*Accipiter gentilis*	X	X	X	X
Red-shouldered Hawk	*Buteo lineatus*	X	X	X	X
Broad-winged Hawk	*Buteo platypterus*	X	RS UCS PR	RS UCS PR	RC MA
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	X
Golden Eagle	*Aquila chrysaetos*		X		
American Kestrel	*Falco sparverius*	RC MA	RC MA	RC MA	RC MA
Merlin	*Falco columbarius*	X	X		
Peregrine Falcon	*Falco peregrinus*	X	X	RC CR	X
Rock Pigeon	*Columba livia*	X	X	X	X

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Eurasian Collared-Dove	*Streptopelia decaocto*			X	
Mourning Dove	*Zenaida macroura*	X	X	X	X
Common Ground-Dove	*Columbina passerina*			X	
Monk Parakeet	*Myiopsitta monachus*				X
Yellow-billed Cuckoo	*Coccyzus americanus*	CBSD	X	CBSD	CBSD RC MA
Black-billed Cuckoo	*Coccyzus erythropthalmus*	CBSD RC RS UCC UCS MA	CBSD RC UCC MA	CBSD RC UCC MA	CBSD UCC PR
Barn Owl	*Tyto alba*	X	X	X	X
Eastern Screech-Owl	*Megascops asio*	X	X	X	X
Great Horned Owl	*Bubo virginianus*	X	X	X	X
Northern Hawk Owl	*Surnia ulula*		X		
Barred Owl	*Strix varia*	X	X	X	X
Long-eared Owl	*Asio otus*	X	X	X	X
Short-eared Owl	*Asio flammeus*	X	CBSD	X	X
Boreal Owl	*Aegolius funereus*	X	X		
Northern Saw-whet Owl	*Aegolius acadicus*	X	X	RC MA	X
Common Nighthawk	*Chordeiles minor*	X	X	X	X
Chuck-will's-widow	*Caprimulgus carolinensis*			RC MA	X
Eastern Whip-poor-will	*Caprimulgus vociferus*	CBSD RC UCC MA	CBSD UCC PR	CBSD RC UCC MA	CBSD RC UCC MA
Chimney Swift	*Chaetura pelagica*	CBSD	CBSD	CBSD RC RS UCS MA	CBSD RC MA
Ruby-throated Hummingbird	*Archilochus colubris*	X	X	UCS PR	X
Belted Kingfisher	*Megaceryle alcyon*	CBSD RC MA	CBSD RC MA	CBSD RC RS UCS MA	CBSD
Red-headed Woodpecker	*Melanerpes erythrocephalus*	CBSD RC UCC IM	X	CBSD UCC PR	CBSD RC UCC IM
Red-bellied Woodpecker	*Melanerpes carolinus*	X	X	X	X
Yellow-bellied Sapsucker	*Sphyrapicus varius*	X	UCS PR	X	X
Downy Woodpecker	*Picoides pubescens*	X	X	RS UCS PR	X

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Hairy Woodpecker	*Picoides villosus*	X	UCS PR	X	X
Red-cockaded Woodpecker	*Picoides borealis*			RC UCC CR	RC UCC CR
American Three-toed Woodpecker	*Picoides dorsalis*	X	X		
Black-backed Woodpecker	*Picoides arcticus*	X	X		
Northern Flicker	*Colaptes auratus*	CBSD RC MA	CBSD RC MA	CBSD RC MA	CBSD RC MA
Pileated Woodpecker	*Dryocopus pileatus*	X	X	UCS PR	X
Olive-sided Flycatcher	*Contopus cooperi*	X	RC UCC MA	RC UCC CR	
Eastern Wood-Pewee	*Contopus virens*	RC MA	RC MA	RC MA	RC MA
Yellow-bellied Flycatcher	*Empidonax flaviventris*	X	X	X	
Acadian Flycatcher	*Empidonax virescens*	X	X	RC RS UCS MA	X
Alder Flycatcher	*Empidonax alnorum*	X	X	X	X
Willow Flycatcher	*Empidonax traillii*	UCS PR	X	X	X
Least Flycatcher	*Empidonax minimus*	RC MA	X	X	X
Eastern Phoebe	*Sayornis phoebe*	X	X	UCS PR	X
Great Crested Flycatcher	*Myiarchus crinitus*	X	X	X	X
Eastern Kingbird	*Tyrannus tyrannus*	RC MA	RC MA	X	RC MA
Loggerhead Shrike	*Lanius ludovicianus*	X		CBSD RC CR	CBSD RC CR
White-eyed Vireo	*Vireo griseus*	X	X	X	X
Yellow-throated Vireo	*Vireo flavifrons*	X	X	RC RS UCS MA	RC MA
Blue-headed Vireo	*Vireo solitarius*	X	UCS PR	X	X
Warbling Vireo	*Vireo gilvus*	X	X	X	X
Philadelphia Vireo	*Vireo philadelphicus*	X	UCS PR		
Red-eyed Vireo	*Vireo olivaceus*	X	UCS PR	UCS PR	X
Gray Jay	*Perisoreus canadensis*	X	X		
Blue Jay	*Cyanocitta cristata*	X	X	X	X
American Crow	*Corvus brachyrhynchos*	X	X	X	X

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Fish Crow	*Corvus ossifragus*	X	X	X	X
Common Raven	*Corvus corax*	X	X	X	X
Horned Lark	*Eremophila alpestris*	CBSD	X	X	CBSD
Purple Martin	*Progne subis*	X	X	RC MA	X
Tree Swallow	*Tachycineta bicolor*	UCS PR	RS UCS PR	X	X
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	X	X	X	X
Bank Swallow	*Riparia riparia*	CBSD RC MA	CBSD RC MA	CBSD	CBSD
Cliff Swallow	*Petrochelidon pyrrhonota*	X	X	X	X
Barn Swallow	*Hirundo rustica*	RC MA	X	RC MA	X
Carolina Chickadee	*Poecile carolinensis*	X		RS UCS PR	X
Black-capped Chickadee	*Poecile atricapillus*	X	UCS PR	X	X
Boreal Chickadee	*Poecile hudsonicus*	X	CBSD RC MA		
Tufted Titmouse	*Baeolophus bicolor*	X	X	UCS PR	X
Red-breasted Nuthatch	*Sitta canadensis*	X	X	X	X
White-breasted Nuthatch	*Sitta carolinensis*	X	X	UCS PR	X
Brown-headed Nuthatch	*Sitta pusilla*			X	RC MA
Brown Creeper	*Certhia americana*	X	X	X	X
Carolina Wren	*Thryothorus ludovicianus*	X	X	X	X
Bewick's Wren	*Thryomanes bewickii*			RC CR	
House Wren	*Troglodytes aedon*	X	X	X	X
Winter Wren	*Troglodytes hiemalis*	X	UCS PR	X	X
Sedge Wren	*Cistothorus platensis*	X		X	RC CR
Marsh Wren	*Cistothorus palustris*	X	X	X	RC MA
Blue-gray Gnatcatcher	*Polioptila caerulea*	X	X	X	X
Golden-crowned Kinglet	*Regulus satrapa*	X	X	X	X
Ruby-crowned Kinglet	*Regulus calendula*	X	X	X	

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Eastern Bluebird	*Sialia sialis*	X	X	UCS PR	X
Veery	*Catharus fuscescens*	RC MA	RC RS UCS MA	X	RC MA
Bicknell's Thrush	*Catharus bicknelli*		RS UCC UCS PR	UCC PR	
Swainson's Thrush	*Catharus ustulatus*	X	X	X	
Hermit Thrush	*Catharus guttatus*	X	X	X	X
Wood Thrush	*Hylocichla mustelina*	RC UCC MA	RC UCC MA	RC RS UCC UCS MA	RC UCC MA
American Robin	*Turdus migratorius*	X	X	X	X
Gray Catbird	*Dumetella carolinensis*	X	X	UCS PR	UCS PR
Northern Mockingbird	*Mimus polyglottos*	X	X	X	X
Brown Thrasher	*Toxostoma rufum*	RC MA	RC MA	RC MA	RC MA
European Starling	*Sturnus vulgaris*	X	X	X	X
American Pipit	*Anthus rubescens*		X		
Cedar Waxwing	*Bombycilla cedrorum*	UCS PR	UCS PR	UCS PR	X
Ovenbird	*Seiurus aurocapilla*	X	UCS PR	X	X
Worm-eating Warbler	*Helmitheros vermivorum*	X	X	RC RS UCS MA	X
Louisiana Waterthrush	*Parkesia motacilla*	X	X	RC RS UCS MA	X
Northern Waterthrush	*Parkesia noveboracensis*	X	X	X	X
Golden-winged Warbler	*Vermivora chrysoptera*	RC UCC MA	X	RC UCC IM	RC UCC MA
Blue-winged Warbler	*Vermivora cyanoptera*	RC RS UCS MA	X	RC RS UCS MA	RC RS UCS MA
Black-and-white Warbler	*Mniotilta varia*	X	RS UCS PR	RC MA	RC MA
Prothonotary Warbler	*Protonotaria citrea*	X		UCC PR	UCC PR
Swainson's Warbler	*Limnothlypis swainsonii*			X	X
Tennessee Warbler	*Oreothlypis peregrina*	X	X		
Nashville Warbler	*Oreothlypis ruficapilla*	X	X	X	X
Mourning Warbler	*Geothlypis philadelphia*	X	X	X	
Kentucky Warbler	*Geothlypis formosa*	X		RC UCC MA	RC UCC MA

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Common Yellowthroat	*Geothlypis trichas*	X	UCS PR	UCS PR	X
Hooded Warbler	*Setophaga citrina*	X	X	RS UCS PR	RC MA
American Redstart	*Setophaga ruticilla*	X	RS UCS PR	X	X
Cape May Warbler	*Setophaga tigrina*	X	X		
Cerulean Warbler	*Setophaga cerulea*	RC UCC MA	X	RC RS UCC UCS IM	X
Northern Parula	*Setophaga americana*	X	UCS PR	X	X
Magnolia Warbler	*Setophaga magnolia*	X	UCS PR	X	X
Bay-breasted Warbler	*Setophaga castanea*	X	RC MA		
Blackburnian Warbler	*Setophaga fusca*	X	RS UCS PR	X	X
Yellow Warbler	*Setophaga petechia*	X	X	X	X
Chestnut-sided Warbler	*Setophaga pensylvanica*	X	X	X	RC MA
Blackpoll Warbler	*Setophaga striata*	X	X	X	
Black-throated Blue Warbler	*Setophaga caerulescens*	X	RS UCS PR	X	X
Palm Warbler	*Setophaga palmarum*	X	X		
Pine Warbler	*Setophaga pinus*	X	X	X	X
Yellow-rumped Warbler	*Setophaga coronata*	X	X	X	X
Yellow-throated Warbler	*Setophaga dominica*	X		RS UCS PR	X
Prairie Warbler	*Setophaga discolor*	CBSD UCC PR	CBSD UCC PR	CBSD RC UCC MA	CBSD RC UCC MA
Black-throated Green Warbler	*Setophaga virens*	X	RS UCS PR	X	X
Canada Warbler	*Cardellina canadensis*	RC UCC MA	RC RS UCC UCS MA	UCC PR	RC UCC IM
Wilson's Warbler	*Cardellina pusilla*	X	X		
Yellow-breasted Chat	*Icteria virens*	X		RC MA	RC IM
Eastern Towhee	*Pipilo erythrophthalmus*	RC MA	X	RC RS UCS MA	RC MA
Bachman's Sparrow	*Peucaea aestivalis*			RC UCC CR	
Chipping Sparrow	*Spizella passerina*	X	X	X	X

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Clay-colored Sparrow	*Spizella pallida*	X	X	X	
Field Sparrow	*Spizella pusilla*	CBSD RC MA	X	CBSD RC MA	CBSD RC MA
Vesper Sparrow	*Pooecetes gramineus*	RC IM	X	X	X
Lark Sparrow	*Chondestes grammacus*	X		RC CR	
Savannah Sparrow	*Passerculus sandwichensis*	RC MA	X	X	X
Grasshopper Sparrow	*Ammodramus savannarum*	CBSD	X	CBSD RC IM	CBSD RC IM
Henslow's Sparrow	*Ammodramus henslowii*	RC UCC IM		RC UCC IM	RC UCC CR
Le Conte's Sparrow	*Ammodramus leconteii*	X			
Nelson's Sparrow	*Ammodramus nelsoni*	X	X		X
Saltmarsh Sparrow	*Ammodramus caudacutus*		X		RC RS UCC UCS MA
Seaside Sparrow	*Ammodramus maritimus*				RC RS UCS MA
Fox Sparrow	*Passerella iliaca*		X		
Song Sparrow	*Melospiza melodia*	UCS PR	UCS PR	UCS PR	X
Lincoln's Sparrow	*Melospiza lincolnii*	X	X		
Swamp Sparrow	*Melospiza georgiana*	X	X	X	X
White-throated Sparrow	*Zonotrichia albicollis*	X	X	X	X
Dark-eyed Junco	*Junco hyemalis*	X	X	X	X
Summer Tanager	*Piranga rubra*	X		RC MA	X
Scarlet Tanager	*Piranga olivacea*	X	RC MA	RS UCS PR	RC MA
Northern Cardinal	*Cardinalis cardinalis*	X	X	X	X
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	X	X	X	RC MA
Blue Grosbeak	*Passerina caerulea*			X	X
Indigo Bunting	*Passerina cyanea*	X	X	UCS PR	X
Dickcissel	*Spiza americana*	X		X	X
Bobolink	*Dolichonyx oryzivorus*	CBSD RC RS UCC UCS MA	CBSD RC UCC MA	CBSD UCC PR	CBSD UCC PR
Red-winged Blackbird	*Agelaius phoeniceus*	X	X	X	X

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Common Name	Scientific Name	BCR 13	BCR 14	BCR 28	BCR 30
Eastern Meadowlark	*Sturnella magna*	CBSD RC MA	X	CBSD RC MA	CBSD
Western Meadowlark	*Sturnella neglecta*	X		X	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	X			
Rusty Blackbird	*Euphagus carolinus*	X	CBSD		
Brewer's Blackbird	*Euphagus cyanocephalus*	X			
Common Grackle	*Quiscalus quiscula*	X	X	X	X
Boat-tailed Grackle	*Quiscalus major*				X
Brown-headed Cowbird	*Molothrus ater*	X	X	X	X
Orchard Oriole	*Icterus spurius*	X	X	X	X
Baltimore Oriole	*Icterus galbula*	RC RS UCS MA	X	X	RC MA
Pine Grosbeak	*Pinicola enucleator*	X	X		
Purple Finch	*Carpodacus purpureus*	X	RS UCS PR	X	X
House Finch	*Carpodacus mexicanus*	X	X	X	X
Red Crossbill	*Loxia curvirostra*	X	X	RC IM	X
White-winged Crossbill	*Loxia leucoptera*	X	X	X	
Pine Siskin	*Spinus pinus*	CBSD	CBSD	X	
American Goldfinch	*Spinus tristis*	UCS PR	X	RS UCS PR	X
Evening Grosbeak	*Coccothraustes vespertinus*	X	RC RS UCS MA	X	X
House Sparrow	*Passer domesticus*	X	X	X	X

X = Present in BCR; CBSD = Common Bird in Steep Decline; RC = Regional Concern; RS = Regional Stewardship;

UCC = U.S.-Canada Concern; UCS = U.S.-Canada Stewardship; CR = Critical Recovery Action Needed; IM = Immediate Management Action Needed;

MA = Management Attention Needed; PR = Planning and Responsibility Actions Needed

SOP 1 - Safety

Northeast Temperate Network
Version 1.02

Overview

The Northeast Temperate Network (NETN) considers the occupational health and safety of its employees, cooperators, contractors and volunteers ("monitoring staff") to be of utmost importance, and is committed to ensuring that all personnel receive adequate training on National Park Service (NPS) safety procedures, incident reporting, and emergency response prior to field work. This SOP and supporting appendices were designed to provide a summary of safety issues that should be reviewed and understood by anyone participating in the breeding landbird monitoring protocol, and to serve as a first reference in case of an incident. Topics covered include emergency procedures and contacts, incident reporting, field preparation, safe field procedures, vehicle safety, and workers compensation procedures. A Green-Amber Red Risk Assessment (GAR) has been conducted for this protocol and is included as an appendix (Appendix S1.A). Additionally, a Job Safety Analysis (JSA), which documents hazards associated with this protocol and recommends approaches to mitigate these hazards, is included as an appendix (Appendix S1.B) to this SOP. The JSA must be read and signed by all monitoring staff who conduct field work for this protocol. Forms that go along with this SOP (Safety Acknowledgment, Safety Checklist, and Trip Plan) are provided in Appendix S1.C. This SOP does not cover first aid.

Responding to an Incident

Life-Threatening Medical Emergency

1. **Call 9-1-1 or park emergency number. If in an NETN park, use park radios to contact dispatch.** Uninjured, assisting personnel: Administer first aid to the best of your knowledge, ability and training. If appropriate, transport to emergency room. Directions to the nearest hospital from each park are in Appendix C and emergency numbers are in Appendix D. Locations of the nearest hospital to each park have also been programmed into the GPS navigation units that are provided to the forest crew.

2. Uninjured, assisting personnel: As soon as it is practical to do so, inform the protocol lead and the park's emergency contact of the incident (Appendix D).

3. For injured NPS employees and NPS volunteers, complete Worker's Compensation paperwork within 48 hours of incident (Appendix E). For other, non-NPS monitoring staff (i.e., contractors and cooperators), follow your organization's procedures for documenting accidents.

Non-Emergency Incidents

1. For a non-emergency incident that may require medical attention, injured monitoring staff must contact the protocol lead immediately after incident.

2. For injured NPS staff and NPS volunteers, complete Worker's Compensation paperwork (must be done within 48 hours of incident, Appendix E). For contractors and cooperators, follow your organization's procedures for documenting accidents.

3. Injured monitoring staff should seek medical attention, if needed.

NOTE: Never discard original paperwork related to workers compensation claims (including information from doctor's visits, CA-1, CA-2, CA-16 or CA-17 forms).

Field Preparation

Everyone participating in breeding landbird monitoring is responsible for maintaining a safe work environment for themselves and others.

Job Safety

An important tool used to promote safe conduct is the Job Safety Analysis (JSA; sometimes called a Job Hazard Analysis or JHA). This approach is consistent with NPS Directors Order 50 and Reference Manual 50B for Occupational Health and Safety. The JSA process is to (1) identify hazards associated with field and laboratory settings, as appropriate, and (2) develop approaches to mitigate those hazards. All monitoring staff must sign an acknowledgment that they have read the JSA in Appendix S1.B. In addition, it is highly recommended that all participants in this protocol read the entire Safety SOP before conducting field work.

First Aid Kits and Training

NETN strongly encourages all monitoring staff to carry a backpacking first aid kit with them in the field. An inventory of first aid kits should be performed prior to each field season to ensure that all medical supplies are in sufficient quantity and haven't expired. Each first aid kit should have an inventory list of the supplies it should contain. Items in first aid kits that are used should be promptly replaced. If you do not have access to a first aid kit and want to carry one, let the Project Manager know and NETN will purchase one that can be borrowed from the park you are volunteering at.

NETN also strongly encourages all monitoring staff to obtain basic first aid and CPR training, particularly if they have not been certified in the past 5 years.

Teamwork

Since much of the monitoring for this protocol is off-trail in somewhat inaccessible areas, NETN recommends that people work in teams for monitoring. Working with another person makes it more likely that someone will be able to obtain help in the event of an accident, and working with someone else usually makes field work more enjoyable. If you are unable to find someone to walk your study site route with you and you would like to work with someone else, please notify the Project Manager and he or she will contact the appropriate NPS staff to explore whether a field partner is possible.

Daily Communication and Planning

Monitoring staff are expected to carry a reliable communication device. In most NETN parks, a personal cell phone can be used. At ACAD, cell phones are not reliable and NETN has purchased a Personal Locator Beacon (PLB) and SPOT GPS Messenger that can be checked out by volunteers.

The SPOT GPS Messenger can be used for checking in at the end of the field day (as well as sending an emergency signal if needed), while the PLB is a more reliable emergency signaling device. Monitoring staff must fully understand how to operate all communication devices before heading into the field. All modes of communication must be fully charged and tested at the beginning of each day.

Monitoring staff must notify the Project Manager and the appropriate park resource manager (or a designated individual; RM/DI) with expected dates of field work; both of these individuals must have current maps of the study site routes to be surveyed. On each monitoring day, monitoring staff must know which study site they will be monitoring and how they will get there before going into the field. The RM/DI must be contacted the day before field work will occur and provided with the monitoring staff name, cell phone number, vehicle license plate number, expected parking location(s), name of the study site, and estimated time of arrival and departure from the park. Monitoring staff must also establish a check-in time for completion of field work. If monitoring staff do not check in on or before the planned check-in time for completion of field work, the RM/DI will immediately try to reach them by all available methods. If the monitoring staff have not been reached within 30 minutes, the RM/DI will notify emergency services and initiate a search.

At ACAD, when the NETN PLB and SPOT GPS Messenger are being borrowed by the monitoring staff the trip information must also be provided to the NETN staff members responsible for tracking messages from the devices. NETN must also be provided with the RM/DI name, phone number, and e-mail, and the RM/DI must be provided with contact information for NETN staff.

If the survey is cancelled or if the plan changes while in the field, staff must notify the RM/DI immediately. At the end of the day, staff must notify the RM/DI that they have returned from the field. At ACAD, the SPOT Messenger can be used to notify NETN that more time is needed in the field or that field work is completed; NETN staff will relay this message to the RM/DI. If NETN staff are not contacted, they will assume that the monitoring staff checked in directly with the RM/DI.

All monitoring staff are responsible for being aware of the time and ensuring that end of day check-ins occur on schedule; the RM/DI will call emergency services if the monitoring staff misses their check in and cannot be located within 30 minutes of the check-in time.

Personal Gear

Monitoring staff are responsible for ensuring they are wearing field appropriate clothing and footwear such as long pants, a hat and hiking boots. Depending on the weather, rain gear or warm clothing should be taken into the field and it is recommended that an extra set of clothing be kept in the vehicle. Monitoring staff should take care to avoid over exposure to the sun by wearing sunscreen and/or protective clothing. Monitoring staff should always carry ample water (2-3 liters) and food when working in the field. Dehydration is a serious condition that can lead to more serious conditions if untreated, and should be avoided. It is important to drink liquid frequently to maintain hydration on a warm day, even if you don’t feel thirsty.

Field Safety

Slip, Trip, Fall Prevention

Uneven terrain, slippery rocks, dense brush, and fatigue are all hazards that could result in a slip, trip, or fall. The following guidelines should be obeyed by monitoring staff to avoid injury from slips, trips, or falls:

- Always wear appropriate footwear such as sturdy hiking boots
- Pay attention to where you are going, and remain alert of potential hazards
- Walk at an appropriate pace and adjust pace for changes in terrain (e.g., slow down and take smaller steps on slippery surfaces)
- When hiking long distances, take breaks to avoid fatigue
- When navigating to a point count station off trail, choose the safest route (this may not be the shortest route). Avoid river crossings, excessively steep terrain and sudden drop-offs. Always be careful when navigating over piles of scree, and alert others of falling rocks.

Proper use of Backpacks

Forest crew members are expected to carry ≥ 35-40 pound packs over uneven terrain on a daily basis, and it is important for everyone to understand appropriate ways to pack, lift, and carry a heavy backpack to avoid serious back, neck and shoulder injuries. Monitoring staff must follow these guidelines:

- Use a sturdy field pack with padded and adjustable hip and shoulder straps. Packs will be provided for forest crew members.
- Pack heavy items in the center of the pack and close to your back.
- Make sure weight is evenly distributed from side to side.
- Once equipment is packed, tighten the compression straps to minimize movement inside the pack during travel.
- When picking up a heavy pack, use your legs to do the lifting, and use slow, smooth movements. Keep your back straight, and keep the pack close to your body. Do not twist or bend at the waist, and do not swing the pack quickly over one shoulder.
- Always carry a pack with both shoulder straps and with the hip belt and chest straps secured.
- The pack should be positioned near the center of the back, and most of the weight should rest on your hips.
- Keep your pack organized, and only carry the necessary equipment, food, and water to reduce weight.

Weather

Weather conditions in the eastern U.S. can be hazardous and can change quickly. Monitoring staff are responsible for planning their day according to the local weather forecast and for being aware of their surroundings and changing conditions.

Thunderstorms

Storms that produce strong winds and lightning are dangerous and should be avoided in the field. If caught in a lightning storm, seek shelter in a building or car as soon as possible. If no shelter is available, spread out and move to an open space. Squat low to the ground on the balls of your feet with your hands on your knees (do NOT lie flat on the ground). Avoid high elevations, conductive materials, and tall structures such as trees or telephone poles. If you are in the open and feel your hair stand on end (indicating lightning is about to strike), immediately make yourself the smallest target possible and minimize contact with the ground.

NOTE: A person struck by lightning can often be revived by prompt administration of CPR and oxygen.

Excessive Heat and Sun

Over exposure to heat and sun can cause dehydration, heat exhaustion, or heat stroke. All are serious conditions that can be life threatening, and should be avoided. When working in hot weather, be sure to drink plenty of water and eat foods that can replace electrolytes. Wear loose and light colored clothing, including a hat to block the sun's rays. It may help to shift the field schedule to avoid working outside during the hottest part of the day.

WARNING: Signs of heat stroke include hot, red or spotted (usually dry) skin, and the sufferer may be mentally confused, delirious, having convulsions, or unconscious. If heat stroke is suspected, seek immediate medical attention!

Poor Air Quality

Summer ozone and particulate matter levels occasionally exceed federal health standards. Young children, seniors, and those suffering from asthma, chronic bronchitis, and chronic obstructive pulmonary disease or heart problems are especially sensitive to poor air quality and should minimize outdoor activity when poor air quality warnings are posted. The risks of occasional exposure to ozone and fine particulate matter are minimal for healthy individuals.

When poor air quality warnings occur, it is advisable for monitoring staff to avoid overly strenuous activity during the hottest part of the day (pollution levels tend to be lowest early in the morning), and to stick to lower elevations under a forest canopy.

To check local air quality forecasts, or learn more about health risks of air pollution, visit the AIRNow intergovernmental agency website: http://www.airnow.gov/.

Deer ticks and Lyme Disease

Several species of ticks are commonly encountered in eastern U.S. parks while working in the field (Figure S1.1). This includes the deer tick (*Ixodes scapularis*), which is a known vector of Lyme

disease and Ehrlichiosis. Monitoring staff must take the precautions outlined below to help minimize the chances of having an embedded tick that could lead to illness:

- Clothes treated with tick and insect repellents have been found to be fairly effective tick repellant. Monitoring staff are strongly encouraged to treat their clothing with permethrin prior to conducting monitoring. Monitoring staff should carefully follow the application instructions on the spray bottles to ensure their safety. Permethrin will remain active for several weeks and through several washings.

- Monitoring staff should take additional precautions to protect themselves from ticks, including tucking pants in socks and tucking in shirts. Long sleeves and gaiters have been found to help.

- Check clothes and skin for ticks at the end of every field day. Ticks typically need to be embedded for at least 24 hours for disease transmission to occur; therefore, the earlier ticks are found and removed, the lower your chances are of acquiring a tick-borne illness.

- If you find a tick that is already embedded, use fine-tipped tweezers to firmly grasp the tick close to your skin. Slowly and steadily pull the tick’s body away from your skin. Be careful not to crush the tick’s body to minimize the chances of it regurgitating fluids into the wound. Clean the bite area once the tick is removed with soap and water.

- If you receive a deer tick bite, notify the Project Manager, who will put you in contact with NETN staff so you can start a worker's compensation CA-1 claim to get a CA-16. If you start to notice symptoms of a tick borne disease, use the CA-16 to get medical treatment.

- Keep an eye out for any early symptoms of tick borne diseases. Symptoms may include a bull’s eye rash around the tick bite (doesn’t always occur), tingling or numbness in extremities, a spotted rash on extremities, bad headaches, high fever, joint aches, stiff neck, fatigue, or swollen glands. If you develop a combination of these symptoms soon after a tick bite, seek medical attention.

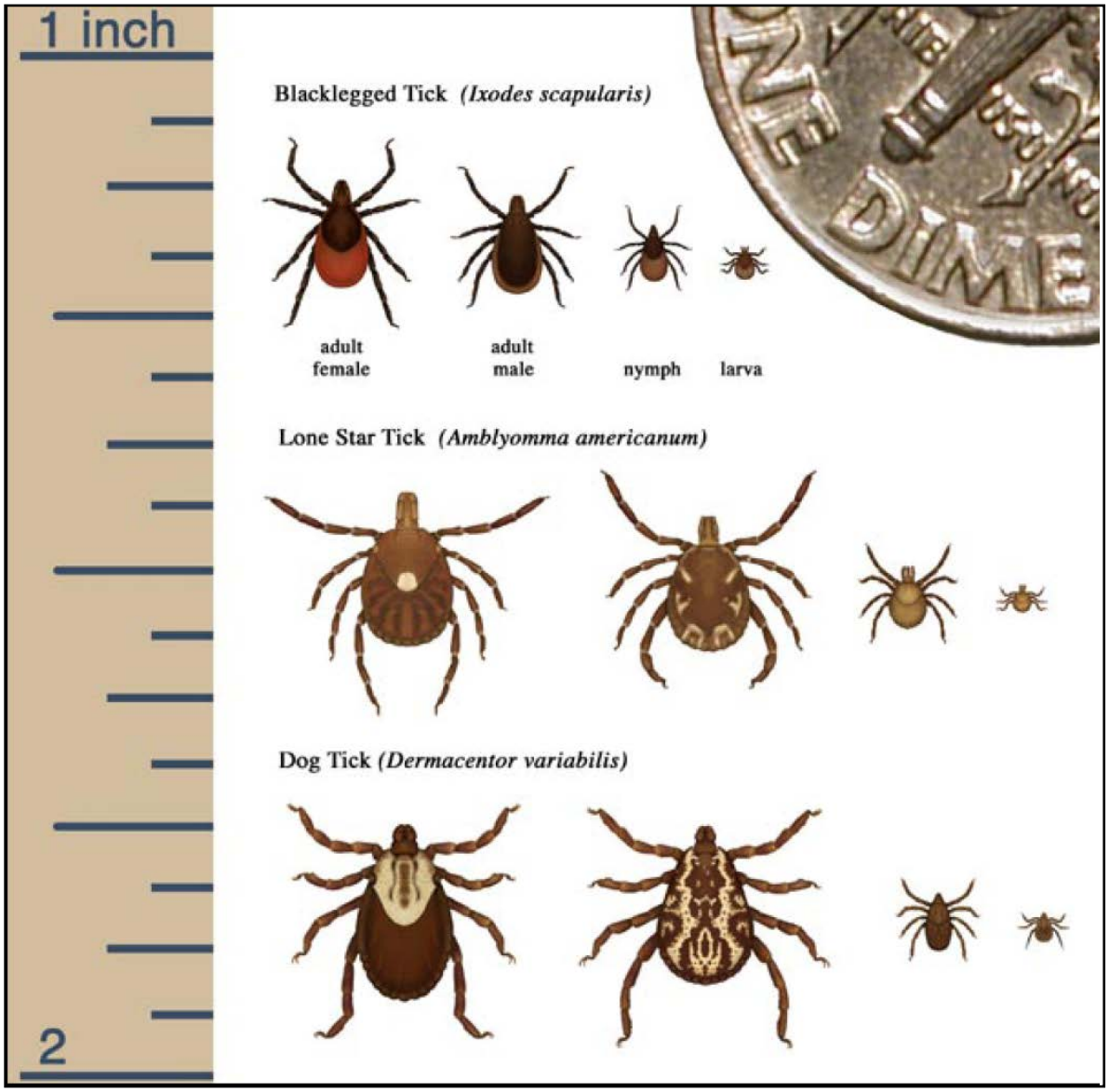


Figure S1.1. Tick species found in the eastern US.

<u>Considerations for using repellents containing DEET:</u>

- DEET products have been widely used for many years; these products have occasionally been associated with some adverse reactions. Frequently, reported reactions are about skin or eye irritation. There have been reports of central nervous system problems.
- By using products with lower concentrations of DEET and by applying as little of the product as needed for your outdoor work, you can reduce your expose to DEET.
- Products with about 20 - 30% DEET are considered effective for most insects, but do not seem to be effective against the black-legged or deer tick (*Ixodes scapularis*)

- Generally, products with about 20 - 30% DEET are considered safe for adults (except for those with allergies to DEET products) when applied as directed.

Considerations for using repellents containing permethrin:

- Products containing permethrin are for use on **clothing only – not for use on skin**.
- Permethrin kills ticks that come in contact with treated clothing and one application lasts two weeks or more. Do not treat the clothing more than once every two weeks.
- Carefully read and follow manufacturer's instructions for application, and refer to the MSDS sheet if you have questions.
- Do not apply while clothing is being worn.
- Apply to clothing item in a well-ventilated outdoor area, protected from wind.
- Lightly moisten the fabric with permethrin – do not saturate the fabric.
- Allow clothing item to dry outdoors for at least two hours before wearing (4 hours in humid conditions).
- Keep treated clothes in a separate bag for storage and transport.
- Launder treated clothing, separately from other clothing.

More information on permethrin:

http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin_fs.htm

http://drugsafetysite.com/permethrin/

Prophylactic (preventative) use of antibiotics:
Antibiotics are sometimes used to prevent Lyme disease transmission from the deer tick. Antibiotics may be prescribed following a deer tick bite if the tick was attached for 24 or more hours, AND the bite occurred in an area where Lyme disease is common. Other tick borne diseases are usually treated using antibiotics only after symptoms become obvious.

A few things to keep in mind about antibiotic therapy:
According to the US Public Health Service, Centers for Disease Control:

- Every time a person takes antibiotics, sensitive bacteria are killed, but resistant germs may be left to grow and multiply. Repeated and improper uses of antibiotics are primary causes of the increase in drug-resistant bacteria.
- Misuse of antibiotics jeopardizes the usefulness of essential drugs. Decreasing inappropriate antibiotic use is the best way to control resistance.

- Antibiotic resistance can cause significant danger and suffering for people who have common infections that once were easily treatable with antibiotics. When antibiotics fail to work, the consequences are longer-lasting illnesses; more doctor visits or extended hospital stays; and the need for more expensive and toxic medications.

More information on Lyme Disease and Ticks:

Center for Disease Control:
http://www.cdc.gov/lyme/

(also a free webinar on tickborne diseases)

American Lyme Disease Foundation:
http://www.aldf.com/

Tick Management Handbook:
http://www.ct.gov/caes/lib/caes/documents/publications/bulletins/b1010.pdf

Poisonous Plants and Animals

Both for safety and protection of park resources, it is never advisable for monitoring staff to eat wild plants while working in a National Park, regardless of their confidence in plant identification. Keep a safe distance from wildlife.

Poison Ivy

Poison ivy (*Toxicodendron* spp.) is present in most NETN parks, and can be very abundant in localized areas. When working in areas with poison ivy, it is advisable that monitoring staff learn to recognize this plant and take precautions to avoid skin contact with any part of it. Using a pre-exposure cream and wearing long sleeves and long pants can help reduce the amount of skin contact with the plant. If needed, use poison ivy wipes after contact. Monitoring staff should be careful not to rub their faces when working around poison ivy. After working in an area with abundant poison ivy, monitoring staff should gently wash exposed skin in cool water with poison ivy soap, and should change into fresh field clothes. At the end of a field day, monitoring staff should also wash potentially contaminated equipment (e.g., backpack). If a severe allergic reaction occurs, the affected individual should seek medical attention, notify the Project Manager as soon as possible, and file a workers compensation claim.

Venomous Snakes

The following species of venomous snakes may occur in some NETN parks: copperhead (*Agkistrodon contortrix*) and timber rattlesnake (*Crotalus horridus*). The best course of action is to avoid all snakes by keeping them at a safe distance. When in poisonous snake country, pay attention to where you put your hands and feet, and be aware around rock piles and bedrock outcrops. Note that many snake bites are purely defensive, and contain no venom. Bites from immature snakes are much more likely to contain a more dangerous amount of venom than bites from adult snakes. Should you receive a snake bite from a potentially poisonous snake, follow the procedure below:

- Treat all bites as if envenomation has occurred.
    - Time is of the essence
    - If working in a team, assign one person to use a cell phone to call for assistance. Identify the call as a snakebite incident, and identify the victim's location and the closest possible point of access for responders.
    - Quickly remove rings, watches, shoes etc., before swelling begins.
    - Immobilize the bitten limb firmly with a splinted elastic (Ace) bandage and get the victim out of the woods and to a hospital as quickly as possible.
    - **Do not** use thin circulation restrictive cords, pack with ice for long periods (more than five minutes) or attempt to cut open or otherwise enlarge the fang punctures.
- Reassure the victim that they will be OK and otherwise attempt to maintain the calm both for the victim and for all others involved.
    - In a crew situation, begin leading the victim slowly out of the woods as soon as the bitten limb has been immobilized. **Move as slow as necessary to maintain a normal heart rate for the victim.** Waiting for assistance will only prolong the process of getting proper medical treatment.
    - In a solitary situation, establish radio or telephone contact and relay the necessary information as you walk slowly out of the woods. Focus on remaining calm and maintaining a normal heart rate.
- It is better to spend your available time getting to proper medical treatment facilities than it is to fumble with field therapy and wait for assistance to reach you.

The range of the copperhead covers the following NETN parks: Morristown NHP (MORR), Roosevelt Vanderbilt NHS (ROVA), Saratoga NHP (SARA) and Weir Farm NHS (WEFA). The likelihood of encountering a copperhead is low in NETN parks. Copperhead bites are not typically considered life threatening, and in most cases antivenin is not administered.

The range of the timber rattlesnake covers all NETN parks except ACAD. This species is listed by NatureServe as "critically imperiled" (S1: New Hampshire, Vermont, Massachusetts, and Connecticut) or "vulnerable" (S3: New York, Pennsylvania) throughout NETN, and the likelihood of encountering a timber rattlesnake in NETN parks is very low. Adult timber rattlesnakes are capable of delivering a lethal dose of venom.

Bees, Wasps, and Yellow Jackets

If any monitoring staff are allergic to bee stings, they should alert their colleagues and make sure to carry appropriate medications. If they carry an epinephrine injector and are working in a team, they should make sure their colleague knows where it is carried. Be alert to potential hive and nest

locations while hiking to point count stations and working on point count stations. Look for insects travelling in and out of one location (e.g., brush, ground holes, and hollow logs). If someone is stung, Benadryl and a cold compress may bring relief. If stinger is left behind, scrape it off of skin. Do not use tweezers as this squeezes the venom sack, worsening the injury. If the victim develops hives, asthmatic breathing, tissue swelling or a drop in blood pressure, seek medical help immediately.

Black Bears
Black bears range throughout the Northeast, but an encounter with a bear in the field is not likely since bears generally avoid people. Nevertheless, be alert for bears near dawn or dusk, and be especially aware of mother bears with cubs. Never approach cubs or come between a mother bear and her cubs. If a bear is encountered, face the animal and continually make noise – do not freeze or remain silent. Appear larger by standing tall, waving arms or jacket over your head, and slowly back away. Never run from a black bear; if charged or attacked, throw objects and shout loudly, and fight back aggressively.

Vehicle Safety

Responsibilities of Vehicle Operators

Virtually all monitoring staff for the landbird protocol will be using their personal vehicles to get to and from their monitoring sites. Monitoring staff are responsible for inspecting their vehicles before every use to ensure the vehicles are in safe working condition. This includes visually checking tire pressure, adjusting mirrors, and making sure equipment is secure, as well as taking care of preventative maintenance in a timely manner. It is strongly recommended that monitoring staff obey the following rules (these rules are mandatory in government vehicles):

- Wear a seat belt.
- Do not use cell phones (both talking and texting) while driving.
- Adhere to all federal and state vehicle regulations, including all posted speed limits.

Procedures for reporting a motor vehicle accident

In the event of an automobile accident, volunteers and NPS staff should follow NPS accident reporting procedures. Cooperators or contractors would need to follow their organization's procedures. The NPS procedures are as follows:

1. Stop immediately and turn on emergency flashers.
2. Take steps to prevent another accident at the scene.
3. Call 911 or ambulance if necessary.
4. Notify police, NPS law enforcement (if at a park with law enforcement – ACAD, MIMA, MORR, and SARA) and the Project Manager. The Project Manager will notify NETN staff.

5. In the event of death, actual or potential serious injury, or significant property damage (damage greater than $2,500), the staff involved must convey this information as soon as is practical to NETN staff, so that the NPS Regional Tort Claims Officer (TCO), Dave Schuller (215-597-5368), can be notified.

6. In reporting an accident, monitoring staff should state the facts to the best of his/her knowledge. **Conclusions as to fault or responsibility should not be stated.** Monitoring staff should report the accident only to authorized representatives of the Government, their insurance company, and police officers investigating the accident. Monitoring staff shall also file any report required by law.

7. Get name and address of witness (preferably two witnesses). Ask witness to complete Standard Form (SF) 94, Statement of Witness, if the form is available.

8. State/provide your name, address, place of employment (or park where volunteering), name of your supervisor (Project Manager if a volunteer), and upon request show your driver's license and vehicle registration information.

9. Complete Standard Form (SF) 91, Motor Vehicle Accident Report as soon as practical. If conditions prevent this, make notes of the following:

    a. Registration information for other vehicle(s) (owner's name, owner's address, tag number, VIN, and vehicle description)

    b. Information on other drivers (name, address, operator's permit, and expiration date)

    c. Name and address of each person involved and extent of injury, in any.

    d. Name and address of company insuring other vehicle(s) and insurance policy number

    e. General information such as location, time, measurements, weather, damage, etc.

10. Encourage police to provide a Police Report and, if available, submit a copy with SF-91.

11. If you have a camera, take pictures of the accident scene and any damage to the vehicles involved. Submit along with SF-91.

12. If vehicle is unsafe to operate, arrange for towing services (if a government vehicle, pay using the vehicle gas card).

13. Submit all reports and data to the NETN Program Manager within one working day.

14. If a federal employee or volunteer is injured, the workers compensation process needs to be initiated <u>within 48 hours of incident.</u> NETN staff will assist with this process. It is important for injured monitoring staff to receive prompt medical treatment. <u>Make sure the employee sees a doctor, not a nurse, nurse practitioner, or physician's assistant.</u>

15. NETN staff will submit copies of all reports and data to the NPS regional TORT Claims Officer (TCO) [Dave Schuller 215-597-5368] as soon as possible but no later than 10 calendar days after the accident.

