PIF Conservation Design Workshop Agenda:

Tuesday, 11 April 2006

8:00 – 8:15 Welcome, meeting logistics, housekeeping, etc. (Jane Fitzgerald, Central Hardwoods Joint Venture, American Bird Conservancy)

8:15 – 8:45 **Objectives and Challenges of Goal-oriented Landscape Design** (**BRYAN WATTS** and Mike Wilson, Center for Conservation Biology, College of William and Mary)

Abstract: Since the realization more than 25 years ago that a large portion of the new world avifauna was experiencing broad-scale declines, avian conservation in North America has evolved into the most sophisticated, all encompassing conservation effort in the world. The movement now includes thousands of organizations focused on the common goal of stabilizing or restoring populations of all bird species. Over a short time period activities have moved through several phases, culminating in the production of taxa-specific, continent-wide conservation plans that present population targets for priority species. However, these plans provide no guidance in how to reconcile conflicts between priority species, seasons, or spatial scales when attempting to achieve population targets. There is an urgent need to develop a conceptual approach and process that will allow the conservation community to move from a set of independent objectives to integrated goals that may be applied to specific landscapes. We will outline the beginnings of a conceptual approach designed to evaluate goal-oriented, landscape-scale management scenarios.

SESSION I - GIS-based Habitat Assessment and Landscape Characterization
(8:45 – noon)

8:45 – 9:25 **Utility of national spatial data for conservation design projects** (**STEVE WILLIAMS**, Biodiversity and Spatial Information Center, North Carolina State University)

Abstract: The availability, accuracy, and volume of national spatial data are increasing at a rapid pace. In particular, the access to data has been vastly improved over the last 5 years. Types of spatial data include physical (elevation, hydrography), biological (land cover, species occurrence), climatic (precipitation, min/max temp), and infrastructure (roads, protected lands). Status, content, availability, and potential utility for conservation design projects will be discussed for several key data sets.

9:25 – 10:15 **Resolving habitat classification and structure using aerial photography** (**MIKE WILSON**, Center for Conservation Biology, College of William and Mary)

Abstract: Digital land cover data are the most widely used sources to characterize the ecological conditions of landscapes at marcro-scales but suffer in their inability and inconsistency to resolve finer scale habitat structure or discrete patch boundaries. Many of the habitats not easily identified in these digital data include those listed as priorities for management by Partners in Flight (PIF) planning efforts. This creates a critical gap in efforts to complete status evaluations for the species most in need of conservation. Aerial photography provides a suitable source to classify habitat structure to levels where other digital data sets cannot. However, aerial photo analysis for habitat classification is hampered by the amount of time required to sample large areas and errors propagated by human subjectivity. Several computer automated image analysis programs have been developed but these also suffer from the inability to distinguish between some habitat classes. The PIF Mid-Atlantic Habitat Assessment provides an example of how the analysis of aerial photography was used to develop a regional stewardship assessment of priority habitat types. Although digital landcover products are always evolving, the ability to distinguish certain habitats may be in a too distant future. The development of a national framework of aerial photo analyses may be vital for integrating assessments of certain habitat types within and between Bird Conservation Regions.

10:15 – 10:40 **BREAK**

10:40 – 11:20 **Ecosystem Modeling and Some Applications to Management** (**DAVID DIAMOND**, Missouri Resource Assessment Partnership, University of Missouri, Columbia)

Abstract: Ecosystems are controlled by macroclimate at continental scales and landform (geology and topography) at mesoscales. Hierarchical ecoregion maps that cover all of North America have been created to reflect the patterns of ecosystems across the landscape at macro- and mesoscales. Differences in ecological sites are largely controlled by variation in soils, especially moisture. GIS is useful for modeling geolandforms down to the site level of detail insofar as appropriate data are available. Historic vegetation can, in turn, be modeled to fine-resolution geolandforms within landscape mosaics. Results from this type of modeling can be used to help define appropriate desired future conditions by ecological site type and predict the response of current vegetation to the application of management options. Furthermore, GIS affords a manager spatially explicit data from which to model management scenarios across the landscape. This talk with outline the process of ecoregion delineation and provide several examples of its use for management.

