

STUDY SITE INSTRUCTIONS

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INTRODUCTION

Selecting an appropriate study site is one of the most important steps in the BFL research protocol. **The following section provides you with the guidelines of study site selection. Please read the information carefully,** as proper selection of study sites will affect your overall enjoyment of the project and our ability to glean patterns and useable results from your data.

BFL is not just a study of birds, it's also a study of landscapes and habitats. To get the most from your data, statistically and biologically, we would ideally like a random sample of all forest habitats. These habitats would include forests of various types (Appalachian oak, pinyon pine-juniper, etc.), sizes, ages, elevations, latitudes, and disturbance levels. However, it's unrealistic, even in a study as large as BFL, to obtain a completely random sample of all forest habitats. So, we've developed a study-site selection process that gives you the flexibility to select convenient study sites while generating the range of unbiased data required for proper statistical analyses. BFL depends on a full range of forest sizes and types that are potentially suitable breeding habitat for the study birds. The sites that you select will become part of a continent-wide network of BFL sites that we hope to study for many years to come.

Since the data you provide on the presence/absence, behavior, and breeding status of forest birds only tells half of the complex story of forest bird ecology, we need information about the habitats associated with your study sites. In order to get this information, we ask you to describe the habitats associated with your study site(s) at three geographic scales—**the survey point, the study site, and the surrounding landscape.** Habitat and physical characteristics measured at each of these scales tell us a great deal about how forest birds select a place to nest and what their habitat requirements are for successful breeding. We realize that collecting habitat data can be tedious work; however, these data are critical to the success of BFL, and therefore, to the conservation of North America's forest birds. We hope you will approach your habitat work with the same enthusiasm and diligence that you have for counting and observing birds.

SELECTING SURVEY POINTS

Selecting appropriate survey points is a critical component of the project. These must be in appropriate breeding habitat for your target species. Check the *References: Species Accounts* section of this binder to identify potential habitats for your study species. We define “forest” as vegetation with an average canopy height greater than 20 feet (6 meters). All “forest” stands with vegetation less than 20 feet (6 meters) tall, even regenerating forest, is considered “nonforest.”

You may establish as many or as few survey points as you like—we hope you will be able to conduct BFL at about eight, although data from even one site is important. Because one of the objectives of BFL is to assess breeding success in small forest patches (less than 25 acres or 10 hectares), these areas, where available, should be given high priority. However, data are needed for comparison purposes from all forest patches, sizes, including large to contiguous forests, so please conduct BFL in larger forest tracts if these are the only areas available to you.

First, select appropriate **forest patches**, then identify **survey points** within the patches, and finally establish **study sites** around each survey point (see definitions at left). **Please be sure to ask permission before venturing onto private land.** We suggest photocopying the “Letter to Landowners” included in this kit and presenting it to private landowners.

How to select forest patches

Please do not select forest patches where you know your study species are already breeding this season. For example, if you find a Cooper’s Hawk nesting in a forest patch, do not intentionally place a study site around the nest. **Selecting such sites biases the data.** Ideally, you should select forest patches before the birds start breeding. Select only forest patches that contain appropriate habitat capable of supporting your study species. You may select forest patches where your study species have been casually observed in past breeding seasons.

To locate forest patches, use topographic maps, aerial photographs, or survey the region by driving roads or walking trails. Sources of maps and photos are listed in the *References: Map Resources* section of this manual. You’ll also find that a recent aerial photo or a map showing forested areas will be useful for measuring habitat variables (see “Landscape Level Characteristics” in this section).

DEFINITIONS

Forest patch

A block of forest of any size that is surrounded by nonforested land such as farm fields, water, major highways, grasslands, or housing developments

survey point

The point in the forest patch where you will stand to survey selected study species

Study site

A circular plot with the survey point at the center. The radius of the circle is 500 ft. (150 m)

Forest

Vegetation with an average canopy height greater than 20 ft. (6 m)

NonForest

All vegetation less than 20 ft. (6 m) tall, even if regenerating forest

Edge

The line where the forest meets a nonforested area that is at least 300 ft. (90 m) wide

Road

Any linear break in the forest canopy that is 25 to 300 ft. (8 to 90 m) wide. See page 2.8 for specific examples.