Accident/collision reports should be filed for:

1. All motor vehicle accidents involving federally owned or leased vehicles and employee-owned or rented vehicles while being used on official business, regardless of the amount of damage.

2. All public/visitor accidents will be reported on a SF-91 when a government-owned vehicle is involved, government property is damaged, fatality occurs, medical treatment is required and/or a reasonable possibility of a tort claim is expected.

3. Thefts and Vandalism should be reported to Park Law Enforcement Officials rather than reported on SF-91.

4. Reporting Multiple Vehicle Accidents – when a privately owned vehicle damages Government property, two reports (SF-91) are required: one report for the Government property and one for the private operator.

Appendix S1.A - Green-Amber-Red Risk Assessment

This appendix describes application of the GREEN-AMBER-RED (GAR) Risk Assessment Model as outlined in the NPS Operational Leadership Student Manual (Version 2; July 2011) to the NETN Breeding Landbird Monitoring Protocol. This GAR was written by the NETN Program Manager (Brian Mitchell) on 24 February 2012 and approved by the NPS Northeast Region I&M Program Manager (John Karish) on 17 January 2013.

The GAR model allows for a general assessment of a task or operation and generates communication concerning the risks of an activity (in this case, conducting the field-based activities of the NETN Breeding Landbird Monitoring Protocol). The most important part of the process is the team discussions leading to an understanding of the risks and how they will be managed.

The GAR is a seven step process. Each step is defined and explained in the context of the NETN Breeding Landbird Monitoring Protocol below.

Step 1: Define the Mission or Task

The NETN Breeding Landbird Monitoring Protocol includes a field-based monitoring activity: surveying breeding landbirds along study site routes in forests and fields. Monitoring staff are usually volunteers who work independently and are coordinated by a contractor (the Project Manager). Staff are encouraged to work in pairs and NPS has agreed to help find partners for monitoring volunteers when the volunteers request a partner. The activity is conducted away from roads and trails, and at ACAD (the park with the most difficult terrain and greatest distances from roads and trails) the monitoring has been limited to locations with lower slopes (<30%) that are within 1.5 km of roads. Potential safety hazards (along with mitigation measures) have been identified in a Job Safety Analysis (JSA; Appendix S1.B). Of specific concern is that monitoring staff will regularly be working in fairly remote areas with limited communication options in the event of an emergency. A serious injury due to walking through thick brush or a trip and fall while traversing uneven or steep terrain are both possible and are the most significant risks encountered when conducting this activity.

Step 2: Define the Threats

The threats/hazards for this activity along with mitigation measures are described in the associated JSA (Appendix S1.B).

Step 3: Assess Risk and Assign a Numerical Value

The numerical ranks (Table S1.A.1) were assigned by Brian Mitchell, the NETN Program Manager and the NPS project leader for the NETN Breeding Landbird Monitoring Protocol. NETN staff and the Project Manager reviewed the ratings and analysis and their suggestions were incorporated. It should be noted that at the time numerical values were assigned (February 24, 2012) the protocol had been in operation for six years and considerable time and effort had already gone into evaluating and mitigating risks.

The GAR process is described in NPS Operational Leadership Student Manual (Version 2; July 2011).The activity risk can be visualized using the colors of a traffic light. If the total risk value falls

Appendix S1.A Green-Amber-Red Risk Assessment (continued).

in the GREEN ZONE (1-35), risk is rated as low. If the total risk value falls in the AMBER ZONE (36-60), risk is moderate and you should consider adopting procedures to minimize the risk. If the total value falls in the RED ZONE (61-80), you should implement measures to reduce the risk prior to starting the event or evolution.

The ability to assign numerical values or "color codes" to hazards using the GAR Model is not the most important part of risk assessment. What is critical to this step is team discussions leading to an understanding of the risks and how they will be managed.

Table S1.A.1. NETN Breeding Landbird Monitoring Protocol assigned risk codes of 0 (For No Risk) through 10 (For Maximum Risk) to each of the eight Green-Amber-Red Risk Assessment elements.

Element	Rating
Supervision	5
Planning	3
Communication	3
Contingency Resources	6
Team Selection	6
Team Fitness	3
Environment	5
Event/Evolution Complexity	5
Total Risk Score	36

Step 4: Identify Risk Control Options

Supervision

The NETN Breeding Landbird Monitoring Protocol clearly identifies personnel, roles and responsibilities, and a chain of command. A coordinator (the contracted Project Manager) is the supervisor and is available to answer questions from monitoring staff, and the staff are encouraged to work with a partner in the field but may opt to work alone. Monitoring staff are required to follow check-in and check-out procedures with NPS staff at their assigned park. A score of 5 was assigned because of the lack of direct supervision and the likelihood that many monitoring staff will work alone.

Planning

The NETN Breeding Landbird Monitoring Protocol includes numerous SOPs that explain hiring, training, personal safety, emergency communication (equipment and contacts), and appropriate field activities. Monitoring staff are asked to review the volunteer manual, which summarizes relevant field procedures and provides a summary of the safety SOP, and they must sign an acknowledgement that they have reviewed the JSA. Monitoring staff are highly recommended to have first aid and CPR training. Due to this advance planning, written documentation, and training procedures, a low score (3) was assigned.

Appendix S1.A Green-Amber-Red Risk Assessment (continued).

Communication

Routine and emergency communication procedures are explained in the relevant SOPs, and monitoring staff are provided with contact information specific to their assigned park. The procedures include coordination with park natural resource managers and other designated park staff. It also includes a daily check-out/check-in procedure for monitoring staff to ensure that a responsible party knows if someone has not returned from the field activity in a timely manner. Due to this advance planning, written documentation, and training procedures, a low score (3) was assigned.

Contingency Resources

Contingency resources include communication equipment and procedures that explicitly involve park rangers, park dispatch, and 9-1-1. Monitoring staff are required to carry a cell phone, but coverage is not complete in many parks. At the park with the worst cell coverage (ACAD), monitoring staff can check out a Personal Locator Beacon and SPOT GPS Messenger to facilitate check-ins and emergency response. In the worst case scenario, an incident involving a solo individual in an area with no cell phone coverage could result in a long delay before emergency services are alerted. However, monitors use marked routes and they end field work before noon, so if a search is initiated after a missed check-in the individual should be located on the same day and within a few hours of starting a search. A score of 6 was assigned for this worst-case scenario.

Team Selection

The monitoring protocol identifies the essential skills and abilities required to execute this protocol in a competent manner. Monitoring staff are experienced birders, and many of them are retirees. There is also some variation in their orienteering and hiking experience. Monitoring staff are strongly encouraged to obtain basic first aid and CPR certification, and to work with a partner if they are at all concerned about field conditions. A score of 6 was assigned because some monitoring staff may have limited experience with off-trail hiking and navigating.

Team Fitness

The nature of the Breeding Landbird Monitoring Protocol should ensure an overall high level of team fitness. Monitoring staff are only in the field for approximately 5 hours per day (not including drive times), and each individual typically monitors one site once per year. Some individuals monitor multiple sites or monitor their site twice per year (with 2 weeks between sampling events). In these cases, monitoring staff do not monitor multiple sites in one day. A score of 3 was assigned because the shifts are not long, even though the work can be strenuous and begins around dawn. Monitoring staff must be diligent about adequate rest and nourishment to ensure that fatigue does not become a factor.

Environment

Environment was assigned a medium score (5) primarily because the work often involves activities in dense foliage away from trails, on uneven and occasionally steep terrain. Activities may start before dawn and occur during a variety of weather conditions, but are cancelled by rain and high winds.

Appendix S1.A Green-Amber-Red Risk Assessment (continued).

Incident Complexity

Incident complexity was also assigned a medium score (5) because daily field conditions change due to weather. Individual monitoring staff must use judgment and experience to respond appropriately.

Step 5: Evaluate Risk vs. Gain

The scores for this assessment fall at the very bottom of the "amber" zone, indicating a moderately risky activity. While it is theoretically possible to make changes to reduce risk even further, doing so will likely cause volunteers to leave the program due to the intrusive requirements. The NETN Program Manager feels that the current procedures provide a good balance that encourages monitoring staff to be safe without being overly protective. NETN feels that this monitoring activity, if carried out in accordance with all SOPs, has an acceptable level of risk.

Step 6: Execute Decision

The decision made by the NETN Program Manager is to conduct the activity in accordance with NETN Breeding Landbird Monitoring Protocol Standard Operating Procedures (SOPs).

Step 7: Supervise – Watch for Change

The NETN Program Manager continually solicits feedback from the contractor and NPS staff on safe execution of the protocol including risk control options not considered thus far.

Appendix S1.B - Job Safety Analysis

JOB SAFETY ANALYSIS: Breeding Landbird Monitoring Field Work and Travel to, from, and within Parks	**JOB TITLE:** Breeding Landbird Monitor **DEPARTMENT:** Northeast Temperate Network **ANALYSIS BY:** Brian R. Mitchell, NETN Program Manager	☐ **NEW** ☐ **REVISED** ☒ **REVIEWED** John Karish, NER I&M Program Manager
Required and/or Recommended Personal Protective Equipment: Required: At least one method of communication (i.e., cell phone in most parks; Personal Locator Beacon and SPOT GPS Messenger at ACAD), driver's license. Recommended as appropriate: first aid kit, rain gear, condition-appropriate footwear and clothing, sufficient food and water.		

Tasks	Potential Hazards	Recommended Action or Procedure
Planning and Communication	Not being prepared and following plan/itinerary. Communication breakdowns.	• Plan ahead. Know where you will be going, the study site to be surveyed, and any particular hazards associated with the monitoring route. Check the weather forecast and plan accordingly. • Check in with park resource manager or designated individual (RM/DI) prior to field work with a trip plan, and after field work to confirm the work is safely completed. Contact the RM/DI with any changes, including cancellation of field work. If return will be delayed, contact RM/DI before agreed-upon check-in time to establish a new check-in time. • Always carry at least one method of communication, and verify that it has a full charge before starting field work.
Emergency Preparedness	Not knowing emergency procedures. Not having emergency supplies.	• Know who to contact and how to reach them in the event of a life-threatening or non-life-threatening emergency. • Have current CPR and first aid certification. • Carry a well-maintained first aid kit.

Appendix S1.B Job Safety Analysis (continued).

Tasks	Potential Hazards	Recommended Action or Procedure
General foot travel	Falling or tripping due to wet areas, poor footing, uneven terrain, loose/rolling rocks and heavy pack.	• Use caution at all times. Walk carefully, watching footing. • Wear appropriate boots for conditions. Stay aware of your feet. Address blisters and hot spots promptly. • Avoid carrying excessive weight loads or unbalanced loads. • When walking on a steep slope, lean upslope. Ensure that stems and vines are alive and can support your weight before relying on them. • Use extreme caution traversing wet rocks, streams, steep slopes or blowdown areas.
Working outdoors during storms	Being struck by falling trees or branches; being struck by lightning	• Listen to the weather forecast each morning (park radio and/or internet). • Breeding landbird monitoring is not conducted when it is raining or windy. • Plan or adjust field work to avoid being out in thunderstorms. • Postpone work if safety will be compromised by storm conditions. If you see or hear a thunderstorm coming, retreat from high ground and exposed areas. Go inside a sturdy building or vehicle, if possible. • If you can't get inside and if you feel your hair stand on end, lightning is about to strike. • Make yourself the smallest target possible and minimize contact with the ground. • Crouch down on your pack on the balls of your feet and keep your feet close together. Place your hands on your knees and lower your head. • During a thunderstorm, members of the crew should stay separated by at least ten feet.
Poisonous plants, especially poison ivy	Contamination/toxicity from contact with poisonous plants	• Learn to identify poison ivy in its many growth forms. • Wear long sleeves and pants. • Be aware of poison ivy and avoid coming in direct contact with it. • Thoroughly wash hands, equipment, and clothes with Tecnu or similar specialized soap if you come into contact with poison ivy.

Appendix S1.B Job Safety Analysis (continued).

Tasks	Potential Hazards	Recommended Action or Procedure
Working in bear territory	Black bear encounter	• Be especially alert near dawn or dusk. • Be especially aware of mother bears with cubs. Never approach cubs or come between a mother bear and her cubs. • Face the animal, continually make noise – do not freeze or remain silent. • Appear larger by standing tall, waving arms or jacket over your head. • Slowly back away – do not approach a bear. • Never run from a bear. • Throw things and shout loudly. • Fight back aggressively.
Bee, wasp, or yellow-jacket stings	Multiple stings from disturbing or stepping into nest areas	• Be alert to hives in brush, ground holes, or hollow logs. Watch for insects traveling in and out of one location. • If you are allergic to bee stings, tell your partner (if working in a pair). Make sure you carry emergency medication with you at all times and that your partner (if applicable) knows where you keep it. • Wear long sleeve shirts and trousers, tuck in shirt. Bright colors and metal objects may attract bees or wasps. • If you are stung, a cold compress may bring relief. • If stinger is left behind, scrape it off of skin. Do not use tweezers as this squeezes the venom sack, worsening the injury. • If the victim develops hives, asthmatic breathing, tissue swelling or a drop in blood pressure, seek medical help immediately.
Bites from mosquitoes, black flies, and other insects	Itchy reactions to multiple bites	• Wear long sleeves and pants. • Avoid sitting on the ground or on logs, especially in dry sunny grassy areas. • Use insect repellants. Do not apply Permethrin, Permanone, or greater than 30% DEET directly to skin, only to clothing. • Carry after-bite medication to reduce skin irritation.

Appendix S1.B Job Safety Analysis (continued).

Tasks	Potential Hazards	Recommended Action or Procedure
Ticks	Contracting diseases transmitted from ticks	• Use tick avoidance precautions, including pre-treating clothing with permethrin, tucking pants into socks and shirt into pants when hiking. • Wear clothes (including pants and long-sleeved shirts) that are light colored and check for ticks on clothing after traveling through vegetation. • Conduct a thorough tick check every evening after completing field work. • Know how to identify tick life forms, and the signs & symptoms of tick-borne diseases.
Venomous snakes	Being bitten by a venomous snake	• Venomous snakes are rare in NETN parks. • Be alert for snakes in thick vegetation and rocky habitats. • Look before putting hands or feet in places out of immediate view. • Treat all bites as if envenomation has occurred. • Immobilize the bitten area and keep it lower than the heart. • Apply a bandage, wrapped two to four inches above the bite, to help slow the venom. This should not cut off the flow of blood from a vein or artery - the band should be loose enough to slip a finger under it. • Remove rings, watches, shoes, etc. before swelling begins in earnest. • Seek medical attention immediately and/or call for help. Remain calm. • Rattlesnake bites are more likely to be life-threatening.
Walking through thick vegetation	Cut, scratched, or bruised by vegetation; eye or ear injuries	• Shield your eyes and face with your hands, glasses, or hat when moving through tall thick brush. Keep your head and eyes pointed somewhat downward so your head hits obstacles before your eyes. • Wear pants and long-sleeved shirts to protect bare skin. • Look before you grab vegetation to avoid grasping thorny stems. • Do not follow closely behind other people to avoid having branches snap back and hit you.

Appendix S1.B Job Safety Analysis (continued).

Tasks	**Potential Hazards**	**Recommended Action or Procedure**
Crossing streams	Injuries from falling and/or drowning	• Do not cross streams that are flowing quickly and higher than mid-calf; find another route. • Thoroughly investigate area to find safest crossings. • Wear appropriate foot gear for stream crossings. • It is safer to wade through water, rather than rock hop across a stream trying to keep your boots dry. • Unbuckle your pack and be prepared to jettison gear should you lose your balance or fall in. • Use a sturdy pole or walking stick for balance.
Working in heat, humidity, or cold	Heat exhaustion, sunburn, dehydration, hypothermia	• Evaluate the weather forecast each morning and plan field work accordingly. • Carry and drink plenty of water. • Take extra breaks during extreme weather events. Adjust the work routine to minimize exposure to extreme heat and humidity. • Take adequate garments for all possible weather conditions. Choose clothing that will keep you warm even if it gets wet.
Hazard trees	Being struck by falling trees or branches	• Look up. Be alert for widow-makers, storm damaged trees with large broken limbs, and unstable standing dead trees. • Do not spend extended time in an area with hazard trees.
Carrying a pack and other equipment	Injuries from improper packing, adjustment, and lifting of backpacks. Injuries from improper carrying of gear	• Learn how to properly pack, adjust, lift, and carry a pack. • When hand-carrying gear, keep one hand free. • If carrying long equipment, be aware of other people and never swing around quickly. Avoid allowing a long piece of equipment to project up and behind you, where you cannot see it.

Appendix S1.B Job Safety Analysis (continued).

General operation of a vehicle	Injuries from vehicle accident; Damage to vehicle	• Perform pre-operational check of vehicle (oil, tire pressure, tire condition, fluids, wipers, brakes, lights, gas, etc.). Report all needed repairs to the crew leader or supervisor promptly. • Do not use the vehicle if it is unsafe. • Wear seat belts with shoulder harnesses whenever vehicle is in motion. • Do not use cell phones or text while driving. • Only NPS employees, volunteers or authorized cooperators and contractors are allowed to operate or ride in a government vehicle. • Ensure full visibility from all windows and mirrors. Clean windshield regularly. • Always ride inside the vehicle. • Properly store and secure all tools, equipment, and cargo so that they will not shift during sudden starts or stops. • Plan your travel before you start. Know your route. • Practice defensive driving; be alert to potential hazards. • Obey all traffic laws and speed limits. • Adjust speed to changing weather or traffic conditions • Allow adequate following/stopping distance. • Avoid distractions such as eating while driving. • Be alert for pedestrians or bicyclists using roadways. • Be watchful for wildlife crossing roads, especially at early morning, dusk, and after dark. • Do NOT drive if fatigued. Stay alert!

Appendix S1.C - Safety Forms

Safety Acknowledgment Form

By signing below, I certify that I have read the safety section of the Volunteer Training Manual and the Breeding Landbird Monitoring Job Safety Analysis. I have shared any safety concerns or suggestions with the Project Manager and they have been addressed to my satisfaction.

Print Name: _____

Signature: _____

Date: _____

Please return this form, along with the completed and signed NPS Agreement for Individual Voluntary Services, to:

Steve Faccio

VCE

PO Box 420

Norwich, VT 05055

These forms only need to be completed once for each volunteer, prior to any field monitoring activities. An annual review of the Volunteer Training Manual and Job Safety Analysis is recommended for all volunteers.

Appendix S1.C Safety Forms (continued).

Breeding Landbird Monitoring Safety Checklist

One month to one week before field work

- ☐ Complete volunteer form and JSA acknowledgment and return to Project Manager (one-time requirement)
- ☐ Contact park Resource Manager and Project Manager with planned survey dates
- ☐ Discuss safety issues and bring up any concerns with Resource Manager and Project Manager, including:
  - Safety and emergency procedures
  - Emergency contact(s)
  - Assistance finding monitoring partner
- ☐ Verify that you have needed gear, including:
  - Clipboard, data sheets, timer, pens/pencils
  - Cell phone or other communication device (e.g., SPOT GPS Messenger at Acadia)
  - Suitable field clothes and personal gear (e.g., insect repellent, food, water, rain gear)
  - First aid kit (highly recommended)

One-two days before field work

- ☐ Complete trip plan and send it to the park resource manager or designated individual
- ☐ If using SPOT GPS Messenger and Personal Locator Beacon at ACAD, check out the equipment and review procedures, and send trip plan to NETN staff responsible for tracking traffic from these devices
- ☐ Verify that the trip plan has been received
- ☐ Check weather forecast and adjust plans accordingly

Day of field work

- ☐ Notify park Resource Manager or designated individual of any changes to your plans
- ☐ Check in on arrival (if requested by park resource manager or designated individual)
- ☐ Conduct field work
- ☐ Check in after field work – DO NOT FORGET!

Appendix S1.C Safety Forms (continued).

Breeding Landbird Monitoring Trip Plan

This form must be completed and e-mailed to the park resource manager (or other designated individual) in advance of your monitoring trip. If you are monitoring a study site at Acadia and will be borrowing the NETN SPOT GPS Messenger and Personal Locator Beacon, NETN staff will need a copy of this trip plan and contact information for the individual who will be serving as your official check-in.

Name of monitor:_____

Cell phone number: _____ - _____ - _____

Home phone number: _____ - _____ - _____

Name of monitoring partner:_____

Partner cell phone number: _____ - _____ - _____

Partner home phone number: _____ - _____ - _____

Date of trip:_____

Start time:_____

End time:_____

Check-in time:_____

Warning: if you do not check in by this time, an attempt will be made to reach you by phone; if you do not respond, emergency services will be notified. Do not forget to check in!

Vehicle make, model, and license plate:_____

Planned parking location(s):_____

Study site to be monitored:_____

Note: the person receiving this trip plan must have a map of the study site route.

Appendix S1.D - Directions to Nearest Hospital from Each Park

Northeast Temperate Network

Acadia National Park– Headquarters

Directions to nearest hospital start at the **Headquarters building** (A) in Acadia National Park and end at the **Mount Desert Island Hospital** (B) in Bar Harbor, Maine. Destination is 1.6 miles and **five minutes** away.

Phone Number: (207) 288-5081.

Location: 10 Wayman Lane, Bar Harbor, ME 04609

Directions:

1. Head East (turn right) on Eagle Lake Road/ ME- 233 toward Arata Drive. Continue to follow ME-233 for 1.3 miles
2. ME-233 turns right and becomes Main St./ ME -3. Continue for 0.2 miles.
3. Turn left at Wayman Ln. MDI Hospital will be on the left (115 ft).

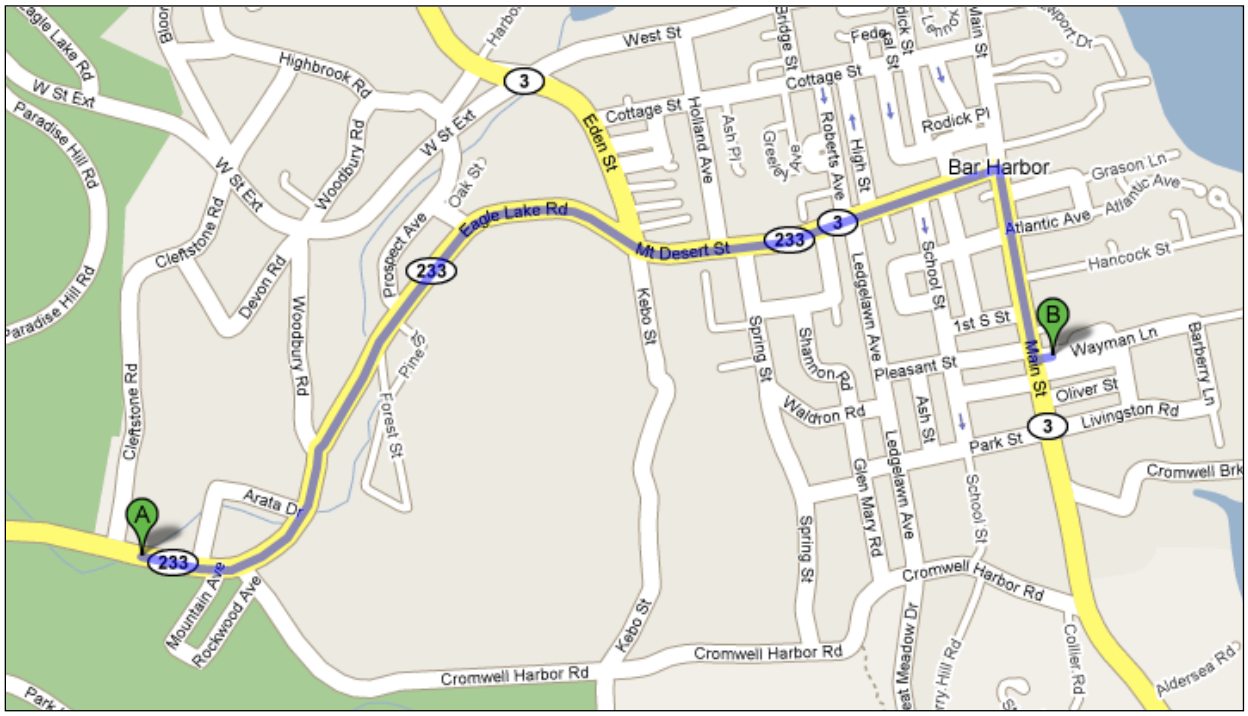


Figure S1.D.1. The route from Acadia NP Headquarters to the Mount Desert Island Hospital in Bar Harbor, Maine.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Acadia National Park– Seawall

Directions to nearest health clinic start at the **Seawall Park Housing** (A) in Acadia National Park and end at the **Community Health Center** (B) in Southwest Harbor, Maine. This clinic has been good for treating Lyme disease, but does not have emergency services. Destination is 2.3 miles and **four minutes** away.

Phone Number: (207) 244-5630.

Location: 9 Village Green Way, Southwest Harbor, ME 04679

Directions:

1. Head east on ME-102 Alt N/Seawall Road toward Seascape Ln for 2.2 miles.

2. Turn right onto ME-102 N/ Main St. and go 0.7 mi.

3. Turn left onto Village Green Way and go 0.1 mi. Community Health Clinic is at 9 Village Green Way.

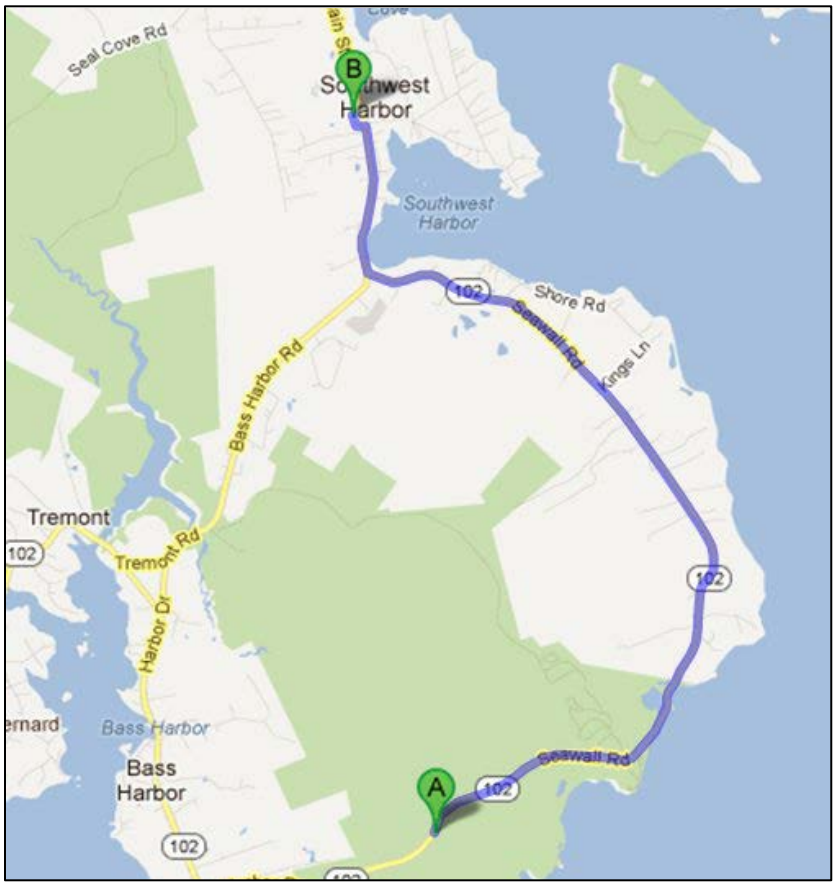


Figure S1.D.2. The route from Seawall Campground (A) to the Community Health Center (B) in Southwest Harbor, Maine.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Acadia National Park– Schoodic

Directions to nearest health clinic start at the **Schoodic Education and Research Center Entrance** (A) in Acadia National Park and end at the **Eleanor Eidener Dixon Memorial Clinic** (B) in Gouldsboro, Maine. Destination is 11.5 miles and **24 minutes** away.

Phone Number: (207) 963-4066.

Location: 37 Clinic Road, Gouldsboro, ME 04607

Directions:

1. Head south out of parking lot and go about 240 feet.

2. Take the 1st left and go 0.1 miles.

3. Turn left toward Moore Rd and follow 3.3 miles.

4. Continue straight onto Moore Rd for 1.5 miles.

5. Turn left onto ME-186 W/Main St and proceed 0.6 miles.

6. Turn right onto ME-186 W/Newman St and follow for 6.0 miles.

7. Continue onto Clinic Rd and go 0.1 miles. Clinic will be on the left.

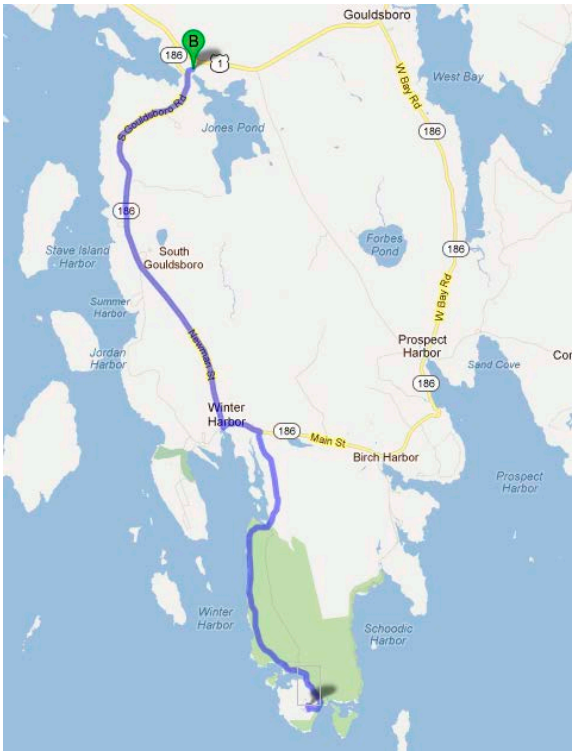


Figure S1.D.3. The route from Schoodic Education and Research Center (A) in Acadia National Park to Eleanor Widener Dixon Memorial Clinic (B) in Gouldsboro, Maine.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Marsh-Billings-Rockefeller National Historical Park

The nearest hospital to Woodstock, Vermont is Dartmouth Hitchcock Medical Center (DHMC) in Lebanon, New Hampshire, and is about 22 miles and **31 minutes away**. Directions to nearest hospital start at the **Billings Farm parking lot** (A) in Woodstock, Vermont and end at the **Dartmouth Hitchcock Medical Center** (B) in Lebanon, New Hampshire:

Phone Number: (603) 650-5000

Location: 1 Medical Center Drive, Lebanon, NH.

Directions:

1. From the Billings-Farm parking lot, turn left at the Y onto Elm Street/ VT-12. Continue for 0.4 miles.

2. Turn left at Pleasant St./ VT-12. Continue for 0.6 miles.

3. Turn left at US-4/VT-12/Woodstock Rd. Continue to follow US-4 for 9.4 miles.

4. Turn right and go 0.1 miles.

5. Take the ramp onto 1-89 South and go 8.1 miles.

6. Take exit 18 for NH-120 toward Hanover and go 0.2 miles.

7. Turn left at Centerra Pkwy/Lahaye Drive and continue on Lahaye Drive for 0.5 miles.

8. Turn right at the Hitchcock Loop Road/ Medical Center Drive and continue for 0.3 miles.

9. Turn left at DHMC East Entrance, and turn right to stay on DHMC East Entrance.

Figure S1.D.4. Route from Marsh-Billings-Rockefeller NHP in Woodstock, Vermont to Dartmouth Hitchcock Hospital in Lebanon, New Hampshire.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Minute Man National Historical Park

Directions to nearest hospital start at the **Brooks Village parking lot** (A) on 2A (N Great Road) in Minute Man National Historical Park, and end at **Emerson Hospital**. Destination is 3.9 miles and about **8 minutes** away:

Phone Number: (978) 369-1400

Location: 133 Old Road to 9 Acre Corner, Concord, MA 01742.

Directions:

1. Head west on Massachusetts 2A W/N Great Road/ Lexington Rd. toward Brooks Road. Continue for 3.8 miles.

2. Turn left onto Old Road to 9 Acre Corner. Destination will be on left side of road.

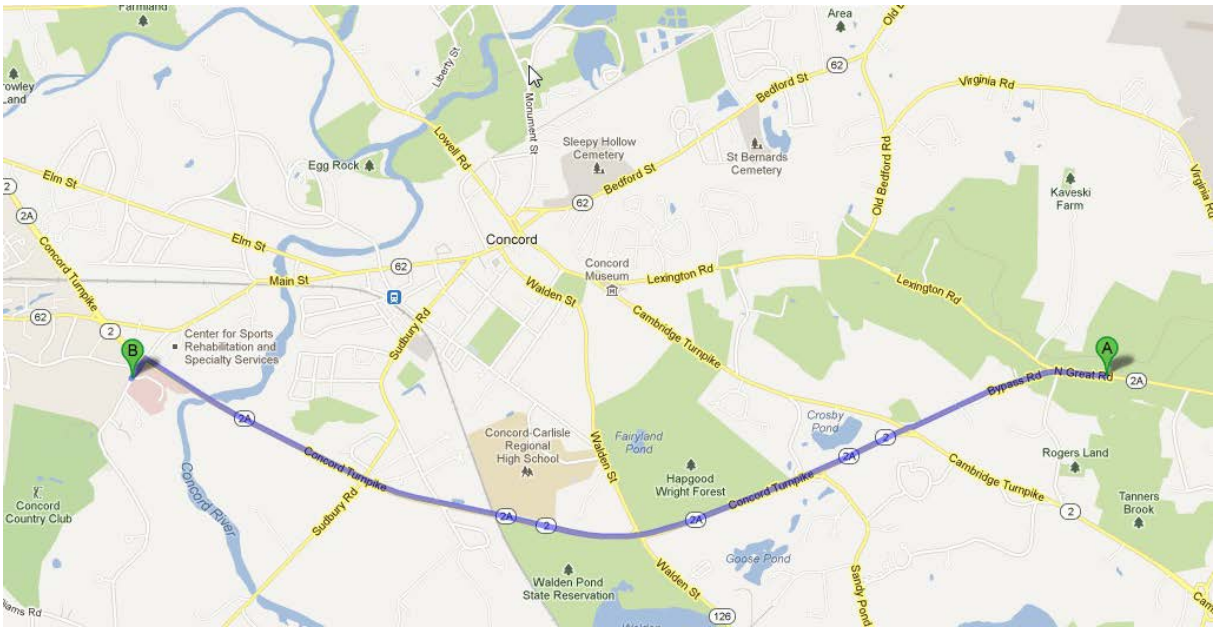


Figure S1.D.5. Route from Minute Man NHP Brooks Village parking lot in Concord, Massachusetts to Emerson Hospital, also in Concord.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Morristown National Historical Park

Directions to nearest hospital start at the **Jockey Hollow Visitor Center** (A) in Morristown National Historical Park, and end at **Morristown Memorial Hospital** (B). Destination is 6.5 miles and about **18 minutes** away:

Phone Number: (973) 971-5000.

Location: 100 Madison Ave, Morristown, NJ 07962.

Directions:

1. Head northwest on Cemetary Rd. toward Sugarloaf Rd. Continue 1.2 miles.

2. Turn left at Sugarloaf Rd. Continue 1.3 miles

3. Turn left on Jockey Hollow Rd. Continue 0.8 miles

4. Continue on Western Ave. Continue 1.9 miles.

5. Turn right on NJ-124/ Washington St. Continue 0.2 miles.

6. Continue on NJ-124/ South St. for 0.7 miles.

7. Turn slight left at Madison Ave/ NJ-53. Continue 0.5 miles. Destination is on the left.

Figure S1.D.6. Route from Morristorn NHP Jockey Hollow Visitor Center to the Morristown Memorial Hospital, both in Morristown, New Jersey.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Roosevelt-Vanderbilt National Historic Sites (ELRO, HOFR, VAMA)

Directions to nearest hospital start at the **Visitor Center parking lot** (A) at the Home of FDR National Historic Site**,** and end at **St. Francis Hospital** (B). Destination is 4.8 miles and about **9 minutes** away:

Phone Number: (845) 483-5000.

Location: 241 North Road, Poughkeepsie, NY 12601.

Directions:

1. Head south on Albany Post Rd./ Rte-9/ US-9 toward Kessler Dr. Continue for 3.7 miles.

2. Turn left onto Delafield St. Continue for 0.2 miles.

3. Turn left onto Spruce St. Continue for 308 ft.

4. Spruce St. turns right and becomes Talmadge St. Continue for 0.2 miles.

5. Turn left at NY-9G/ Washington St. Continue for 0.4 miles.

6. Destination is on the right side of Washington St.

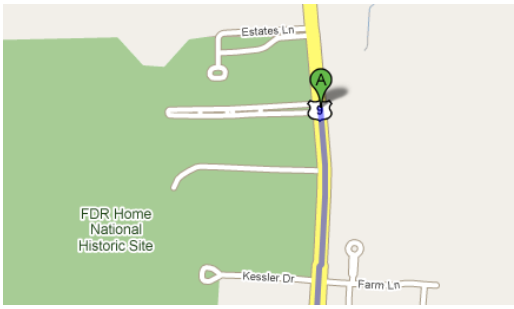


Figure S1.D.7. Start point at Home of FDR NHS Visitor Center parking lot.

Figure S1.D.8. End point at St. Francis Hospital.

Figure S1.D.9. The entire route.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Saint-Gaudens National Historic Site (Option 1)

Directions to nearest hospital start at the **Visitor Center parking lot** (A) at Saint-Gaudens National Historic Site**,** and end at **Mount Ascutney Hospital** (B). Destination is 3.8 miles and about **10 minutes** away:

Phone Number: (802) 674-6711.

Location: 289 County Road, Windsor, VT 05089.

Directions:

1. Head southwest on St. Gaudens Rd. toward NH-12A/ NH Rte 12A/ Wilson Rd. Continue for 0.6 miles.

2. Take a slight left at NH-12A/ NH Rte 12A/ Wilson Rd, and continue for 1.5 miles.

3. Turn right onto Bridge St. and continue for 0.3 miles.

4. Turn left on State St. and go 0.7 miles.

5. Turn right at County Rd. and go 0.3 miles.

6. Destination is on the left side of County Rd.

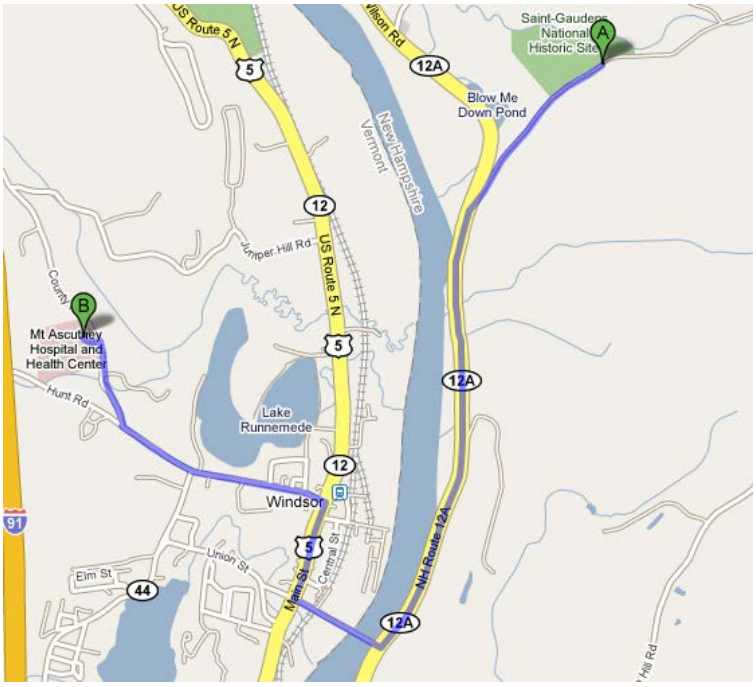


Figure S1.D.10. Option 1 route from Saint-Gaudens NHS Visitor Center parking lot to Mount Ascutney Hospital.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Saint-Gaudens National Historic Site (Option B)

An alternative to Mount Ascutney Hospital is the Dartmouth Hitchcock Medical Center in Lebanon, New Hampshire. For injuries that are not life-threatening, DHMC is the better option. Directions to DHMC start at the Visitor Center parking lot (A) at Saint-Gaudens National Historic Site**,** and end at Dartmouth Hitchcock Medical Center in Lebanon, NH (B). Destination is 19.5 miles and about **33 minutes** away:

Phone Number: (603) 650-5000

Location: 1 Medical Center Drive, Lebanon, NH.

Directions:

1. Head southwest on St. Gaudens Road toward NH-12A/NH Route 12A/ Wilson Rd. Continue for 1 mile.

2. Turn sharp right at NH-12A/NH Route 12A/ Wilson Road, and continue on NH-12A for 11.4 miles.

3. Merge onto I-89 S via the ramp to Concord/Lebabon and go 3.8 miles.

4. Take exit 18 for NH-129 toward Hanover and go 0.2 miles.

5. Turn left at Centerra Pkwy/Lahaye Drive and continue on Lahaye Drive for 0.5 miles.

6. Turn right at the Hitchcock Loop Road/ Medical Center Drive and continue for 0.3 miles.

7. Turn left at DHMC East Entrance, and turn right to stay on DHMC East Entrance.

Figure S1.D.11. Option 2 route from Saint-Gaudens NHS to Dartmouth Hitchcock Medical Center.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Saratoga National Historical Park

Directions to nearest hospital start at the **Saratoga National Historical Park entrance on NY-32** (A)**,** and end at **Saratoga Hospital** (B). Destination is 11.6 miles and about **24 minutes** away.