11:20 – 12:00 **Methods for generating landscape metrics** (**ED LAURENT**, Biodiversity and Spatial Information Center, North Carolina State University)

Abstract: Landscape and patch metrics, or quantitative descriptions of patterns and shapes over large areas, are increasingly being used in conservation design. Among other uses, they permit coarse descriptions of species-habitat associations for regional planning activities. This presentation will focus on available software and methods for generating quantitative landscape descriptions as well as the theoretical underpinnings of their use. Specific topics that will be addressed include: vector vs. raster analyses, an overview of some patch and landscape metrics, extrapolating results of intensive studies for extensive predictions, anthropocentric vs. functional landscape descriptions, and an introduction to map algebra describing species-habitat associations.

Click here for downloadable PowerPoint presentation and here for PDF version.

Noon – 1 p.m. **LUNCH**

SESSION II - Approaches to Linking Bird Distribution and Abundance with Habitat Assessments at the BCR Scale (1:00 – 5:00 p.m.)

1:15 – 2:00 **Landcover/database approaches** (**CHRISTOPHER RUSTAY**, Playa Lakes Joint Venture)

Abstract: The Playa Lakes Joint Venture is conducting bird planning within BCRs 18 and 19, the Short and Mixed-Grass Prairies. We crosswalked a variety of GIS layers from seven states into a seamless landcover which is focused on our bird habitat needs. For landbirds, we researched densities by habitat type and condition. To easily hold and rework this information we have developed what amounts to a bird-accounting system for the landscape. We call this our HABS database. HABS holds densities assigned to species for each conditions of habitat within each states' portion of the two BCRs. Additional factors may be applied to these acres to account for amount of available habitat that may be suitable for reasons not amenable to analysis by GIS. For a few species that require larger blocks of habitat, more complex GIS models are used to determine appropriate acres (e.g. see Lesser Prairie-Chicken). HABS multiplies densities by habitat acres to arrive at a current estimated carrying capacity across all habitats and all conditions which a species occupies in each BCR portion of a state.

We then compare this figure to population objectives and determine a percent of goal already achieved. Additional habitat objectives, if needed, are then essentially determined by working backwards using the densities in the HABS. However, a variety of options could be available for a species depending upon the number of habitat types utilized by that species. Once an number of acres of each

habitat type has been determined for one species, HABS can quickly show the effects of achieving those acres on every other priority species in the area.

The basic model has been applied in other portions of the continent, but to our knowledge, not in this all-inclusive manner. To achieve this level of planning, cost a little over $400,000 in conception and implementation, primarily staff time.

There are some uncertainties with this approach. A large number of assumptions go into the basic models for many species. We are unsure of the extent to which species which are patchily distributed or occupy habitats not well captured by GIS are appropriately accounted for. Other concerns, such as projecting habitat trends, will be incorporated in the future.

This level of planning, however, is appropriate for the current capacity that Joint Venture partners have to implement objectives. It is flexible and easily adapted. We expect to replace many of the assumptions currently in the database with data as new research is conducted. A user interface to the HABS allows one to easily see the effects of habitat management programs on all birds utilizing the area. It allows us to incorporate all four bird plan objectives into one accounting system and design one landscape for all priority species at the same time.

2:00 – 2:45 **Building models from point count data** (**TIM JONES**, Atlantic Coast Joint Venture, U. S. Fish and Wildlife Service)

Abstract: Point counts, the most ubiquitous form of sampling in bird studies, are circular-plot surveys where all birds seen or heard are recorded. Sampling can be conducted within a fixed radius of the plot center or at an unlimited distance. Data obtained from point counts can be used for a variety of purposes including estimation of local densities, estimation of population trends and modeling of bird-habitat relationships. During this presentation, I will briefly discuss only the basics of point count methodology (e.g., species' detectability) and trend analysis since the focus of this talk is on the use of point count data to build habitat-relationship models. I will focus primarily on sample design issues, collection of ancillary habitat data and statistical modeling of the relationships between a measure of abundance and habitat characteristics.