HOW TO SELECT FOREST PATCHES

- Determine suitable habitat for selected study species
- Select as many (or as few) forest patches as you like
- Do not select forest patches based on prior knowledge of where your study species are breeding
- To identify potential forest patches of appropriate habitat:
 - use topographic maps and/or aerial photos
 - survey the area on foot or by vehicle

SOURCES OF MAPS AND AERIAL PHOTOS

- Site coordinator list (in pocket of binder)
- The Agricultural Stabilization and Conservation Service or Natural Resources Conservation Service (formerly Soil Conservation Service) office in your county
- Local university or college
- Sources listed in *References: Map Resources* section

SURVEY POINT NAME

Give each of your survey points a unique name (up to six characters long) and use this name on your Field Form and Web data forms. If you have conducted BFL in previous years at these sites, please use the same survey point names that you used in the past.

Look for discrete islands of forest (forest patches) surrounded by nonforest habitat. Try to find at least eight forest patches in a range of sizes. We prefer that your study site be mostly forested, but in certain situations such as very small woodlots, riparian strips, or areas accessible only by car, it is acceptable to have nonforested portions in your site (see Figure 1). In many cases, defining a discrete forest patch will be difficult, especially in areas where a patchwork of forest stands are interconnected by corridors. For the purpose of BFL, these areas are considered part of one large, contiguous forest patch. **If you can locate only one or a few forest patches or only continuous forest, data from points in these forests will be useful to BFL.**

How to establish survey points

In each forest patch, select one or more survey points where you will conduct the BFL survey protocol. When selecting survey points, please observe the following criteria:

- **Try to pick a survey point that is representative of the habitat in your entire study site.** We realize this may not be possible at sites with varied vegetation.
- **Each survey point must be within the forest patch** but can be any distance from the edge of the forest.
- **Points must be at least 1,000 feet (300 meters) apart for most species and 3,000 feet (900 meters) apart for any of the hawks.** This reduces the chance of counting the same birds at more than one point.
- **Try to spread your survey points over several forest patches** rather than putting all of them in the same patch.

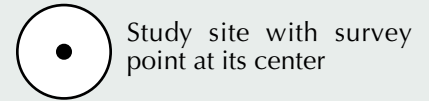
If you have selected survey points from maps or aerial photographs, you will need to locate your survey points in the field by using a map and compass. You may need to pace off distances in the field to make sure that your points are not too close together. See Appendix A for information on measuring your pace. Global Positioning System (GPS) equipment, if available, may also help you locate your survey points in the field. Once you have located your points, mark them by tying flagging tape (brightly colored plastic ribbon, available in hardware stores) to an easily visible tree trunk or branch.

For each of the survey points within a forest patch, create a unique six-character (or shorter) name (called the “Survey point ID”). Use this name on your Field Form and on the Web-based data form. **If you participated in previous years, use the same names again this year.** This will help us match your survey points with past data.

Delineating your study sites

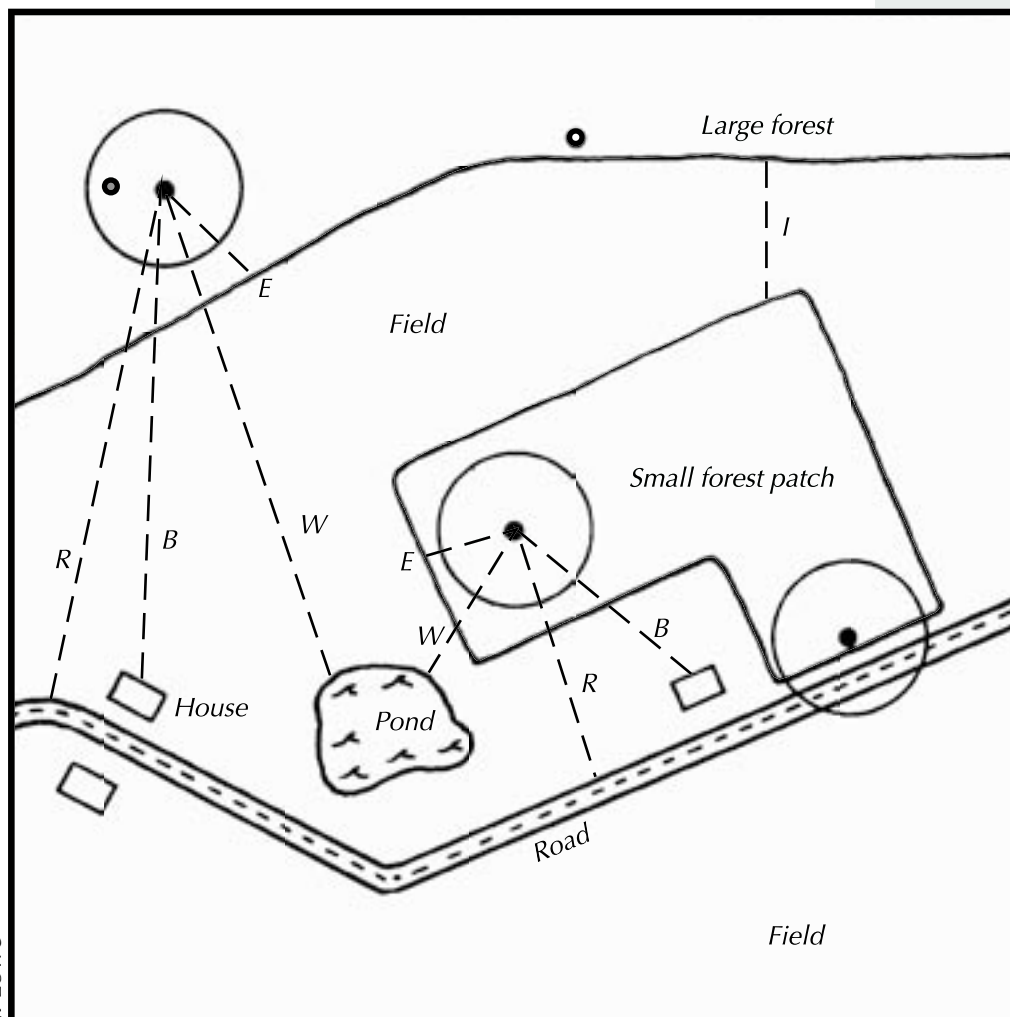
Each survey point that you have identified and marked will become the center of a 500-foot-radius (150-meter) circular study site (see Figure 1). All of your surveying and subsequent observations of breeding behaviors will take place within this study site, and you will describe various characteristics of the vegetation within the 500-foot-radius (150-meter) circle. You may want to pace off 500 feet (150 meters) from the survey point to get a feel for the size of this circle. You should place a few markers with flagging at the periphery of the circle, 500 feet (150 meters) from the center point, that delineate the boundaries of the study site.