Phone Number: (518) 587-3222

Location:.211 Church Street, Saratoga Springs, NY 12866

Directions:

1. Turn right onto NY-32 N and go 0.8 mi.

2. Turn left onto Co Rd 71 and go 1.5 mi.

3. Turn right onto Sweer Rd. and go 1.4 mi.

4. Continue on Nielson Road for 0.9 mi.

5. Turn right onto Chapman Hill Rd and go 0.5 mi.

6. Continue onto Fitch Rd.

7. Turn right onyo New York 9P N and continue 2.2 mi.

8. Turn right onto Gilbert Rd. and go 1.3 mi.

9. Turn left onto Lake Ave. and go 2.1 mi.

10 Continue onto Church Street. After 0.6 mi, destination will be on the right.

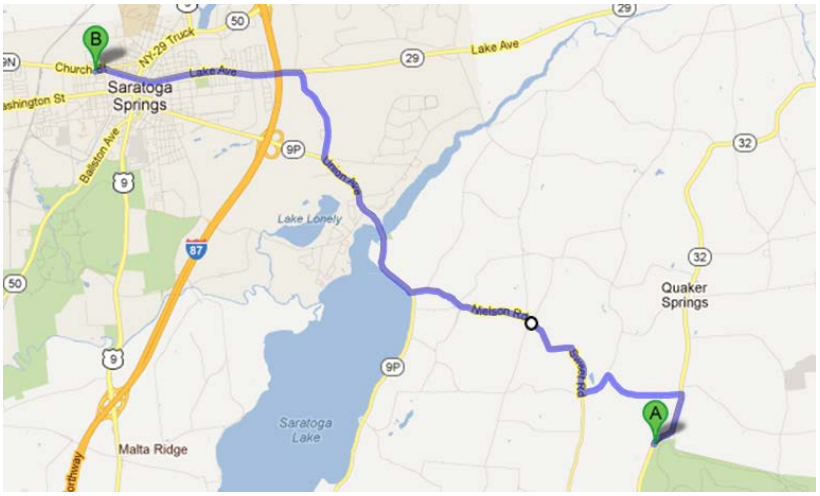


Figure S1.D.12. Route from Saratoga NHP entrance on NY-32 to Saratoga Hospital.

Appendix S1.D. Directions to nearest hospital from each park (continued).

Weir Farm National Historic Site

Directions to nearest hospital start at **Weir Farm National Historic Site** on Nod Hill Road (A), and end at **Danbury Hospital** (B). Destination is 12.2 miles and about **22 minutes** away.

Phone Number: (203) 739-7000
Location: 24 Hospital Avenue, Danbury, CT 06810.

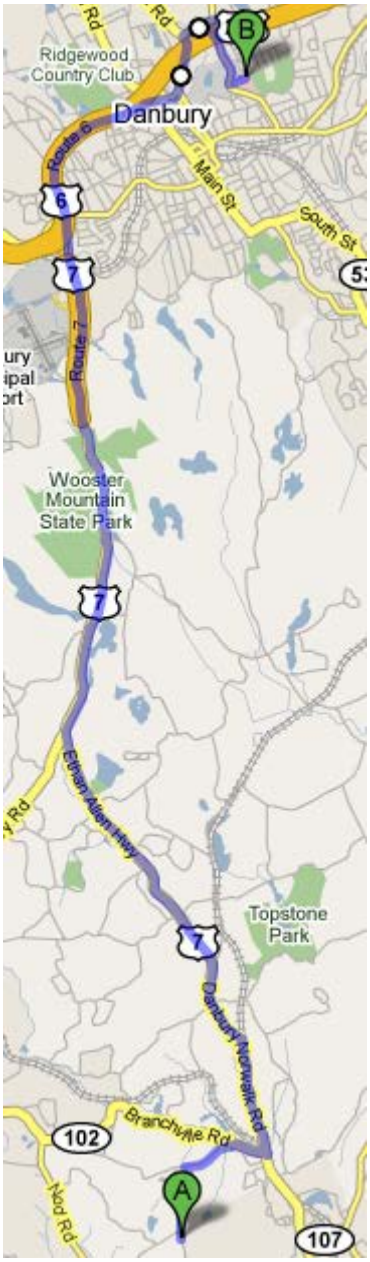


Figure S1.D.13. Route from Weir Farm NHS to Danbury Hospital.

Directions:

1. Exit park North onto Nod Hill Road. Head North on Nod Hill Road toward Pelham Ln. Continue for 0.7 miles.

2. Turn right at Old Branchville Rd, and continue 0.5 miles

3. Turn right at Branchville Rd/CT-102, and continue 0.3 miles.

4. Turn left at Danbury Norwalk Rd/US-7 Continue to follow US-7 for 8.6 miles

5. Take the exit onto 1-84 E/ US-7 N toward New Milford/Waterbury and continue for 1.7 miles.

6. Take exit 5 toward CT-37/Bethel/CT-39/CT-53. Go 0.2 miles.

7. Merge onto Downs St. and go 0.7 miles.

8. Continue on CT-37/North St. / Rte-37 for 0.7 miles

9. Turn right at Hayestown Avenue and go 0.3 miles.

10. Turn right at Tamarack Avenue and go 0.6 miles.

11. Turn left at Hospital Avenue.

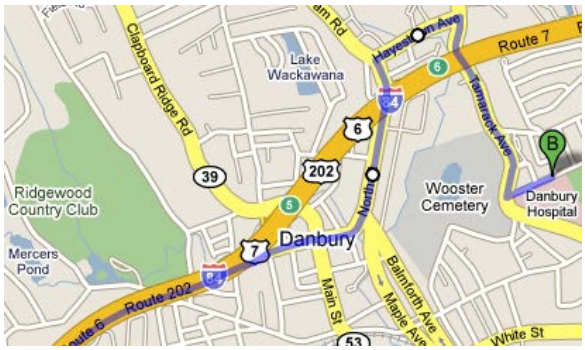


Figure S1.D.14. End point at Danbury Hospital

Appendix S1.D. Directions to nearest hospital from each park (continued).

	1. Head **north** on **N Inner Line Dr** toward **N PA-23/Valley Forge Rd**	go 0.1 mi total 0.1 mi
23	2. Turn **left** at **N PA-23/Valley Forge Rd** Continue to follow N PA-23 About 10 mins	go 4.5 mi total 4.6 mi
↰	3. Turn **left** Destination will be on the left	go 240 ft total 4.6 mi

Appendix A. List of potential species for each NETN park/BCR and their PIF Continental and/or Regional Importance Rank, and Conservation Action Priority (continued).

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	February 2012	Brian Mitchell	New SOP	Safety requirements
1.01	December 2012	Brian Mitchell	Minor edits, update MIMA hospital and directions	Lou Sideris sent info for a better hospital.
1.02	April 2014	Brian Mitchell	Removed references to project management by VCE, replaced with “Project Manager”.	Make SOP more general for future use.

SOP 2 - Field Season Logistics

Northeast Temperate Network
Version 1.09

Overview

Because this is a volunteer-based monitoring program, the most important preparation prior to the field season is to ensure that skilled volunteer personnel are trained and available to accomplish the field work. Prior to the field season each year, preferably in March or April, the project manager should contact volunteer observers to determine the number participating and whether additional volunteers will need to be recruited (for volunteer recruitment & training, see SOP 3 - Recruiting and Training Volunteers). If suitable numbers of volunteers cannot be found and funding permits, the Project Manager may offer some volunteers a small stipend to reimburse them for their time commitment.

By 10 May each year, the Project Manager will prepare a mailing to all volunteer observers that will include the following items:

- Volunteer Training Manual
- Field mapping cards and data coding sheets (for examples, see SOP 5 - Conducting Variable Circular Plot Point Counts) for the upcoming field season
- List of point count stations and GPS waypoints assigned to each observer
- Written directions, map, and compass bearings to locate point count stations
- Blue flagging for updating study site route markings
- Field season completion checklist (SOP 3 - Recruiting and Training Volunteers)-
- Any recent summaries or reports resulting from the breeding landbird monitoring program
- Cover letter thanking them for participating in the breeding landbird monitoring program, reminding them of the monitoring window dates and starting times, and encouraging them to review the protocol, including relevant SOPs, prior to the field season. It is particularly important that observers review breeding landbird identification by sight and sound (SOP 3 - Recruiting and Training Volunteers), since misidentification of a species is perhaps the most serious error observers can make during a breeding landbird count. Misidentification is much more serious than errors in estimating distances or double-counting a bird
- Copy of monitoring permit for their park, which volunteers must carry with them in the field

National Park Service (NPS) staff at each park will also be responsible for acquiring any necessary clearances for volunteers, notifying park security if need be, or otherwise ensuring that observers have access to park property during early morning hours (ca. 0400 - 0430 hours) in order to arrive at their first point count station at approximately 0500 hours.

Northeast Temperate Network (NETN) staff will be responsible for obtaining a research permit at each park. Most NETN parks have issued 10-year permits to cover monitoring activities, but the permit for ACAD must be renewed each year.

Two weeks before the end of the monitoring window, the Project Manager will contact all of the volunteers to find out if they have been able to monitor their assigned study site(s). If a volunteer is having difficulty finding time to monitor their site, the Project Manager will ask another nearby volunteer if they can monitor the site (in return for a stipend for their time), or will look into other alternatives for getting the study site monitored.

Volunteers will be contacted again immediately after the monitoring window, to verify that study sites were monitored and to remind volunteers that data should be entered within one month of monitoring. The project manager will follow up with volunteers after a month, and request that all data sheets be mailed in, even if the data have not been entered online.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	January 2006	Steve Faccio	SOP used beginning with the 2006 field season.	
1.01	April 2006	Brian Mitchell	Added revision log.	
1.02	April 2008	Steve Faccio Brian Mitchell	Project Manager may offer some volunteers a stipend, if funding permits. Added information about permits.	
1.03	December 2008	Steve Faccio Brian Mitchell	Minor editorial changes.	
1.04	February 2009	Steve Faccio	Added Field Season Completion Checklist as Appendix 1.1 and changed Revision Log to Appendix 1.2.	
1.05	April 2009	Steve Faccio	Incorporated reviewer comments into Field Season Checklist.	
1.06	August 2009	Sarah Lupis	Formatting, minor editorial changes.	
1.07	May 2010	Brian Mitchell	Move completion checklist to SOP 2 [Now SOP 3]	
1.08	March 2011	Brian Mitchell	Add mid-season and immediate post-season contact with volunteers.	Annual protocol review; improve volunteer management.
1.09	April 2014	Brian Mitchell	Removed reference to early data entry appreciation gifts. Data should be entered within a month of monitoring; all data sheets should be mailed to project manager after a month. Removed references to project management by VCE, replaced with “Project Manager”.	Not allowed by DOI policy. Speed up data entry. Make SOP more general for future use.

SOP 3 - Recruiting and Training Volunteers

Northeast Temperate Network
Version 2.05

Overview

This Standard Operating Procedure explains how to recruit volunteer observers and the training procedures that all observers should follow to learn to identify breeding landbirds by sight and sound, and to estimate distances in the field.

Northeast Temperate Network (NETN) staff will be responsible for obtaining a research permit at each park. Most NETN parks have issued 10-year permits to cover monitoring activities, but the permit for ACAD must be renewed each year.

Recruiting Volunteer Observers

Volunteer observers will be recruited from a variety of local sources, including bird clubs, Audubon Chapters, birding listservs, and via state BBS coordinators. Verifying potential participants' bird identification skills is very important, but testing multiple applicants is difficult, time consuming, and therefore costly.

The Vermont Forest Bird Monitoring Program (FBMP) has relied on word-of-mouth recommendations of local birders, as well as self-evaluation based on a description of the necessary abilities. More recently, the FBMP has developed a simple, self-administered, online auditory Bird Identification Quiz to help determine if potential observers have the necessary skills to participate in the program (http://www.vtecostudies.org/FBMP/birdquiz.html).

Development of a more elaborate quiz that could be adjusted for geographic region within the NETN, as well as habitat being surveyed (e.g., forest, grassland), would be a cost-effective tool with which the project manager could evaluate participants' breeding landbird identification abilities. In addition, it would provide potential observers with a way to self-evaluate their own identification skills. The NETN and the Project Manager are actively pursuing tools for ensuring birder skills, including supporting the extension of a web-based birder certification program to the northeast. This site (http://www.birdercertification.org) has been improved to the point that it is worth pilot testing as a tool for testing volunteers. Beginning in 2011, volunteers will be encouraged to take the tests on this site and obtain certification. Volunteers may be required to obtain certification through this site in the future, as the site becomes more complete and reliable.

Training Volunteer Observers

The most essential component for the collection of credible, high-quality breeding landbird data is well-trained and experienced observers. This cannot be overemphasized. In order to participate, volunteer observers must already possess a high degree of skill in bird identification. Therefore, little training is needed in this area. However, new volunteers will be provided with a list of breeding landbird species previously detected at the study site or park in which they will

be surveying so they can familiarize themselves with the identification of any problematic species prior to the start of the survey period. Although observers will be experienced in the identification of breeding landbirds, many will have little or no experience in estimating distances to vocalizing birds. Because it is not realistic to expect volunteers from all parks to be able to attend a training session on estimating distances to vocalizing birds, and it is not economically feasible to offer training sessions at each Network park, volunteers will be provided with written training procedures and asked to practice distance estimation at their study site or in a habitat similar to the one in which they will be surveying. Volunteers will also be encouraged to use the NETN Google Earth portal (http://science.nature.nps.gov/im/units/NETN/googleMaps/parkMaps_GoogleEarth_flash.cfm) for gaining familiarity with their study site route.

To facilitate training, each volunteer will receive a Volunteer Training Manual (available on the NETN website), which provides background on the project, including goals and objectives, sampling design, and survey assumptions, and outlines the procedures for conducting point counts, self-training in distance estimation, use of map and compass, and data entry procedures.

Observers will also be sent a checklist (Figure S3.1) that lists key training and data management steps. They will be asked to initial each step to certify that they have followed the recommended procedures.

Other Aspects of Training

Park or NETN staff will ensure that volunteers are provided with, and are comfortable using, equipment needed while they are in the field, including GPS navigation and emergency communication equipment (e.g., park radios or cell phones). Volunteers will be encouraged to practice using navigation equipment and will also be encouraged to locate their point count stations during the day before their official counts. This will allow them to gain familiarity with the point count locations and save time when they are conducting their counts.

Legal and Legislative Requirements

Prior to engaging in any training or field activities for the National Park Service volunteers must complete a Volunteer Services Agreement (OMB 0596-0080). The signed agreement provides workman's compensation in the event that the individual is injured while engaged in his/her volunteer duties. Volunteer agreements can be obtained from the park or project leader and should be filed with the park the volunteer will be conducting surveys for. In the case where a volunteer will be conducting surveys at multiple parks, separate agreements should be filled out for each park.

To comply with the Privacy Act, no personal information (name or contact information) from park visitors or untrained volunteers will be collected by network staff. All volunteers engaged in this protocol will receive training and sign a Volunteer Services Agreement, which the Project Manager will forward to the appropriate park. The coordination of the trained volunteers will be handled by the contracted project leader, not NETN staff. Data received by NETN from the project coordinator will include observers' names and some additional information (such as an assessment of the observer's abilities and years when each person participated in the monitoring program) but will not include personal details like contact information and date of birth.

To comply with the Paperwork Reduction Act (PRA) of 1995, approval must be obtained from OMB prior to collection of data from park visitors, and renewed every 3 years. PRA applies only to one-time observations from park visitors, not to data collected by trained volunteers with an ongoing relationship with the park (i.e., participants in the NPS “Volunteer in Parks” program). Since NETN only uses trained volunteers, this protocol is in compliance with all requirements of the PRA.

Name_____ Park_____

	Initials	Date	TASK	When to Accomplish
1			Read/review Volunteer Training Manual and Job Safety Analysis	Mid- to late-May
2			Complete and sign NPS *Agreement for Individual Voluntary Services* form and the separate Safety Acknowledgment; **Steve must have these documents before you can go into the field**	Mid- to late-May (if not on file from previous year)
3			Practice distance estimation as outlined in Volunteer Training Manual	Mid- to late-May
4			Brush-up on breeding landbird songs in the field or with recordings	Mid- to late-May
5			Conduct first field survey (last week of May surveys are acceptable at MORR and WEFA)	1-15 June
6			Conduct second field survey (optional at some parks)	15-30 June
7			Transcribe data from Field Mapping Cards onto Data Coding Sheets	Within 1 day of conducting field survey
8			Make photocopies of Field Mapping Cards and Data Coding Sheets and mail originals to VCE (address below). Retain copies for use in data entry.	Within 3 days of conducting last field survey.
9			Enter field data into Bird Point Count Database and return this sheet to VCE (address below).	No later than 31 July
10			Total up volunteer hours contributed to project this season and enter below.	No later than 31 July
TOTAL VOLUNTEER HOURS:				
Comments:				

Mail to: Steve Faccio
VCE
PO Box 420
Norwich, VT 05055

Figure S3.1. Field Season Completion Checklist. This checklist is an important part of our quality control procedures. Please initial and date each task as it is completed, and return this sheet once data entry is complete (by 15 August).

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	January 2006	Steve Faccio	SOP used beginning with the 2006 field season.	
1.01	April 2006	Brian Mitchell	Added revision log. Clairified reference to Appendix 1; now refers to protocol narrative.	
1.02	December 2008	Steve Faccio Brian Mitchell	Inserted section on Training Volunteers, moved section on estimatingdistances to Appendix 2.1, and changed Revision Log to Appendix 2.2.	
1.03	February 2009	Steve Faccio	Added Volunteer Training Manual as Appendix 2.2 and chanced Revision Log to Appendix 2.3.	
1.04	August 2009	Sarah Lupis	Formatting, minor editorial changes.	
2.00	February 2010	Adam Kozlowski and Brian Mitchell	Significant revision to Volunteer Training Manual to reflect streamlined field procedures and updated data management procedures. Updated survey procedures and added mammal data coding sheet. Added volunteer data management responsibilities appendix.	Changes to reflect efforts to simplify field data collection and improve data management procedures.
2.01	March 2010	Steve Faccio	Minor editorial changes during review. Volunteer training manual is now a separate document, not an appendix.	
2.02	March 2011	Brian Mitchell	Updated information on birder certification web site and added reference to NETN Google Earth portal. Added note about early data submission reward to checklist.	Annual procedure review; ideas to improve volunteer training and management.
2.03	May 2011	Adam Kozlowski and Brian Mitchell	Added information on volunteer agreements and compliance with the Privacy Act and Paperwork Reduction Act.	Use of volunteers requires we include this information.
2.04	February 2012	Brian Mitchell	Revised checklist; volunteer agreement and safety acknowledgment must be received prior to any field work	Safety requirement
2.05	April 2014	Brian Mitchell	Removed references to project management by VCE, replaced with “Project Manager”. Revised completion checklist to adjust dates and remove mention of early submission rewards	Make SOP more general for future use Match current procedures

SOP 4 - Establishing and Marking Point Count Stations

Northeast Temperate Network
Version 2.05

Overview

This SOP explains the procedure for establishing and marking point count stations.

Procedures

Establishing Point Count Stations

In locating study point count stations, four basic criteria were established: 1) point counts should be spaced approximately 200-250 m apart to avoid duplicate sampling while permitting observers to move efficiently between points; 2) points should be located at least 50 m from forest edges in order to maximize sampling effort on focal species and avoid fragmentation effects; 3) points should be located within the dominant, mature forest cover types found in each park; and 4) at least one forest vegetation sampling plot per study site should be co-located within 50 m of a point count so that future changes in breeding landbird populations can be compared with broad changes to forest structure, composition, and other variables. In addition, point count stations should be located at least 15 m away from hiking trails and interpretive signing, and at least 50 m from park boundaries, roads, buildings, and other areas frequented by the public. To meet these criteria, point count stations were selected in four ways:

1. A systematic grid was used at Marsh-Billings-Rockefeller NHP (MABI), Minute Man NHP (MIMA), Morristown NHP (MORR), Roosevelt-Vanderbilt park units (ROVA), Saint-Gaudens NHS (SAGA), Saratoga NHP (SARA), and Weir Farm NHS (WEFA).

2. At Acadia NP (ACAD) sites were required to have a central station within 50 m of a long-term forest monitoring plot, and randomly selected using the Generalized Random Tesselation Stratified (GRTS) algorithm (Stevens 1997, Stevens and Olsen 2004). The sites were selected to be accessible to volunteers (within 1.5 km of a road, with a slope less than 30%), and with all stations within the same large (> 100 ha) block of contiguous forest habitat (as defined by broad vegetation type on the Acadia National Park vegetation map).

3. At SARA, study sites were also established within grasslands since this habitat type represents a significant component of the natural communities at that park.

4. At SAIR, the small size of the park prevented us from using the methods describe above. Two point stations separated by 250 m were established along the Saugus River and within the park boundary in consultation with the park's resource manager. A third station was established between the two in order to provide a chance to record additional species, although most analyses will exclude this point due to the potential for double-counting individuals recorded at the two other points. Additional details of the sampling design are presented in the protocol narrative.

Marking Point Count Stations

It is critical that observers be able to move quickly from one point to the next in order to complete their survey before breeding landbird activity slows down at around 0900 hours. Therefore, each point count station must be identified with both a permanent (aluminum tree tag) and visible marker (flagging tape) in order to facilitate their timely location by volunteer observers (Figure S4.1). In addition, a small amount of flagging spaced every 25 to 100 m (depending on density of habitat and therefore an observer's ability to maintain a compass bearing) in between stations will be necessary to help guide observers to the next listening station. This is especially important since GPS is not always reliable under the forest canopy in summer. Point count stations and flagging will be located at least 15 m away from hiking trails and interpretive signing, and at least 50 m from park roads, buildings, and other areas frequented by the public.

While it is possible that the flagging at each point count could be removed after surveys are completed, and re-flagged prior to conducting surveys the following year, that would require additional volunteer time. Such an expectation may not be feasible for all volunteers, especially if they live any distance from the park, and may reduce the pool of potential observers, which is already fairly small due to the high level of skill necessary to participate. Unless park staff are willing to commit to re-flagging each year, the preference is to leave flagging up year-round, and have volunteer observers replace it when necessary during the course of their surveys.

Point count stations in grassland habitat at SARA should be located using a GPS unit while conducting breeding landbird surveys. The high accuracy of GPS in open habitats eliminates the need for permanent marking of each point.

Beginning in 2008, point counts and study site routes in ACAD were permanently marked with metal trail signs and "fire tacks" (Figure S4.2). Fire tacks are small, but highly reflective, and should help volunteers navigate between point counts with a flashlight or headlamp in low light. Point counts were marked with metal signs and flagging, while routes between points were marked every 20-25 m with signs (no flagging). This marking method was expanded to the other NETN parks in 2012.

Figure S4.1. Example of point count markers—aluminum tree tag and flagging tape.

Figure S4.2. Example of metal signs used at ACAD to mark point count stations. A reflective "fire tack" is visible at the left edge of the tree even with the top of the sign. Routes between point counts are marked similarly, but without flagging.

Point Count Station Maps and Directions

Park maps indicating point count stations and station ID numbers will be printed and mailed to each observer prior to the start of the field season to assist them in navigating from point to point. Observers will also be provided with specific instructions for surveying their study site. Complete study site route information and coordinates for each park can be downloaded from the breeding landbird volunteer materials section on IRMA here: https://irma.nps.gov/App/Reference/Profile/2190230. All study site route information is also available through each park's Google Earth module, which can be accessed through NETN's website here: http://science.nature.nps.gov/im/units/netn/googleMaps/googleEarth_NETN.cfm.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	January 2006	Steve Faccio	SOP used beginning with the 2006 field season.	
2.00	April 2007	Steve Faccio Brian Mitchell	SOP used beginning with the 2007 field season Added revision log. Sites and stations for ACAD are completely new, based on revised sampling design. Additional sites added Sampling design section clarified, and information about ACAD design added. Reference to narrative added, in regards to additional information on sampling design.	
2.01	May 2008	Steve Faccio Brian Mitchell	SOP used beginning with the 2008 field season Added information about site selection at SAIR, plus SAIR map and coordinates Added information about new route marking methods at ACAD Added updated ACAD maps and coordinates	
2.02	August 2009	Sarah Lupis	Formatting, minor editorial changes.	
2.03	May 2010	Brian Mitchell	Addition of ACAD Youngs Mountain map and station locations; correction of a location error for one ACAD station	
2.04	May 2011	Brian Mitchell	Addition of directions for most study site routes.	
2.05	December 2012	Brian Mitchell	Study site route info moved to stand-alone document posted on web site Study site routes updated with signs and fire tacks at all parks. "Sampling Points" replaced with "Point Count Stations" in title and elsewhere.	Too much extraneous material in protocol itself. Easier navigation for volunteers. Need to use consistent terminology.

SOP 5 - Conducting Variable Circular Plot Point Counts

Northeast Temperate Network
Version 2.03

Overview

This SOP provides step-by-step instructions for conducting the recommended 10 minute variable circular plot point count. For each breeding landbird observed, the time (minute of the count) and distance band (0-10 m, 10-25 m, 25-50 m, and > 50 m) will be recorded. The methodology is largely based on songbird monitoring protocols developed for the Lower Mississippi Valley Joint Venture, available at www.lmvjv.org/population_monitoring. In addition, other than differences in distance bands, the procedures described below are compatible with methods used by the Great Lakes Network (GLKN) and the United States Fish and Wildlife Service (USFWS) in the Northeast and Midwest. The other programs do not use the 0-10-m band, but do use a 50-100 m band. The Northeast Temperate Network (NETN) does not use this larger distance band due to the inability of observers to accurately estimate distances beyond 50 m. The 0-10 m band is used due to the recommendation of Buckland et al. (1993), who suggest that the size of the distance bands should increase as they move away from the observer rather than be equal. NETN, USFWS, and GLKN data are comparable for distance analysis using 0-25, 25-50, and 50 m + bands.

Each volunteer observer will receive a Volunteer Training Manual (available for download on the NETN website) outlining the point count procedures in this SOP, as well as training methods for distance estimation, and how to navigate by map and compass.

The data being collected during point counts (Table S5.1) will be analyzed with two different methods (distance sampling and removal models), each of which is an independent approach to estimating abundance by correcting for the probability of detecting an individual. If we can accurately estimate this probability (which can vary by habitat, observer, and other factors), we can estimate the number of breeding landbirds that were NOT seen or heard during the point count, and derive a better estimate of abundance than we would get using only birds actually seen or heard. It is important to understand the assumptions of these methods, and to work to meet these assumptions. Both approaches assume that breeding landbirds are correctly identified to species, and that each individual is only recorded once. The distance sampling approach further assumes that all breeding landbirds at the center point are always detected, and that the distance band recorded is the correct distance band. The removal modeling approach assumes that the time recorded for the individual breeding landbird is the time it was first heard or seen, and the approach works better with the simplifying assumption that observers are equally likely to hear a breeding landbird of a given species during every minute (in other words, the observer is just as likely to hear or see a Brown Creeper at minute one as he or she is at minute five).

When observers are collecting data, they should keep in mind that the most important assumptions are that breeding landbirds are correctly identified to species, and that each individual is recorded

only once. The next most important assumption is that distance estimates are correct. The removal modeling assumptions are less important and all other data that are collected (e.g., sex, nest location, and whether the bird is singing, calling, or seen) are secondary to the primary goals of getting accurate species and distance information. If observers feel that they are unable to meet the assumptions of the distance sampling or the removal modeling approaches, they should provide a written comment with as much detail as possible when they submit their data forms. This will be a tremendous help to the data analysis phase of the project.

Table S5.1. Description of variables recorded at point count stations during Northeast Temperate Network breeding landbird monitoring.

Variable	Description
Park	Name of park where site is located.
Site	Name of site
Observer	Observer identification (e.g., initials).
Date	MM/DD/YYYY
Temp ˚F	Temperature in degrees Fahrenheit.
Sky	Sky condition, combining cloud cover and precipitation (see Table S5.4).
Wind	Wind speed from Beaufort scale and direction (see Table S5.2).
Start Time	Time of day; 2400 hour clock (e.g., 0732).
Point #	Number of the point within the study site.
Species	Species of breeding landbirds and squirrels observed.
Time Period	Minute (9-0) during which a species was observed.
Observation Code	Code indicating type of observation (e.g., visual or auditory detection).
Distance Band	Distance category from observer that a species was detected within.
Flyovers	Birds observed flying over the point count station.
Comments	Notes and specific remarks about the count.

Survey Procedures

1. ***Count Conditions.*** Counts should be conducted early in the morning and during proper survey conditions. We recommend a 0500 hrs start time. Winds should be calm to light (< 7 mph; Code 2 or less on the Beaufort Scale, Table S5.2). Acceptable weather conditions for counting breeding landbirds include a sky condition of 5 or less (although fog should not interfere with visual identification of birds; Table S5.4). Clear conditions or slightly damp are ideal. Counts should not be conducted in rain, unless it is very light. The rule is to conduct surveys only in weather that is unlikely to reduce count numbers. Generally, the more calm and clear the weather, the better the count. It is advisable to listen to the forecast the night before the survey and plan accordingly.

   Prior to the first point count, fill in the site name, date, and observer name on the field mapping card (Figure S5.1). Then, upon arriving at each point count station, record the station number, wind speed (Table S5.2), wind direction (Table S5.3), sky conditions (Table S5.4), and temperature (degrees Fahrenheit). Prior to beginning the count, orient the field mapping card (Figure S5.2) to a fixed direction, record the direction in the box at the top of the count circle, and record the start time.

2. ***Use Count-down Timer.*** Begin the count by starting the National Park Service (NPS)-issued count-down timer to keep track of time. Alternatively, a smart phone with a timer function (NOT a stopwatch) can be used; set the timer for 10 minutes and verify that it counts towards zero when you start it.

   Note: Although the data will be transcribed to coding sheets later, the field mapping card is the only true record of what was detected during the survey. Even during the rush of a busy point count survey, remember to record data clearly and in a firm hand. When filling out the mapping cards make notations in a consistent manner and use the standardized symbols and codes as defined on the field forms.

Table S5.2. Codes and descriptions for wind speeds (Beaufort Scale)[1]

Code #	km/h	mph	Description
0	<2	<1	Smoke rises vertically
1	2 to 5	1 to 3	Wind direction shown by smoke drift
2	6 to 11	4 to 7	Wind felt on face; leaves rustle
3	12 to 20	8 to 12	Leaves, small twigs in constant motion; light flag extended
4	21 to 32	13 to 18	Small branches are moved
5	33 to 30	19 to 24	Small trees begin to sway

[1] These are the same codes used in the Breeding Bird Survey. Acceptable conditions for counting breeding landbirds include a wind speed of code 2 or less.

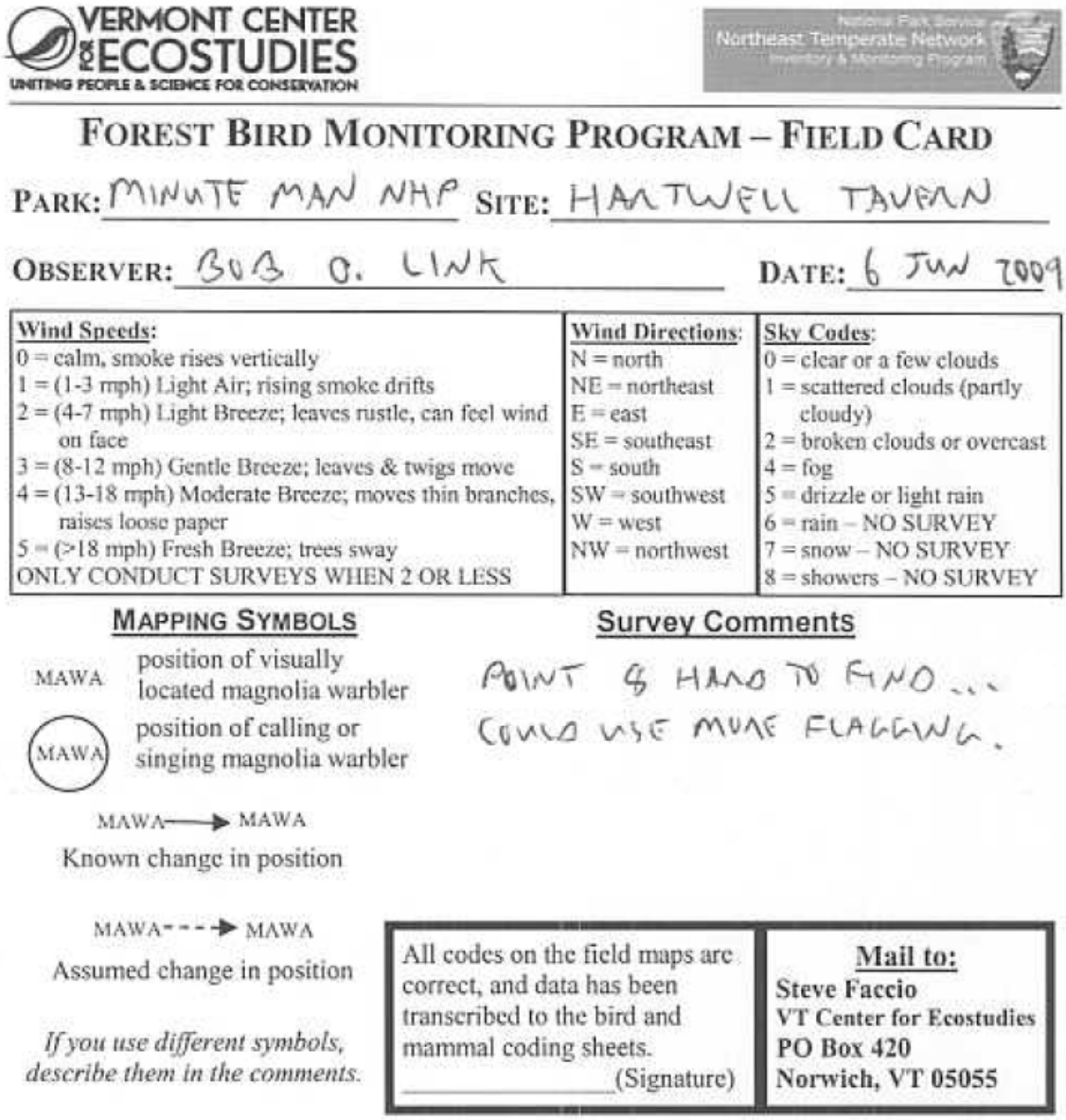
Table S5.3. Codes and descriptions for wind direction.

Code#	Description
0	No Wind
1	North
2	Northeast
3	East
4	Southeast
5	South
6	Southwest
7	West
8	Northwest
9	Not Recorded

Table S5.4. Codes and descriptions for sky conditions[1].

Code#	Description
0	Clear or a few clouds
1	Scattered clouds (partly cloudy)
2	Broken clouds or overcast
4	Fog
5	Drizzle or light rain
6	Rain
7	Snow
8	Showers

[1] These are the same codes used in the Breeding Bird Survey. Acceptable conditions for counting breeding landbirds include a sky condition of 5 or less (although fog should not interfere with visual identification of birds).



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National Park Service
Northeast Temperate Network
Inventory & Monitoring Program

FOREST BIRD MONITORING PROGRAM – FIELD CARD

PARK: MINUTE MAN NHP SITE: HARTWELL TAVERN

OBSERVER: BOB O. LINK DATE: 6 JUN 2009

Wind Speeds:	Wind Directions:	Sky Codes:
0 = calm, smoke rises vertically	N = north	0 = clear or a few clouds
1 = (1-3 mph) Light Air; rising smoke drifts	NE = northeast	1 = scattered clouds (partly cloudy)
2 = (4-7 mph) Light Breeze; leaves rustle, can feel wind on face	E = east	2 = broken clouds or overcast
3 = (8-12 mph) Gentle Breeze; leaves & twigs move	SE = southeast	4 = fog
4 = (13-18 mph) Moderate Breeze; moves thin branches, raises loose paper	S = south	5 = drizzle or light rain
5 = (>18 mph) Fresh Breeze; trees sway	SW = southwest	6 = rain – NO SURVEY
ONLY CONDUCT SURVEYS WHEN 2 OR LESS	W = west	7 = snow – NO SURVEY
	NW = northwest	8 = showers – NO SURVEY

MAPPING SYMBOLS

MAWA — position of visually located magnolia warbler

(MAWA) — position of calling or singing magnolia warbler

MAWA ⟶ MAWA — Known change in position

MAWA - - - → MAWA — Assumed change in position

If you use different symbols, describe them in the comments.

Survey Comments

POINT 4 HARD TO FIND ...
COULD USE MORE FLAGGING.

All codes on the field maps are correct, and data has been transcribed to the bird and mammal coding sheets.
_____(Signature)

Mail to:
Steve Faccio
VT Center for Ecostudies
PO Box 420
Norwich, VT 05055

Figure S5.1. Example cover page of a field mapping card, including standardized symbols used to record observations made while conducting point counts.

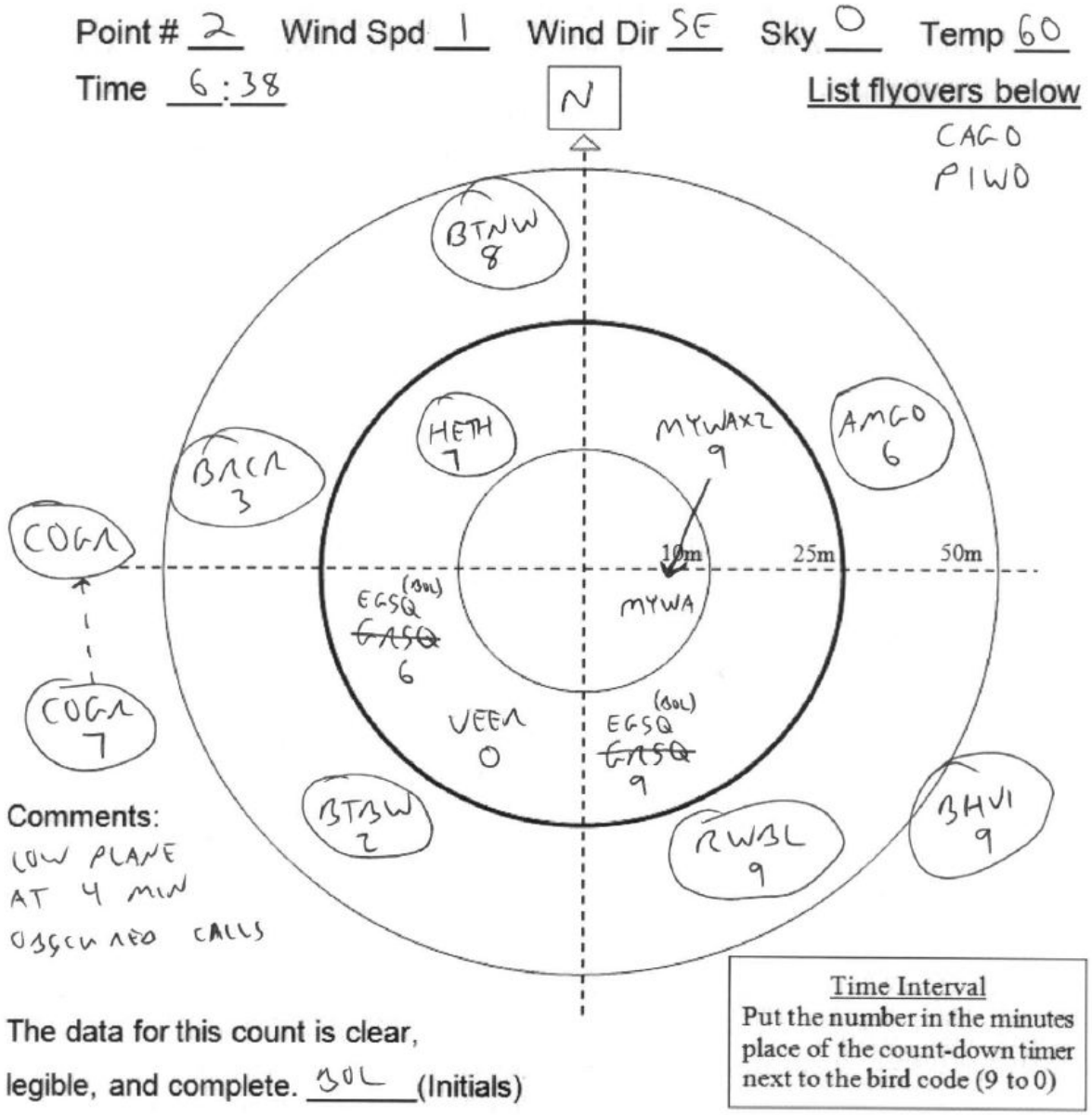

Figure S5.2. Example field mapping card.

1. ***Navigate to Point.*** Use a GPS or map and compass to navigate to your points. The forest study site routes have been marked with signs and fire tacks every 25 to 100 m (depending on the density of the vegetation). If any of the markers are worn out or missing, please note the location (e.g., fire tack missing mid-way between point 2 and 3) and notify the Project Manager.

2. ***Count (record) All Breeding Landbirds and Squirrels.*** All breeding landbirds and squirrels (see box below) seen and heard during the 10-minute sampling period should be counted and recorded on the NPS-issued field mapping card. Be sure to note in which minute breeding landbirds are first encountered, **using the minute visible on the timer or smart phone at the time of detection**. This will require close attention to your timer. For each breeding landbird detected, record on the field map its four letter code (SOP 5 - Conducting Variable Circular Plot Counts, Appendix S5.A) followed by the minute during which it was first encountered (i.e., 9 for birds encountered during the first minute counting down to 0 for encounters during the last minute of the 10-minute survey period). See Figure S5.2 for a sample field card. Remember that the crucial information is species identification, distance band, and time of first detection (in that order). No other information is required, although recording type of detection (i.e. visual versus calling or singing) may help you track the individuals. If multiple individuals of the same species are detected at the same time and distance (but are not a flock), use CODExN, where CODE is the 4-letter species code and N is the number of individuals. If a flock is detected, use CODExNF. For example, a pair of warblers might be "MYWAx2", while a flock of 30 starlings is "EUSTx30F".. Breeding landbirds that fly through or over the point count station and do not stay within the area of the point count do not meet the assumptions of distance or removal models. For these birds, record the species code in the top-right corner of the map (these observations are still valuable for telling us that the species is in the area).

Red squirrels, gray squirrels, and eastern chipmunks are known to be effective nest predators. We want to monitor their populations as well as those of forest breeding landbirds. Follow the same recording procedures for these mammals as you would for birds, using the following four-letter codes:

RESQ—red squirrel
EGSQ—Eastern gray squirrel
CHIP—Eastern chipmunk

1. ***Map Observations.*** Counting is done by mapping all observations (both visual and auditory) on the field mapping cards provided, keeping track of movements as best you can. Mapping (marking the location and noting movements) is the best way to reduce duplicate records. Mark breeding landbirds on the field card in the appropriate distance band and approximate spatial location. The recorded distance should be the horizontal distance between the location a bird was <u>first detected</u> and the point count station center. Imagine dropping a plumb-bob down from a bird's location and estimating its distance from the point

count station center. For species that occur in flocks, record the flock (e.g., species) and flock size in the appropriate distance band. There is no need to record each bird in a flock individually. Different symbols can be used to record the status of each bird observation (i.e. visual observation, calling or singing, etc., Figure S5.1 and Figure S5.2). Use standard species AOU codes to identify species observed (four-letter codes can be found in Appendix S5.A, or downloaded at http://www.vtecostudies.org/FBMP/materials.html).