I will be using data from a long-term forest breeding-bird monitoring program in northern Minnesota and northwestern Wisconsin. This study had three major objectives: a) to assess the effect of industrial forest management practices on the population levels of a large suite of species, b) to develop bird-habitat relationship models, and c) to link population responses and habitat relationships to a forest growth and succession model. We explored several statistical approaches to modeling bird-habitat relationships, including Logistic regression, Poisson regression and Classification and Regression Tree models. Although we were

able to develop statistically significant habitat models using these approaches, we also developed a novel Monte-Carlo simulation approach that provided better predictive abilities and was more easily integrated with the forest growth and succession model. I will compare and contrast the various statistical techniques and which would be most appropriate given differing conditions.

2:45 – 3:00 **BREAK**

3:00 – 3:45 **Building models from Breeding Bird Surveys** (**WAYNE THOGMARTIN**, U.S. Geological Survey, La Crosse, Wisconsin)

Abstract: The Breeding Bird Survey (BBS) is the most expansive survey of breeding landbirds in North America. Counts from these data can be used in models of species habitat associations to help inform conservation action. However, there are a number of issues relating to BBS data that one must consider in their course of their modeling. For instance, the BBS is a *road-side survey*, and as such, there may be biases associated with the use of these data for those species which are repelled or attracted by roads or are otherwise affected by changes in habitat because of roads. The BBS is an *annual survey*, but remotely sensed data which are most often related against these survey data are often only available for a specific point in time. Thus, some consideration as to the temporal aspects of the data are required. BBS data are *collected by volunteer* birders. As such, observers may vary tremendously in their ability to detect species. There is a possibility that counts from the BBS are *spatially correlated*, and failure to recognize this potential correlation may lead to biased parameter estimation and inappropriately narrow confidence limits about those model parameters. As with most survey data, BBS *data are counts*, and thus are usually more properly described by Poisson or negative binomial distributions rather than the Gaussian (normal) distribution common to least-squares regression. The BBS is *areally dimensionless*. Ostensibly, volunteers record all birds seen or heard within a distance of 400m of a survey location. However, because species vary in their detectability, this 400m detection distance may be quite inappropriate for determining the spatial resolution of any estimates drawn from these data. This leads to the last major point; the BBS provides an *index to abundance*. As such, it may be unclear as to how to translate that index of abundance to an estimate of true population size. In addition to being areally dimensionless, the survey primarily counts singing males. For many species, floaters or non-territorial individuals and females are poorly surveyed by the BBS. These various issues need to be resolved to properly translate estimates of relative abundance into credible estimates of population size. I provide as an example of these various issues some modeling of rare bird abundance that I have been involved in for the Prairie Hardwood Transition. We employed a hierarchical, spatial count model with environmental covariates to estimate relative abundance for 10 landbirds, Upland Sandpiper (*Bartramia longicauda*), Bobolink (*Dolichonyx oryzivorus*),

Black-billed Cuckoo (*Coccyzus erythropthalmus*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Sedge Wren (*Cistothorus platensis*), Wood Thrush (*Hylocichla mustelina*), Golden-winged Warbler (*Vermivora chrysoptera*), Cerulean Warbler (*Dendroica cerulea*), Grasshopper Sparrow (*Ammodramus savannarum*), and Henslow's Sparrow (*A. henslowii*). We adopted a Bayesian approach to model estimation because it is the only means by which we can accommodate concerns regarding 1) the count-based nature of the data, 2) nuisance effects associated with differences between observers and years, and 3) potential spatial correlation between survey counts. We mapped our statistical models to identify areas in which conservation action and subsequent monitoring effort can be most efficiently applied. My work on these and other species continues in other Bird Conservation Regions of the eastern United States. http://www.umesc.usgs.gov/terrestrial/migratory_birds/bird_conservation.html