LEGEND



- E** Distance to nearest edge
- R** Distance to nearest road
- W** Distance to nearest water
- B** Distance to nearest occupied building
- I** "Isolation"—Distance to nearest other forest patch of at least 100 acres (40 hectares).
- Nest found within a study site—use a Nest Record Card to record information about this nest
- Nest found outside study sites—use a Nest Record Card to record information about this nest

Percentage of forest = 33%



Edge = 13.5 inches on the map, which translates to 27,000 feet on the ground at a scale of 1:24,000 (13.5 in. x 2,000 ft./in. = 27,000 ft.)

NOTES: For the study site near the road, use only the forested section for canopy and low vegetation measurements.

You will also measure the distance to nearest patch of 500 acres (200 hectares) or more (not illustrated in Figure 1).

J. Lowe

FIGURE 1. Example of typical study sites and fragmentation measures within a 2,500-acre (1,000-hectare) landscape block.

If you need assistance...

We urge you to try to identify study sites yourself. To find maps and aerial photographs of your area, try contacting the Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service) or Agricultural Stabilization and Conservation Service (ASCS) office in your county. These offices and other federal, state, or provincial land management offices may have recent aerial photographs. Color or black-and-white photocopies of aerial photos are useful and inexpensive. If you live near a university or college, contact the department of natural resources (or equivalent). Many universities have data on local topography computerized in Geographical Information Systems (GIS).

Finally, to make the site-selection process easier, we have enlisted the help of employees and representatives from numerous cooperating agencies and organizations. Check the list of site coordinators (see “How to get help: Working with site coordinators,” page 2.15) or call one of the agencies listed in Table 1. These people may be able to direct you to potential sites and assist you with habitat measurements.

TABLE 1. LAND MANAGEMENT AGENCIES

U.S. AND CANADIAN FEDERAL LAND MANAGEMENT AGENCIES

- USDA Forest Service**—Ranger district or forest supervisor’s offices
- USDI Bureau of Land Management**—District or area offices
- USDI National Park Service**—National parks, national monuments
- US Department of Defense**—Several military bases are participating in BFL
- USDI Fish and Wildlife Service**—Refuge headquarters or field offices
- Canadian Forest Service/Service Canadien des Forets**
- Natural Resources Canada/Ressources Naturelles Canada**
- Environment Canada/Environnement Canada**
- Canadian Wildlife Service/Service Canadien de la Faune**
- Parks Canada/Parcs Canada**

STATE AND CANADIAN PROVINCIAL AGENCIES

The names of these agencies will vary by state or province (this list is not all inclusive).