2. ***Orientation.*** Holding the field mapping card in a fixed position, spend part of the time facing in each of the cardinal directions in order to better detect breeding landbirds.

3. ***Count Individuals Once.*** Do not record any birds believed to have been counted at previous stations. All birds should only be counted once.

4. ***When to Stop.*** At the end of 10 minutes, stop recording breeding landbird observations. Do not record any new birds seen or heard after the 10 minutes have passed. Before leaving the point, check over the field mapping card thoroughly to make sure it is complete and legible. Remember, this is the only record of what happened during the survey. Take the time to clarify anything illegible or out of the ordinary, and then initial the card.

5. ***Sampling Frequency.*** Each site should be sampled at least once during the breeding season, but one or two follow-up, replicate surveys within two weeks of the initial visit will be encouraged. The exception to this will be at NETN's three smallest parks (Saint-Gaudens NHS, Saugus Iron Works NHS, and Weir Farm NHS), which, due to their small sizes, can only accommodate a few point count stations each. In order to reduce between-year variability at these three parks, study sites will be surveyed twice annually, with replicates occurring about 7-14 days apart. In order to reduce within- or between-site bias due to time of day, each study site will be surveyed in the same order each time (e.g., the order in which point counts are surveyed will not be reversed).

6. ***Data Transcription.*** Breeding landbird and mammal data from the field mapping card(s) should be transcribed to data coding sheets (Figure S5.3) before they are entered into the online database. **It is not necessary to transcribe data in any particular order (e.g., chronologically or taxonomically); it is often easiest to transcribe data one quadrant at a time, starting at the upper right quadrant, and working from the innermost distance band to the outermost band.** Remember, only transcribe the record of a bird or mammal the first time you saw or heard it. Each individual you encounter should only be recorded once on the summary data coding sheets. After completing each coding sheet, conduct a 100% check to look for transcription errors. If you need to correct information on the mapping card or data coding sheet (for example, you used the wrong bird code), draw a single line through the incorrect data and then enter the correct data next to the original data, along with your initials. Sign the data coding sheet indicating the 100% data transcription check has been completed.

7. ***Using the Online Database.*** Once proofed, breeding landbird and mammal data recorded on data coding sheets should be entered into the Bird Point Count Database (http://data.prbo.org/science/biologists/index.php). Verify each row of bird data as it is entered into the database and conduct a complete check of all data after finishing each data coding sheet. Sign the data coding sheet indicating that the 100% data entry check has been completed.

8. ***Mail Data.*** After data have been entered into the online database and proofed, and within a month of data collection, mail the field mapping cards and the data coding sheets to:

   Steve Faccio
   Vermont Center for Ecostudies
   PO Box 420
   Norwich, VT 05055

   If it is not possible to enter the data online within a month of the field visit, the field map and data coding sheets (even if incomplete) should be mailed to the Project Manager for data entry.

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Bird Data Coding Sheet – Landbird Monitoring Program

Park Name: MINUTE MAN NHP **Site Name:** HARTWELL TAVERN

Observer: BOB O. LINK **Initials:** BOL **Date:** 6 JUN 2014

Point #	Start Time	Species Code	Time Period	0-10 m	11-25 m	26-50 m	> 50 m	Distance Not Rec	Flyover
1	6:05	1. RBWO	9		C				
		2. ETTI	9	C					
		3. AMCR	6				C		
		4. BCCH	1	BOL ~~C~~ 1					
2	6:38	5. MYWA	9		2I				
		6. AMGO	6			C			
		7. RWBL	9			C			
		8. BHVI	9				C		
		9. VEER	0		I				
		10. BTBW	2			C			
		11. COGR	7				C		
		12. HETH	7		C				
		13. BACR	3			C			
		14. BTNW	8			C			
		15. CAGO							NR
		16. PIWO							NR
		17. EGSQ	9		I				
		18. EGSQ	6		I				
3	7:02	19. ETTI	9	C					
		20. AMRO	8		C				
		21. OVEN	6			C			
		22. WOTH	1			C			
		23.							
		24.							
		25.							

Time Period – Enter the time code (minute when the bird or mammal was first observed). This is the digit displaying in the minutes place of your count-down timer (9 through 0; e.g. birds seen during the first minute of observation get a 9).

Codes used for bird numbers and occurrence – *Place the appropriate code from the list below in the appropriate distance field in the table above* ***(0-10 m, 11-25 m, 26-50 m, >50 m, Distance Not Rec,*** *or* ***Flyover).***

Calling or singing = **C** Individual seen = **I** Flock or other group = **FLK** Not Recorded = **NR**

For more than one individual, precede code with number. For example: one bird singing is "C", two individuals seen (but not detected simultaneously) is "2I", and a flock of 15 is "15FLK".

For Flyovers, group size is optional (as is detection time), so flyovers can be denoted by "NR" in the Flyover column.

I proofed the transcription from the Field Mapping Cards: Signature: Bob O Link

I proofed data entered into database: Signature: Bob O Link

Page 1 of 1

Figure S5.3. Example breeding landbird data coding sheet.

Appendix S5.A. Alphabetical list of Vermont Forest Bird Monitoring Program species and associated four-letter codes.

Common Name	Code	Common Name	Code
Alder flycatcher	ALFL	Common yellowthroat	COYE
American crow	AMCR	Cooper's hawk	COHA
American goldfinch	AMGO	Downy woodpecker	DOWO
American kestrel	AMKE	Eastern bluebird	EABL
American redstart	AMRE	Eastern chipmunk	CHIP
American robin	AMRO	Eastern gray squirrel	EGSQ
Baltimore oriole	BAOR	Eastern kingbird	EAKI
Bank swallow	BANS	Eastern meadowlark	EAME
Barn swallow	BARS	Eastern phoebe	EAPH
Barred owl	BDOW	Eastern screech-owl	EASO
Bay-breasted warbler	BBWA	Eastern towhee	EATO
Belted kingfisher	BEKI	Eastern tufted titmouse	ETTI
Bicknell's thrush	BITH	Eastern wood-pewee	EAWP
Black-and-white warbler	BAWW	European starling	EUST
Black-backed woodpecker	BBWO	Evening grosbeak	EVGR
Black-billed cuckoo	BBCU	Field sparrow	FISP
Blackburnian warbler	BLBW	Fish crow	FICR
Black-capped chickadee	BCCH	Golden-crowned kinglet	GCKI
Blackpoll warbler	BLPW	Golden-winged warbler	GWWA
Black-throated blue warbler	BTBW	Grasshopper sparrow	GRSP
Black-throated green warbler	BTNW	Gray catbird	GRCA
Blue jay	BLJA	Gray jay	GRAJ
Blue-gray gnatcatcher	BGGN	Great horned owl	GHOW
Blue-winged warbler	BWWA	Great-crested flycatcher	GCFL
Blue-winged/golden-winged warbler complex	BWGW	Hairy woodpecker	HAWO
Bobolink	BOBO	Henslow's sparrow	HESP
Boreal chickadee	BOCH	Hermit thrush	HETH
Broad-winged hawk	BWHA	Hooded warbler	HOWA
Brown creeper	BRCR	House finch	HOFI
Brown thrasher	BRTH	House sparrow	HOSP
Brown-headed cowbird	BHCO	House wren	HOWR
Canada warbler	CAWA	Indigo bunting	INBU
Cape may warbler	CMWA	Least flycatcher	LEFL
Carolina wren	CARW	Lincoln's sparrow	LISP
Cedar waxwing	CEDW	Louisiana waterthrush	LOWA
Cerulean warbler	CERW	Magnolia warbler	MAWA
Chestnut-sided warbler	CSWA	Marsh wren	MAWR
Chimney swift	CHSW	Mourning dove	MODO
Chipping sparrow	CHSP	Mourning warbler	MOWA
Cliff swallow	CLSW	Myrtle warbler	MYWA
Common grackle	COGR	Nashville warbler	NAWA
Common nighthawk	CONI	Northern cardinal	NOCA
Common raven	CORA	Northern goshawk	NOGO
Northern harrier	NOHA	Warbling vireo	WAVI

Appendix S5.A. Alphabetical list of Vermont Forest Bird Monitoring Program species (continued).

Common Name	Code	Common Name	Code
Northern mockingbird	NOMO	Whip-poor-will	WPWI
Northern parula	NOPA	White-breasted nuthatch	WBNU
Northern rough-winged swallow	NRWS	White-throated sparrow	WTSP
Northern saw-whet owl	NSWO	White-winged crossbill	WWCR
Northern waterthrush	NOWA	Wild turkey	WITU
Olive-sided flycatcher	OSFL	Willow flycatcher	WIFL
Orchard oriole	OROR	Wilson's warbler	WIWA
Ovenbird	OVEN	Winter wren	WIWR
Philadelphia vireo	PHVI	Wood thrush	WOTH
Pileated woodpecker	PIWO	Worm-eating warbler	WEWA
Pine siskin	PISI	Yellow palm warbler	YPWA
Pine warbler	PIWA	Yellow warbler	YEWA
Prairie warbler	PRAW	Yellow-bellied flycatcher	YBFL
Prothonotary warbler	PROW	Yellow-bellied sapsucker	YBSA
Purple finch	PUFI	Yellow-billed cuckoo	YBCU
Purple martin	PUMA	Yellow-shafted flicker	YSFL
Red crossbill	RECR	Yellow-throated vireo	YTVI
Red squirrel	RESQ		
Red-bellied woodpecker	RBWO		
Red-breasted nuthatch	RBNU		
Red-eyed vireo	REVI		
Red-headed woodpecker	RHWO		
Red-shouldered hawk	RSHA		
Red-tailed hawk	RTHA		
Red-winged blackbird	RWBL		
Rose-breasted grosbeak	RBGR		
Ruby-crowned kinglet	RCKI		
Ruby-throated hummingbird	RTHU		
Ruffed grouse	RUGR		
Rusty blackbird	RUBL		
Savannah sparrow	SAVS		
Scarlet tanager	SCTA		
Sedge wren	SEWR		
Sharp-shinned hawk	SSHA		
Slate-colored junco	SCJU		
Solitary vireo	SOVI		
Song sparrow	SOSP		
Swainson's thrush	SWTH		
Swamp sparrow	SWSP		
Tennessee warbler	TEWA		
Three-toed woodpecker	TTWO		
Tree swallow	TRES		
Turkey vulture	TUVU		
Veery	VEER		
Vesper sparrow	VESP		

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	January 2006	Steve Faccio	SOP used beginning with the 2006 field season.	
1.01	May 2007	Steve Faccio Brian Mitchell	SOP used beginning with the 2007 field season.	
			Added revision log.	
			Clarified distance sampling assumptions	Need to detect all breeding landbirds at center point, not necessarily all in first band.
			Maximum wind speed changed to code 2 from code 3.	
1.02	May 2008	Steve Faccio Brian Mitchell	SOP used beginning with the 2008 field season	
			Added information about compatibility of this SOP with GLKN and USFWS	
			Added SAIR to the small parks that are surveyed twice	
			Changed on-line database reference to the USGS point count database	
			Updated website and mailing addresses	
1.03	August 2009	Sarah Lupis	Formatting, minor editorial changes.	
1.04	December 2009	Brian Mitchell	Added rationale for not matching USFWS and GLKN distance bands	
2.00	February 2010	Adam Kozlowski and Brian Mitchell	Updated survey procedures and added mammal data coding sheet. In particular, streamlined the data forms to remove extraneous codes and ensure that the correct data is collected at each point count. Observation codes are now just C (calling/singing), I (individual seen), or FL (flock seen or heard). Observers no longer need to record distance or time of detection for flyovers; these observations violate distance and removal model assumptions. Added wind direction codes. Updated sky codes so that they match the point count database. New data forms ask observers to certify data with signatures.	Modify field procedures and forms to reduce data errors
2.01	March 2010	Steve Faccio	Minor editorial changes	
2.02	December 2012	Brian Mitchell	Volunteers can use a phone with a timer function.	Less equipment to track in field.
			Volunteers should note and report any missing trail markers.	Facilitate study site route maintenance.

Version	Date	Revised By	Changes	Justification
2.03	April 2014	Brian Mitchell	Data sheets should be mailed to project manager within a month, regardless of whether online data entry is complete.	Speed up data entry.
			Removed reference to project materials on VCE website (materials are available through NETN).	Make SOP more general for future use.
			Removed references to USGS database, replaced with AKN database and web site.	Change in database manager
			Mammal data sheets no longer needed; mammal sightings are entered with the bird data	New database allows mammal entry
			Number of individuals should be recorded for any group of birds, not just flocks.	Clarification
			Update Yellow Warbler and Eastern Gray Squirrel codes in Appendix	New database has different codes
			“State” and “Coordinates” removed as variables	Not collected in the field
			Replaced figures of field map and coding sheet; removed mammal coding sheet	Revised to accommodate new database and codes
			Clarify procedures for recording flocks and other groups	Address data inconsistency

SOP 6 - Field Quality Control Recordings

Northeast Temperate Network
Version 1.00

Overview of SOP

Ideally, observer quality would be assessed in the field with periodic side-by-side point counts with the Project Manager. Difficulties with coordinating schedules have made this goal impossible to achieve in practice, so this SOP documents an alternative: using a digital audio recorder in the field to record point counts, which are reviewed by the Project Manager. This SOP explains the procedure for setting up a Tascam DR-05 recorder for field use, conducting quality control recordings, and reviewing the recordings for assessing volunteer observer quality.

Setting up the Tascam DR-05

Refer to the Tascam DR-05 User Manual for detailed instructions on the use of the recorder. The procedures here document settings used for conducting QC recordings in the field. Figure S6.1 is an image of the front of the recorder, containing button numbers referred to in these instructions.

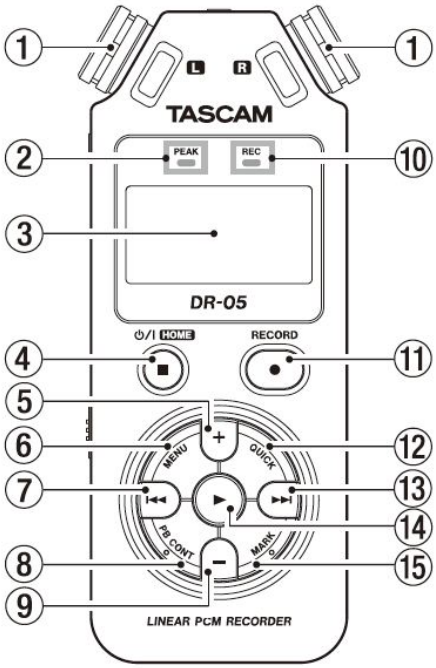
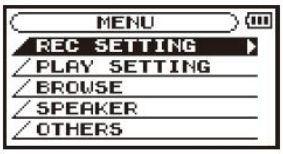


Figure S6.1. Diagram of Tascam DR-05 front panel, with features and buttons numbered.

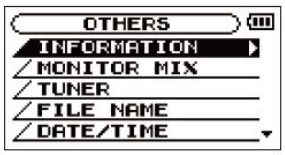
Return to Factory Defaults

The setting changes described below assume that the recorder is starting from factory defaults. To return to factory defaults:

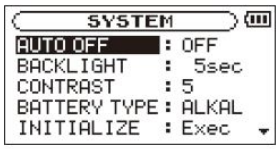
1. Press the Menu button (6), and scroll to the “Others” item by pressing the – button (9).



2. Press the Play button (14) to enter the “Others” tab, and press the – button (9) until “System” is highlighted. Press the Play button (14).



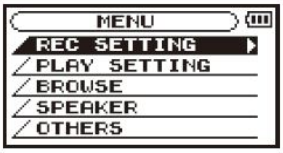
3. Press the – button (9) until “Initialize” is highlighted, and then press the Play button (14) to highlight “Exec”. Press the Play button (14) again.



4. Press the Play button (14) to restore the factory defaults, or the Stop button (4) to cancel.

Set Date and Time

1. Press the Menu button (6), and scroll to the “Others” item by pressing the – button (9).



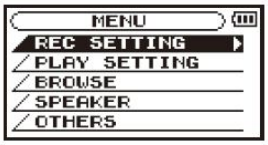
2. Press the Play button (14) to enter the “Others” tab, and press the – button (9) until “Date/Time” is highlighted. Press the Play button (14).

3. Press the Fast Forward or Rewind buttons (7 or 13) to move between highlighted fields, and use the + or – buttons (5 or 9) to change field values. When finished, press the Play button (14) to confirm the changes.

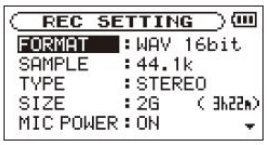
Low Cut Filter

The low cut filter is off by default, but this filter is helpful to reduce wind noise and other low frequency sounds on the recordings. Set the filter to 120 Hz as follows:

1. Press the Menu button (6). Press the + or – buttons (5 or 9) to highlight “Rec Setting”, and then press the Play button (14).



2. Scroll down with the – button (9) until “Low Cut” is highlighted, and press the Play button (14).

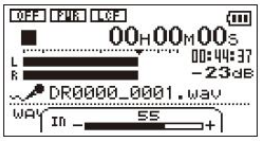


3. Press the + button (5) until “120Hz” is highlighted, and press the Home button (4).

Maximize Recording Level

The recording default has the recording input level (gain) minimized. For recording bird point counts it is much more likely that the maximum input level will be used. Maximize the recording level by pressing the Record button (11).

Press the Fast Forward button (13) until the recording level reads “90”.

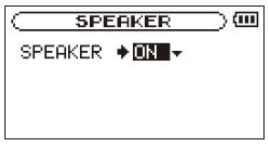


Press the Home button (4) to cancel the recording standby mode.

Turn Speaker On

Enabling the speaker will allow observers to check recordings even if they don't have headphones. The speaker will not play during recording or if a headphone is plugged in. Press the Menu button (6), scroll down to "Speaker" with the – button (9), and press the Play button (14).

Use the + Button (5) to highlight "ON".

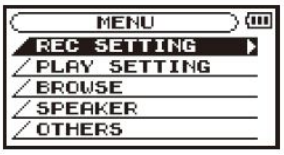


Press the Home button (4) to return to the main screen.

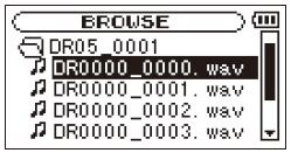
Erase Existing Audio Files

Files may have been accidentally left on the recorder from a previous field season. Delete any files on the recorder before sending to a volunteer for field use (but ensure that all data files have been downloaded prior to deleting them). To delete files:

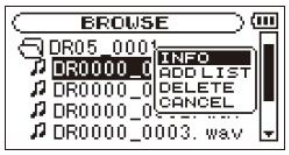
1. Press the Menu button (6). Press the + or – buttons (5 or 9) to highlight "Browse", and then press the Play button (14).



2. If no .wav files appear in the list then there are no files to delete. If there are .wav files, use the + or – buttons (5 or 9) to select a file to delete.



3. Press the Quick button (12), and then use the + or – buttons (5 or 9) to scroll to “Delete”. Press the Play button (14).



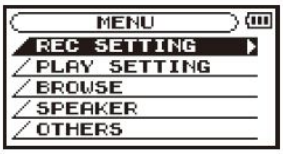
4. A confirmation message will appear. Press Play (14) to confirm delete, or Stop (4) to cancel.

5. Repeat the process for any additional files that need to be deleted.

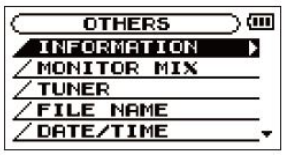
Setting the File Name Prefix

To assist with data management, the file name prefix is set to reflect the year and park of data collection. A six-character prefix is used – the four letter park code followed by the two digit year (e.g., MABI14 for Marsh-Billings-Rockefeller NHP in 2014). Set the prefix as follows:

1. Press the Menu button (6), and scroll to the “Others” item by pressing the – button (9).



2. Press the Play button (14) to enter the “Others” tab, and press the + or – buttons (5 or 9) until “File Name” is highlighted. Press the Play button (14).



3. Press the – button (9) to highlight “WORD”, then the Play button (14) to move to the first letter.

4. Use the + and – buttons (5 and 9) to select a character, and the Fast Forward and Rewind buttons (7 and 13) to move between letters. Press the Home key (4) when finished.

Basic Operation of the Tascam DR-05 Recorder

Turn the recorder on or off by pressing and holding the Power/Home button (4; Figure S6.1).

Put the recorder in Standby mode by pressing the Record button (11). The Record Indicator (10) will flash. When an appropriate recording level is set and you are standing quietly, the black bars next to “L” and “R” should be between the two ovals in Figure S6.2, and the Peak Indicator (2) does not light. If necessary, press the Fast Forward and Rewind buttons (13 and 7) to adjust the recording level; typically you will want the recording level to be maximized (set to 90).

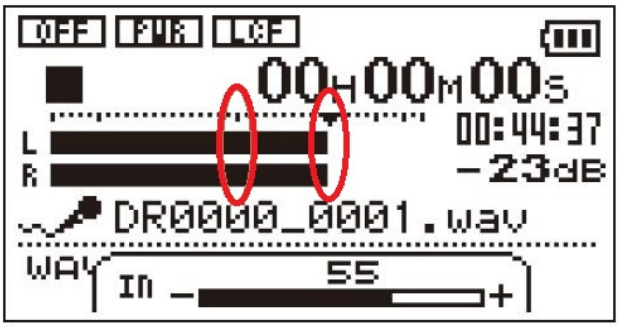


Figure S6.2. Recording standby screen showing the target background noise level (between the ovals) for audio recording.

Pressing the Record button (11) from Standby mode will begin a recording; Standby can be canceled by pressing the Stop button (4). Once a recording has started, it can be stopped by pressing the Stop button (4).

To play back a recently completed recording, press the Play button (14). If the recorder has been powered off, you may need to scroll through available recordings using the Fast Forward or Rewind buttons (7 and 13). Volume of playback is controlled using the + and – buttons (5 and 9) during playback. Headphones are plugged into the side of the recorder (labeled “Line Out”). If you don’t have headphones, you can listen via the built-in speaker.

Field Procedures

The project manager will mail recorders to three observers each year prior to the start of the monitoring season. Recorders are currently mailed using the NETN FedEx account, with pre-filled labels for returning the recorders after use.

The recorder is not weather resistant; do not attempt to make recordings if conditions are foggy, drizzling, or raining. Wind may hamper recording quality, but recordings can be attempted at any wind level suitable for bird point counts.

Prior to field work, verify that the recorder has suitable battery charge; when you turn on the recorder the battery status displays in the top-right of the display, and it should have three bars. If there are fewer bars, install fresh batteries.

When you arrive at each point count location, locate a nearby tree branch at approximately head-height. Slide the locking tab on the strap to the center of the strap, loop the strap through the recorder and slide the tab down tight to the top of the recorder (see Figure S6.3). Then, use the strap to loop the recorder around the branch. The recorder will hang with the stereo microphones facing up. Ideally the recorder will hang a few feet from you and the tree trunk or any other obstructions, and be about 5 feet above the ground (hanging it on a small tree or sapling works well). Try to avoid placing the recorder directly on the ground.

Figure S6.3. Method for hanging recorder with microphones facing up.

Power the recorder on and press the “Record” button (red circle). The “REC” light will be flashing. Check the recording level and adjust if needed, and then press the “Record” button again. The “REC” light will illuminate and be steady.

Begin your point count. When you start your count and timer, clearly and audibly state “Start”. At the end of the count, clearly and audibly state “End”. Then annotate the recording by saying your name, the park and route, the point number, the date and the time, as well as any observations about the recording (e.g., recorder next to a large tree, or on the ground because there was no suitable location to hang it from).

Once you’ve annotated your recording, press the “HOME”/Stop button (white square). The “REC” light will turn off. Power off the recorder and pack it for use at the next point count station.

Please return the recorder to the Project Manager within a month of your field visit, along with your completed data forms.

File Management

The Tascam DR-05 has a USB port that can usually be used to connect to a computer, but testing the connection occasionally resulted in problems. Attempt to connect to a computer first using a USB cable between the recorder and computer. If this works, the microSD card in the recorder will be available as a drive on the computer. If the USB cable does not work, the microSD card will need to be removed from the recorder and placed into a USB adapter and plugged into the computer directly.

Once the card is recognized as a drive, move the files from the microSD card to a data folder named with the current year. This folder should be stored within another folder titled “QC Recordings”.

Rename the files to reflect the site and point count station number. For example, a recording from point number 5 on the SARA Northwest route (route 38) from 2014 might originally be named “SARA14_0006.wav” and would be renamed “SARA14_3805.wav”. When renaming files, it may help to refer to the data sheets to match the date and time of the audio file with specific point count times; don’t forget that the time listed for a recording at a specific point will be about 10 minutes later than the start time of the point count. If there is a problem with the recording date and time, listen to the verbal annotation at the end of the audio file to determine the correct route and point to use in the file name.

Once files have been renamed, make a .zip archive of the folder and transfer a copy to the NETN data manager (contact NETN staff for possible avenues for transferring large files). The data manager will store the folder on the network’s server at: Z:\PROJECTS\MONITORING\Landbird_Monitoring\5_Data\Data_Files\QC Recordings.

Make sure that the audio files are erased from the microSD card, and replace the card in the audio recorder if it has been removed.

Quality Control Review of Audio Recordings

The project manager will review all audio recordings, with the goal of identifying species on the recordings, the first time each species is heard, and the loudness (approximate distance) of the first detection of each species.

Data can be recorded on a “Bird Coding Data Sheet” with “QC” written after the Site Name. Use the date of the audio recordings, not the date the recordings are reviewed. All data fields on the coding sheet will be used, except “Flyovers”. Valid observation codes are C (Calling), S (Singing), and D (Drumming). Use the “0-10 m” column for close/loud calls, the “11-25 m” column for intermediate calls, and the “26-50 m” column for distant/soft calls.

Use headphones or a decent set of multimedia speakers to review each recording. Find the point on the recording where the observer states “Start”, and start a countdown timer at the same time. Listen to the recording in real time, writing down the first detection of each species and the time period, and place the observation code in the correct distance column. Do not pause or rewind the recording.

If the observer forgot to say “Start”, you may be able to determine the start time on the recording by noting the recording time when the observer says “Stop” or when their countdown timer alarm sounds. Rewind exactly ten minutes from that point, and use that location on the audio file as the start.

Compare the data provided by the observer with the quality control data. Any species that the observer marked as being close (distance bands 1 and 2) should be audible on the recording. More distant species may not be audible. Compare species detected to determine whether the observer may have confused similar-sounding species, or failed to detect uncommon or high-pitched species. These problems could indicate an observer with limited experience or hearing loss. Also compare the time periods and distance bands between the original and the quality control data. Observers who report markedly different time periods or who tend to lump their data into near or far distance bands may need some additional training. Remember that species detected by the observer but not audible on the recording cannot be quality-checked; the bird may have been visually detected or too far away to be audible on the recording.

A summary of the quality control findings should be provided to the NETN program manager, and the results should be discussed with the volunteer(s) who provided the quality control data. Significant problems (species missed or confused) may be cause for not using the data collected by the observer (i.e., keeping it in “RESTRICTED” status), directing the observer to additional training, pairing the observer with a more experienced observer in the future, and/or removing the observer from the project.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	April 2014	Brian Mitchell and Steve Faccio	SOP used beginning with the 2014 field season.	New approach to QC needed due to difficulty of double-observer logistics.

SOP 7 - Data Management

Northeast Temperate Network
Version 4.04

Overview of SOP

Careful, accurate collection of data as directed in these SOP's is critical to the success of Vital Signs monitoring. This SOP explains the procedure for proper transcription, verification and stewardship of breeding landbird monitoring data once they have been collected. Data management responsibilities are divided between volunteer observers, the project manager (PM), and the network data manager (DM). The roles and responsibilities detailed here are also presented in graphical form in Figures S7.1 through S7.3.

Data Collection

Breeding landbird point count data will be collected on Field Mapping Cards. The Field Mapping Cards will clearly identify all required information, using examples where needed to ensure that proper data are recorded. Observers should record both their breeding landbird and mammal observations in a clear and firm handwriting using the standardized symbols defined on the Field Mapping Cards. Before leaving the point, observers will check over the Field Mapping Card thoroughly to make sure it is complete and legible, taking the time to clarify anything illegible or out of the ordinary. Observers will initial the Field Mapping Card in the space allotted to signify that the data is complete and legible to the best of their ability.

Data Transcription and Verification

As soon as possible after leaving the field (preferably within 24 hours), observers will verify that they used the correct breeding landbird codes on their field mapping cards. Incorrect codes will be crossed out with a single line, corrected by the observer, and initialed. Observers will sign the field mapping card cover page to signify that they have checked their bird codes (valid codes can be found in SOP 5 - Conducting Variable Circular Plot Counts, Appendix S5.A). Next, observers will transcribe their point count data from the Field Mapping Cards to Data Coding Sheets. Breeding landbird and mammal data are each copied to the same Data Coding Sheets. Mapped data are transcribed to the Data Coding Sheets to reorganize it into a tabular format that can be easily and accurately transcribed into the project's database. To minimize the possibility of carrying errors forward, the observer is required to conduct a 100% check of the original Field Mapping Card data against completed Data Coding Sheet(s). Any errors discovered during this data verification step should be corrected immediately by crossing out the error with a single line, entering the correct value next to the error, and initialing and dating the correction. The observer will sign the Data Coding Sheet in the place provided, signifying that the data verification process has been completed.

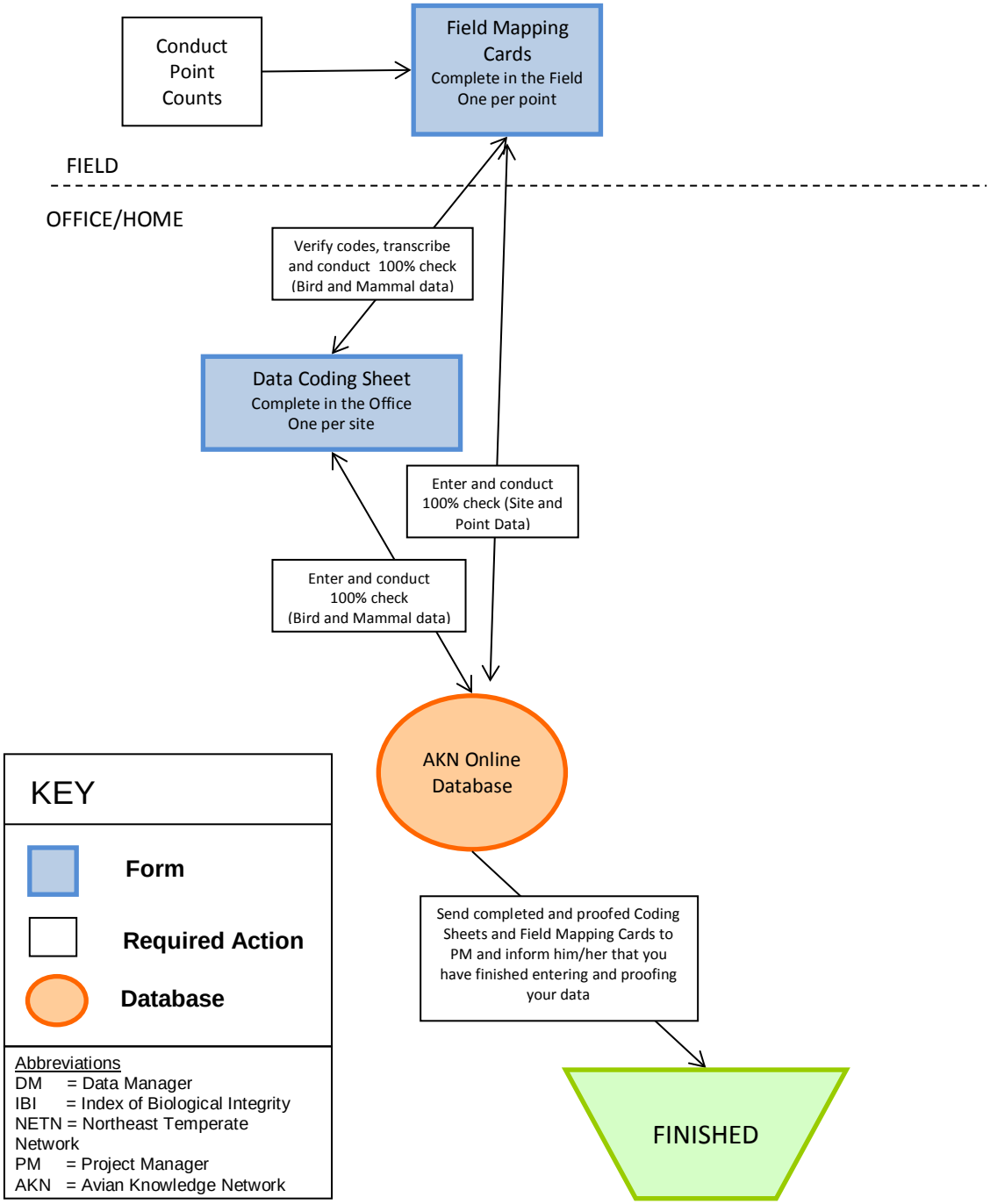


Figure S7.1. Flow diagram for breeding landbird monitoring protocol data management responsibilities: Volunteer Observers.

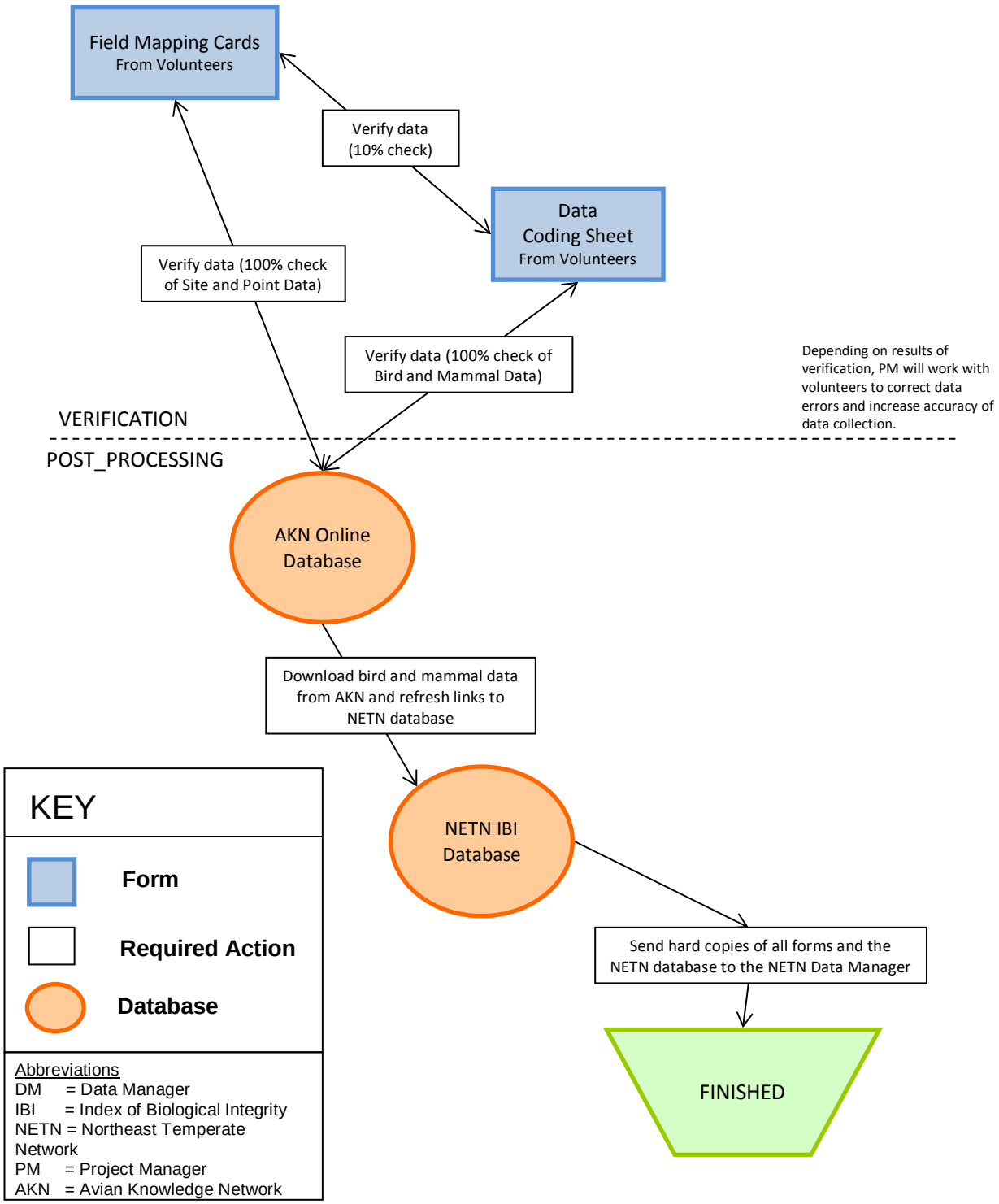


Figure S7.2. Flow diagram for breeding landbird monitoring protocol data management responsibilities: Project Manager.

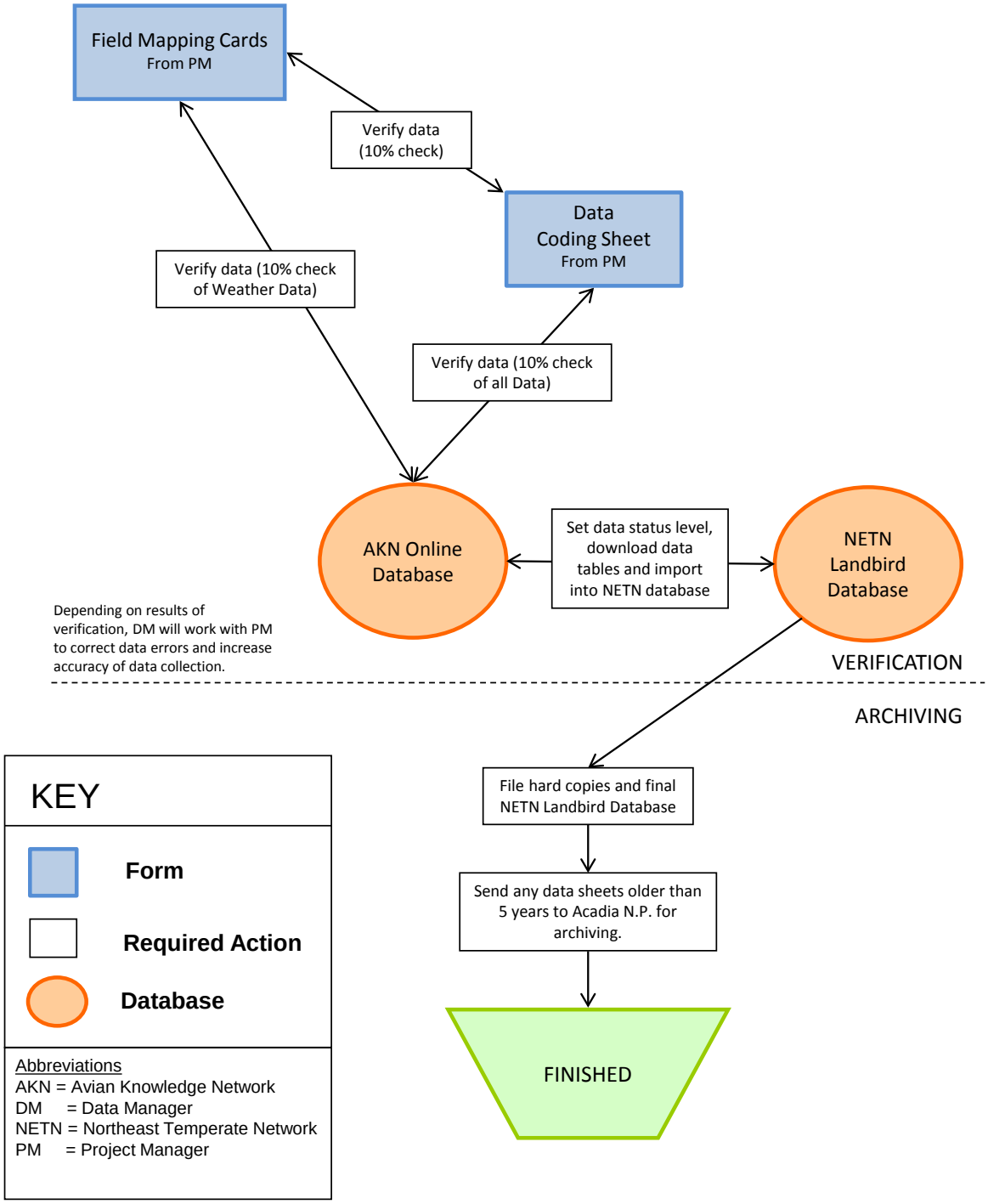


Figure S7.3. Flow diagram for breeding landbird monitoring protocol data management responsibilities: Network Data Manager.

Online Data Entry and Verification

Once the Data Coding Sheets have been verified, observers will enter the breeding landbird monitoring data into the Bird Point Count Database (http://data.prbo.org/science/biologists/index.php). This web-based, publicly accessible, searchable, repository for point count data collected in North America is a collaborative project between the U.S. Fish and Wildlife Service (USFWS), the NPS, the American Bird Conservancy, and Point Blue.

The goals of this point count repository are to:

- Provide easy data entry and access to everyone, while providing appropriate security controls.
- Accommodate count data from multiple sources, allowing for small differences in protocols, such as:
    - Counts at different times of year: breeding, winter, or migration counts.
    - Counts differing in time intervals (3 vs. 5 minutes, for example) or radii.
    - Counts designed to adjust for detection probability, such as distance sampling.
- Store vegetation information associated with points.
- Enforce data quality control through validation routines and through distributed responsibility.