3:45 – 4:30 **Building models from existing knowledge – HSI approaches** (**FRANK THOMPSON**, North Central Research Station, USDA Forest Service)

Abstract: A habitat suitability index (HSI) is a numerical index of habitat suitability on a 0.0 to 1.0 scale based on the assumption that there is a positive relationship between the index and habitat carrying capacity. Historically models were composed of one or more variables representing life requisites for a species, often called suitability indices (SIs). These variables were combined in an arithmetic equation to estimate the HSI. A geometric mean was typically used because it was assumed that if the SI value for any one life requisite was zero the HSI should be zero, however, more complex model forms are also used. Documentation explains the model's structure, data sources, and assumptions. Models can be based on published knowledge, data, expert opinion, or conjecture. Models should be viewed as hypotheses of species-habitat relationships. Their value is to serve as a basis for improved decision making and increased understanding of habitat relationships; they specify hypotheses of habitat relationships that can be tested and improved.

Recent development of HSI models has resulted in models that can be applied to large landscapes and that utilize Geographic Information Systems. These models typically rely on data layers derived from remote sensing and other existing spatial data bases or large-scale inventories. Because of the focus on larger scales and their use of GIS technology they can better address ecological and landscape effects on wildlife such as area sensitivity, edge effects, interspersion, landscape composition, and juxtaposition of resources. They often produce raster-based maps of HSI values that can be viewed or raster values can be summarized with descriptive statistics or frequency distributions. GIS-based HSI models can be used in conjunction with landscape simulation models and population viability models as powerful tools to assist conservation planning. HSI models can fill a knowledge gap between research and real world conservation efforts because they

can be developed with existing knowledge for scales relevant to conservation planning, however, a potential weakness is that few models have been validated.

4:30 – 5:00 **Wrap up** (**TOM WILL**, U. S. Fish and Wildlife Service)

Wednesday, 12 April 2006

8:00 – 9:30 **Approaches to Linking Bird Distribution and Abundance with Habitat Assessments at the BCR Scale: PANEL DISCUSSION**

Summary - Stepping forward population objectives and delivering conservation - presented by Tom Will to kick off the panel discussion

SESSION III - Projecting Bird Numbers and Habitat Conditions into the Future (9:30 – 5:00)

9:30 – 10:00 **Introductory remarks** (**REX JOHNSON**, U.S. Fish and Wildlife Service)

Abstract: Future bird populations are simply a function of current populations plus births minus deaths. A P1 population objective is an arbitrarily defined future population state. Predicting the consequences of changes in habitat quantity or quality, including changes attributable to strategic habitat management requires an understanding of the relationship between habitat, birth rate and death rate. Knowing birth rate, we can estimate a target survival rate, and vice versa, needed to attain our P1 objective over a specified time horizon. The decision about which rate to try to affect is a function of limiting factors and our relative ability to alter them.

Vital rates, particularly survival, are difficult to estimate, especially for non-game species. Lacking this information, we must assume that management is effective in raising one rate, while holding the other constant. If true, the consequence is some rate of population increase. The alternative is to use trend data to retrospectively assess conservation performance, a reactive and inefficient form of adaptive management. As the bird community builds capability for biological planning and strategic habitat conservation, we must do a better job of targeting our monitoring to understand the effects of habitats on focal species vital rates, rather than be content to estimate status and trend.