- Department of Fish and Game or Wildlife Agency**
- Department of Natural Resources**
- Parks Department**
- Forestry/Lands Department**

NONGOVERNMENTAL ORGANIZATIONS

Be sure that you have permission before venturing onto private land.

- The Nature Conservancy**—Land Stewardship or preserve offices
- Tribal Headquarters**—Indian reservations often have biologists and foresters to help manage their lands; the Native American Fish and Wildlife Biologists Association.
- Forest products industry**—You may be able to get access to blocks of land owned by private timber companies; if possible, talk to the company wildlife biologist. The forest products industry is active in Partners in Flight.

If you need further assistance locating sites, contact the BFL staff at the Cornell Lab of Ornithology (phone numbers are listed on page iii) and we will link you to the nearest source of help. We will do our best to make it easy for you to find sites.

DESCRIBING HABITAT

To develop accurate conservation guidelines for forest birds, we need to know how birds interact with their habitat. We realize that collecting data on habitat characteristics may not be nearly as interesting as looking for your study birds; however, these data are vital to the success of BFL. Please do your best to collect all required habitat data thoroughly and accurately.

The following instructions refer to the sections on the backside of the Field Form (see Data Entry: Field Form). **Please use one Field Form per study site**, regardless of how many bird species you survey at that site or how many study sites are in the same forest patch.

Note the location of the study site on the top of your Field Form (“Location of site”). Be as specific as possible so that you or others can easily return to that site for future studies. Example: “4 miles east of Ithaca on Rte. 13; along north side of Fall Creek, behind old schoolhouse near large white oak.” Also, make copies of any aerial photos or maps you use, indicate on them the exact location of your forest patches and survey points, and send them with your Field Forms.

We ask you to describe the habitat at your study sites in three ways. First, describe your **survey point characteristics** (the place where you stand to conduct protocols). Second, describe the general **study site characteristics** within the the 500-foot (150-meter) radius circular plot around the survey point. Third, describe the **landscape level characteristics** of the 2,500-acre (1,000-hectare) block surrounding the study site. To determine landscape characteristics, you will need aerial photographs or accurate maps that show forested areas.

Survey point characteristics

- **Latitude and longitude**—You can determine latitude and longitude from a topographic map or the BFL mapping software found on our web site. Latitude lines run east to west; longitude lines run north to south. The best way to determine latitude and longitude is by using a Global Positioning System (GPS) receiver in the field or Geographical Information System (GIS). Refer to the References:Map Resources section of the manual for information on how

DESCRIBING HABITAT

- Use one Field Form for each study site
- Give each survey point a unique name and record it on the Field Form
- Determine and record size of the forest patch (Appendix B)
- For each survey point, record these variables on the back of the Field Form:
 - latitude/longitude
 - elevation
 - distance to nearest road
 - distance to nearest edge
 - distance to nearest water
 - distance to nearest occupied building
- For each study site, record these habitat variables on the back of the Field Form:
 - hydrology
 - forest cover type
 - slope
 - land use
 - land ownership
 - canopy height
 - canopy characteristics
 - low vegetation characteristics
- For the 2,500-acre (1,000-hectare) landscape surrounding each survey point, calculate these variables using maps and record on the back of the Field Form:
 - patch edge
 - forest patch size
 - percentage of forest
 - linear distance of edge
- If your patch is less than 1,000 acres (400 hectares), calculate two measures of isolation for each forest patch (see “Isolation measurements” in this section)

SURVEY POINT CHARACTERISTICS

For each survey point, these variables should be recorded on the back of the Field Form.

- latitude/longitude
- elevation
- distance to nearest:
 - road
 - edge
 - water
 - occupied building

to measure latitude and longitude from maps. GPS units can be purchased at sporting goods stores, or check with your site coordinator or local governmental agency to see if they have a unit you can borrow.

- **Elevation**—Report the elevation above sea level at the survey point. You can determine elevation by carefully checking the contour intervals on a topographic map. Be sure to indicate units (feet or meters) on your data forms. If you use a GPS unit to calculate elevation, please check this number against measurements from a topographic map because GPS units are not always accurate for determining elevation.
- **Distance to nearest edge**—Measure or pace the distance from the survey point to the nearest forest/nonforest edge of your patch (for large distances, measure from a map or aerial photo). A break in the forest that is 300 feet (90 meters) wide or more constitutes an edge (Figure 1). Indicate units.
- **Distance to nearest road**—Measure or pace the distance from the survey point to the nearest road (for large distances, measure from a map or aerial photo). We define a “road” as a linear break in the forest canopy that is 25 to 300 feet (8 to 90 meters) wide (Figure 1). Please indicate units. The road may be dirt or paved, open to motor vehicles, or closed. For the purpose of this project, a power-line cut or other right-of-way that breaks the canopy is considered a “road.” Recent research suggests that the corridor created by even a small dirt road may allow cowbirds and predators access to the forest interior.
- **Distance to nearest water**—Measure or pace the distance from the survey point to the nearest stream, pond, marsh, swamp, etc. (Figure 1). Indicate units.
- **Distance to nearest occupied building**—Measure or pace the distance from the survey point to the nearest building that is occupied during the breeding season (Figure 1). Indicate units.