Data entry should be conducted within 24 hours of leaving the field to ensure observers' ability to clearly recall events in case of a discrepancy. Data are entered into the Bird Point Count Database via an online data entry system that allows volunteer observers to enter data once they have created a user account and been added to the NETN monitoring project (SOP 7 - Data Management, Appendix S7.A). To help reduce data entry errors the database entry form has dropdown menus for site name, observer, and species and observation codes. Additionally, upon entering each row of data, observers are asked to carefully compare the date, time, species, and observation codes recorded on the Field Mapping Card with those transcribed onto the Data Coding Sheet to make sure they are consistent. Any errors that are found should be corrected immediately. Once data entry and checking are complete, the observer will sign the Data Coding Sheets and mail the following items to the project manager so that s/he can review them:

- Completed and initialed Field Mapping Cards
- Completed, signed as verified, entered into the database, and signed as checked Data Coding Sheets

The Field Mapping Card and Data Coding Sheets should be mailed to the Project Manager within one month of field data collection. The sheets should be mailed in at this time even if some or all of

the data have not been transcribed to the coding sheets or if online data entry is incomplete. Mailing data in within a month of collection significantly speeds up the data entry and QC process.

Post-acquisition Data Entry and Verification

After receiving the Field Mapping Cards and Data Coding Sheets from the observer, the project manager will initiate further verification of the data. Evaluating post-acquisition data is a difficult but necessary task that requires close communication with the observers to resolve discrepancies. The project manager will make copies of all the original data sheets on acid-free paper and conduct: a 10% check of data transcription from Field Mapping Cards to Data Coding Sheets, and a 100% check of Data Coding Sheets against the records in the online database.

A 10% check is conducted by reviewing data corresponding to one randomly selected point count per study site (including the site-level data – park, site, date, and observer – and point-level data – weather and start time), so that some data is reviewed from each observer. If an error is discovered at any point during the 10% check, an additional point count from the same observer and site will be randomly selected and reviewed. If an additional error is detected, a 100% check of all the observer's data will be required. For all errors found during the 10% check or 100% check, the PM will work with the observer to resolve any data conflicts identified and provide additional guidance to prevent those errors from occurring in future surveys. Changes made to the data will only be made on the copies. Changes will be initialed clearly to signify who, why, and when the change was made. Errors repeated across many observers may signify a problem with the protocol or datasheet and should be addressed as soon as possible in consultation with the NETN data manager.

Once the 10% check of the Data Coding Sheets is completed the PM will conduct a 100% check of all the breeding landbird data entered into the online database. Data are coded as "RAW" in the database upon initial entry, "CLEAN" after observer review of the data, and "RESTRICTED" after the 100% check. The data will not show in the public search at any of these status levels. The 100% check is conducted by checking every database record against its Data Coding Sheet record. Only the PM and DM have the ability to edit data once they have been entered. Data verification is necessary to ensure that values recorded on the field form and keyed into the database are correctly entered (i.e., the entered value is the "correct" value). The PM will note any changes made to the database on copies of the Data Coding Sheets (date, reason, initials) and if necessary provide guidance to observers who need extra help. Once the PM is satisfied that the data is clean s/he will mark them in the database as "RESTRICTED".

Following completion of his/her data management responsibilities each year, the PM will mail all copies of the completed and verified Field Mapping Cards, Data Coding Sheets, and the latest version of the NETN Landbirds database to the NETN office.

As data are received the Network data manager will conduct an additional 10% check of the data transcription from Field Mapping Cards to Data Coding Sheets (using the procedures outlined above), and a 10% check of the Data Coding Sheets against the records in the online database. A greater than 2% error rate in any of the 10% checks will require that the data be returned to the PM so that a 100% check can be conducted. The DM will document and make corrections when the error

rate does not exceed 2% or in the case of all discrepancies found in the mammal data. Once the data review is completed, the DM or PM will change the status of each site visit to “AVAILABLE Level 5” (full public availability). If there is an unresolvable problem with the data and it is not suitable for use, the survey should be left at the “RESTRICTED” level. This may occur, for example, when an observer is clearly inexperienced.

Note that the online database does not enforce the preference of one species synonym over another (e.g., YRWA and MYWA are both acceptable codes). Rather than correcting the online database for synonyms, NETN uses a query in its NETN Landbirds database to convert data to preferred synonyms; use of synonyms should not be considered a data error. See SOP 7 - Data Management, Appendix S7.B for details.

Data Archiving

Original data forms will be sent annually to the NETN office. The NETN will maintain at least 5 years of data in the network office; older data sheets will be periodically archived at Acadia NP. The manager of the online database (Point Blue) is responsible for performing periodic backups of all data residing in the central database. Each year, after all breeding landbird and mammal data for the survey year has been entered and verified, the PM will download all NETN data residing in the master database and store as an archived copy. A duplicate copy will be sent to the NETN office.

Data Requests

Requests for NETN breeding landbird monitoring data should be directed to either the Project Manager (sfaccio@vtecostudies.org) or the NETN data manager (Adam_Kozlowski@nps.gov). Each request will be reviewed on a case-by-case basis, and any data on sensitive species (as defined by each park’s Resource Manager) will be removed before data are provided.

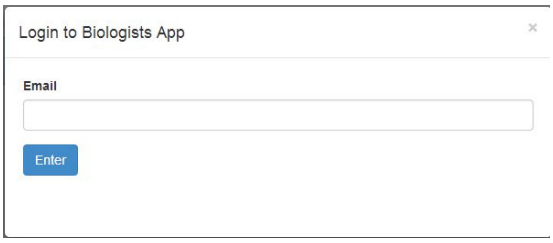
Appendix S7.A. Online database instructions

The recommended internet browser for working with the online database is Chrome. Firefox and Safari also work, but Internet Explorer is not recommended.

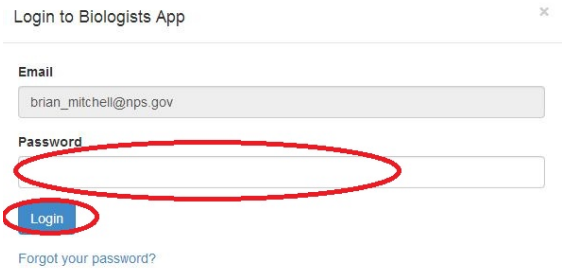
Accessing the Online Database

Logging in

1. The database is available at http://data.prbo.org/science/biologists.
2. Enter your e-mail address when prompted.

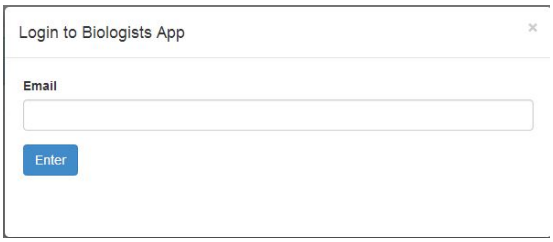


3. Enter your password and click “Login”.

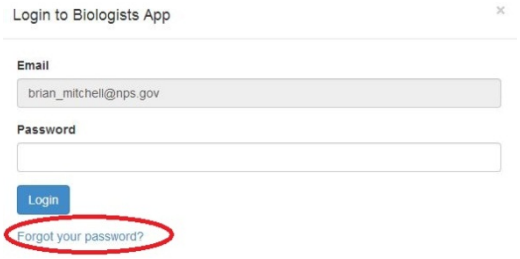


Lost Password

1. The database is available at http://data.prbo.org/science/biologists.
2. Enter your e-mail address when prompted.



3. If you don’t know your password or want to change it, click “Forgot your password?”.

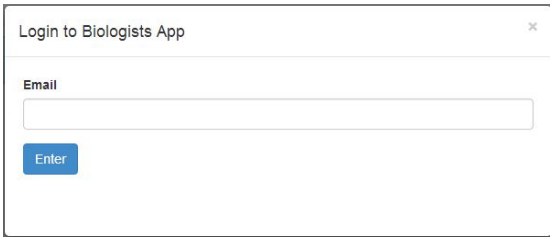


4. An e-mail will be sent to you with a link to reset your password. The link will take you to a "New Password" page where you need to enter a new password twice and then click "Save". Once you save your new password you should follow the steps above for "Logging In".

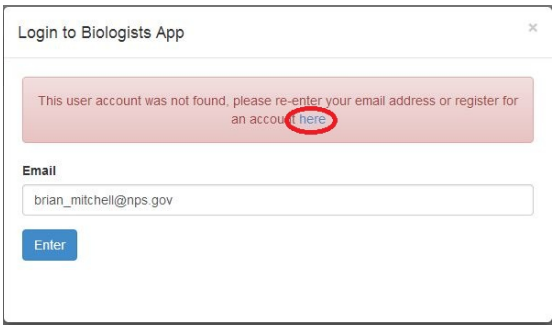
New Account

1. The database is available at http://data.prbo.org/science/biologists.

2. Enter your e-mail address when prompted.

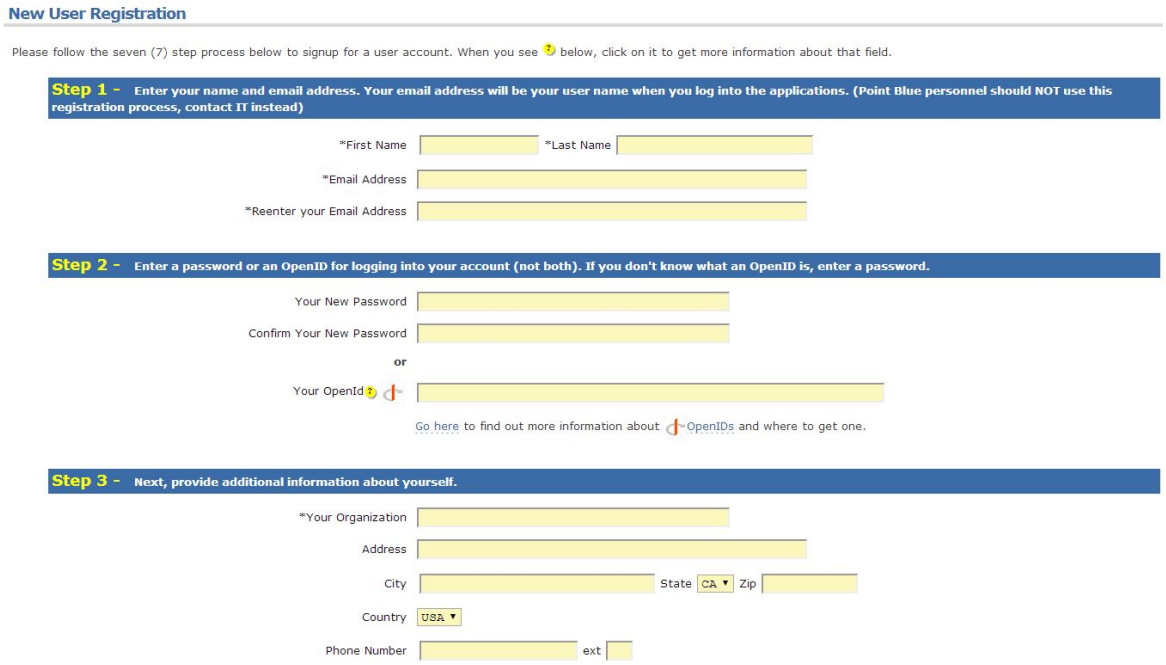


3. If no account was found, click on the link to register for an account.

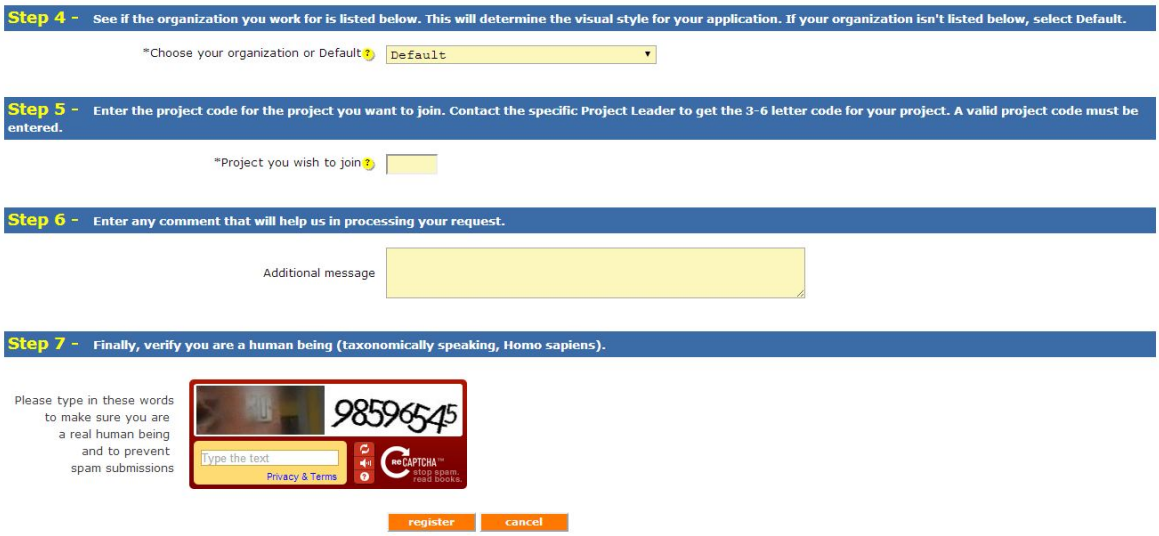


Appendix S7.A. Online database instructions

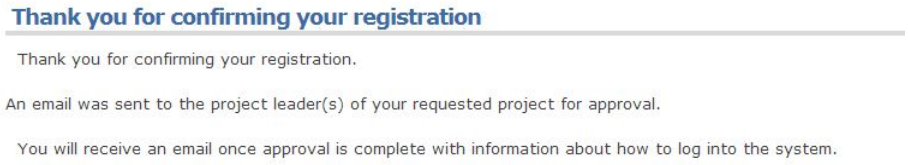
1. You'll be taken to a registration form with 7 parts. Steps 1 and 2 should be self-explanatory. For Step 3, you can enter "Northeast Temperate Network" for the Organization, with the following address: 54 Elm Street, Woodstock, VT, 05091. The phone number is 802-457-3368.



2. For Step 4, select "US National Park Service" from the options. For Step 5, type "NETN". Step 6 can remain blank, unless you are also an observer for VCE's Forest Bird Monitoring Program. In that case, type "Also an observer for project VTFBMP". For Step 7, type the numbers in the top of the "ReCaptcha" box into the text box. If you cannot read the numbers clearly, click the "Get a new challenge" button, which is the red button with two arrows in a circle. Once the form is completed, click "register".



3. You will receive an e-mail with a link. Clicking on the link in the e-mail will bring up a registration confirmation screen. The project leader will receive an e-mail asking him or her to approve your request for joining the project.

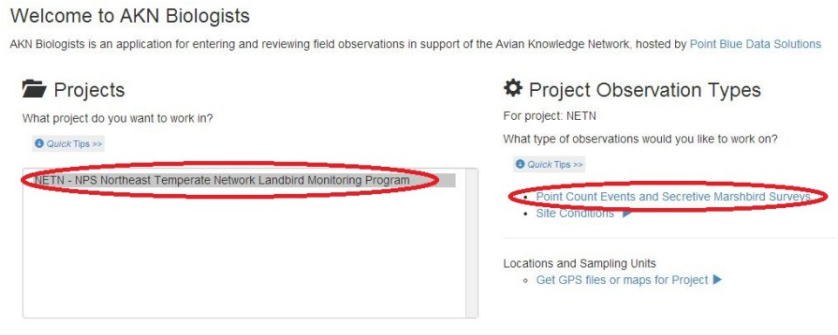


4. You will not be able to log in to enter data until the approval process is completed.

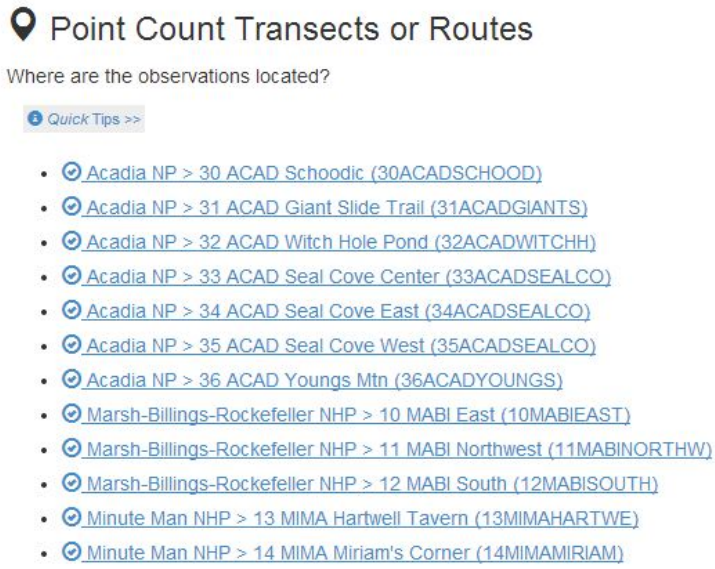
Entering Observation Data

IMPORTANT: Plan to enter all of your data in one sitting. Data are cached to your internet browser during data entry, and not saved to the database until all data for a survey are entered and pass basic quality control checks. If you do have to take a break, your data will likely be saved on your computer and you should be able to start where you left off, but this is not guaranteed (it will depend on your local computer settings). If you need to resume data entry after an interruption, restart your process at Step 1, using the same internet browser (e.g., Chrome). When you get to Step 4 you should see your previously entered data.

1. After logging in, you will see a “Welcome” screen with projects you have access to as well as actions you can take. Make sure the project is highlighted (“NETN – NPS Northeast Temperate Network Landbird Monitoring Program”) and click on “Point Count Events and Secretive Marshbird Surveys”.

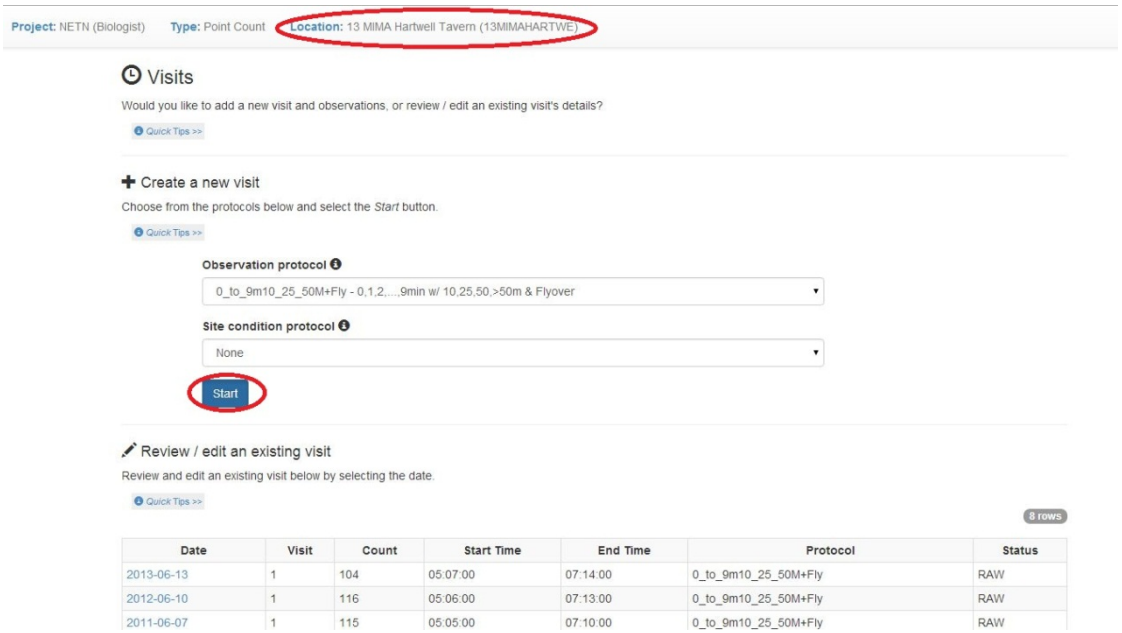


2. Choose your site from the list of landbird routes. The list is alphabetized by park name, then route number within each park. Note that the figure below only shows the top of the list of routes.

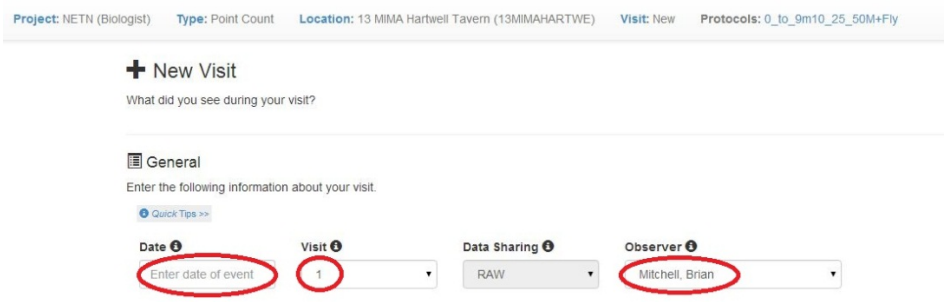


3. The next screen allows you to create a new visit (enter data) or review previous visits to the route. To get to the data entry screen, first verify the location at the top of the screen, then click “Start”. The observation protocol (“0_to_9m10_25_50M+Fly”) and site condition protocol (“None”) should be set by default; do not change this (site conditions will be entered later). Note: if you got interrupted during data entry and need to resume where you left off, or are interested in scanning old data for the route (including viewing a list of species detected during a given survey), click on the date of the survey in the “Review/edit an existing visit” section.

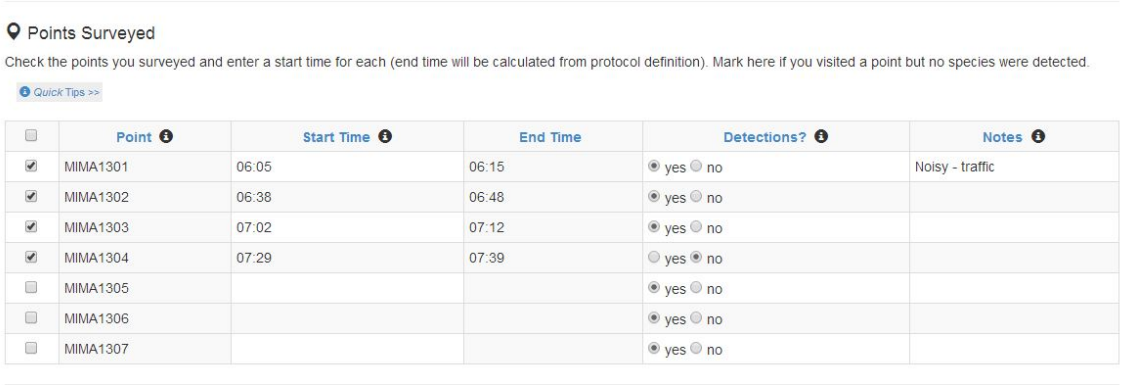
Appendix S7.A. Online database instructions



4. You will be taken to a “New Visit” screen. Fill out the “General” section at the top with the date of the survey and visit number, and verify that the correct observer name is selected (the database will default to the person entering the data). The date can be entered in a variety of formats and will convert to the standardized format used by the database. The visit number should be “1” for the first visit of the year, and then increment for any additional visits. If two people collect data concurrently (double-observer point counts), the lead observer (official volunteer for the route) uses visit “1” and the other observer uses visit “2”.



5. The next section is “Points Surveyed”. For each point that was surveyed, place a check in the box to the left of the point name. Then provide the starting time for each count. If any of the point counts had NO birds detected, click in the circle next to “no” in the “Detections?” column. Finally, add any notes about the point count (e.g., comments about noise, or other unusual events). The image below shows the “Points Surveyed” section filled out for a partial survey of the first four points on a route, where the fourth point had no bird detections.



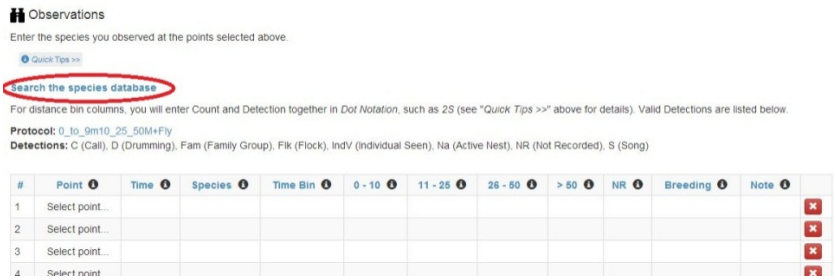
Points Surveyed

Check the points you surveyed and enter a start time for each (end time will be calculated from protocol definition). Mark here if you visited a point but no species were detected.

Quick Tips >>

	Point	Start Time	End Time	Detections?	Notes
☑	MIMA1301	06:05	06:15	◉ yes ○ no	Noisy - traffic
☑	MIMA1302	06:38	06:48	◉ yes ○ no	
☑	MIMA1303	07:02	07:12	◉ yes ○ no	
☑	MIMA1304	07:29	07:39	○ yes ◉ no	
☐	MIMA1305			◉ yes ○ no	
☐	MIMA1306			◉ yes ○ no	
☐	MIMA1307			◉ yes ○ no	

6. Before entering observations, verify any species codes on your coding sheet that you are unsure about; the database will not check your species codes for errors until you complete data entry, and data entry errors that accidentally produce a valid code (for an unintended species) will not be detected by the database. For example, the correct Yellow Warbler code is YEWA, not YWAR, and gray squirrel is EGSQ. To verify species codes, click on "Search the species database" in the "Observations" section of the data entry screen.



Observations

Enter the species you observed at the points selected above.

Quick Tips >>

Search the species database

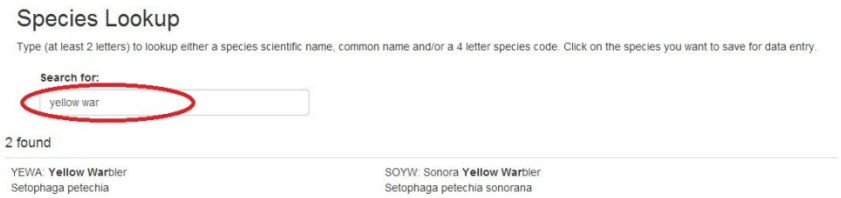
For distance bin columns, you will enter Count and Detection together in *Dot Notation*, such as *2S* (see "*Quick Tips >>*" above for details). Valid Detections are listed below.

Protocol: 0_to_9m10_25_50M+Fly

Detections: C (Call), D (Drumming), Fam (Family Group), Flk (Flock), IndV (Individual Seen), Na (Active Nest), NR (Not Recorded), S (Song)

#	Point	Time	Species	Time Bin	0 - 10	11 - 25	26 - 50	> 50	NR	Breeding	Note	
1	Select point...											✖
2	Select point...											✖
3	Select point...											✖
4	Select point...											✖

7. A new tab should open in your browser; begin typing a code, common name, or scientific name in the "Search for:" box to check your codes.



Species Lookup

Type (at least 2 letters) to lookup either a species scientific name, common name and/or a 4 letter species code. Click on the species you want to save for data entry.

Search for:

yellow war

2 found

YEWA: **Yellow War**bler
Setophaga petechia

SOYW: Sonora **Yellow War**bler
Setophaga petechia sonorana

8. Once you are confident that your species codes are correct, enter data in the “Observations” section. The columns on the online form will match your data coding sheet, except that the online form has columns for “Breeding” (not used by this project, but available to document signs of breeding) and “Notes”. Clicking “i” next to a column heading will provide a list of valid codes, and the “Quick Tips” link at the top of the Observations section has useful information about data entry. The data entry form will automatically convert entries to all caps, and you can use “Enter” to go to a new line, the up or down arrows to move vertically, and Tab and Shift-Tab to move forward and back. Note: If you did not record the time of detection of a species (e.g., for flyovers), select “NR” for the Time Bin.

Observations

Enter the species you observed at the points selected above.

Quick Tips >>

Search the species database

For distance bin columns, you will enter Count and Detection together in *Dot Notation*, such as *2S* (see "*Quick Tips >>*" above for details). Valid Detections are listed below.

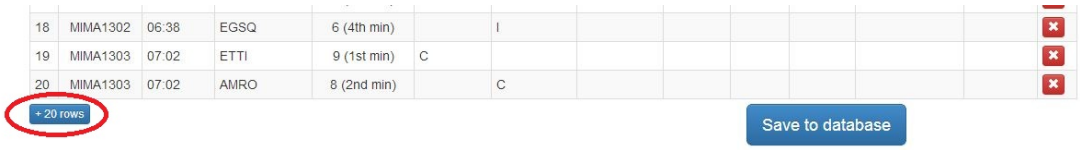
Protocol: 0_to_9m10_25_50M+Fly
Detections: C (Call), D (Drumming), FAM (Family Group), FLK (Flock), I (Individual Seen), NA (Active Nest), NR (Not Recorded), S (Song)

#	Point	Time	Species	Time Bin	0 - 10	11 - 25	26 - 50	> 50	NR	FLY	Breeding	Note	
1	MIMA1301	06:05	RBWO	9 (1st min)		C							
2	MIMA1301	06:05	ETTI	9 (1st min)	C								
3	MIMA1301	06:05	AMCR	6 (4th min)				C					
4	MIMA1301	06:05	BCCH	1 (9th min)	I								
5	MIMA1302	06:38	MYWA	9 (1st min)		2I							
6	MIMA1302	06:38	AMGO	6 (4th min)			C						
7	MIMA1302	06:38	RWBL	9 (1st min)			C						
8	MIMA1302	06:38	BHVI	9 (1st min)				C					
9	MIMA1302	06:38	VEER	0 (10th min)		I							
10	MIMA1302	06:38	BTBW	2 (8th min)			C						
11	MIMA1302	06:38	COGR	7 (3rd min)				C					
12	MIMA1302	06:38	HETH	7 (3rd min)		C							
13	MIMA1302	06:38	BRCR	3 (7th min)			C						
14	MIMA1302	06:38	BTNW	8 (2nd min)			C						
15	MIMA1302	06:38	CAGO	9 (1st min)						NR			
16	MIMA1302	06:38	PIWO	9 (1st min)						NR			
17	MIMA1302	06:38	EGSQ	9 (1st min)		I							
18	MIMA1302	06:38	EGSQ	6 (4th min)		I							
19	MIMA1303	07:02	ETTI	9 (1st min)	C								
20	MIMA1303	07:02	AMRO	8 (2nd min)		C							

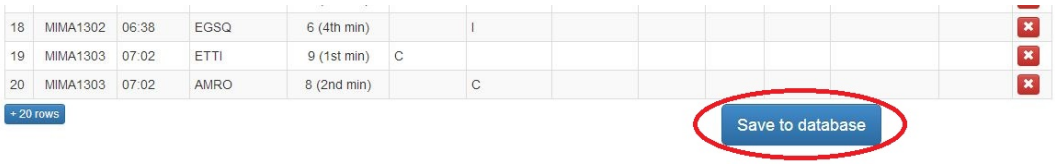
+ 20 rows

Save to database

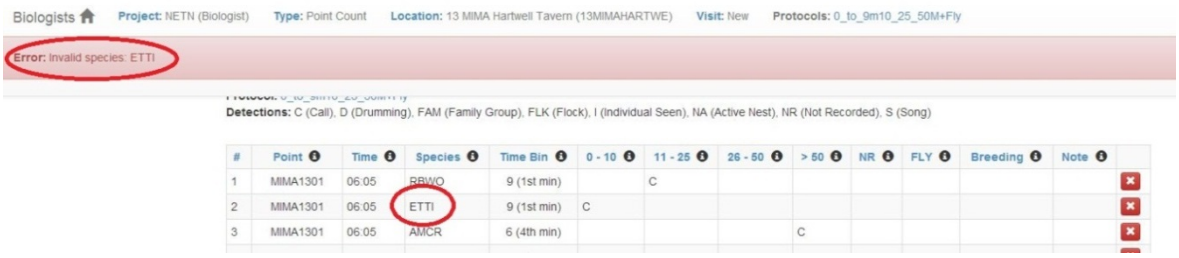
9. You will need to click on “+20 rows” at the bottom-left of the data entry screen for each additional batch of 20 rows. Once all data rows are entered, review the data for errors and correct any mistakes you see. Pay particular attention to the species codes. The database will allow ANY 4-letter combination during data entry, and it will not catch mistakes that produce a 4-letter code for a different species than the one observed.



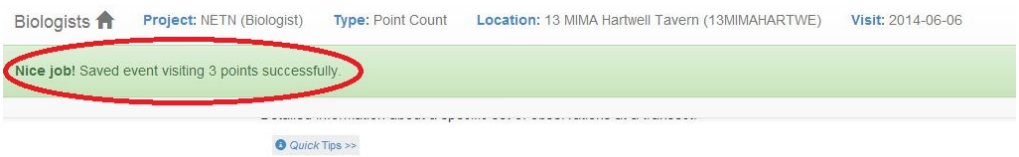
10. Once you are comfortable with the data accuracy, click “Save to database”. The database will perform a number of data checks.



11. If an error message appears on the screen, review the data and correct the error. The most common errors are invalid species codes and invalid detection cues. Note that you can sort by species code by clicking the “Species” label, to facilitate locating problem codes. All other fields can also be sorted. Don’t forget to correct your coding sheet as well if you used an incorrect species code.



12. If the data save successfully, you will see a message after clicking “Save to database”. You can close the message by clicking the “X” to the far right of the message.

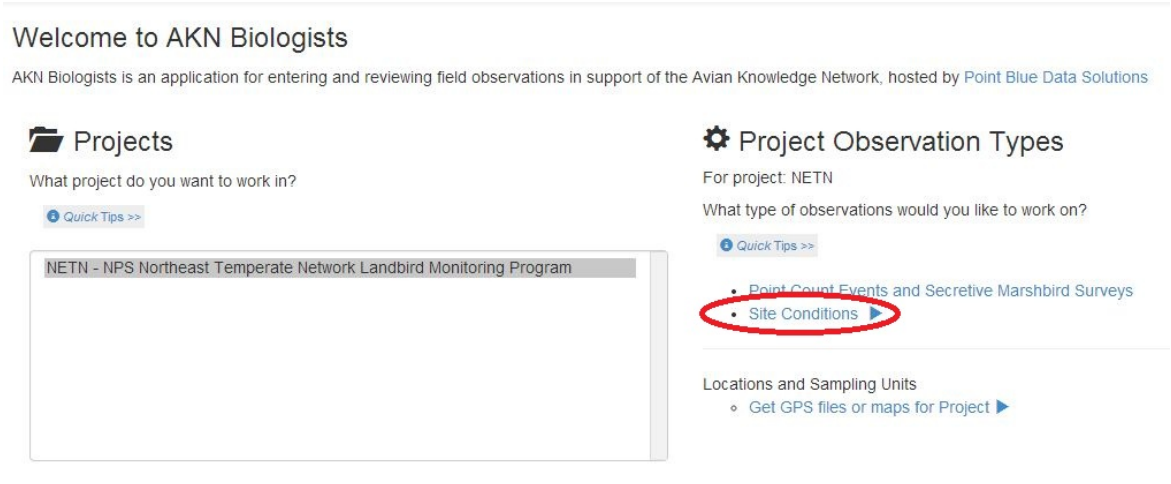


13. You will be taken to the “Review or Edit Visit” screen for proofing your data. This might be a good time to take a break if you need one!

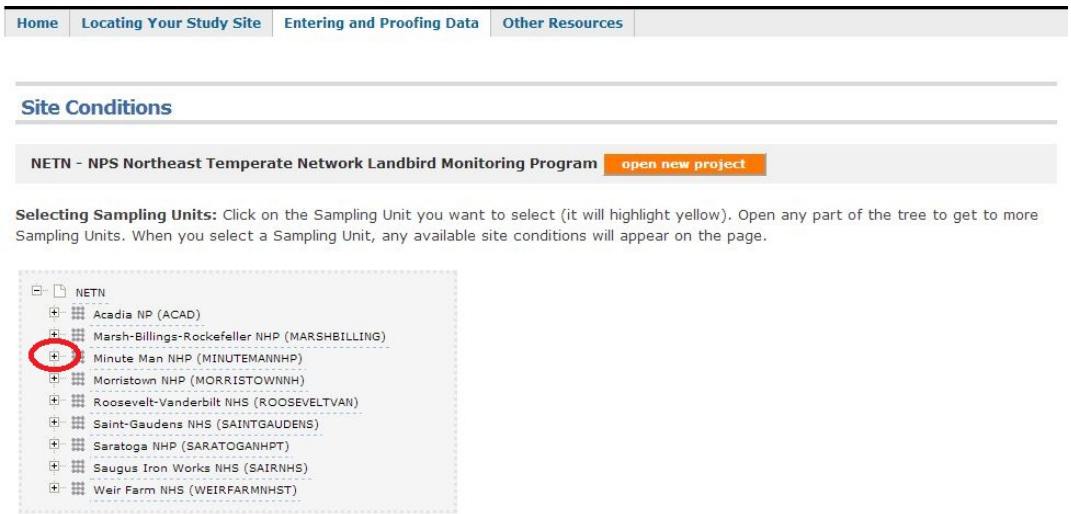
Entering Site Conditions

1. Log in to the database. If you are continuing from the previous session, click on “Project” at the top-left of the screen.

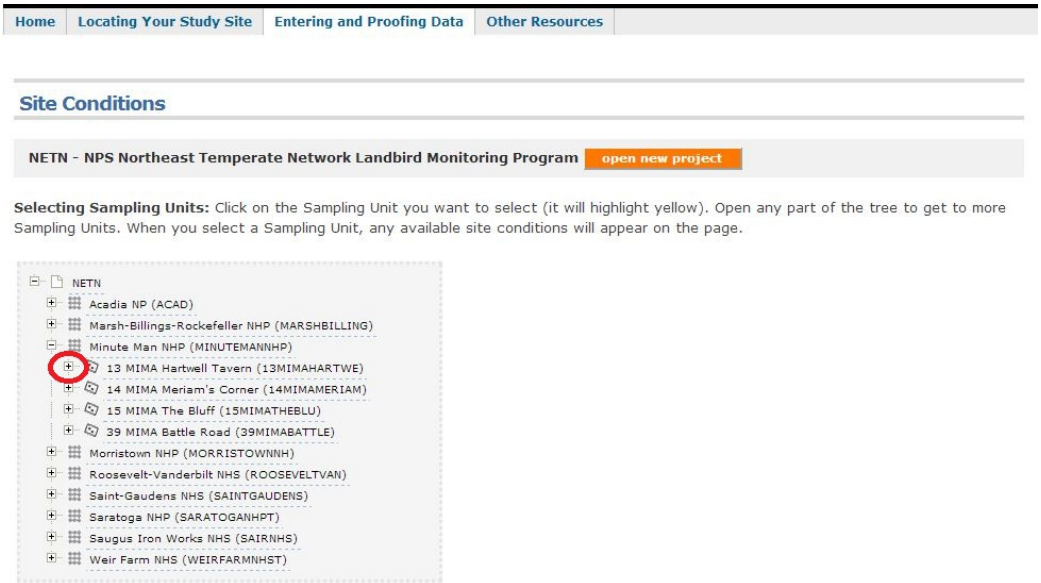
2. Click on “Site Conditions” under “Project Observation Types”.



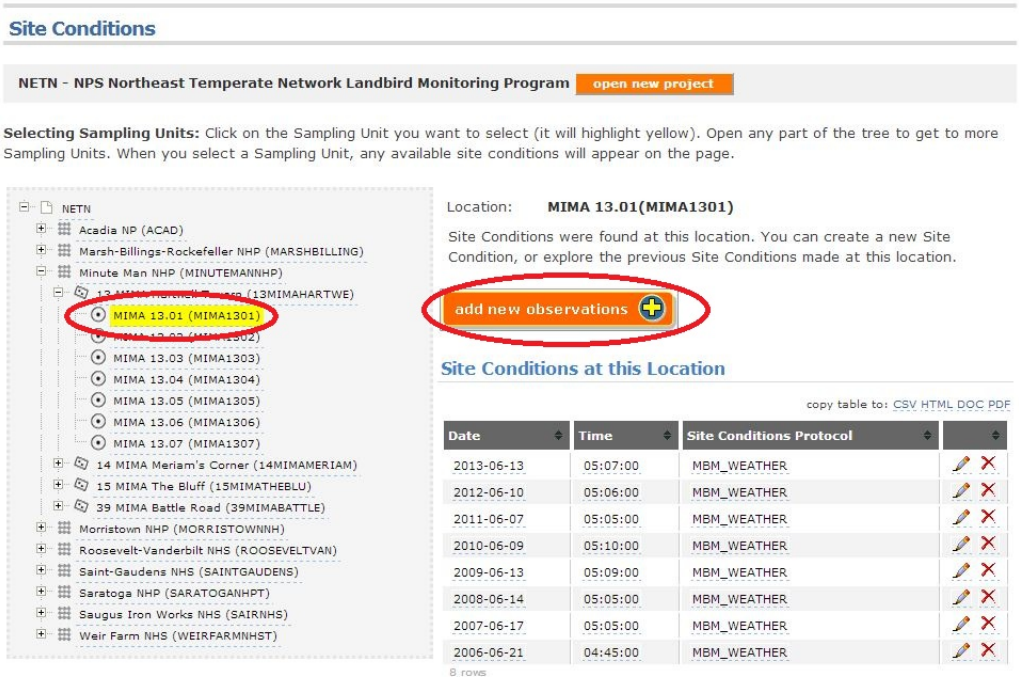
3. On the next screen, you will see a list of parks. Click on the “+” next to your park.



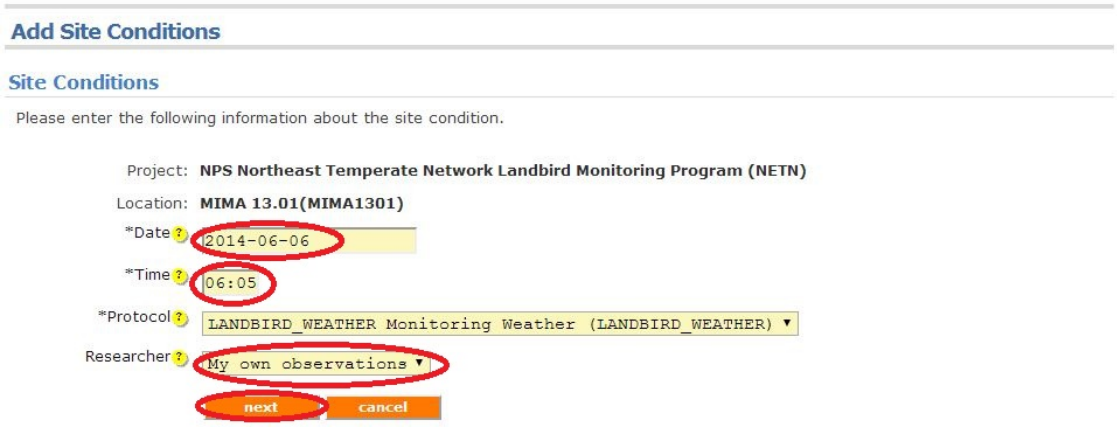
4. Click on the "+" next to your site to display the list of points.