10:00 – 10:15 **BREAK**

10:15 – 10:45 **Landbird population and habitat objective-setting in oak and conifer forest habitats in the Pacific Northwest: contrasts in process and use of results** (**BOB ALTMAN**, American Bird Conservancy)

Abstract: We are modeling breeding bird habitat relationships and conducting geospatial analyses for a suite of focal bird species in conifer forest and oak habitats in western Washington to assess the capacity of the landscape for bird populations. The presentation will describe the process with an emphasis on the challenges in making decisions and assumptions using data of variable quantity and quality, along with questions and suggestions on potential alternatives and future analyses. Additionally, we will compare and contrast several components of the process and outcomes including independent (conifer) and merged (oak) GIS layers; the use of focal species; development of bird density databases and the use of density estimates; a contiguous managed landscape (conifer) versus a very patchily distributed developing landscape (oak); comparison of population estimates using three different GIS layers (conifer); the use of regional bird population objectives prior to assessing habitat capacity (conifer); bird-habitat model components of patch size and proximity to other patches (oak); optimization among focal species and successional stages (conifer); future scenarios of changes in land use/management hypothetically assumed (conifer) or projected based on data from "futures" analyses and consultation with land mangers (oak); and local management unit spatially-explicit objective-setting (oak). Examples of the latter will be described for both public and private lands. We will also describe optimization scenarios for various forest management activities as an additional useful outcome of bird-habitat models in conifer forests beyond population and habitat objective-setting.

10:45 - 11:15 **Introduction to the USDA Forest Inventory Analysis (FIA) Program** (**MARK NELSON**, USDA Forest service)

Abstract: The USDA Forest Service's Forest Inventory and Analysis (FIA) program collects information to estimate the amount, condition, and change in the forest resources of the United States. FIA incorporate remote sensing and geospatial technologies for a variety of purposes: (1) to enhance FIA's existing plot-based estimates, (2) to improve public access and use of geospatial information associated with FIA data, (3) to create new geospatial data products that portray FIA information, and (4) to develop new estimation methodologies that integrate plot data with remote sensing imagery and other geospatial data. The author provides an overview of the geospatial aspects of the FIA program including the sample design and observations collected. Particular emphasis is placed on issues related to bird conservation. The author will address the questions, what is FIA, how can FIA data be used, and what utility does FIA have for conservation planning.

11:15 – noon **Application of FIA data to spatial modeling of landscape change and bird habitat suitability** (Todd Farrand and John Tirpak, University of Missouri, Columbia)

Abstract: To be successful, large-scale conservation initiatives, like the North American Landbird Conservation Plan, require an understanding of how landscape change impacts populations. GIS-based bird-habitat models can fill this gap by providing a mechanism for relating populations to habitat conditions that serves as a basis for the development of population goals and habitat objectives. Incorporating Forest Inventory and Analysis (FIA) data can improve the quality of spatial models by adding information about vegetation structure to 2-dimensional maps of forest cover.

Our project, *A methodological framework for ecoregional-scale landbird conservation planning in forested avifaunal biomes*, was initiated to develop a model-based approach to bird conservation planning. Our objectives are to develop from national-level datasets a transferable methodology for assessing the suitability of current landscapes, monitoring landscape change, and predicting population response to future landscapes. We developed Habitat Suitability Index (HSI) models from the literature for 43 priority bird species in the Central Hardwoods and West Gulf Coastal Plain/Ouachitas Bird Conservation Regions (BCR). Our models estimate relative density (21 species) or relative density and productivity (22 species) based on landscapes characterized from four primary datasets: the National Land Cover Dataset (NLCD), National Elevation Dataset (NED), National Hydrography Dataset (NHD), and Forest Inventory and Analysis (FIA) plot data. The models include independent variables derived at both landscape (e.g., edge density, landform class, patch size, distance to stream) and local scales (e.g., basal area, forest age class, tree density).

Spatial modeling of FIA data is crucial to the success of our efforts because vegetation structure is an important component of habitat but is lacking from current large-scale land cover datasets. In this presentation, we review various approaches to spatial modeling of FIA data, discuss the approach we selected and the information we intend to get from it, and present an example of the process and preliminary outputs. Further, we will discuss the caveats and opportunities of this comprehensive, replicable approach to ecoregional-scale planning and assessment.