Study site characteristics

If your point is located near a forest/nonforest edge, then be sure to only use the forested portion of your study site when describing the following habitat characteristics. For example, if your point is on the edge of a woodlot adjoining a corn field, then canopy height only refers to the trees in the woodlot. Don't average the height of the trees in the woodlot with the height of the corn. Also, see Figure 1 on page 2.5 for a diagram of a point on the edge of a clearing near a road.

- **Hydrology during the breeding season**—Note whether any of the following are found on part or all of your study site (within 500 feet or 150 meters of the survey point) during the breeding season:

Stream or flowing water—Flowing water present

Pond or standing water/marsh—Standing water occurring in open areas with no trees

Forested wetland/swamp—Standing water with trees

Riparian forest strip—A linear (narrow) forested area along the edge of a river, stream, or lake

No water—No surface water on the study site

- **Forest cover type**—Mark one category that best describes the trees in the forest canopy at your study site:

Coniferous (natural)—Predominately cone-bearing, needle-leaf trees such as pine, spruce, fir, or larch

Coniferous plantation—Cone-bearing, needle-leaf trees planted by humans, usually indicated by even-aged trees in rows

Deciduous—Predominately deciduous trees such as oak, maple, beech, or magnolia. If your study site is predominantly evergreen broadleaf such as live oak, please note in the “Comments” section

Mixed coniferous/deciduous—A mix of mature trees of each type within the study site

- **Slope**—Select the one category that best describes the terrain within the study site: *Sloped*, *Level*, or *Undulating* (up and down)

- **Land use**—Mark as many as apply to your study site:

Undisturbed—No obvious human-caused disturbance within the past 30 years; forest appears to be in a “natural” state

Light recreation—Occasional use of hiking trails or roads in the area; little disturbance or noise noticeable

Heavy recreation—Frequent use of trails or roads; noise from recreational vehicles or people often heard

Partially cut—Some trees have been removed from the site but enough remain to consider it a forest

Commercial forest—A forest primarily managed for commercial timber products (lumber, pulp, etc.)

Grazed—Evidence of grazing by domestic animals

Recently burned—Obvious evidence that fire occurred (in understory or overstory) within past 10 years

Suburban woodlot—Remnant forest surrounded by human habitations; includes city parks

Other—List or describe type of significant disturbance in “Comments” section

STUDY SITE CHARACTERISTICS

For each study site, record these habitat variables on the back of the Field Form:

- hydrology
- forest cover type
- slope
- land use
- land ownership
- canopy characteristics
- low vegetation characteristics

- **Ownership**—Determine who owns the study site:
 - Private**—Owned by individuals, corporations, or private organizations such as The Nature Conservancy, National Audubon Society, or a nature center
 - Private timber company**—Owned by a private forest products company
 - State**—Owned by state or provincial government; includes state or provincial parks, state forests, etc.
 - County or town**—Owned by municipal government
 - Federal**—Owned by the United States or Canadian government; includes federally managed lands such as National Forests, National Parks, National Wildlife Refuges, etc. Mark the agency, if listed, or write the agency name on the line beside “Other” or in “Comments” section
 - Tribal lands**—Owned by Native Americans; includes Indian Reservations or tribally owned lands
 - Other ownership**—If ownership is other than those mentioned here, mark “Other” and fill in comment line or describe in “Comments” section

Canopy characteristics

For the purpose of BFL, we define “canopy” as all vegetation that is higher than 20 feet (6 meters). The canopy variables pertain to the *entire* 500-foot-radius (150-meter) circular study site. We suggest that you wander through your entire site before estimating canopy height and percentage cover so that these values are representative of the entire study site and not just reported for your survey point.