5. Click on the first point you sampled. A list of existing dates with site observations will appear, as well as an option to "add new observations". Click on "add new observations".

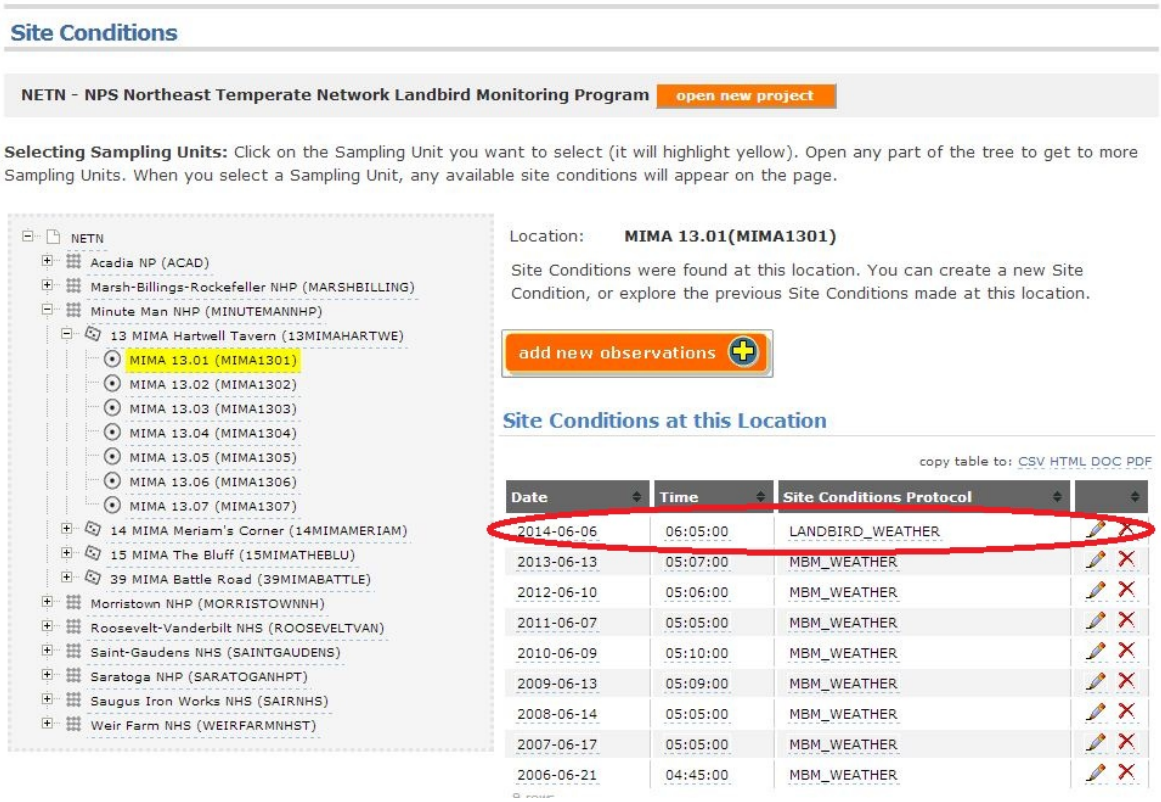


6. Enter the date (the database uses YYYY-MM-DD, but will attempt to convert other formats) and time of your observations. The researcher can be changed if the person entering data is different from the person collecting the data, but normally can be left at “My own observations”. Click “next”.



7. Enter the temperature, sky code, wind direction code, and wind speed code. Note that the database cannot handle alphabetical wind direction codes, so convert your codes as follows: 0 = No Wind, 1 = N, 2 = NE, 3 = E, 4 = SE, 5 = S, 6 = SW, 7 = W, 8 = NW, 9 = Not Recorded. Click Save after entering your condition codes.

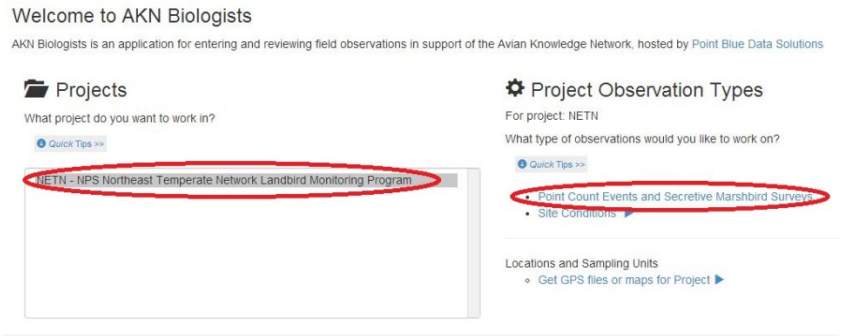
8. You will be returned to the screen from Step 5, and your newly entered site conditions will be reflected on the table of existing site conditions. Repeat Steps 5 – 7 for each additional point that was sampled.



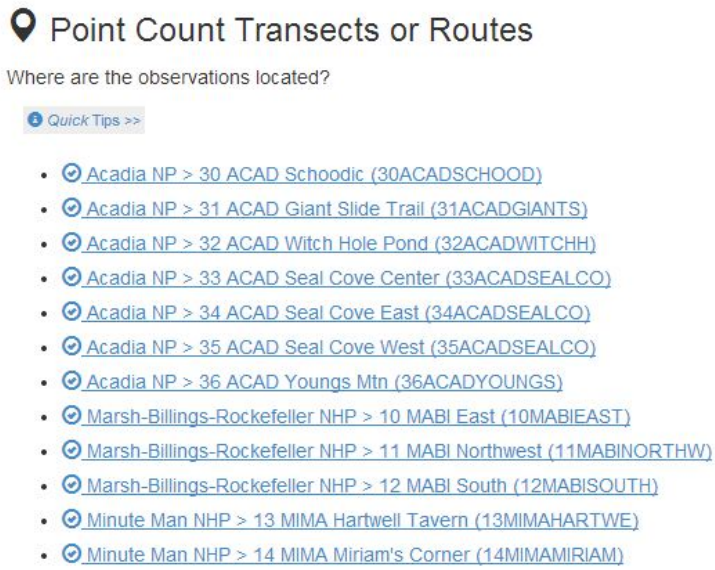
9. Once you have completed data entry of site conditions, log out of the database or close your browser. The site conditions are entered on an older application that does not connect back to the main application used for entering and reviewing observation data.

Proofing Observation and Site Data

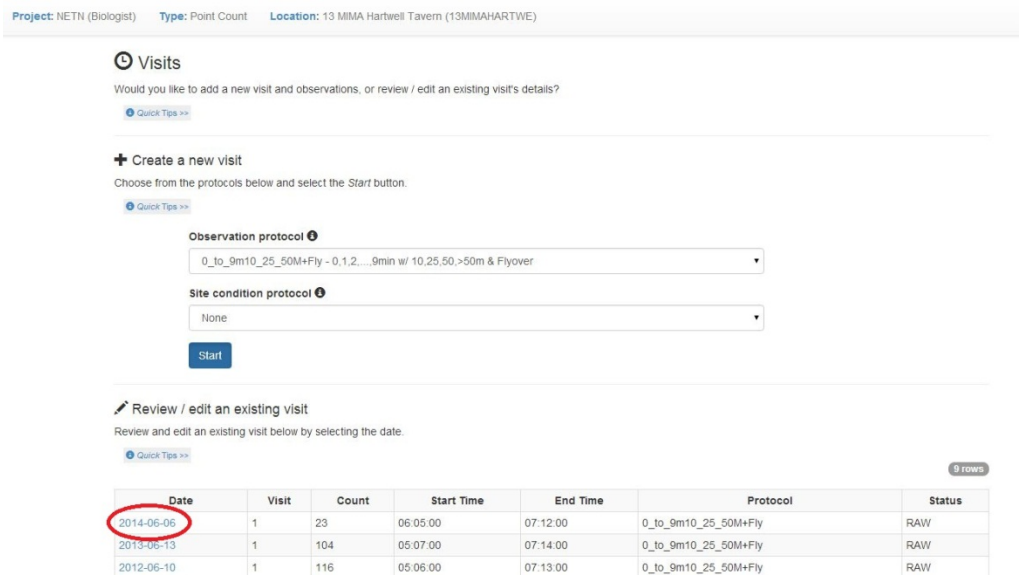
1. After logging back in (http://data.prbo.org/science/biologists; you may be logged in automatically) you will see the "Welcome" screen again. Make sure the project is highlighted ("NETN – NPS Northeast Temperate Network Landbird Monitoring Program") and click on "Point Count Events and Secretive Marshbird Surveys".



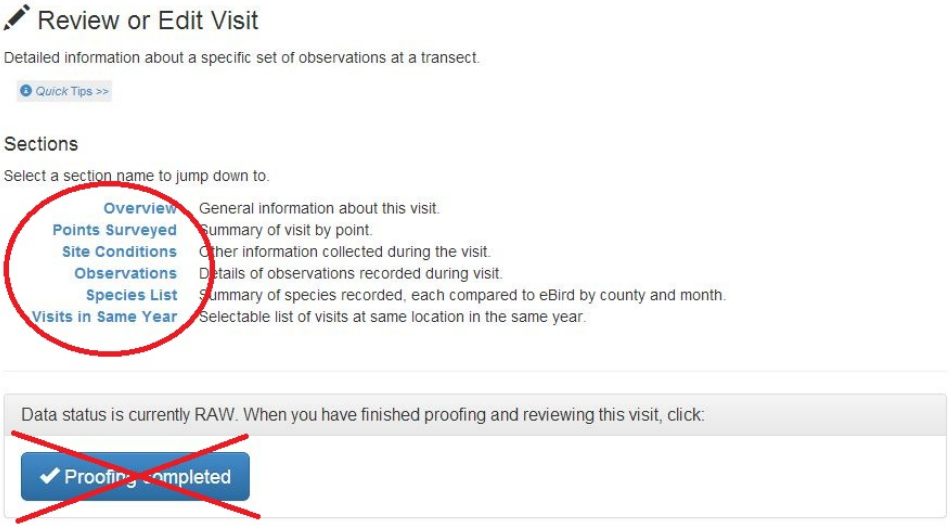
2. Choose your site from the list of landbird routes. The list is alphabetized by park name, then route number within each park. Note that the figure below only shows the top of the list of routes.



3. The next screen allows you to create a new visit (enter data) or review previous visits to the route. You want to “Review/edit an existing visit” rather than start a new visit, so click on the visit.

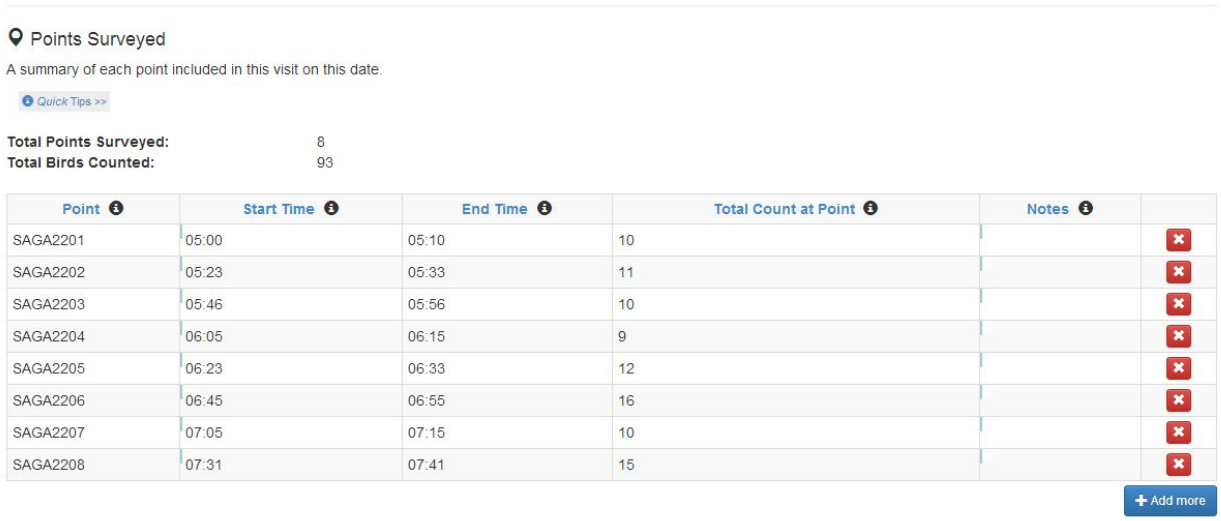


4. The next screen is long, and contains the data you entered as well as a species list. Clicking a link in the “Sections” portion will jump to a portion of the “Review or Edit Visit” screen. You will see a box that says “Proofing Completed”. DO NOT click this box until the data have been reviewed according to the procedures below.



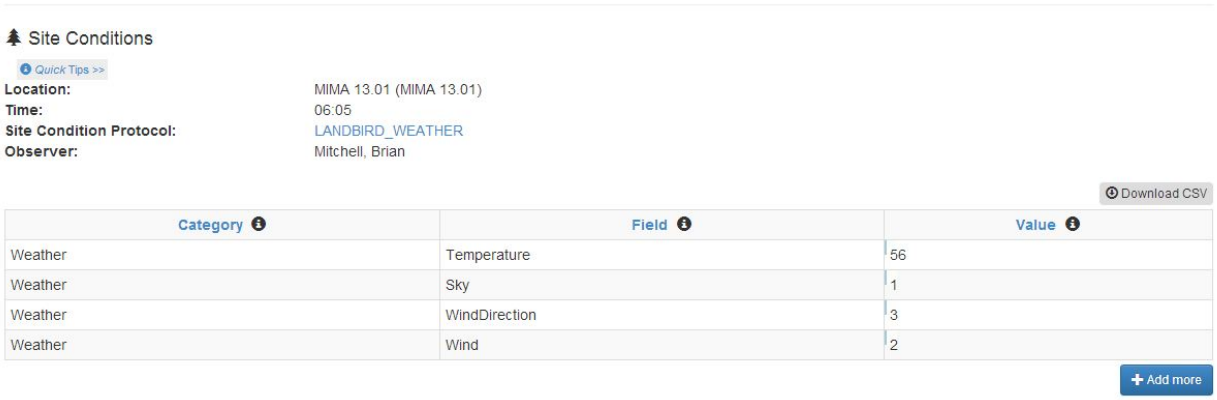
5. Begin by clicking the “Overview” link or scrolling to the Overview section. Verify the site (“Transect” in the database), Date, and Visit. These data cannot be changed; if there is an error contact the Project Manager for assistance.

6. Continue to the “Points Surveyed” section, either by scrolling down or using the link at the top of the page. Verify that all your points are listed, and that the Start Time for each point and any notes related to each point count are correct. If you need to edit a Start Time or Note, just double-click in the field and make your change. Unlike when entering observations, each change you make on this screen is saved to the database immediately after you leave the data field (by pressing enter or clicking outside of the field). This section also displays the number of species detected at each point (“Total Count at Point”).

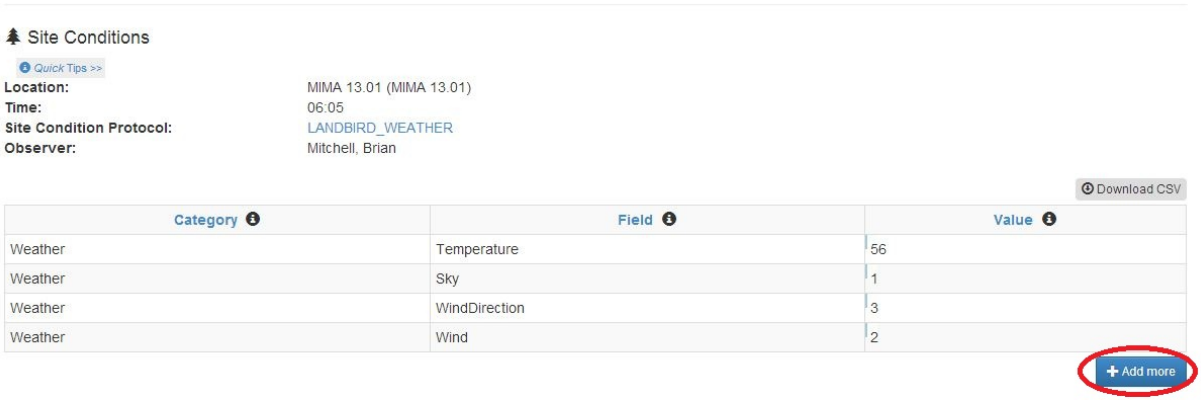


Point	Start Time	End Time	Total Count at Point	Notes
SAGA2201	05:00	05:10	10	
SAGA2202	05:23	05:33	11	
SAGA2203	05:46	05:56	10	
SAGA2204	06:05	06:15	9	
SAGA2205	06:23	06:33	12	
SAGA2206	06:45	06:55	16	
SAGA2207	07:05	07:15	10	
SAGA2208	07:31	07:41	15	

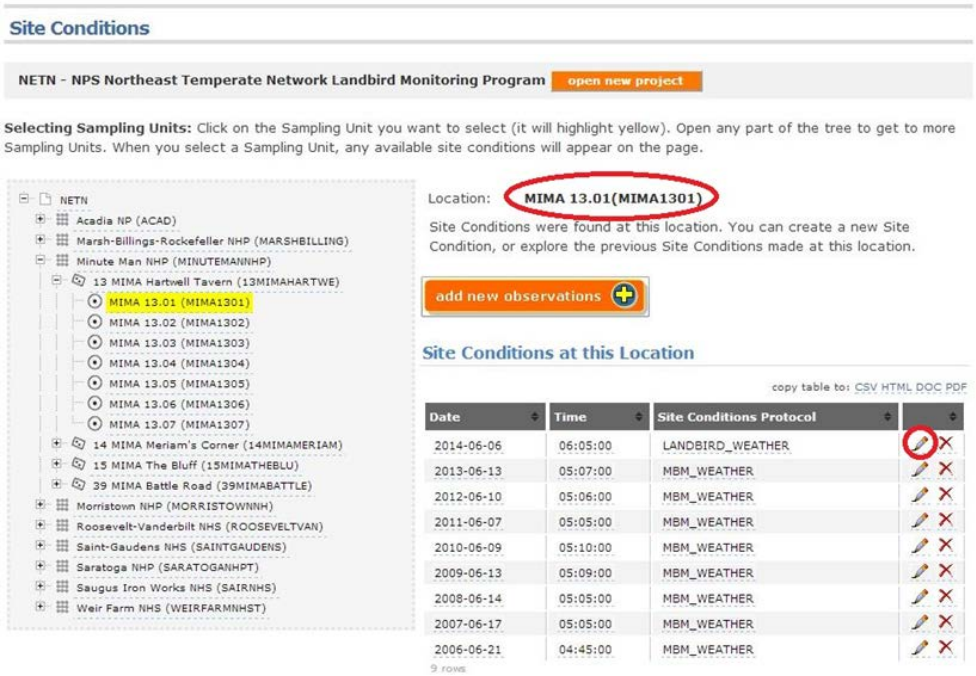
7. Continue to the “Site Conditions” section, either by scrolling down or using the link at the top of the page. Each point count station will be listed separately, and the stations might not be listed in order. For each station, verify the time, observer, temperature, wind direction, and wind speed (listed as “Wind”). The wind direction codes are: 0 = No Wind, 1 = N, 2 = NE, 3 = E, 4 = SE, 5 = S, 6 = SW, 7 = W, 8 = NW, 9 = Not Recorded.



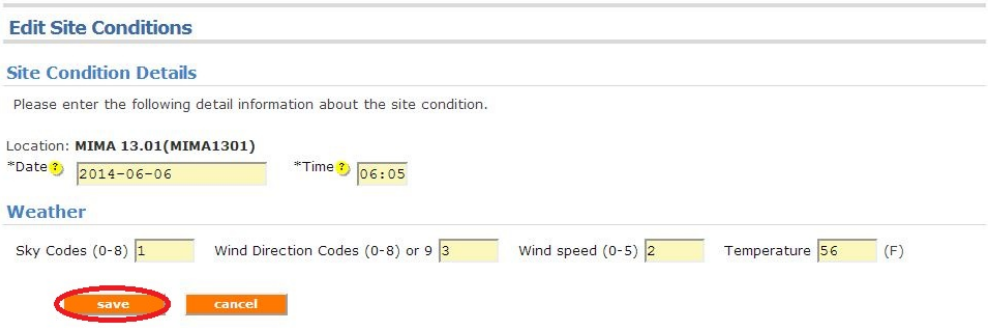
8. IMPORTANT: If you discover an error in the site conditions, the errors cannot currently be fixed from this screen. Making changes generates an error message and the data are not actually corrected even though the data on the screen are altered. Review all the site condition data and create a list of the corrections needed, then click the “Add more” button below the site conditions for the first point needing correction.



10. Verify the point count station on the next screen, and click the pencil icon for the date that you need to edit.

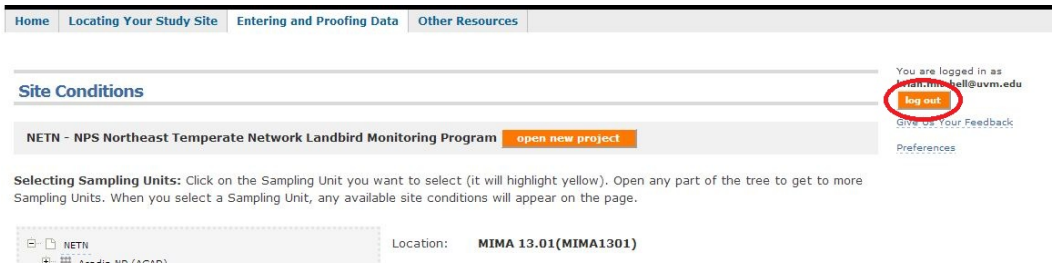


11. On the next screen, correct the data and click “save”.



12. If other points need correction, click the label for the next point on the left, and follow Steps 7b and 7c for each point.

13. Once you have completed correcting the site condition data, log out of the database or close your browser. The site conditions are entered on an older application that does not connect back to the main application used for entering and reviewing observation data.



14. Follow Steps 1-3 at the start of this section to get back to the data proofing screen for the correct visit.

15. Continue to the "Species List" section, either by scrolling down or using the link at the top of the page. This section will be below the "Observations" section. This section allows you to compare the species code used with the common name of the species. Please review the list carefully to ensure that you did not inadvertently use an incorrect species code. The Occurrence field is currently empty, but it will eventually provide information from eBird to indicate if the species is common, uncommon, rare, or never seen near the point count station and at the same time of year.

Species List

A summary of all species seen during this visit at all points.

Quick Tips >>

Total Species Observed: 28

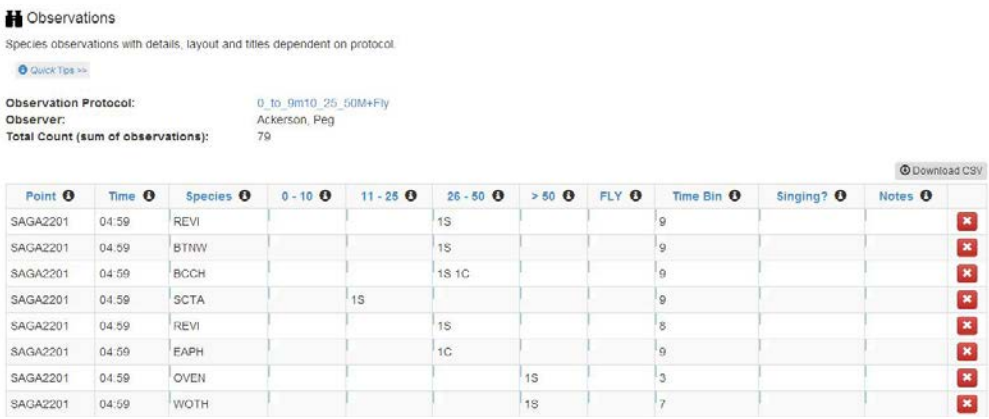
Download CSV

Species	Common Name	Scientific Name	Count for Species	Taxonomic Order	Occurrence
WISN	Wilson's Snipe	Gallinago delicata	1	496	
RBWO	Red-bellied Woodpecker	Melanerpes carolinus	1	1019	
PIWO	Pileated Woodpecker	Dryocopus pileatus	1	1056	
EAWP	Eastern Wood-Pewee	Contopus virens	3	1212	
EAPH	Eastern Phoebe	Sayornis phoebe	2	1239	
GCFL	Great Crested Flycatcher	Myiarchus crinitus	1	1254	

16. Once you are confident that your species codes are correct, scroll up to the "Observations" section. Review your data line by line, to ensure that the time, distance category, and detection type are correctly entered. Point and Time cannot be changed, and the "Singing?" column should be ignored. All other data can be corrected by double-clicking in the appropriate field. Each change you make on this screen is saved to the database immediately after you leave the data field (by pressing enter or clicking outside of the field).

17. NOTE: If your data coding sheet has multiple individuals of the same species detected at the same time, the database will consolidate the data into one row. For example, REVI seen in distance band 2 and heard in band 3 will have "1I" in the 11-25 column and "1C" in the 26-50 column on a single row. If they were both in distance band 2, "1C1I" will be in the 11-25 column, and if they were both heard in distance band 2 then "2C" will be in the 11-25 column.

Appendix S7.A. Online database instructions



Observations

Species observations with details, layout and titles dependent on protocol.

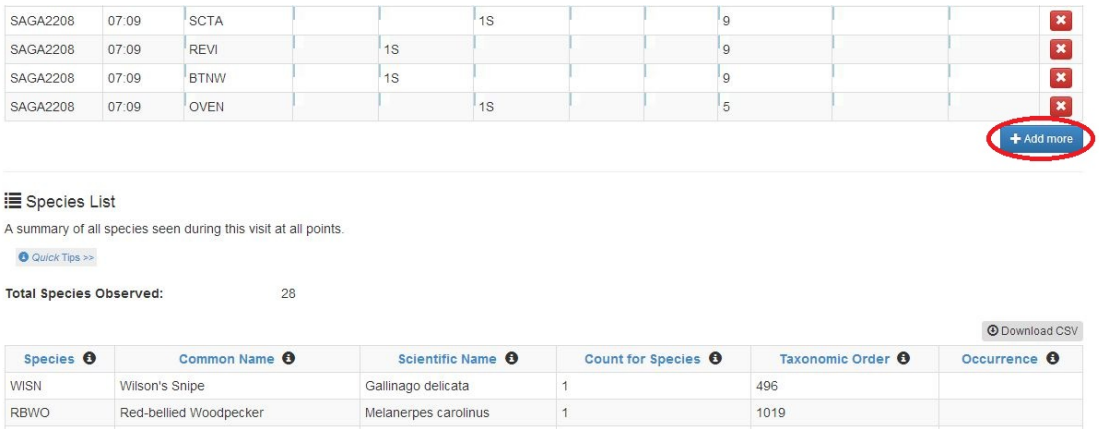
Quick Tips >>

Observation Protocol: 0_to_9m10_25_50M+Fly
Observer: Ackerson, Peg
Total Count (sum of observations): 79

Download CSV

Point	Time	Species	0 - 10	11 - 25	26 - 50	> 50	FLY	Time Bin	Singing?	Notes
SAGA2201	04:59	REVI			1S			9		
SAGA2201	04:59	BTNW			1S			9		
SAGA2201	04:59	BCCH			1S 1C			9		
SAGA2201	04:59	SCTA		1S				9		
SAGA2201	04:59	REVI			1S			8		
SAGA2201	04:59	EAPH			1C			9		
SAGA2201	04:59	OVEN				1S		3		
SAGA2201	04:59	WOTH				1S		7		

18. If you discover that one or more rows of data were not entered, click on “Add more” at the bottom of the Observations section.



SAGA2208	07:09	SCTA			1S			9		
SAGA2208	07:09	REVI		1S				9		
SAGA2208	07:09	BTNW		1S				9		
SAGA2208	07:09	OVEN			1S			5		

+ Add more

Species List

A summary of all species seen during this visit at all points.

Quick Tips >>

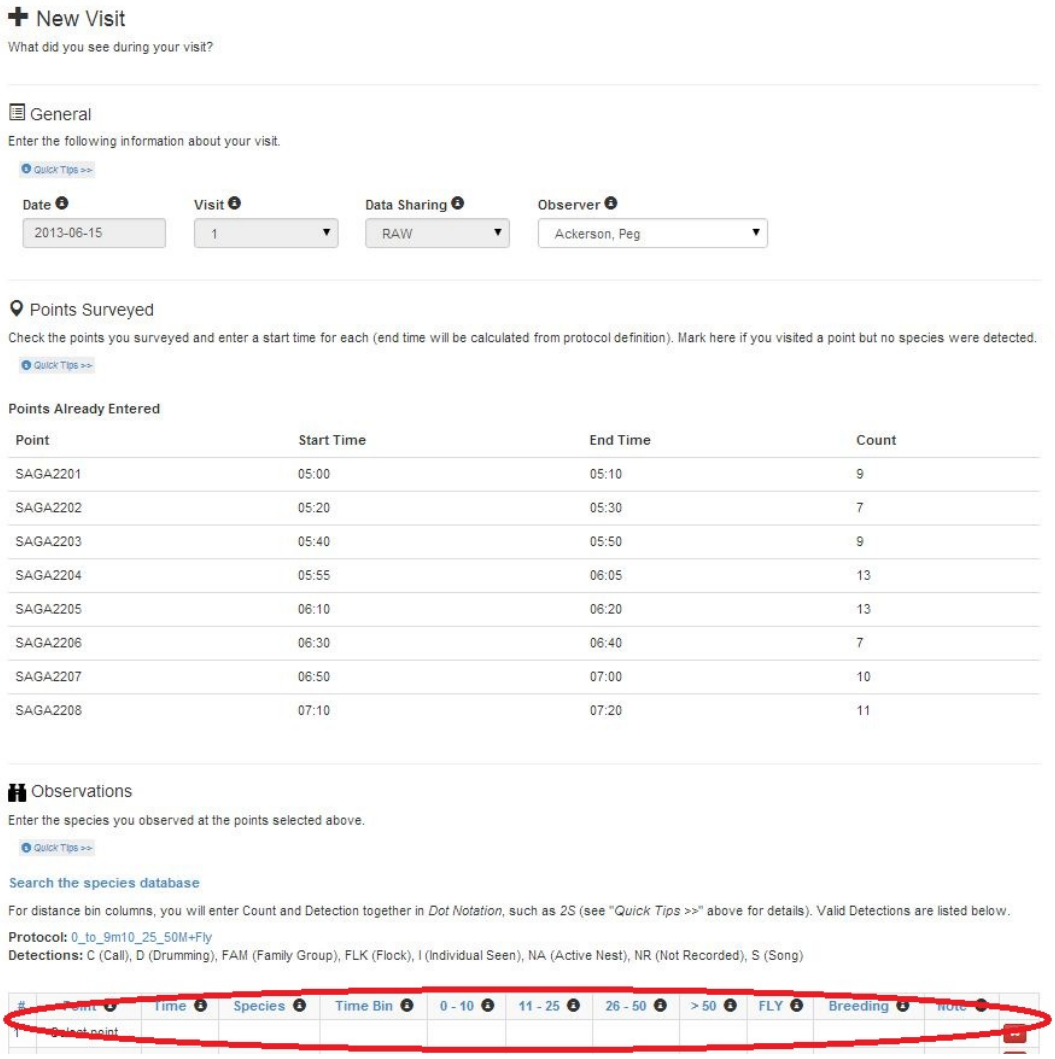
Total Species Observed: 28

Download CSV

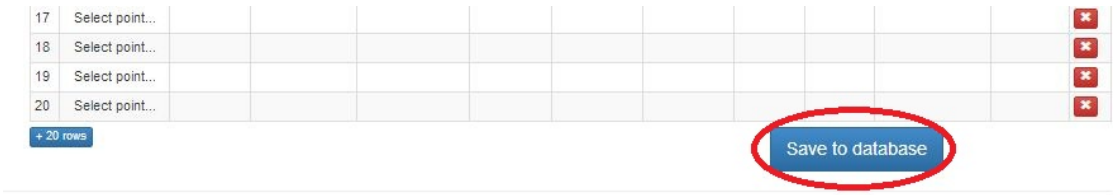
Species	Common Name	Scientific Name	Count for Species	Taxonomic Order	Occurrence
WISN	Wilson's Snipe	Gallinago delicata	1	496	
RBWO	Red-bellied Woodpecker	Melanerpes carolinus	1	1019	

19. You will be taken to a “New Visit” data entry screen, with a list of points surveyed and a data entry section for new Observations. Enter the missing data on this screen, and note that the Time (start time) will not be filled in automatically.

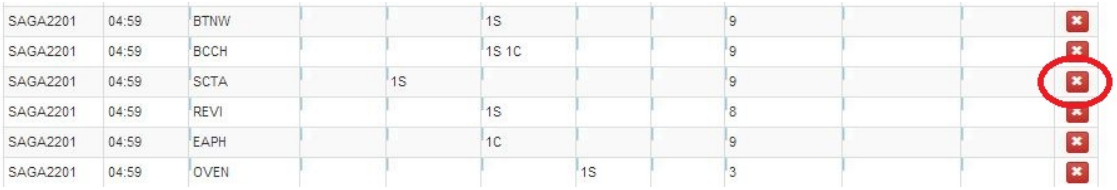
Appendix S7.A. Online database instructions



20. Click “Save to database” when done entering new data. You will be returned to the proofing screen.

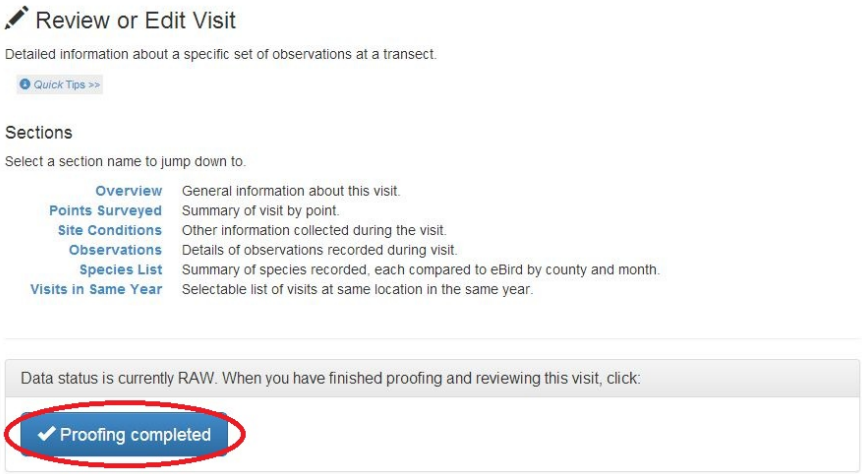


21. If you need to delete a row of data (e.g., you accidentally entered the same observation twice), click on the red “X” by the observation you want to delete. Say “OK” to the warning message to delete the data row.

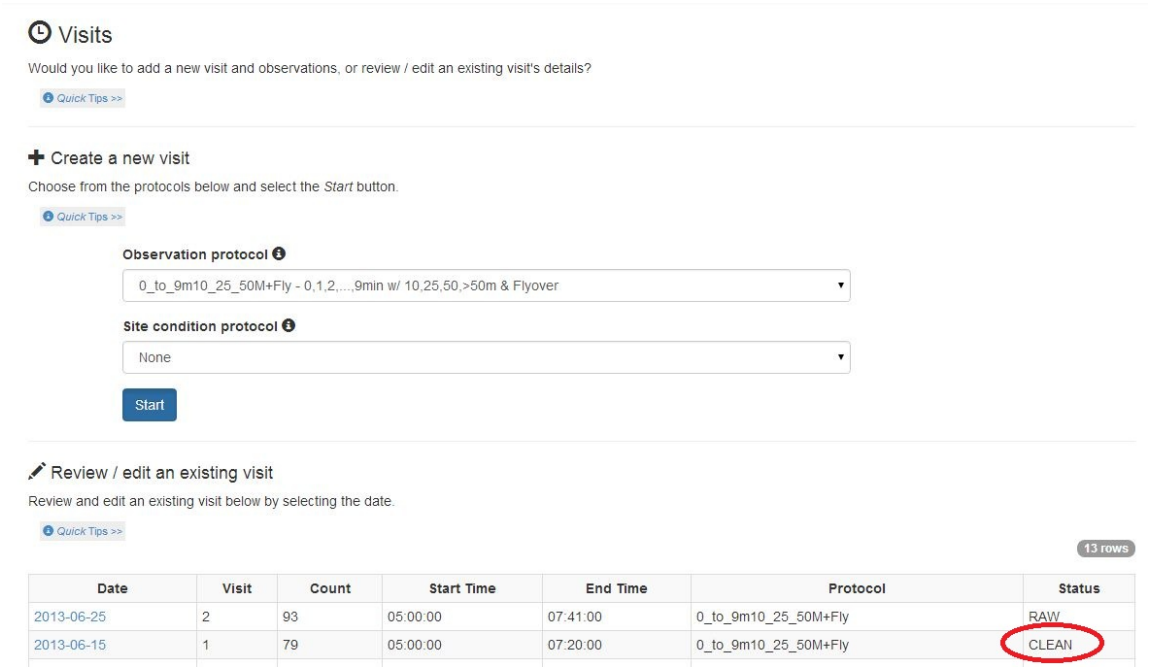


SAGA2201	04:59	BTNW			1S			9			
SAGA2201	04:59	BCCH			1S 1C			9			
SAGA2201	04:59	SCTA		1S				9			
SAGA2201	04:59	REVI			1S			8			
SAGA2201	04:59	EAPH			1C			9			
SAGA2201	04:59	OVEN				1S		3			

22. When you have completed reviewing all of your data, return to the top of the “Review or Edit Visit” screen and click on “Proofing completed”.



24. You will be returned to the “Visits” screen, and the Status of your data will now be “CLEAN” instead of “RAW”.



25. Congratulations! You’ve finished data entry. Please mail your field map and data coding sheets to the Project Manager.

Project Manager Tasks

User Management

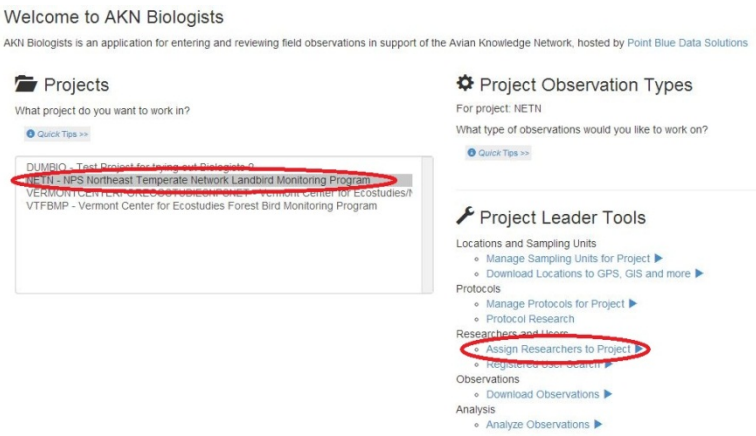
The project manager can add observers to the project, set observer status as “Active” or “Inactive”, and set observers up as a project leader and determine which project leaders receive e-mails from new users requesting access to the project.

Project participants can be assigned to the project as “Biologists/Researchers,” who can enter and edit data, or “Project Leaders,” who can publish, download, and analyze data as well as enter and edit data, and who can assign user roles. Point Blue recognizes other user categories (Observer, Citizen Scientist, and Analyst), but these categories do not appear to be under the control of the project manager, nor do they appear in the “Project Leader” tools for managing users.

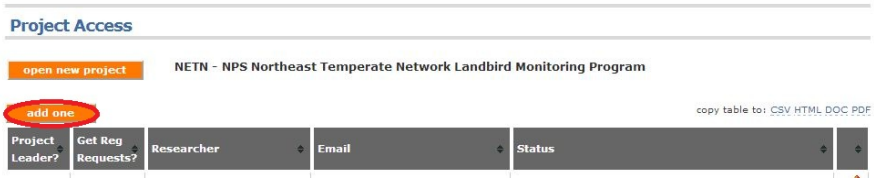
To add a user who has registered in the system:

1. Log in to the system (http://data.prbo.org/science/biologists/), make sure the correct project is highlighted (if you have access to more than one), and click on “Assign Researchers to Project”.

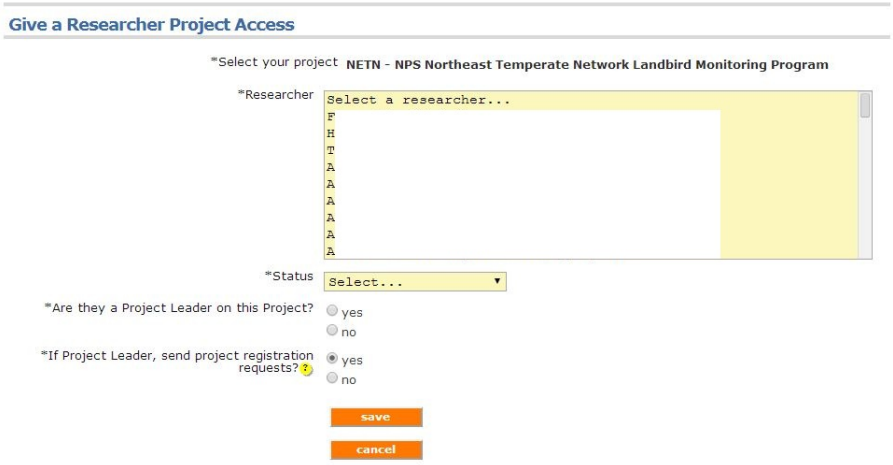
Appendix S7.A. Online database instructions



2. On the Project Access screen, click “add one”.



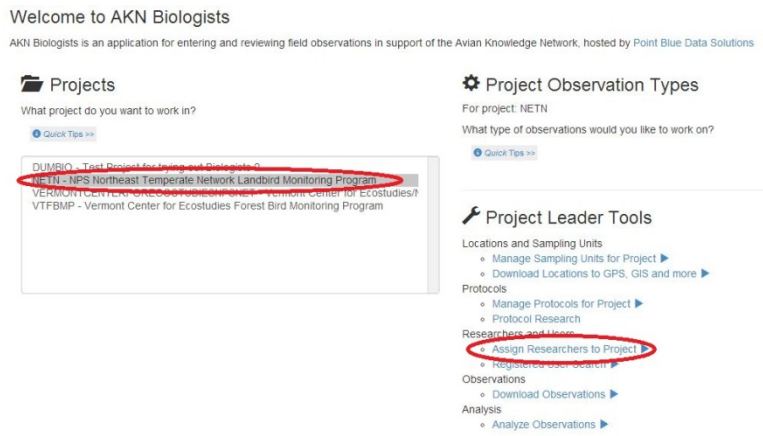
3. A new screen will open. Select a researcher name from the list, assign their Status as active or inactive, and check whether they are a Project Leader and whether they should get registration requests. Click “Save” when finished. Note that in the screen shot below, researcher names and e-mails have been removed to protect personally identifiable information.