Noon – 1 p.m. **LUNCH**

1:00 - 2:00: **Simulating landscape changes due to habitat succession, natural disturbance events, and management and predicting impacts on birds.**

(**STEVE SHIFLEY** and Frank Thompson, North Central Research Station, USDA Forest Service)

Abstract: Understanding the cumulative effects and resource trade-offs associated with forest management requires the ability to predict, analyze, and communicate information about how forest landscapes (1,000's to > 100,000 ha in extent) respond to silviculture and other disturbances. This knowledge is essential for linking wildlife habitat models with models of vegetation change because habitat evaluation for many important wildlife species is linked to spatially explicit information about forest vegetation (i.e., mapped current and future vegetation conditions). Forest vegetation simulation mapping tools vary in spatial scale from a few hundred ha (e.g., FVS), to a few thousand ha (e.g., LMS, SUPPOSE), to a few hundred thousand ha or more (e.g., LANDIS, TESLA). These approaches also differ in the mount of detail they carry and their relative ease of calibration and application. At our lab we have applied the spatially-explicit landscape simulation model, LANDIS, and compared the expected outcomes of forest management alternatives including intensive and extensive even-aged and uneven-aged management, singly and in combination, as well as no harvest. We have included the concomitant effects of wildfire and windthrow and compared outcomes in terms of spatial patterns of forest vegetation by age/size class, edge density, core area, volume of coarse wood debris, timber harvest, standing crop, and tree species composition over a 200-year simulation horizon. The ability to produce maps of simulated landscape change under alternative management scenarios provides opportunities for managers and the interested public to view and discuss the implications of management decisions. This work has provided the necessary foundation to link a number wildlife habitat suitability models for birds, bats, and terrestrial wildlife. Although conceptually simple, the process of initializing, calibrating, and applying the methodology can be onerous. Examples of simulating landscape-scale, forest vegetation change using the LANDIS model illustrate the process and address many of the issues that must be dealt with in the application of any landscape-scale vegetation model.

2:00 – 3:00 **The constraints of urbanization on population goals** (**MIKE WILSON**, Bryan Watts, and Bart Paxton, Center for Conservation Biology, College of William and Mary)

Abstract: Human domination of the globe is increasing at unprecedented rates. Urbanization is recognized as the leading cause of habitat loss and fragmentation and considered more drastic than other human land uses because the losses are permanent. In most cases, habitats consumed by urbanization are often replaced by impervious surfaces such as buildings or concrete. The limits that impervious surfaces impose on goal-oriented management need to be reconciled and in many cases used to refine conservation goals. We used human population data from the

2000 U.S. Census and 2001 National Land Cover to derive the relationship between human population density and impervious surface. We then summarized habitat availability from aerial photography across a gradient of impervious surface area. The combination of these data were then used to hindcast changes in habitat availability due to urbanization using decadal changes in human population levels. Results demonstrate unrecoverable shortfalls in the amount of land available to meet bird population goals. It is apparent that changes in the amount of habitat places a larger responsibility for successful restoration of bird populations to early BBS levels on remaining manageable lands and that fundamental conservation actions are needed to curb and consolidate non-recoverable uses of the land by humans. The continued development of spatially explicit models of urban growth is urgently needed as a tool to guide further allocation of conservation resources.

3:00 – 3:15 **BREAK**

3:15 – 4:15: **Monitoring, Modeling, and Management: Influences of Landscape Pattern and Climate on Avian Demographics** (**PHIL NOTT**, Institute for Bird Populations)

Abstract: Demographic monitoring data collected by the MAPS banding network provides us with estimates and indices of bird population demographics, including population size, apparent survival rate, and reproductive success for a variety of landbird species of conservation concern. These demographic parameters can be modeled using a variety of publicly available spatio-temporal data (e.g .NLCD, DEM) to create species-landscape models from which we can create landscape-scale (10,000's of hectares) landbird population management guidelines. The species-landscape models are constructed at regional scales but landscape management can be implemented at the scale of individual landholdings. Alternatively, these models can be used to map potential breeding habitat at regional scales or finer. However, climate and weather patterns may mask the effects of management. For instance, among Neotropical migrants appropriate habitat management may not be observed to benefit declining populations if conditions on the wintering grounds lead to high winter mortality and/or poor physiological condition. We demonstrate, the influences of landscape, topography, climate driven pestilence, and overwintering conditions on populations of landbirds breeding in six national forests of the Pacific Northwest Region 6 and at eight DoD installations across the southeastern and south-central US.