- **Canopy height**—Estimate the height of the majority of mature trees that make up the canopy within the study site. Do not average tall and short trees; instead give a “typical” height of canopy trees. Indicate the units (feet or meters) on the form. Here is one good way to estimate canopy height:
 1. Find a tree that represents the typical height of the canopy.
 2. Mark your height (or the height of a co-worker, if you are working in a team) on the tree or a nearby shrub.
 3. Stand back from the tree and visually estimate how many “humans” high the tree is. Multiply this number times the human height to get an estimate of canopy height.
- **Percentage of canopy cover**—Estimate the percentage of sky that is hidden from view by vegetation throughout your entire study site, when you look up. We have included a series of reference figures with the Field Form that may be helpful. Next, separate this value into the percentage of deciduous canopy cover and percentage of coniferous

canopy cover. These two numbers should add up to the number for overall percentage of cover. For example, you might estimate the total canopy cover to be 80% by using the reference figures. Next you would determine that your study site is three-quarters deciduous trees and one-quarter coniferous trees. In this case, you would record 60% deciduous and 20% coniferous canopy cover on your Field Form.

- **Most common trees in canopy**—Record up to three of the most common canopy trees within the study site. Use a field guide to trees or consult a checklist of trees found in your area. If none of the trees listed are appropriate, mark “Other” and write the name(s) on the line or in the “Comments” section. If only one or two species dominate the canopy, only mark or write in those. If you know a more specific name for your canopy trees (such as White Oak for “Oak,” or *Pinus ponderosa* for “Pine”) please list the names in the “Comments” section.

Low vegetation characteristics

For the purpose of BFL, we define low vegetation as all vegetation below 20 feet (6 meters). This includes branches of trees that are lower than this height as well.

- **Percentage of low vegetation cover**—Estimate the percentage of the ground that would be covered by living or dead vegetation if you could look down at your entire study site from just below the canopy (rocks, pavement, water, bare soil, etc. should not be included in your total number). We have included a series of figures with the Field Form that may be helpful. Next, separate this value into the percentage of saplings (small trees), percentage of deciduous shrubs, percentage of coniferous shrubs, percentage of ground cover (all non-woody plants such as grasses, ferns, flowers, mosses, etc.), and the percentage of dead vegetation (fallen trees, stumps, snags, leaf litter, etc.). These numbers should add up to the overall percentage of cover. This number must be less than or equal to 100.
- **Most common low-vegetation plants**—List up to three of the most common low-vegetation plants within the study site. These may be small regenerating trees of the same species that occupy the canopy or they may be shrubs that remain beneath the forest canopy. Use a plant field guide or consult a checklist of plants found in your area.

LANDSCAPE LEVEL CHARACTERISTICS

- Outline a 2,500-acre (1,000-hectare) block with the survey point at the center (Table 1 explains how to measure the block on your map or photo)
- For the 2,500-acre (1,000-hectare) landscape surrounding each survey point, calculate these variables using maps and record on the back of the Field Form:
 - patch edge
 - forest patch size
 - percentage of forest
 - linear distance of edge
- If your patch is less than 1,000 acres (400 hectares), calculate two measures of isolation for each forest patch (see “Isolation measurements” in this section)
- If you need help, contact a local site coordinator
- Send us maps or photos to help us visualize your site

Landscape level characteristics

For BFL to be successful, we need participants to describe the 2,500-acre block of landscape surrounding their study site. In particular, knowing what percentage of the surrounding area is forested and the amount of edge present will help us to understand the relationship between forest birds and forest fragmentation on a landscape scale.

We realize that, because these measurements are best taken from aerial photographs or up-to-date topographic maps, it may be difficult for you to provide this information. For assistance, refer to “How to get help: working with site coordinators” in this section or contact the BFL staff.

If possible, clearly mark your study sites on a copy (or photocopy) of the aerial photos or maps you used to make your landscape calculations and send this to us. **If obtaining the landscape information is causing you to delay sending us your data, please do not hesitate to call a site coordinator or the BFL staff for assistance.**

- **Patch Edge**—Check all habitat/land-use types that are adjacent to your patch. You may need to answer this question in the field as well as at home while looking at your topographic maps. For habitat types such as secondary growth or natural shrub, you may need to drive or walk around the area surrounding your patch to actually see what habitat types adjoin your patch. Topographic maps will probably show land uses such as residential and industrial/commercial.