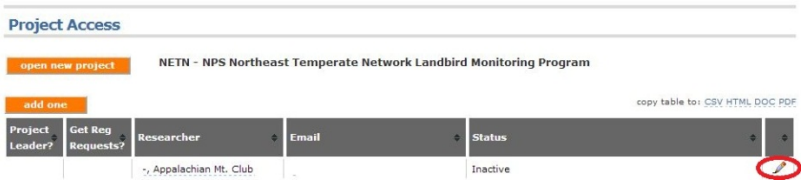
To update the status of a researcher assigned to the project:

1. Log in to the system (http://data.prbo.org/science/biologists/), make sure the correct project is highlighted (if you have access to more than one), and click on “Assign Researchers to Project”.

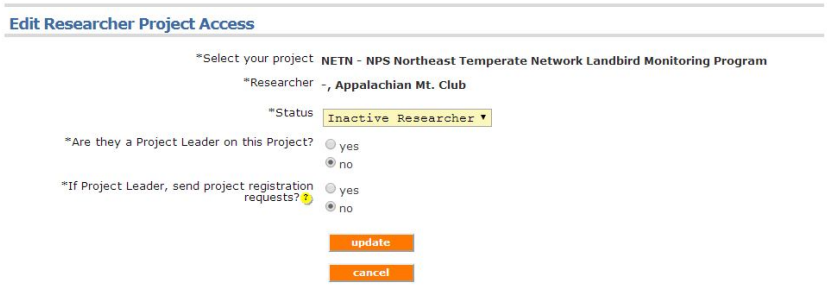
Appendix S7.A. Online database instructions



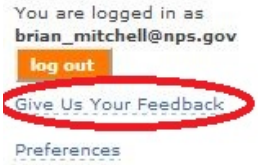
2. On the Project Access screen, click the pencil symbol at the far right of the row for the user.



3. On the screen that opens, you can update the status (Active or Inactive), and assign the Project Leader role and whether or not the Project Leader receives registration requests.



4. It is not possible for the Project Leader to remove a researcher. Use the "Give Us Your Feedback" link to ask for assistance if you need to permanently remove a researcher from the project. Researchers who have contributed data should not be removed; if there is data the researcher should be set to "Inactive".



Data Review and Certification

The data review process is identical to “Proofing Observation and Site Data”, above.

As each “CLEAN” site survey is reviewed during the 100% check, change the data status to “RESTRICTED”. This data status indicates that the data cannot be used without permission. To change the status, go to the “Overview” section, and double-click on the data status. Select the new status from the drop-down box that appears.

Once all data review is completed for the year and the data are deemed clean and final, load each visit for the year in turn and change the status to “AVAILABLE Level 5”. This is full public availability, and can be used for all NETN data. If a rare, threatened, or endangered species is detected in the monitoring, the park natural resource manager should be contacted to verify that this level of availability is appropriate. Table S7.A.1 contains the current potential data statuses, for reference.

Table S7.A.1. Potential data statuses in the online point count database.

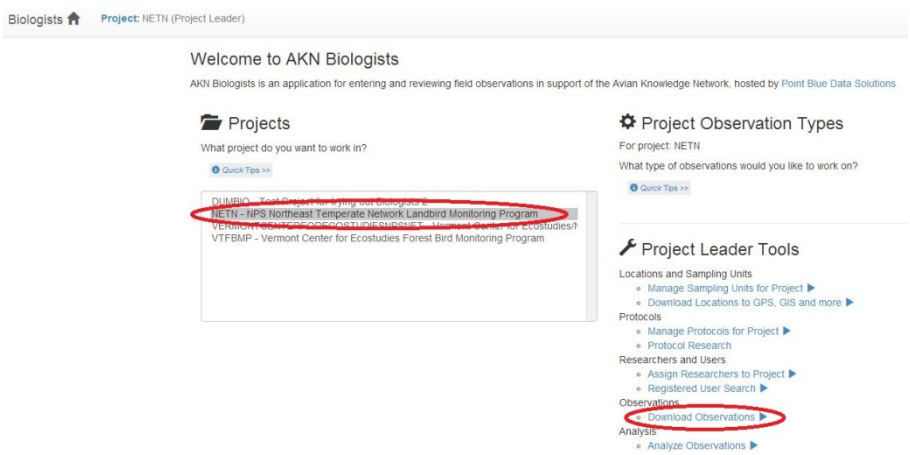
Status	Description
RAW	Raw Input − Unreviewed − do not use outside of project
CLEAN	Biologist Reviewed − awaiting project leader approval − do not use outside of project
RESTRICTED	Restricted access − clean and project leader verified data, but must contact Point Blue or contributing institution project leader or division director before using. Data is not distributed to other Avian Knowledge Network (AKN) partners automatically.
APPROVED	Available for analysis − internal Point Blue or contributing institution use only
AVAILABLE Level 1	Same as APPROVED but also shared with AKN: Data are stored in the AKN’s primary data warehouse. The warehouse serves as the primary archive of all AKN data, and no applications connect directly to the warehouse. Instead, data from the warehouse are ported to separate data views created specifically to optimize the performance of an application that connects to it. Data owners can specify how their data can be used in the data views, with the option that their data are not exposed to the public at all.
AVAILABLE Level 2	Same as AVAILABLE Level 1 with the following addition: data can be used in certain publicly available, predefined visualizations (i.e. maps and graphs), but direct access to the data is restricted.
AVAILABLE Level 3	Data are used in publicly available, predefined visualizations (i.e. maps and graphs). Additionally, the complete BMDE data set is available upon request, subject to approval from the original data provider.
AVAILABLE Level 4	Data can be used in publicly available, predefined visualizations (i.e. maps and graphs) and also may be available upon request. Additionally, some components of the data are made available to existing bioinformatic efforts (GBIF and ORNIS). These bioinformatic efforts only provide the data "marked-up" to Darwin Core, used to describe primary

Status	Description
	occurrence (location, date and species for example).
AVAILABLE Level 5	Data are used in publicly available, predefined visualizations (i.e. maps and graphs), and are available to existing bioinformatic efforts. Additionally, the complete BMDE data set is available for download directly via download tools.

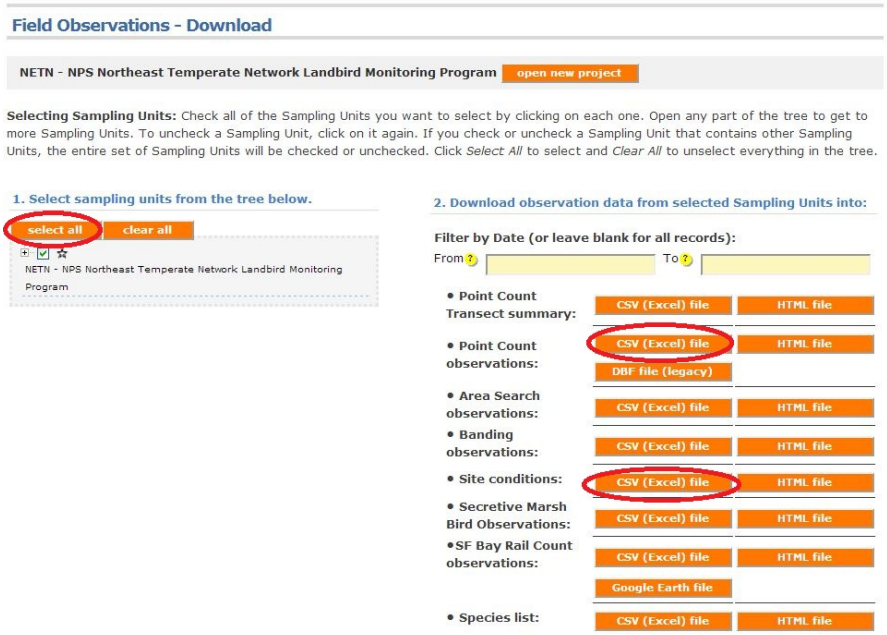
Downloading and Importing Data to the NETN Landbird Database

1. Someone with Project Leader permission (the Project Manager, NETN Data Manager, or NETN Program Manager) must log in to the online database (http://data.prbo.org/science/biologists/index.php).

2. Select the NETN project, and click "Download Observations".



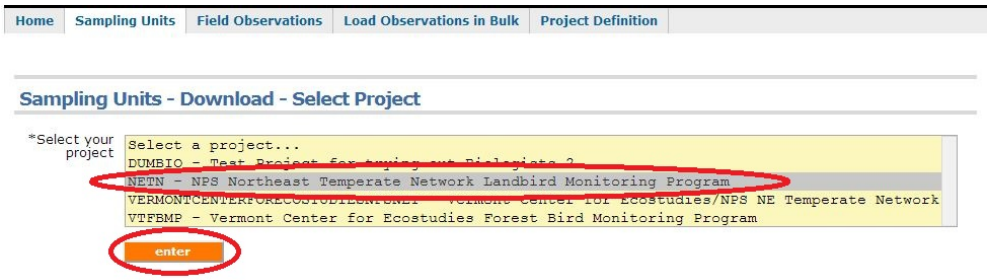
3. Click the "select all" button, then click on "CSV (Excel) file" for Point Count observations and Site conditions.



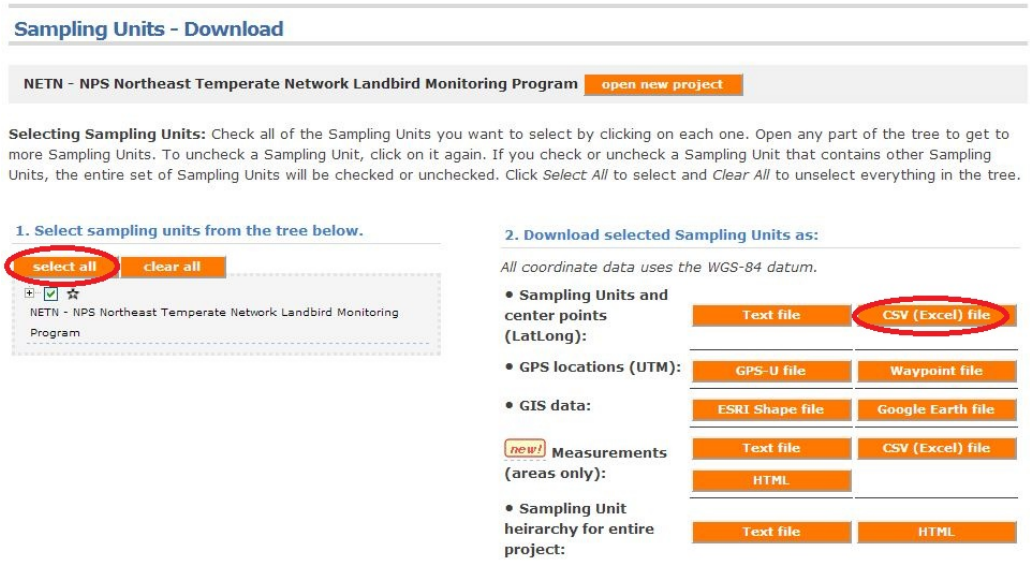
4. If any of the sampling sites have changed (e.g., new point count stations added to a route, or a new route added to the monitoring project), you will also need to download station location data. To download station data:

    a. Click on “Sampling Units” near the top-left of the screen, and click “Download” in the menu that appears.

    b. Select the NETN project if multiple projects are available, and then click “enter”.



    c. Click the “select all” button, then click on “CSV (Excel) file” for Sampling Units and center points (LatLong).



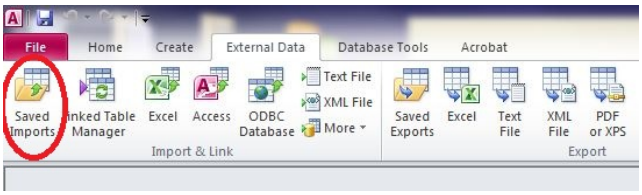
5. The data files will download to your default downloads directory. The files will be named “SamplingUnitProject_YYMMDDHHMMSS.csv”, where Y = Year, M = Month, D = Day,

H = Hour, M = Minute, and S = Seconds of the download (Pacific time zone). Rename the files “Point_Count_Observations.csv” and “Point_Count_Weather.csv”. If you downloaded station location data, name the file “Point_Count_Stations.csv”.

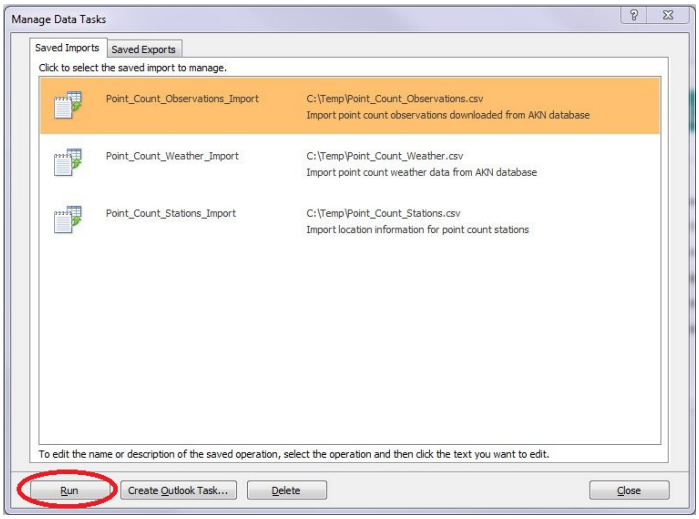
6. Move the downloaded files to C:\Temp.

7. Open each file in a text editor, and remove any blank rows under the header row (blank rows have a series of commas with no text).

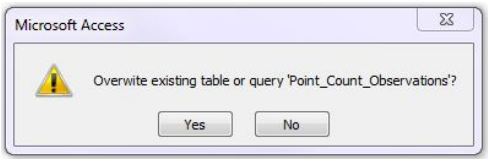
8. Open the “NETN Landbirds.mdb” database. Click on “External Data” on the ribbon, then “Saved Imports”.



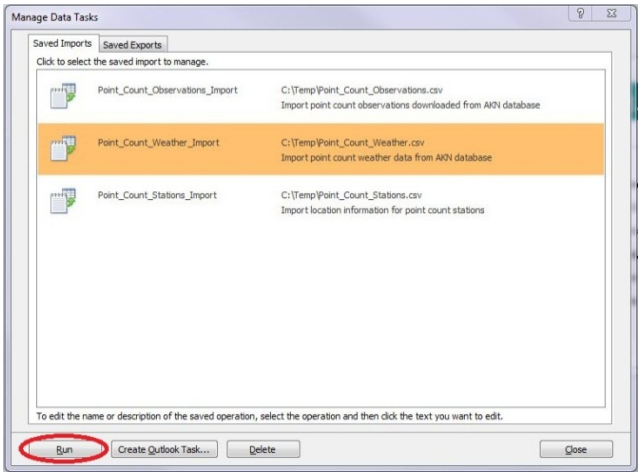
9. On the “Saved Imports” tab, make sure “Point_Count_Observations_Import” is highlighted, and click “Run”.



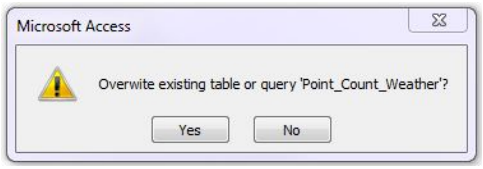
10. Click “Yes” when asked to overwrite the existing table.



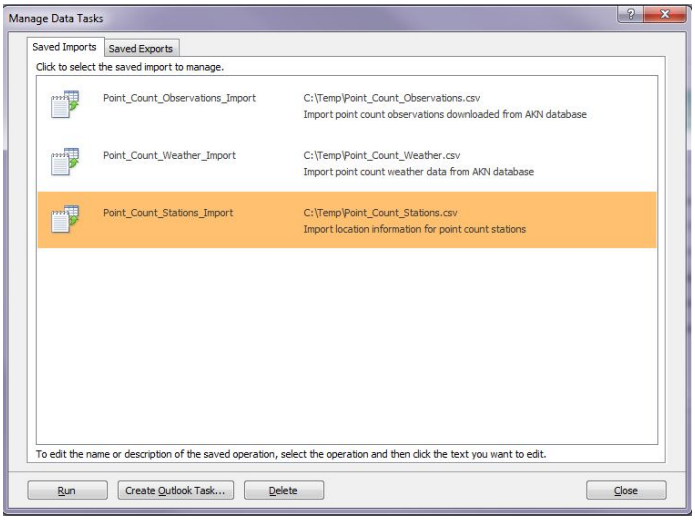
11. Then click on “Point_Count_Weather_Import” and click “Run”.



12. Click “Yes” when asked to overwrite the existing table.



13. If you downloaded station location data, click on “Point_Count_Station_Import” and click run, and click “Yes” when asked to overwrite the existing table.



14. Click “Close” to exit the dialog box.

Appendix S7.B. NETN Landbirds Database Procedures

The database used for analyzing and reporting data for this protocol is an analytical database (NETN Landbirds.mdb) developed by NETN staff. This database contains data tables downloaded from the online point count database. The procedures described in this appendix cover using the NETN Landbirds database to generate the assessments described in SOP 9 – Data Reporting. These procedures are written for Microsoft Access 2010.

Using the NETN Landbirds Database

1) The database will open to the Main Switchboard.

2) If this is your first use of the database for the reporting year, make sure to follow the procedures for "Annual Update to the NETN Landbirds Database", below. In particular, new observers need to be added correctly for their data to be viewable, and the report forms need to be updated to show the current year's data.

3) If there have been any changes to the data in the downloaded point count database, it is essential to click "Update Tables" from the "Updates" switchboard to ensure that the tables in the NETN Landbirds database are correctly populated. The update will take a few minutes and a progress bar will display; when the cursor changes back to a pointer instead of an hourglass, the update is finished. Make sure to also click the "Update Google Earth Tables" item to ensure the most recent information is available for Google Earth via the NETN web site.

4) There will not normally be a need to work with the queries and tables in the NETN Landbirds database; to view the database, press F11.

5) From the main switchboard, clicking on the Add Mammal Data button will open a customized data entry form. Select the location, date, observer, and point count station for the survey to which mammal data will be added. It is essential that the breeding landbird data for that survey already be entered in order for the data to link properly. If the point count in the mammal form's dropdown list isn't visible, verify that the most recent version/copy of the downloaded database is linked to the NETN Landbirds database. If so, check online to insure the breeding landbird data from that survey has already been entered.

6) Park and Site summary reports and charts (frequency of 10 most abundant species) can be viewed and exported using "Park and Site Summary Reports and Export". Reports can be viewed by park or site and the data can be exported to Excel (spreadsheets will export to c:\temp; make sure this directory exists on your computer).

    a) The column in the exported spreadsheet that contains the average number of birds of each species per site (or park) does not always contain the correct value. If a species was not seen at the site or park in one or more years, the value will be overestimated. The values in the report are correct.

    b) Charts will not export to Excel or Word; they can be printed to pdf if Adobe Acrobat is installed, or captured with a screen capture utility and inserted into a document as images.

c) Park and site summaries and charts are based only on the first visit to each point in each year to help make comparisons between years more consistent. The landbird ecological

d) integrity assessment reports, trend reports, and statistical modeling use all data collected, and repeat visits are particularly helpful for the statistical modeling.

7) Multi-year ecological integrity assessment reports (using a customizable number of years) can be generated using the "Landbird Assessment Reports" switchboard. These reports use all data collected for a given point, including repeat visits.

8) The other reports that are available include:

a) A list of all detections, with year, park, site, species, time, and distance. This may be useful for QC. The same button also opens queries listing the number of individual detections by site and by park for each year. These queries include all detections, including those from repeat visits of the same point.

b) A list of species that were detected on second and later surveys that have never been detected during the first survey of each study site, as well as a list of species detected in the second (or later) survey but not on the first survey of the study site in the most recent year.

c) Partners in Flight (PIF) Regional Concern and Continental Concern detections—numbers of individuals of each PIF species seen at each park. This query includes all detections, including those from repeat visits of the same point.

d) Connect the Dots Summary—this includes the calculation of the Shannon index by park, species richness by park, and PIF species (from an outdated list) seen in each park. The Shannon index is based only on the first visit to each point each year; the other data is based on all detections. This option is outdated, unused, and no longer functions correctly.

e) Sites Not Surveyed—Lists the sites that were not sampled each year.

f) There are also two reports listing the species in each guild.

9) There is also an option to "Export Protocol Tables". These are two tables (Appendix A to the Narrative and a table from SOP 9) that need to be updated after the PIF data are updated in the database. Print these tables to .pdf, and then from Acrobat save them as .jpg to insert them into the protocol.

<u>Annual Update to the NETN Landbirds Database</u>

1) Follow the instructions in "Downloading and Importing Data to the NETN Landbird Database"

2) Every year, the observer tables will need to by synchronized because NETN stores some additional information about observers in the NETN Landbirds database that is not saved in the downloaded database. If all NETN observers in the NETN Landbirds database are not correctly matched (using the field pwrc_ObsID) to the downloaded database, then data for observers that are not in the NETN database or with incorrect pwrc_ObsID values will not be reported. This

process is needed so that surveys from poor observers (skill level of 1) can be automatically excluded from reports.

a) On the main switchboard, click on “Update and Verify Observers” from the “Updates” switchboard. A dialog box will open, either with a warning that some observers don’t have matching pwrc_ObsID values, or a notice to update observer information and then press the “Update and Verify Observers” button again.

b) If a warning is displayed, two tables and two queries will open after clicking OK. The first query lists records where the pwrc_ObsID in the NETN table does not match any values in the downloaded table. The second lists records where either the first or last names do not match across the two tables. The two tables are t_Observers (from the downloaded database, read only) and tbl_NETN_Observers (from the NETN Landbirds database, editable). Use the queries to help correct the information in tbl_NETN_Observers. Once the information is updated, close both tables and both queries and click on “Update and Verify Observers” again to see if the corrections worked.

c) If a notice is received, two tables will open after clicking OK to the message: t_Observers (read only, from the downloaded database) and tbl_NETN_Observers (editable). Review the table to add any notes about observers (whether they are active or not, and update their skill level and observer notes with any new information. In addition, add any new observers to the table, and get their correct pwrc_ObsID off of t_observers. If a record is not added for each new observer, their monitoring data will not be reported by the NETN Landbirds database.

d) After making any changes to tbl_NETN_Observers, click on “Update and Verify Observers” again to ensure that the warning does not display.

1) From the “Updates” switchboard, select “Check for count errors” and enter the year of the data you want to check. A query will open that displays information for points where there is a chance that a stopwatch was used rather than a countdown timer (i.e., the first minute was coded as 0 rather than 9). If only one or two point counts for an observer are listed in the query, the data is probably OK. But if most or all of the counts from a specific observer are listed, then they probably were not using a countdown timer. Contact the observer to verify, then correct the data accordingly and add a note to the data sheet(s) and database.

2) Update information on progress towards completing the baseline 5 years of data collection in the tables “Baseline_Forest_IBI” and “Baseline_Grassland_IBI”. Specifically, for each site where the baseline 5 years has not been collected, determine if the most recent year completes the baseline, and update notes about missing data years.

3) If there is a new site added to the program:

   a. Adding a new site will require adding a new query: “Qry_Site_Summary_Report_2N”, where N is the next available letter and the new site name is used to limit the query. The new site

will be listed in table t_PointGroups. Failure to add this query correctly will result in the top ten most common birds not being highlighted in the site summary report.

b. Then the macro mac_Switchboard.UpdateTables will need a new row to include the new site in the intermediate table tbl_Site_Summary_Report_Intermediate

c. The site must also be added to the table "Baseline_Forest_IBI" or "Baseline_Grassland_IBI" as appropriate, along with data on the progress towards completing a baseline 5 years of data collection.

4) If there is a new park added to the program:

   a. Adding a new park will require adding a new query: "Qry_Park_Summary_Report_2N", where N is the next available letter and the new park name is used to limit the query. Failure to add this query correctly will result in the top ten most common birds not being highlighted in the park summary report.

   b. Then the union query "Qry_Park_Summary_Report_2" will need a new UNION ALL statement for the added query.

5) If there is a new park or site added to the program, you will also need to update tbl_Parks_and_BCRs with the new site and/or park name, as well as the BCR number. If the new site is a grassland site, then tlu_Grassland_Sites and Qry_ForestDetectionsBySiteAndYear and Qry_ParkSummaries need to be updated with the new grassland site name (for the queries, this goes in the PGName column). In addition, if the new site is a grassland the site number will need to be added to the criteria for GuildsWithNoSpecies_Grassland_3, qry_SitesNotSampled_2, and qry_SitesNotSampled_3.

6) Update the query Qry_New_Species_After_First_Survey_Current_Year:

   a. Open the query in design view.

   b. In the row labeled "Field", replace the field name in the final column (which should display the previous year) with the current year. NOTE that this will not work unless there is data from the current year available, and the tables have been updated.

   c. In the column labeled "Year", replace the criteria with the current year (it should display the previous year).

7) Review species detected that are not in forest or grassland guilds. These species are excluded from the ecological integrity assessment calculation, and if new species show up that should be in the assessment (e.g., a new passerine detected in an NETN park), they will need to be added to the correct guild(s).

a. Run the query qry_Species_with_No_Guild_Forest; provide a start year and end year (e.g., use most recent data year for both). Review the list for species that should be in a forest guild.

b. Run the query qry_Species_with_No_Guild_Grassland; provide a start year and end year (e.g., use most recent data year for both). Review the list for species that should be in a grassland guild.

c. If any species need to be added to a forest or grassland guild, add them to the table "GuildMembers" (for forest) or "GuildMembers_Grassland" (for grassland).

d. Note: if a species is not in any guild, but should be included in the ecological integrity assessment as part of the breeding landbird community (currently no species fall in this category), add an entry to the appropriate table in the previous step, but do not assign a guild.

e. If you have modified guild membership, don't forget to "Update Tables" from the main switchboard.

8) Make sure to update the Google Earth tables each year; from the main switchboard select "Updates", then "Update Google Earth Tables". The update may take several minutes.

9) The Park Summary Report will need to be updated every year:

a. Update the report's record source to include the new year for both the total number of points and for Shannon diversity (add the fields using the query builder). Add these new fields to the report.

b. If Access is responding very slowly, the following steps can be sped up by cutting the Record Source string for the report and pasting it into notepad. After the rest of the steps are completed, paste the string back and save the report.

c. Copy a set of fields from an earlier year and paste them into a clear spot on the report. Separate out the overlapping fields and name them correctly: the bottom field (control source will be =[YYYY]) should be named YYYY. The field with no formatting is YYYYDefault; the italicized field is YYYYCommon; the bold field is YYYYPIF; and the bold/italics field is YYYYPIF_Common. Edit the data source for each field to refer to the correct year in each formula.

i. Conditional formatting could have been used to display the appropriate formatting for report data, but unfortunately conditional formatting does not export from Access.

d. Add text box to calculate richness, named YYYY_Richness

e. Add text box to calculate birds per point, named YYYY_BPP

10) The Site Summary Report will also need an annual update. Follow 3A through 3E. NOTE: New fields from the Park Summary Report can be copied and pasted to the Site Summary Report; pasted items will have the same names and formulas as in the original.

11) Verify that no bird codes corresponding to birds in an ecological integrity assessment guild have changed. Use a query to link the guild list table with the species lookup table, and use a join to determine whether there are species in the guild table that lack a corresponding code in the lookup table. Correct any mismatched codes.

Other Updates to the NETN Landbirds Database

1) Unknown Species and Synonyms. The NETN Landbirds database removes codes for unknown species (currently UAHA, UNCS, UNGU, UNIN, UNKN, and UNWO) prior to reporting, and also converts synonyms to preferred codes (currently DEJU to SCJU, YRWA to MYWA, NOFL to YSFL, and SOVI to BHVI). The corrected table of species records is actually a query, "t_PointCounts_dist," and the corrections are made by the query "Qry_t_Point_Counts_dist." To change the unknown species exclusions or synonym conversion, modify the information in the third column of the query. To exclude a new Unknown code , add another "And <>" statement followed by the four letter code (in quotes). For a new synonym conversion, add a new nested IIF statement. Note that this query also limits the records used to the NETN surveys (since the AKN download also provides the VCE FBMP data) and to observers with skill level greater than "1". In addition, Survey IDs 328287 through 328292 have been excluded since they occurred in the late afternoon (the second survey at this site, MIMA Battle Road in 2012, was retained since it was an AM survey, even though it was later than most (started 9:30 AM).

2) PIF status table. The PIF priority codes are updated annually, and are available from the Rocky Mountain Bird Observatory (pif.rmbo.org). Download and import the new table as follows:

    a. Go to pif.rmbo.org. Click "Scores" and then "BCR Breeding List" and then "Download all BCRs".

    b. In Access, rename the table "ALL_BCRs" to "All_BCRs_YYYY" where YYYY is the previous year.

    c. Select "External Data"… "Import & Link"… "Text File". Browse to select the file, and then select "Import the source data into a new table…" and then click "OK".

    d. Select "Delimited" then click "Next". Select "Comma" as the delimiter, click to check "First Row Contains Field Names", and select double-quotes as the text qualifier. Click "Next" three times. Name the table "ALL_BCRs" and click "Finish".

    e. Compare the tables by opening each one. Look for changed field names, data types, and changes to the way the data are stored (e.g., "Y" and "N" changed to "True" and "False".

Currently the fields that are used by the PIF queries are: BCR, Common Name, Action, AOU_52, UCC, RC, CBSD, RS, and UCS.

f. Convert the “BCR” field to an Integer Number format.

g. If there have been changes to field names and formats, update all qry_PIF_CC_and_RC and qry_PIF_CC_and_RC_2 queries such that any changed fields are loaded into the _2 query and then modified to look like the old values by the other query. This is so that changes don’t have to be cascaded through a large number of queries. Do the same for Qry_ALL_BCR and Qry_ALL_BCR_2, as well as the Qry_App_A group of queries.

h. Some other queries that use the PIF data differently are related to the qry_Summary group; this group of queries is related to an outdated effort to generate “Connect the Dots” summaries and can be ignored.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	January 2006	Steve Faccio	SOP used beginning with the 2006 field season.	
1.01	April 2006	Brian Mitchell	Added revision log.	
2.00	October 2008	Steve Faccio	Major revision to reflect use of the USGS Point Count Database. Added Appendix 5.1: Data Entry Instructions. Moved revision log to Appendix 5.2.	
3.00	March 2009	Brian Mitchell	Moved revision log to Appendix 5.3. Added Appendix 5.2: NETN Breeding Landbird Database Procedures.	
3.01	April 2009	Brian Mitchell	Updated Appendix 5.2 to reflect addition of park and site summary reports and charts, grassland ecological integrity assessment reports, and some database maintenance tasks that will be needed each year.	
3.02	August 2009	Sarah Lupis	Formatting, minor editorial changes.	
3.03	December 2009	Steve Faccio and Brian Mitchell	Minor revision in response to reviewers comments; updated Appendix B to reflect changes in the database.	
4.00	February 2010	Adam Kozlowski	Major revisions to body of document to flesh out specific QAQC procedures. Added Figures S7.1 through S7.3. Added instructions on handling mammal data.	
4.01	May 2011	Brian Mitchell and Kevin Morris	Update online data entry instructions, including procedures for entering flock data. Update NETN Landbird database instructions to include management of volunteer information.	Refined procedures. Need to eliminate data from poor observers.
4.02	May 2012	Brian Mitchell	Update database management and updating instructions to reflect current version of the database.	Database revision.
4.03	December 2012	Brian Mitchell	Update database management and updating instruction to reflect current version of the database.	Database revision.
4.04	April 2014	Brian Mitchell	Data sheets must be mailed to Project Manager within a month of field data collection, even if sheets or online data entry are incomplete. Removed references to project management by VCE, replaced with “Project Manager”. Revise data procedures to reflect incorporation of mammal data in new online database. Original data forms are now sent to NETN rather than retained by the	Speed up data processing, entry, and QC. Make SOP more general for future use. Change in online database

Version	Date	Revised By	Changes	Justification
			contractor. Copies are not needed, since forms are scanned and placed on IRMA.	Original forms should not reside with a contractor
			The Point Count Database is now part of the Avian Knowledge Network rather than USGS.	Change in database manager
			Updated SOP numbers due to insertion of SOP 6 (recorder QC procedures).	Adjustment due to new SOP
			Updated data entry procedures.	New online database
			Updated procedures for downloading data copy and linking to NETN Landbird database.	New online database

SOP 8 - Data Analysis

Northeast Temperate Network
Version 1.04

Overview

This SOP discusses analytical procedures for breeding landbird data collected using point counts.

A wide variety of appropriate analytical methods may be used with point count data, depending on the objectives of the monitoring program, as well as those of the various parks within the Northeast Temperate Network (NETN). Analyses will include annual summaries that consist of relatively simple statistical tabulations, and periodically more complex methods that may include estimates of population densities, trends, and species habitat associations. In some cases, these more complex analyses may require the assistance of a professional biostatistician.

With minor exceptions, our data analysis procedures and recommendations will follow those described in SOP #9 of the U.S. Fish and Wildlife Service (USFWS) Landbird Monitoring Protocol (Knutson et al. 2008). That document provides recommendations about which analyses should occur annually, and which should occur on a periodic basis (e.g., every 3-5 years). We will work with the USFWS and Point Blue to streamline some common data summaries and analyses to enhance the usefulness of the Bird Point Count Database. Below we describe the two primary ways that our data analysis methods will differ from Knutson et al. (2008).

1. In the USFWS protocols, vegetation data are collected in association with bird point counts (see SOP #6 in Knutson et al. 2008), and recommendations are made in SOP #9 on how to summarize and analyze these data annually and periodically. Although we are not collecting habitat data at each avian point count, forest vegetation sampling is being conducted within NETN parks, and we will attempt to associate vegetation data from nearby forest monitoring plots that are in the same habitat type using appropriate statistical methods.

2. We will assess the biological integrity of the avian community as described in SOP #7, rather than using methods based on Howe et al. (2007a, 2007b) as described in SOP #9 of the USFWS protocol.

Beginning in 2013, NETN will develop additional analyses that may become standardized for trend reporting. If standardized analyses are possible (e.g., for occupancy modeling), details will be added to this SOP.

Literature Cited

Howe, R. W., R. R. Regal, J. Hanowski, G. J. Niemi, N. P. Danz, and C. R. Smith. 2007a. An index of ecological condition based on bird assemblages in Great Lakes coastal wetlands. Journal of Great Lakes Research 33:93-105.

Howe, R. W., R. R. Regal, G. J. Niemi, N. P. Danz, and J. Hanowski. 2007b. Probability-based indicator of ecological condition. Ecological Indicators 7:793-806.

Knutson, M. G., N. P. Danz, T. W. Sutherland, and B. R. Gray. 2008. Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions, Version 1. Biological Monitoring Team Technical Report BMT-2008-01. U.S. Fish and Wildlife Service, La Crosse, Wisconson.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	April 2009	Steve Faccio	SOP written.	
1.01	August 2009	Sarah Lupis	Revision History Log added Formatting, minor editorial changes.	
1.02	December 2009	Brian Mitchell	Removed reference to Appendix 2 and added statement that additional details will be provided as standardized analyses are developed.	
1.03	December 2012	Brian Mitchell	Updated data analysis work postponed to 2013.	Insufficient time and staff for analyses.
1.04	April 2014	Brian Mitchell	Replace reference to USGS with Point Blue and USFWS. Update SOP number.	USGS is no longer managing database. New SOP.

SOP 9 - Data Reporting

Northeast Temperate Network
Version 2.05

Overview

This SOP explains the procedure for data reporting.

Effective communication and reporting is essential for transforming field data into a format that is both useful and clearly understandable by park managers, scientists, the public, and policy makers. This will be accomplished by developing standard statistical summaries of vital sign measurements, as well as developing a biological integrity scorecard that provides basic interpretation of the status and trends for this vital sign. Refer to SOP 8 – Data Analysis for a description of how to summarize and analyze the data.

Several different types of reports summarizing and interpreting breeding landbird survey data may be presented, including annual reports, analysis and synthesis reports (e.g., population trends and habitat relationships), protocol review reports, scientific journal articles, and symposia, meetings, and workshops. At a minimum, two different interim (annual) reports will be produced at the close of each season's fieldwork: the Northeast Temperate Network (NETN) Fiscal Year Report, and an Annual Data Summary Report.

NETN Fiscal Year Report

Due annually in October, this consists of a brief (< 1-page) report summarizing any highlights and significant findings, including any publications, reports, and presentations, that have come out of the work over the course of the fiscal year. The NETN Program Manager will provide guidance and examples of previous reports as needed.

Annual Data Summary Report

This report summarizes results from the field season by park, and describes patterns of breeding landbird composition, distribution, and change, as well as assessing the biotic integrity of the avian community (see below). This report is due by March/April each year following a survey and is submitted to the NETN Program Manager, to each NETN park, and to all volunteer participants.

Forest Breeding Landbird Assessment

An assessment of the biotic integrity of the avian community based on an assemblage of behavioral and physiological response guilds, similar to O'Connell et al. (2000), will be utilized for forest breeding landbirds (an assessment and scorecard ranking for the grassland breeding landbird community at Saratoga and Minute Man NHPs is discussed below). Such a biotic integrity scorecard will help elucidate changes in a broader, landscape context and indicate in which direction the park may be moving along a disturbance gradient from "highly disturbed" or "urban," to "pristine" or "natural." Croonquist and Brooks (1991) demonstrated that response guilds, which are groups of species that require similar habitat, food, or other elements for survival, are effective indicators of

habitat disturbance. Changes in availability of specific resources are manifested as population responses in the species dependent on that resource. For example, the loss of snags in a forest stand can result in a decrease in the guild of bark-probing insectivores. As O'Connell et al. (2000) indicate, an assessment of response guilds functions like an index of biotic integrity (Karr 1991, Karr and Chu 1999), providing a system-specific framework in which species assemblages can be ranked on a qualitative scale. This type of avian integrity assessment provides a means to estimate condition that, unlike species richness or Shannon diversity, is not confounded by intermediate levels of disturbance as demonstrated by Blair (1996).

The guild-based avian integrity scorecard is based upon O'Connell et al. (2000) and consists of 13 guilds in eight guild categories (Table S9.1). Individual guilds were broadly categorized as "specialist" or "generalist" based on each guild's relationship to specific elements of ecosystem structure, function, and composition (Noss 1990). A specialist can be a species with a narrow range of habitat tolerances, or one that exhibits a low intrinsic rate of population increase. For our purposes, specialist guilds may be thought of as "guilds indicative of a high-integrity condition" while generalist guilds are "guilds indicative of a low-integrity condition." For example, the Nest Placement guilds relate directly to the availability of appropriate nesting substrate (a structural element). Therefore, breeding landbirds that only nest in the forest canopy (specialists) indicate high integrity condition because they are largely restricted to mature forests native to the region, while shrub nesters (generalists) also encounter appropriate nesting substrate in regenerating forests, agricultural hedgerows, and suburban areas. Functional elements of the ecosystem reflect trophic organization. For example, insectivores are limited to areas of high insect availability (specialists), while omnivores can exploit the range of food resources found in varied habitats (generalists). Ecosystem composition reflects organization induced by factors other than structure and function (e.g., interspecific dynamics). For example, species in the nest predator/brood parasite guild can affect the abundance and distribution of other species. We consider nest predators and brood parasites to be generalists due to their relatively indiscriminate exploitation of other species as sources of food or surrogate parents, while many single-brooded species (specialists) are restricted to large habitat patches that are relatively free from nest predators and brood parasites.

It is important to keep in mind that guilds were selected to reflect different aspects of each species' life history traits. Therefore, species may belong to several guilds simultaneously, including both specialist and generalist guilds.

With species assigned to guilds (Appendix S9.A), the proportional species richness of each guild is calculated. Following O'Connell et al. (2000), the species list is limited to five groups: Passeriformes (perching birds), Piciformes (woodpeckers), Cuculiformes (cuckoos), Apodiformes (swifts and hummingbirds), and Columbiformes (doves). Proportional species richness is then the number of guild members detected, divided by the total number of species detected from the five groups. This value is used to determine a rank of "Good", "Caution", or "Significant Concern" (Table S9.2). "Good" represents acceptable or desired conditions (a high level of ecological function); "Caution" indicates a problem may exist; "Significant Concern" indicates undesired conditions (hampered ecological function) that may benefit from management action.

Table S9.1. Biotic integrity elements, guild categories, response guilds, and guild interpretations used in avian biotic integrity scorecard.

Biotic Integrity Element	Guild Category	Response Guild	Specialist	Generalist
Functional	Trophic	Omnivore		X
Functional	Insectivore forager	Bark prober	X	
Functional	Insectivore forager	Ground gleaner	X	
Functional	Insectivore forager	High Canopy forager	X	
Functional	Insectivore forager	Low Canopy forager	X	
Compositional	Origin	Exotic		X
Compositional	Migratory	Resident		X
Compositional	Number of broods	Single-brooded	X	
Compositional	Population limiting	Nest predator/brood parasite		X
Structural	Nest Placement	Canopy Nester	X	
Structural	Nest Placement	Shrub Nester		X
Structural	Nest Placement	Forest-ground Nester	X	
Structural	Primary habitat	Interior forest obligate	X	

Table S9.2. Avian Integrity Ranks for 13 response guilds and proportional species richness thresholds (based on O'Connell et al. 2000, and Glennon and Porter 2005).