4:15 – 5:00 **PANEL DISCUSSION**

Thursday, 13 April 2006

8:00 – 10:00 **BREAKOUT SESSIONS** - Participants will break into four groups to apply the tools discussed above to develop population goals and habitat objectives for one of four habitat/landscape types. Each group will be given a hypothetical set of criteria regarding priority bird species' habitat needs; the population and habitat data available to planners and modelers; the landscape's condition and threats to its integrity.

Breakout Groups, please answer the following questions for the species/habitat type to be discussed in each respective group – grassland, shrubland, eastern forest, or western forest (see below for table describing each group's hypothetical landscape):

1. What tools and modeling approaches can be employed to develop habitat-based population estimates, for the example species in the table, given the resources listed? (Please outline the steps in a sequence.) What are the limitations of the approach you have outlined? What additional sources of bird population and habitat data and other information could be used to improve the estimates for this habitat type?

2. What tools can be employed to project habitat conditions and populations forward in time (i.e. set realistic population goals and habitat objectives)? What are the limitations of your approach? What additional sources of bird population and habitat data and other information could be used to improve the estimates for this habitat type?

Grassland Landscape:

Species Needs	Prairie Grouse w/ large. home range (2000+ acres) Area-sensitive Passerine needing some bare ground Area-sensitive Passerine needing litter and forbs Passerine needing shrub patches within grassy matrix
Literature Base	good
Data Available	Few point counts, fair BBS coverage
Landcover	NLCD; aerial photos; Digital Ortho Quads
Threats	Habitat conversion Livestock grazing intensity Invasive exotics
Current Landscape Condition	60% fragmented; 40% non-fragmented

Shrubland Landscape:

Species Needs	Galliform w/ large. home range (2000+ acres); Passerine needing large percent shrub cover Passerine needing shrub patches within grassy matrix
Literature Base	Moderate; data on area-sensitivity lacking
Data Available	Few point counts, moderate BBS coverage
Landcover	NLCD; REGAP; aerial photos; Digital Ortho Quads
Threats	Habitat conversion, especially urbanization (ranchettes) Livestock grazing intensity Invasive exotics
Current Landscape Condition	30% fragmented; 70% non-fragmented

Eastern Forest Landscape:

Species Needs	Area-sensitive passerine associated with 1-5 acre canopy gaps mature forest Cavity-nesters Passerine needing patches of shrubland 25 or more acres in a forested matrix
Literature Base	Good
Data Available	Many point counts but not well-designed or stratified by forest types Good BBS coverage
Landcover	NLCD; aerial photos; Digital Ortho Quads; FIA
Threats	Invasive exotics Urbanization (urban, suburban) Lack of management; altered disturbance regimes
Current Landscape Condition	30% fragmented; 70% non-fragmented with tracts from 100,000 – 1 million acres

Western Forest Landscape:

Species Needs	Area-sensitive late-successional species Mixed coniferous/deciduous species Cavity-nesters A fire-associated species
Literature Base	Good
Data Available	Many point counts but not well-designed or stratified by forest types Good BBS coverage
Landcover	NLCD; aerial photos; Digital Ortho Quads; FIA
Threats	Invasive exotics Insect/disease outbreaks Urbanization (urban, suburban, ranchettes) Lack of management; altered disturbance regimes
Current Landscape Condition	40% fragmented; 60% non-fragmented with tracts from

	100,000 – 1 million+ acres

10:00 – 10:15 **BREAK**

10:15 – 11:15 **Reports from Breakout Sessions**

11:15 – noon **Where do we go from here?** (**CHARLES BAXTER**, U.S. Fish and Wildlife Service)

ADJOURN at noon.