TABLE 2. LANDSCAPE CONVERSION FACTORS

Map or photo scale	Dimensions of 2,500-acre (1,000-hectare) block <i>Example: If you are using a map with a scale of 1:6,000, then 1 inch of edge on the map represents 500 feet on the ground</i>	Linear distance of edge and isolation <i>Example: if you are using a map with a scale of 1:12,000, then each side of the block would measure 10¹/₂ inches on the map.</i>		
		ft/in	mi/in	m/cm
1:6,000	20 ⁷ / ₈ "	500	.09	60
1:7,920	15 ⁷ / ₈ "	660	.13	79
1:12,000	10 ¹ / ₂ "	1,000	.19	120
1:15,840	7 ⁷ / ₈ "	1,320	.25	158.4
1:20,000	6 ⁵ / ₁₆ "	1,667	.32	200
1:24,000	5 ¹ / ₄ "	2,000	.38	240
1:25,000	5"	2,083	.40	250
1:40,008	3 ¹ / ₈ "	3,334	.63	400
1:63,360	2"	5,280	1.00	633.6

- **Forest Patch size**—Record the size of the forest patch. (See Appendix B for information on how to measure patch size). Also mark whether you determined the size by measuring (using a grid, pacing, GIS, etc.) or estimating. If you ask the landowners for patch size, try to find out if they measured or estimated it. In situations where one or more forest stands are connected by corridors, try to determine the total size of contiguous (connected) forest.

Making your calculations using the BFL grid

Begin by outlining a 2,500-acre (1,000-hectare) block on the map or photo with the survey point at the center. Use the transparent grid provided or Table 2 to find the dimensions of the block. Within this block, estimate the percentage of land that is forested and the total length of forest/nonforest edge.

- **Percentage of forest**—Estimate the percentage of forested land within the 2,500-acre (1,000-hectare) block surrounding your survey point. You can do this in several ways:
 - If you are using a 1:24,000- or 1:25,000-scale map or aerial photograph (7.5 minute), you can use the transparent grid overlay provided in this kit to measure percentages.
 - If you are using other map/photo scales, you will use a similar method, but with a different grid. You can create your own grid (with 100 or 1,000 squares) using the dimensions in Table 2. If your map scale is not listed in Table 2, you will have to calculate the dimension yourself. If you need help, contact a site coordinator or the BFL staff.
 - A site coordinator or professional land manager may be able to help you measure landscape characteristics.
- **Linear distance of edge**—Estimate the total linear distance of edge (the boundary between forest and nonforest habitats) within the 2,500-acre (1,000-hectare) block. Measure along the perimeter of all isolated forest patches as well as the boundary of any continuous forest. If several forest patches are located within the same 2,500-acre (1,000-hectare) block, calculate linear distance of edge as a total for *all* patches within the block (see Figure 1).

If the boundary between forest and nonforest is fairly simple (straight and not very long) you can use a ruler to measure it, and then convert the measurement to linear feet or meters using the map or photo scale (Table 2). If your scale is not listed and you need help, contact the BFL staff.

HOW TO CALCULATE “PERCENTAGE OF FOREST” WITH THE GRID

1. Locate your survey points on a 1:24,000-scale aerial photograph or map. Lay the grid over the map with the survey point on the dot in the center. The grid contains 1,000 squares that represent 2,500 acres (1,000 hectares) at 1:24,000 scale
2. Count the number of squares that are at least one-half filled with forest and convert this to a percentage (divide your count by 10). Record this number on your data form

NOTE: Grids for different scales of aerial photographs may be available at the agency office where you obtained the photographs. Ask a biologist, forester, or other land manager working at the office if you need help using these grids. If you need further assistance, contact the BFL staff.

HOW TO MEASURE ISOLATION

- **For forest patches less than 1,000 acres (400 hectares):**
 1. Measure from the edge of your forest patch to the edge of the nearest patch that is **100 acres (40 hectares) or more**. Record this value on your data form
 2. Measure from the edge of your forest patch to the edge of the nearest patch that is **500 acres (200 hectares) or more**. Record this value on your data form
- In some cases—depending on the amount of forest fragmentation in your area—the nearest patch of 500 acres (200 hectares) or more may be the same as the nearest patch of 100 acres (40 hectares) or more. If so, use the same value for both measurements
- If your patch is very isolated, you may estimate these distances
- Be sure to record on your data form whether you measured each distance in feet, miles, meters, or kilometers

If the edge that you are measuring is convoluted, you can use either a map wheel or the “string method” to measure inches or centimeters on your map, then convert the measurement to linear feet or meters of edge.

Map wheel—This device is available for in-office use at most land management offices and some engineering or architectural firms. Trace the edge boundary with the wheel to measure edge length, then convert the measurement to feet or meters using the scale of your map or photo (Table 2).

String method—Lay a piece of string on your map or photo along the habitat edge boundary. Mark the string to indicate the length of the edge, then straighten it and measure the distance between the marks with a ruler. Convert to feet or meters using the scale of your map or photo (Table 2). Waxed dental floss works well because it is tacky and sticks to the photo or map.