Biotic Integrity Element	Response Guild Metric (Proportional Species Richness)	Ratings		
		Good	Caution	Significant Concern
Functional	Omnivore	<30%	30-50%	>50%
	Bark Prober	>11%	4-11%	<4%
	Ground Gleaner	>9%	4-9%	<4%
	High Canopy Forager	>12%	7-12%	<7%
	Low Canopy Forager	>22%	14-22%	<14%
Compositional	Exotic Species	0%	0.5-7%	>7%
	Residents	<28%	28-41%	>41%
	Single Brooded	>68%	50-68%	<50%
	Nest Predators/Brood Parasite	<10%	10-15%	>15%
Structural	Canopy Nester	>35%	29-35%	<29%
	Shrub Nester	<18%	18-24%	>24%
	Forest-ground Nester	>18%	5-18%	<5%
	Interior Forest Obligate	>35%	10-35%	<10%

For example, if the breeding landbird community at a given site contains a total of 10 species, two of which are omnivores, then 20% of the species at that site are in the omnivore guild, and the site receives a rank of "Good" for that guild (Table S9.2). The proportional species richness thresholds and ranks are largely based on those derived by O'Connell et al. (2000) for breeding landbirds in forested habitats in the central Appalachians, as well as from those derived by Glennon and Porter (2005) for New York's Adirondack Park. Considering the wide geographic range over which the 11 NETN parks are distributed, the threshold values listed in Table S9.2 may need to be adjusted by bioregion, forest type or Bird Conservation Region (BCR), rather than Network-wide. Additionally,

these threshold values can be refined over time as new information about their ecological relevance is obtained.

Some ecological integrity reporting efforts have developed point-based indices to aggregate information describing integrity of individual metrics into overall ecosystem scores (Karr 1981, O'Connell et al. 2000). The success of those efforts relies upon a subjective understanding of the relative importance of individual metrics in determining overall ecosystem integrity, and in some cases may obscure individual ecosystem components that are in need of attention. Thus, this avian integrity scorecard attempts to concisely convey information on each individual response guild metric, and provide summary information only on the number of metrics classified as "Good," "Caution," and "Significant Concern" in each park. We recognize that the National Park Service (NPS) will need to aggregate this information at higher levels (such as by Vital Sign) for reporting at the national level. For that reason, this scorecard adheres to NPS Vital Signs reporting conventions, and should provide NPS with the necessary information for aggregation.

The following section provides an overview, justification, and scaling rationale for each metric.

Functional Guilds

Omnivores

Overview: This metric evaluates the proportion of omnivorous species within the avian community.

Metric Justification: Omnivores can exploit a wide range of food resources found in varied habitats, and therefore are considered generalists that do not require high integrity or specialized habitats. This large guild consists of 44 species, including American Crow (*Corvus brachyrhynchos*), Blue Jay (*Cyanocitta cristata*), American Robin (*Turdus migratorius*), Brown-headed Cowbird (*Molothrus ater*), and sparrow species.

Scaling Rationale: O'Connell et al. (2000) found that as you move along a gradient from high-integrity to low-integrity the proportion of omnivores in the breeding landbird community increased from roughly 25% to > 50% of the species. This was less dramatic in the Adirondacks, with Glennon and Porter (2005) reporting about 29% in wilderness areas to 38% in low-density village areas.

Good = < 30%
Caution = 30-50%
Sig. Concern = > 50%

Bark Probers

Overview: This metric evaluates the proportion of species within the avian community that forage primarily by bark probing.

Metric Justification: Bark probers are insectivores that require specialized foraging opportunities, including standing snags, large diameter coarse woody debris (CWD), and/or mature to old-growth trees with deeply furrowed or flaking bark providing substrates that support abundant insect populations. Examples of bark probers include Black-and-White Warbler (*Mniotilta varia*), Brown

Creeper (*Certhia americana*), Red- and White-breasted nuthatches (*Sitta canadensis*, *Sitta carolinensis*), as well as woodpecker species.

Scaling Rationale: At high-integrity sites, O'Connell et al. (2000) found that bark probers made up roughly 12% of the species in the community, but declined to 4% at low-integrity sites.

Good = > 11%
Caution = 4-11%
Sig. Concern = < 4%

Ground Gleaners

Overview: This metric evaluates the proportion of species within the avian community that forage primarily by gleaning insects from the ground.

Metric Justification: Ground gleaners are specialized insectivores that forage primarily by picking up invertebrates directly from the ground surface or leaf litter. This guild consists of seven species; Northern Flicker (*Colaptes auratus*), Hermit Thrush(*Catharus guttatus*), Kentucky Warbler (*Oporornis formosus*), Worm-eating Warbler (*Helmitheros vermivorus*), Mourning Warbler (*Oporornis philadelphia*), Ovenbird (*Seiurus aurocapillus*), and Winter Wren (*Troglodytes troglodytes*).

Scaling Rationale: Similar to bark probers, O'Connell et al. (2000) found that the proportion of ground gleaners in the community decreased as you move from high-to-low integrity sites, presumably as specialized foraging opportunities and/or insect biomass declines.

Good = > 10%
Caution = 4-10%
Sig. Concern = < 4%

High Canopy Foragers

Overview: This metric evaluates the proportion of species within the avian community that forages primarily in the high canopy.

Metric Justification: High canopy foragers specialize in feeding high in the forest canopy. These species are typically restricted to mature forests and many are considered forest interior obligates. The vast majority of the 15 species in this guild are insectivores, including Blackburnian Warbler (*Dendroica fusca*), Cape May Warbler (*Dendroica tigrina*), and Bay-breasted Warbler (*Dendroica castanea*), Blue-gray Gnatcatcher (*Polioptila caerulea*), and Red-eyed Vireo (*Vireo olivaceus*). However, both Red (*Loxia curvirostra*)and White-winged (*Loxia leucoptera*) crossbills, which specialize in feeding on conifer seeds, are also included this category.

Scaling Rationale: The proportion of species in a community that forage in the high canopy declines from about 13% to 6% as you move along a gradient from high- to low-integrity (O'Connell et al. 2000).

Good = > 12%
Caution = 7-12%
Sig. Concern = < 7%

Low Canopy Foragers

Overview: This metric evaluates the proportion of species within the avian community that forage primarily in the low canopy.

Metric Justification: Primarily insectivores that specialize in feeding in the understory of forests, forest edges, or in early successional stands, this guild consists of 29 species, including Black-capped (*Poecile atricapillus*), Boreal (*Poecile hudsonicus*), and Carolina (*Poecile carolinensis*) chickadees, Black-billed (*Coccyzus erythropthalmus*) and Yellow-billed (*Coccyzus americanus*) cuckoos, and 15 species of warblers.

Scaling Rational: Low canopy foragers were relatively well-represented in all integrity categories (O'Connell et al. 2000), although a decline in proportional species richness is clearly evident along a gradient from high- to low-integrity sites. At high-integrity sites roughly 23% of the species in the community were low canopy foragers, while 13% of this guild was found at low-integrity sites.

Good = > 22%
Caution = 14-22%
Sig. Concern = < 14%

Compositional Guilds

Exotic Species

Overview: This metric evaluates the proportion of species within the avian community that are exotics.

Metric Justification: The effects of exotic species on the structure, composition and function of natural systems have become a chief concern of ecologists and land managers over the last 20 years (Drake et al. 1989). The introduction of exotic bird species has resulted in a variety of ecological problems ranging from the extinction of indigenous species and the disruption of natural communities (Temple 1992), to increased competition for nest sites (Kerpez and Smith 1990). This guild consists of four species; European Starling (*Sturnus vulgaris*), House Finch (*Carpodacus mexicanus*), House Sparrow (*Passer domesticus*), and Rock Dove (*Columba livia*).

Scaling Rationale: O'Connell et al. (2000) found that the proportion of exotics increased from 0% in high-integrity communities to roughly 16% at low-integrity urban sites. In New York State's Adirondack Park, Glennon and Porter (2005) found the proportion of exotic birds averaged about 0.1% in wilderness sites, to 2.2% at low-density rural sites, and 5.2% in low-density village areas.

Good = 0%
Caution = 0.5-7%
Sig. Concern = > 7%

Resident Species

Overview: This metric evaluates the proportion of species within the avian community that are resident in the study area year-round.

Metric Justification: The non-migratory resident guild is made up of 31 species that exploit a variety of habitats and food resources. Most of these species occupy edge habitats, are tolerant of human disturbance, relatively early breeders, opportunistic foragers, and some may produce multiple broods in a season. This guild includes the corvids, chickadees, nuthatches, and all four exotics listed above.

Scaling Rationale: The proportion of non-migratory resident species in the community ranged from 28% at high-integrity sites, to 42% at low-integrity rural sites, to roughly 70% at low-integrity urban sites (O'Connell et al. 2000, Schmiegelow et al. 1997).

Good = < 28%
Caution = 28-41%
Sig. Concern = > 41%

Single Brooded

Overview: This metric evaluates the proportion of species within the avian community that are single-brooded (e.g., do not produce a second clutch of eggs after successfully fledging young).

Metric Justification: Many single-brooded species are restricted to interior forest habitat, and are absent from smaller forest fragments due to increased competition and higher rates of predation and nest parasitism associated with edge habitats (Freemark and Collins 1992). This large guild contains 72 species, the vast majority of which are long-distance, neotropical migrants, including flycatchers, warblers, orioles, vireos and others.

Scaling Rationale: At high-integrity sites, O'Connell et al. (2000) found that nearly 75% of the breeding landbird community was comprised of single-brooded species, while at low-integrity sites the proportion dropped to <40%. In the Adirondack Park, Glennon and Porter (2005) found that in wilderness areas, single-brooded species made up nearly 79% of the breeding landbird community, but dropped to 61% in forest stands within developed areas of the park.

Good = > 68%
Caution = 50-68%
Sig. Concern = < 50%

Nest Predators/Brood Parasites

Overview: This metric evaluates the proportion of species within the avian community that are nest predators or brood parasites.

Metric Justification: Nest predators and brood parasites have been shown to negatively affect the distribution, abundance, and nest success of other breeding landbird species, particularly neotropical migrants (Wilcove 1985, Robinson et al. 1993), and these effects increase significantly in fragmented and edge habitats (Robinson et al. 1995). This guild consists of seven species, six of which are nest

predators (including five corvids and the European Starling), and the Brown-headed Cowbird, a brood parasite.

Scaling Rationale: O'Connell et al. (2000) found this guild increases from < 10% of the species in the community at high-integrity sites, to > 20% at low-integrity urban sites.

Good = < 10%
Caution = 10-15%
Sig. Concern = > 15%

Structural Guilds

Canopy Nesters

Overview: This metric evaluates the proportion of species within the avian community that nest in the canopy.

Metric Justification: Tree canopy nesters are considered specialists indicative of high integrity because they typically require mature forests native to the region. This guild consists of 33 species ranging from American (*Corvus brachyrhynchos*) and Fish crow (*Corvus ossifragus*), to Eastern Wood-Pewee (*Contopus virens*), Baltimore (*Icterus galbula*) and Orchard orioles (*Icterus spurious*), and several warblers.

Scaling Justification: O'Connell et al. (2000) found canopy nesters decreasing from 37% of the community in high-integrity sites, to about 25% in lower-integrity sites.

Good = > 35%
Caution = 29-35%
Sig. Concern = < 29%

Shrub Nesters

Overview: This metric evaluates the proportion of species within the avian community that nest in the shrub layer, including forest understory, agricultural hedgerows, early successional habitats, and suburban areas.

Metric Justification: Shrub nesters, considered generalists, typically do not require specialized habitats such as mature forests, but encounter suitable nesting substrate in a variety of areas, from regenerating forests, to hedgerows, ornamental plantings, and forest edges. This guild contains 26 species ranging from American Goldfinch (*Carduelis tristis*), to Indigo Bunting (*Passerina cyanea*), Gray Catbird (*Dumetella carolinensis*) and several warblers.

Scaling Rationale: In the Adirondack Park, Glennon and Porter (2005) found the proportion of shrub nesters in the community increased from 16% in wilderness areas to about 21% in more developed regions of the park. In the central Appalachians, O'Connell et al. (2000) found this guild represented about 21% of high-integrity communities, and increased to 29% at low-integrity sites.

Good = < 18%
Caution = 18-24%

Sig. Concern = > 24%

Forest-ground Nesters

Overview: This metric evaluates the proportion of species within the avian community that nest on the ground within forested habitat.

Metric Justification: This guild consists of 16 species, 10 of which are warblers that require specific habitat characteristics for nesting. It includes species that nest in mature forest stands as well as in early successional or regenerating forests. Studies have demonstrated that overbrowse associated with high densities of White-tailed Deer in forests of eastern North America have significant effects on the abundance and diversity of understory and ground nesting forest breeding landbirds (McShea and Rappole 2000), and may be contributing to long-term declines associated with several species.

Scaling Rationale: O'Connell et al. (2000) found that forest-ground nesters comprised 20% of the breeding landbird community at high-integrity sites, and declined to 3% at low-integrity rural sites, and 0% in low-integrity urban sites.

Good = > 18%
Caution = 5-18%
Sig. Concern = < 5%

Interior Forest Obligates

Overview: This metric evaluates the proportion of species within the avian community that requires larger blocks of interior forests.

Metric Justification: Smaller forest fragments (<10ha) tend to support few, if any, area-sensitive or forest-interior landbirds (Robbins et al. 1989, Freemark and Collins 1992). In the latter study, sites with the greatest overall forest cover supported the highest numbers of area-sensitive species, and the numbers of forest-interior species increased most rapidly with forest size. Also, both O'Connell et al. (2000) and Glennon and Porter (2005) demonstrated that the interior forest guild declined with increasing human disturbance.

Scaling Rationale: In the central Appalachians, O'Connell et al. (2000) found that interior forest obligates accounted for nearly 50% of the breeding landbird community at high-integrity sites, but declined rapidly to about 5% at low-integrity urban sites. In the Adirondacks, Glennon and Porter (2005) found that interior forest birds represented about 26% of the bird community in wilderness and wild forest lands, compared to 15% in low density developed areas of the park.

Good = > 35%
Caution = 10-35%
Sig. Concern = < 10%

Grassland Breeding Landbird Assessment—Draft

The integrity of the grassland breeding landbird community at Saratoga NHP (SARA) and Minute Man NHP (MIMA) will be assessed with metrics based on the abundance and proportional richness

of grassland obligate species, shrub-dependant species, edge generalist species, and exotics (Tables S9.3 and S9.4). The proportional species richness will be calculated the same way as in the forest breeding landbird assessment, except that two raptors are included in the grassland obligate guild and the total species count. In addition, for both the grassland and shrubland groups, we will report the proportion of PIF priority species for BCR 13 (SARA) and 30 (MIMA) that are detected out of the total number of PIF priority species for each group (e.g., the number of PIF Priority grassland species detected divided by the total number of PIF Priority grassland species). This will help us measure the overall value of grassland and early successional communities at SARA and MIMA to rare or declining breeding landbirds that are dependent on these habitats within the region (Table S9.3). The threshold values for these metrics were determined from Browder et al. (2002) and Coppedge et al. (2006), and using data from the pilot season of grassland surveys at SARA. These values may be refined over time as additional regional and park-specific data are accumulated and analyzed.

Table S9.3 Avian scorecard metrics for grassland breeding landbird surveys at Saratoga NHP, Saratoga, New York.

Metric	Good	Caution	Significant Concern
Abundance (birds/point)			
Edge generalist species	< 15	15-30	> 30
Shrub-dependant species	< 1.0	1.0-5.0	> 5.0
Grassland obligate species	> 4.0	1.5-4.0	< 1.5
Exotic species	0.0	0.1-1.0	> 1.0
Proportional Species Richness (%)			
Edge generalist species	< 35%	35-70%	> 70%
Shrub-dependant species	< 10%	10-25%	> 25%
Grassland obligate species	> 10%	5-10%	< 5%
Exotic species	0%	0.1-3%	> 3%
Proportion of PIF Priority Grassland Species for:			
BCR 13 (# detected/8)	> 70%	50-70%	< 50%
BCR 30 (# detected/5)			
Proportion of PIF Priority Shrubland Species for:			
BCR 13 (# detected/7)	>75	50-75%	< 50%
BCR 30 (# detected/7)			

Edge Generalist Species

Overview: This metric evaluates the abundance and proportion of species within the avian community that use a variety of habitat edges adjacent to grassland habitats such as forest edges, wetlands, roadside and agricultural hedgerows, and early successional shrublands.

Metric Justification: Edge species are habitat generalists that do not respond to the presence of the large, contiguous grassland habitat being surveyed, and are just as likely to be found in suburban parks, residential developments, and powerline rights-of-way. This guild contains 43 species ranging from American and Fish Crows, to Mourning Dove, Song Sparrow, and Eastern Bluebird. Eleven (26%) of the species in this guild, are listed as conservation priorities for BCR 13 (encompassing SARA) by PIF, while eight (19%) are listed for BCR 30, which includes MIMA (Table S9.4).

Scaling Rationale: Pilot data from the 25 grassland point counts surveyed at SARA in 2006, resulted in an edge species abundance of 11.5 individuals per point. In addition, 66% of the species detected consisted of edge species. Making an assumption that the SARA grassland habitats are somewhere in the middle along an ecological integrity gradient due to the relative size of the fields, as well as their proximity to roads, and impacts from human disturbance and other factors, we adjusted the thresholds accordingly.

Abundance (individuals/point)

Good = < 15.0
Caution = 15.0-30.0
Sig. Concern = > 30.0

Proportional Species Richness
Good = < 35%
Caution = 35-70%
Sig. Concern = > 70%

Shrub-dependant Species
Overview: This metric evaluates the abundance and proportion of species within the community that depend upon early successional forest and old field/shrub habitats. Generally these habitats are maintained through management practices such as periodic (biennial) brush hogging and timbers harvests, but in some cases—such as shrub wetlands—occur naturally. Shrub-dependant species prefer habitats, such as old fields, that have a mix of young, woody plants and grasses, but are not found in grasslands that are mowed annually or grazed by livestock.

Metric Justification: This guild consists of 13 habitat specialists that depend upon early successional/shrub habitats for nesting. Three species—Brown Thrasher (*Toxostoma rufum*), Eastern Towhee (*Toxostoma rufum*), Field Sparrow (*Spizella pusilla*)—in this guild are showing long-term declines based on BBS data from BCR 13, which includes SARA (Sauer et al. 2005), while four are showing increasing trends. In addition, seven (54%) of the species are listed by PIF as conservation priorities for BCR 13 and BCR 30 (Table S9.4).

Scaling Rationale: Results from the pilot season of grassland surveys at SARA resulted in an abundance of 3.0 individuals per point for shrub-dependant species. In addition, 23% of the species detected were shrubland species. Making an assumption that the SARA grassland habitats are somewhere in the middle along an ecological integrity gradient due to the relative size of the fields, as well as their proximity to roads, and impacts from human disturbance and other factors, we adjusted the thresholds accordingly.

Table S9.4. Species assignments within grassland obligate, shrub-dependant, and edge generalist guilds, and PIF priority codes for BCR 13 and BCR 30, based on 2012 data from Partners in Flight.

Guild	Common Name	BCR 13	BCR 30
Edge Generalist	American Crow	X	X
Edge Generalist	American Goldfinch	UCS PR	X
Edge Generalist	American Robin	X	X
Edge Generalist	Baltimore Oriole	RC RS UCS MA	RC MA
Edge Generalist	Bank Swallow	CBSD RC MA	CBSD
Edge Generalist	Barn Swallow	RC MA	X
Edge Generalist	Black-billed Cuckoo	CBSD RC RS UCC UCS MA	CBSD UCC PR
Edge Generalist	Black-capped Chickadee	X	X
Edge Generalist	Blue Jay	X	X
Edge Generalist	Blue-gray Gnatcatcher	X	X
Edge Generalist	Brown headed Cowbird	X	X
Edge Generalist	Cedar Waxwing	UCS PR	X
Edge Generalist	Cliff Swallow	X	X
Edge Generalist	Common Grackle	X	X
Edge Generalist	Common Raven	X	X
Edge Generalist	Eastern Bluebird	X	X
Edge Generalist	Eastern Kingbird	RC MA	RC MA
Edge Generalist	Eastern Phoebe	X	X
Edge Generalist	European Starling	X	X
Edge Generalist	Fish Crow	X	X
Edge Generalist	Gray Catbird	X	UCS PR
Edge Generalist	Great Crested Flycatcher	X	X
Edge Generalist	House Finch	X	X
Edge Generalist	House Sparrow	X	X
Edge Generalist	House Wren	X	X
Edge Generalist	Least Flycatcher	RC MA	X
Edge Generalist	Mourning Dove	X	X
Edge Generalist	Northern Bobwhite	X	X
Edge Generalist	Northern Cardinal	X	X
Edge Generalist	Northern Mockingbird	X	X
Edge Generalist	Northern Rough-winged Swallow	X	X
Edge Generalist	Orchard Oriole	X	X
Edge Generalist	Red-winged Blackbird	X	X
Edge Generalist	Rock Pigeon	X	X

Table S9.4. Species assignments within grassland obligate, shrub-dependant, and edge generalist guilds, and PIF priority codes for BCR 13 and BCR 30, based on 2012 data from Partners in Flight (continued).

Guild	Common Name	BCR 13	BCR 30
Edge Generalist	Ruby-throated Hummingbird	X	X
Edge Generalist	Song Sparrow	UCS PR	X
Edge Generalist	Tree Swallow	UCS PR	X
Edge Generalist	Tufted Titmouse	X	X
Edge Generalist	Warbling Vireo	X	X
Edge Generalist	White-throated Sparrow	X	X
Edge Generalist	Yellow-billed Cuckoo	X	X
Edge Generalist	Yellow-throated Vireo	X	X
Exotic	European Starling	X	X
Exotic	House Finch	X	X
Exotic	House Sparrow	X	X
Exotic	Rock Pigeon	X	X
Grassland Obligate	American Kestrel	RC MA	RC MA
Grassland Obligate	Bobolink	CBSD RC RS UCC UCS MA	CBSD UCC PR
Grassland Obligate	Eastern Meadowlark	CBSD RC MA	CBSD
Grassland Obligate	Grasshopper Sparrow	CBSD	CBSD RC IM
Grassland Obligate	Henslow's Sparrow	RC UCC IM	RC UCC CR
Grassland Obligate	Northern Harrier	RC MA	X
Grassland Obligate	Savannah Sparrow	RC MA	X
Grassland Obligate	Vesper Sparrow	RC IM	X
Shrub-dependent	Alder Flycatcher	X	X
Shrub-dependent	Blue-winged Warbler	RC RS UCS MA	RC RS UCS MA
Shrub-dependent	Brown Thrasher	RC MA	RC MA
Shrub-dependent	Chestnut-sided Warbler	X	RC MA
Shrub-dependent	Common Yellowthroat	X	X
Shrub-dependent	Eastern Towhee	RC MA	RC MA
Shrub-dependent	Field Sparrow	CBSD RC MA	CBSD RC MA
Shrub-dependent	Golden-winged Warbler	RC UCC MA	RC UCC MA
Shrub-dependent	Indigo Bunting	X	X
Shrub-dependent	Mourning Warbler	X	
Shrub-dependent	Prairie Warbler	CBSD UCC PR	CBSD RC UCC MA
Shrub-dependent	Willow Flycatcher	UCS PR	X
Shrub-dependent	Yellow Warbler	X	X

X = Present in BCR; CBSD = Common Bird in Steep Decline; RC = Regional Concern; RS = Regional Stewardship;

UCC = U.S.-Canada Concern; UCS = U.S.-Canada Stewardship; CR = Critical Recovery Action Needed; IM = Immediate Management Action

Needed;

MA = Management Attention Needed; PR = Planning and Responsibility Actions Needed

Abundance (individuals/point)
Good = < 1.0
Caution = 1.0-5.0
Sig. Concern = > 5.0

Proportional Species Richness
Good = < 10%
Caution = 10-25%
Sig. Concern = > 25%

Grassland Obligate Species

Overview: This metric evaluates the abundance and proportion of species that are dependant on grassland habitat. Breeding landbirds in this guild prefer large open fields with a variety of grass species and little if any woody vegetation. Most often these habitats are maintained through annual late-season mowing or livestock grazing.

Metric Justification: The presence of many grassland species, combined with the absence of those species associated with woody vegetation, human-made structures, or cropland, can predict a measure of grassland integrity (Browder et al. 2002). The majority of the species in this guild are found more frequently in relatively large grasslands than smaller fragments. This guild consists of eight species, seven of which show long-term population declines on BBS routes from BCR 13 between 1966 and 2005 (Sauer et al. 2005). In addition, all of the species are listed as conservation priorities in BCR 13 by PIF, and five (63%) are listed as priority species in BCR 30 (Table S9.4).

Scaling Rationale: Using results from the pilot season of grassland surveys at SARA, we found that the abundance of grassland obligates was 2.4 individuals per point. In addition, 11% of the species detected were grassland obligates. Assuming that the SARA grassland habitats are somewhere in the middle along an ecological integrity gradient due to the relative size of the fields, as well as their proximity to roads, and impacts from human disturbance and other factors, we adjusted the thresholds accordingly.

Abundance (individuals/point)
Good = > 4.0
Caution = 1.5-4.0
Sig. Concern = < 1.5

Proportional Species Richness
Good = > 10%
Caution = 5-10%
Sig. Concern = < 5%

Exotic Species

Overview: This metric evaluates the proportion of species within the avian grassland community that are exotics.

Metric Justification: The effects of exotic species on the structure, composition and function of natural systems have become a chief concern of ecologists and land managers over the last 20 years (Drake et al. 1989). The introduction of exotic bird species has resulted in a variety of ecological problems ranging from the extinction of indigenous species and the disruption of natural communities (Temple 1992), to increased competition for nest sites (Kerpez and Smith 1990). This guild consists of four species; European Starling, House Finch, House Sparrow, and Rock Dove.

Scaling Rationale: O'Connell et al. (2000) found that the proportion of exotics increased from 0% in high-integrity communities to roughly 16% at low-integrity urban sites. In New York State's Adirondack Park, Glennon and Porter (2005) found the proportion of exotic birds averaged about 0.1% in wilderness sites, to 2.2% at low-density rural sites, and 5.2% in low-density village areas. Results from the pilot season of data collection showed that grassland habitats at SARA supported 0.4 individual exotics per point, and the only non-native observed was European Starling, representing 2% of the species detected.

Abundance (individuals/point)
Good = 0
Caution = 0.1-1.0
Sig. Concern = > 1.0

Proportional Species Richness
Good = 0
Caution = 0.1-3%
Sig. Concern = > 3%

PIF Priority Grassland Species

Overview: This metric evaluates the proportion of grassland species detected that are listed as conservation priorities for BCR 13 by PIF.

Metric Justification: All eight of the species included in the grassland obligate guild are listed as PIF priority species for BCR 13 (Table S9.4). The proportion that occurs on SARA grasslands is a measure of the value of these habitats for rare and/or declining species in the region.

Scaling Justification: Results from the pilot season of data collection showed that grassland habitats at SARA supported five grassland obligate landbirds, representing 63% of the PIF-listed priorities.

Proportional Species Richness
Good = > 70%
Caution = 50-70%
Sig. Concern = < 50%

PIF Priority Shrubland Species

Overview: This metric evaluates the proportion of shrubland species detected that are listed as conservation priorities for BCR 13 by PIF.

Metric Justification: Seven (54%) of the 13 species included in the shrubland guild are listed as PIF priority species for BCR 13 and BCR 30 (Table S9.4). The proportion that was detected during SARA grassland surveys is a measure of the value of the park for rare and/or declining shrubland species in the region.

Scaling Rationale: Results from the pilot season of data collection showed that shrubland habitats at SARA supported six (86%) of the seven shrubland species listed as PIF priorities.

Proportional Species Richness
Good = > 75%
Caution = 50-75%
Sig. Concern = < 50%

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Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild.

Integrity Element	Response Guild	Species
Functional	Omnivore	American Crow
		American Goldfinch
		American Robin
		Baltimore Oriole
		Blue Jay
		Bobolink
		Brown Thrasher
		Brown-headed Cowbird
		Chipping Sparrow
		Common Grackle
		Common Raven
		Dark-eyed Junco
		Eastern Bluebird
		Eastern Meadowlark
		Eastern Towhee
		European Starling
		Evening Grosbeak
		Field Sparrow
		Fish Crow
		Grasshopper Sparrow
		Gray Catbird
		Gray Jay
		Henslow’s Sparrow
		Indigo Bunting
		Lincoln’s Sparrow
		Nelson's Sharp-tailed Sparrow
		Northern Cardinal
		Northern Mockingbird
		Orchard Oriole
		Pine Siskin
		Red-winged Blackbird
		Rock Dove
		Rose-breasted Grosbeak
		Ruby-throated Hummingbird
		Savannah Sparrow
		Song Sparrow
		Swainson's Thrush
		Swamp Sparrow
		Veery
		Vesper Sparrow
		White-throated Sparrow
		Wood Thrush
		Yellow-bellied Sapsucker
		Yellow-breasted Chat
	Bark Prober	Black-and-White Warbler
		Black-backed Woodpecker
		Brown Creeper
		Downy Woodpecker
		Hairy Woodpecker
		Pileated Woodpecker
		Pine Warbler

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Bark Prober	Black-and-White Warbler
		Pine Warbler
		Red-bellied Woodpecker
		Red-breasted Nuthatch
		Red-headed Woodpecker
		White-breasted Nuthatch
	Ground Gleaner	Hermit Thrush
		Kentucky Warbler
		Mourning Warbler
		Northern Flicker
		Ovenbird
		Winter Wren
		Worm-eating Warbler
	Low Canopy Forager	American Redstart
		Black-billed Cuckoo
		Black-capped Chickadee
		Blackpoll Warbler
		Black-throated Blue Warbler
		Blue-headed Vireo
		Blue-winged Warbler
		Boreal Chickadee
		Canada Warbler
		Carolina Chickadee
		Carolina Wren
		Chestnut-sided Warbler
		Common Yellowthroat
		Eastern Phoebe
		Eastern Tufted Titmouse
		Golden-crowned Kinglet
		Golden-winged Warbler
		Hooded Warbler
		House Wren
		Magnolia Warbler
		Nashville Warbler
		Palm Warbler
		Prairie Warbler
		Ruby-crowned Kinglet
		White-eyed Vireo
		Wilson's Warbler
		Yellow Warbler
		Yellow-billed Cuckoo
		Yellow-rumped Warbler
Compositional	Nest Predator/ Brood Parasite	American Crow
		Blue Jay
		Brown-headed Cowbird
		Common Raven
		European Starling
		Fish Crow
		Gray Jay
	Resident	American Crow
		American Goldfinch
		Black-backed Woodpecker
		Black-capped Chickadee

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Resident (cont.)	Blue Jay
		Boreal Chickadee
		Brown Creeper
		Carolina Chickadee
		Carolina Wren
		Cedar Waxwing
		Common Raven
		Downy Woodpecker
		Eastern Tufted Titmouse
		European Starling
		Evening Grosbeak
		Fish Crow
		Gray Jay
		Hairy Woodpecker
		House Finch
		House Sparrow
		Mourning Dove
		Northern Cardinal
		Northern Mockingbird
		Pileated Woodpecker
		Pine Siskin
		Purple Finch
		Red Crossbill
		Red-bellied Woodpecker
		Red-breasted Nuthatch
		Rock Dove
		White-breasted Nuthatch
		White-winged Crossbill
	Single Brooded	American Crow
		American Goldfinch
		Acadian Flycatcher
		American Goldfinch
		Acadian Flycatcher
		Alder Flycatcher
		American Redstart
		Baltimore Oriole
		Bank Swallow
		Barn Swallow
		Bay-breasted Warbler
		Black-capped Chickadee
		Black-and-White Warbler
		Blackburnian Warbler
		Blackpoll Warbler
		Black-throated Blue Warbler
		Black-throated Green Warbler
		Blue-gray Gnatcatcher
		Blue-headed Vireo
		Blue-winged Warbler
		Bobolink
		Boreal Chickadee
		Brown Creeper

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Single Brooded (cont.)	Canada Warbler
		Cape May Warbler
		Carolina Chickadee
		Cedar Waxwing
		Cerulean Warbler
		Chestnut-sided Warbler
		Chimney Swift
		Cliff Swallow
		Common Raven
		Eastern Kingbird
		Eastern Tufted Titmouse
		Eastern Wood Pewee
		Fish Crow
		Golden-winged Warbler
		Great Crested Flycatcher
		Hooded Warbler
		Kentucky Warbler
		Least Flycatcher
		Louisiana Waterthrush
		Magnolia Warbler
		Mourning Warbler
		Nashville Warbler
		Northern Parula
		Northern Rough-winged Swallow
		Northern Waterthrush
		Olive-sided Flycatcher
		Orchard Oriole
		Ovenbird
		Palm Warbler
		Philadelphia Vireo
		Pine Siskin
		Pine Warbler
		Prairie Warbler
		Red-breasted Nuthatch
		Red-eyed Vireo
		Rose-breasted Grosbeak
		Scarlet Tanager
		Swainson's Thrush
		Tennessee Warbler
		Tree Swallow
		Veery
		Warbling Vireo
		White-breasted Nuthatch
		White-eyed Vireo
		Willow Flycatcher
		Wilson's Warbler
		Winter Wren
		Wood Thrush
		Worm-eating Warbler
		Yellow Warbler
		Yellow-bellied Flycatcher
		Yellow-throated Vireo

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Exotic	European Starling
		House Finch
		House Sparrow
		Rock Dove
Structural	Canopy Nester	Acadian Flycatcher
		American Crow
		American Redstart
		Bay-breasted Warbler
		Baltimore Oriole
		Blackburnian Warbler
		Blue-gray Gnatcatcher
		Blue-headed Vireo
		Blue Jay
		Black-throated Green Warbler
		Cape May Warbler
		Cedar Waxwing
		Cerulean Warbler
		Common Raven
		Eastern Kingbird
		Eastern Wood Pewee
		Fish Crow
		Golden-crowned Kinglet
		Least Flycatcher
		Mourning Dove
		Northern Parula
		Orchard Oriole
		Pine Warbler
		Purple Finch
		Red Crossbill
		Rose-breasted Grosbeak
		Ruby-crowned Kinglet
		Ruby-throated Hummingbird
		Scarlet Tanager
		Warbling Vireo
		White-winged Crossbill
		Yellow-rumped Warbler
		Yellow-throated Vireo
	Shrub Nester	Alder Flycatcher
		American Goldfinch
		American Robin
		Black-billed Cuckoo
		Blackpoll Warbler
		Brown Thrasher
		Black-throated Blue Warbler
		Chipping Sparrow
		Common Yellowthroat
		Chestnut-sided Warbler
		Gray Catbird
		Hooded Warbler
		Indigo Bunting

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Shrub Nester (cont.)	Magnolia Warbler
		Northern Cardinal
		Northern Mockingbird
		Prairie Warbler
		Red-eyed Vireo
		Red-winged Blackbird
		Swainson's Thrush
		White-eyed Vireo
		Willow Flycatcher
		Wood Thrush
		Yellow-breasted Chat
		Yellow-billed Cuckoo
		Yellow Warbler
	Forest-ground Nester	Black-and-white Warbler
		Canada Warbler
		Dark-eyed Junco
		Eastern Towhee
		Hermit Thrush
		Kentucky Warbler
		Louisiana Waterthrush
		Mourning Warbler
		Nashville Warbler
		Northern Waterthrush
		Ovenbird
		Veery
		Worm-eating Warbler
		Wilson's Warbler
		White-throated Sparrow
		Yellow-bellied Flycatcher
	Interior Forest Obligate	Acadian Flycatcher
		American Redstart
		Black-and-White Warbler
		Black-backed Woodpecker
		Blackburnian Warbler
		Blackpoll Warbler
		Black-throated Blue Warbler
		Black-throated Green Warbler
		Blue-headed Vireo
		Brown Creeper
		Canada Warbler
		Cerulean Warbler
		Golden-crowned Kinglet
		Hairy Woodpecker
		Hermit Thrush
		Hooded Warbler
		Kentucky Warbler
		Louisiana Waterthrush
		Magnolia Warbler

Appendix S9.A. Species assignments in the 13 response guilds included in the biotic integrity scorecard. Species listed alphabetically within each guild (continued).

Integrity Element	Response Guild	Species
	Interior Forest Obligate (cont.)	Northern Parula
		Northern Waterthrush
		Olive-sided Flycatcher
		Ovenbird
		Pileated Woodpecker
		Pine Warbler
		Red Crossbill
		Red-breasted Nuthatch
		Ruby-crowned Kinglet
		Scarlet Tanager
		Swainson's Thrush
		Veery
		White-breasted Nuthatch
		White-winged Crossbill
		Winter Wren
		Worm-eating Warbler
		Yellow-bellied Flycatcher

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	May 2007	Steve Faccio	SOP used beginning with the 2007 field season.	
2.00	December 2008	Steve Faccio	Added information about biotic integrity elements and guild categories Removed integrity rank numbers in favor of “Good”, “Caution”, and “Significant	
2.01	January 2009	Steve Faccio	Added information about annual *Fiscal Year* and *Data Summary* reports.	
2.02	August 2009	Sarah Lupis	Formatting, minor editorial changes.	

Version	Date	Revised By	Changes	Justification
2.03	May 2012	Brian Mitchell and Steve Faccio	Assessment approach modified to only include Passeriformes (perching birds), Piciformes (woodpeckers), Cuculiformes (cuckoos), Apodiformes (swifts and hummingbirds), and Columbiformes (doves). Exception is two grassland obligate raptors included in the grassland assessment.	More closely follows O'Connell et al. (2000)
			Eastern Phoebe added to low canopy forager guild and edge generalist guild. American Kestrel and Northern Harrier added to grassland obligate guild. Alder Flycatcher, American Woodcock, Black-billed Cuckoo, Black-capped Chickadee, Blue-gray Gnatcatcher, Blue Jay, Common Grackle, Great-crested Flycatcher, Gray Catbird, Northern Bobwhite, Northern Cardinal, Red-Winged Blackbird, Ruby-throated Hummingbird, Tufted Titmouse, Willow Flycatcher, Yellow-billed Cuckoo, Yellow-Shafted Flicker, and Yellow-throated Vireo added to edge generalist guild	Review of guild membership
2.04	December 2012	Brian Mitchell and Steve Faccio	Added MIMA (BCR 30) to grassland assessment (MIMA Battle Road).	Park requested site
			Edge Generalist abundance metric (Grassland EIA) altered (Good = <15 from <6 and SC = >30 from >10). Species richness metric altered (Good = <35% from <20% and SC = >70% from >50%).	Edge species guild doubled in size; old abundance and species richness figures too low.
			PIF Grassland metric altered (Good >70% rather than >80%).	Initial metric too stringent (all species needed for good rating)
			PIF Shrubland metric (Grassland EIA) thresholds in table revised to match thresholds in metric description.	Error in table
			Alder Flycatcher and Willow Flycatcher moved to Shrub-dependent guild from Edge Generalist guild (Grassland EIA)	Inappropriate assignment.
			Abundance and species richness values based on SARA grassland data from 2006 updated using the latest guild and PIF priority information.	Update to reflect revised guilds.
2.05	April 2014	Brian Mitchell	Update SOP numbers.	New SOP.

SOP 10 - Deviations and Summary of Major Changes

Northeast Temperate Network
Version 1.02

Overview

This SOP documents:

- Modifications made to the study sites or point count stations.
- Known deviations from established methods. Deviations are situations where data were collected in a manner that is substantially different from the methods documented within the SOPs used during a particular field season.
- Major changes in the protocol. Major changes are fundamental shifts in the way data are collected that cannot easily be rectified with earlier data. Major changes are not deviations, provided that the changes are documented in the SOPs. Ideally, any time there is a major change in methods the network will use both methods long enough to determine whether the results from the different methods are sufficiently correlated to allow old data to be corrected. In some cases (especially early in the use of the protocol), the small amount of data lost by the protocol change will not be worth the cost of overlapping methods.

Study Site or Point Modifications

1. MABI; Study Site 10 (East); Point 02: Elm used to previously mark the location of this point count station was found on 13 July 2011 to be dead and becoming unstable. Aluminum tag and blue flagging were removed from dead tree and moved 4 meters to the south to next nearest stable tree. The new tree (15" diameter white ash) was marked with the original aluminum tag from the first tree (#12) and the two fire-tacks and white bird study sign as per the protocol.
2. SARA; Study Site 25 (Bemis Heights) site discontinued after 2011; the site was too difficult and dangerous to survey. The site was replaced with Study Site 38 (Northwest).
3. MIMA; Study Site 39 (Battle Road) added after the request by the park to include a grassland site.

Protocol Deviations or Major Changes

1) In 2010: Data collection for Study Site 30 (ACAD; Schoodic Peninsula; 6 points) was coordinated by Brian Olsen at University of Maine. Dr. Olsen used students to conduct the breeding landbird counts. Review of the datasheets indicated that numerous deviations from the 2010 protocol occurred.

    a. Deviations that did likely did not affect the data:

- Counts were conducted weekly May through July and were done in conjunction with other study sites Brian was researching at the time.
- Photocopies of the field notebooks from this season have been filed with the data from other study sites, but not scanned.

b. Deviations that likely affected the data:

- Standardized datasheets (Field Cards and Coding Sheets) were not used by the observer. Evidence in the field notebook indicates that E, W, N, and S quadrats may have been used to help map breeding landbird detections.
- There was no evidence that breeding landbirds detected were assigned to distance categories.
- There was no evidence that a countdown timer was used.
- There is no indication how flyovers or flocks were handled.
- Handwriting is barely legible making it difficult to decipher the data collected.

2) From 2010 to 2013, only one QA/QC double-observer survey was conducted. Weather cancellations prevented the survey in three years. In 2014, a new QC method was initiated (recording point counts, see SOP 6 – Field Quality Control Recordings).

3) USGS Point Count Database is replaced with AKN Point Count Database in 2014, due to USGS inability to continue managing the database.

Revision History Log

Version	Date	Revised By	Changes	Justification
1.00	July 2011	Adam Kozlowski	New SOP Document data quality for Schoodic study site and moving of MABI 10.02 point.	
1.01	December 2012	Brian Mitchell	Replacement of Bemis Heights study site at SARA, addition of Battle Road study site at MIMA, and documentation of missed QA/QC surveys.	Dangerous site replaced at SARA, grassland site added at MIMA.
1.02	April 2014	Brian Mitchell	Management of online database shifts to AKN (Point Blue) from USGS. Field QC not conducted in 3 of four years (2010-2013); switching to audio recording QC methods (SOP 6).	Change in database manager. Change in QC approach.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 962/124817, June 2014

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