Isolation measurements

Patch isolation is a measure of the distance from your forest patch to other forest patches. This measurement gives us another way of describing how your forest patch fits into the landscape, and how the arrangement of patches in the landscape might affect forest bird distribution and breeding.

If your patch is 1,000 acres (400 hectares) or more, you do not need to complete this part of the form. If your patch is less than 1,000 acres, please measure the distance from the edge of your patch to the nearest patch of 100 acres (40 hectares) or more and to the nearest patch of 500 acres (200 hectares) or more. Depending on the type of fragmentation surrounding your patch, you may be able to use the same photo or map you used to measure the percentage of forest and linear edge, or you may need a larger map.

To measure isolation, find the edge of your patch and look for the nearest neighboring forest patch of 100 acres (40 hectares) or more. Measure the distance on the map or photo from the edge of your patch to the edge of this neighboring patch and convert the measurement to either feet, miles, meters, or kilometers using the map scale (see Table 2). Mark this distance on your form under the category “100 acres (40 hectares) or more” (located on the right under “Isolation measurements”) and indicate whether it was measured in feet, miles, meters, or kilometers.

Now look for the nearest patch of forest that is 500 acres (200 hectares) or more. Again, measure the distance from the edge of your patch that is closest to the edge of this larger neighboring patch and convert this measurement to feet,

miles, meters, or kilometers. Mark this distance on your form under the category “500 acres (200 hectares) or more” and indicate the units. Note that if the first neighboring patch of 100 acres (40 hectares) or more also happens to be 500 acres (200 hectares) or more, you should use the same distance for both measurements.

If your patch is very isolated (miles from the nearest patch of 100 or 500 acres or 40 or 200 hectares), you may estimate the distance to the neighboring patches. Be sure to mark “mi” or “km” to indicate “miles” or “kilometers.”

How to get help: Working with site coordinators

If you are having trouble with any part of the project, don't panic. There is likely to be someone nearby who can help you select sites, find aerial photos or maps, or identify birds or trees. The first place to look for help is the site coordinator list provided in this binder. This list includes employees and members of state, provincial, and federal agencies; environmental organizations; nature centers, and individuals who are veterans of BFL. In many cases, these individuals also serve as the state contact for PIF. If you cannot find anyone on the list who lives close enough to help, try some of the contacts listed in Table 1. If all else fails, call us. We will do our best to link you with someone in your area.

HOW TO GET HELP

- Use the site coordinator list provided in this binder
- Contact land management agencies (see Table 1)
- Contact state or regional PIF groups, www.pwrc.nbs.gov/pif
- Contact the staff of Birds in Forested Landscapes

SUGGESTIONS FOR SITE COORDINATORS

If you are a professional biologist or land manager acting as site coordinator for BFL participants, the following suggestions may be helpful:

- Be sure that the person at your office who has primary contact with the public (for example, the front-desk receptionist) is aware of your involvement in the project. Some volunteers may contact your office but not know your name.
- Locate forest patches on orthophoto quads, aerial photos, or other maps that allow you to determine the size and characteristics of a particular patch, such as the percentage of forest in the surrounding landscape.
- Select sites that are easily accessible, but don't let distance keep you from suggesting an appropriate site you'd like to have studied.
- Make copies of aerial photos, maps, or orthophotos to give to volunteers. You may need to explain how to use aerial photos if the volunteers are not familiar with them.
- If your office has a GIS system, you may be able to use it to evaluate patch size and landscape variables.
- Try to locate sites in areas that aren't likely to be affected by timber harvest or other disturbances during the next two to three years.
- Invite your volunteers to be involved in other agency projects.
- Network with others in your agency through a biologist's network, your regional Neotropical Migratory Bird Coordinator, or Partners in Flight representatives.

We know that you are busy and we appreciate your assistance.

Many federal, state, provincial, and private land management agencies and organizations support BFL and have agreed to help participants. Their offices may be able to provide you with a variety of services, including site selection, permission to conduct surveys on their lands, use of aerial photos or maps, and assistance determining habitat characteristics (such as tree species or percentage of forest). These services will vary depending on your location and the availability of personnel.

Some biologists and naturalists from these agencies and organizations are already participants in BFL and were participants of Project Tanager. They may be looking for birders to survey birds on the agency's study sites. Others may not have heard of the project but may still be interested. If you find an agency or individual willing to help participants, please let us know so that we can acknowledge them and add them to our list of site coordinators.