

# MAPS Chat

*An occasional newsletter of the Monitoring Avian Productivity and Survivorship (MAPS) Program*

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## Full Life-cycle Monitoring, Vital Rates, and Effective Bird Conservation

Dave DeSante (IBP) and

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The goals of most bird conservation efforts are to reverse the decreasing population trends of declining species, increase population sizes of species with low but stable populations, and maintain (or perhaps increase) population sizes for species with apparently healthy populations. Stated alternatively, the goals are to increase the population sizes of species of conservation concern while keeping common birds common. Management actions and conservation strategies, however, do not directly affect population sizes of birds. Rather, they indirectly affect population size by directly affecting the vital rates (e.g., productivity, recruitment, survival) which drive the changes in population size. Thus, whether our management goal is to increase the amount of breeding habitat for a rare or endangered species, or to implement strategies for preserving wintering habitat for a migratory species, we actually are aiming to enhance reproductive success or reduce mortality of the target species. Add in emigration and immigration at the local level, and these are the vital rates that determine the population size and trend of the species.

Reproductive success is generally a function of the quality of the breeding habitat as influenced by both site-specific and landscape-scale factors. These factors include vegetation type, extent, and condition

which influence nest-sites and food resources, but also include such factors as extent of nest predation or cowbird parasitism, and weather. All of these factors, and their interactions, influence the many diverse aspects of reproductive success that range from clutch size and number of breeding attempts through egg and nestling survival to survival of fledglings until they achieve independence from their parents. For migratory birds, these factors can be further complicated by variability in the health or body condition of birds arriving on their breeding grounds, which can result from carry-over effects from previous phases of their life cycle, such as food availability on their wintering grounds prior to their spring migration.

The role that mortality, and its converse – survival – plays in driving population trends, as well as the factors affecting mortality, are generally less well understood than for productivity, especially for migratory species. Conservation efforts often address some of the more obvious mortality factors, such as collisions with lighted buildings or tall TV towers, which doubtless have their greatest effect during migration. Deterioration of habitat conditions

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at important stopover locations, such as the Gulf Coast, may also cause considerable in-transit mortality, and are also often addressed by conservation efforts. Winter habitat conditions, however, may be equally or more important in affecting mortality and may be even more difficult and expensive to address, especially for species with specialized requirements for habitats that have been greatly reduced or degraded by human activity, such as the moist forests on the Caribbean slope of Mexico and Central America. Another factor potentially affecting mortality that may outweigh any of the others, and one that most of us do not think about much, is weather. Fall hurricanes, shifts in wind patterns, and dramatic changes in precipitation, all perhaps aggravated by climate change, may claim the lives of more small birds than any other factor, and we have very little influence on them.

The number of birds that die each year is actually astonishing. The following numbers are no doubt imprecise and possibly inaccurate, but they do illustrate the magnitude of the situation. Researchers associated with Partners In Flight have estimated population sizes of landbird species at the onset of the breeding season, when numbers are smaller than at any other time during the life cycle. Just adding up

## **Chandler Robbins Education and Conservation Award**

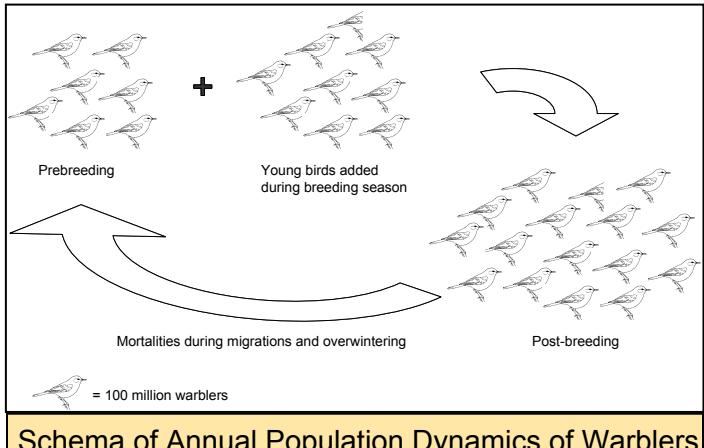


Robin Leong, David F. DeSante, Tony White.  
Photo by Ed Harper

Congratulations to Dave DeSante, IBP Founder and President, for winning the American Birding Association (ABA) Chandler Robbins Education and Conservation Award for 2010! He was presented the award by ABA Board Members Robin Leong and Tony White.

The award recognizes outstanding efforts in birder education, bird conservation, or the management or preservation of habitats on which birds and birding depends.

numbers for eastern and boreal long-distance migratory warblers results in an estimate of 700 million individuals, or about 350 million pairs. Data from research involving direct nest-monitoring as well as inferences from MAPS data suggest that, after taking re-nesting and multiple broods into consideration, each pair of warblers may produce an average of about 2.5 young that attain independence from their parents per year. Add these 875 million young to 700 million adults and you have a post-breeding, pre-fall migration population of over one and a half billion birds.



**Schema of Annual Population Dynamics of Warblers**

The surprising observation to be gleaned from this is that, for warbler populations to remain stable, as many as 875 million birds can die between the end of the breeding season and the following spring. This is consistent with data from MAPS that suggest that only about half of all adults return in the following spring and perhaps only about 40% of the young birds that survived to independence from their parents make it through their first winter. Another observation prompted by these results is that mortality of young birds during fall migration may not be that crucial, considering that most of those birds are going to die before their first breeding season anyway, but that mortality of young during spring is very important because spring-migrating birds have already demonstrated their ability to survive through the winter and will have a chance to breed if they survive northbound migration.

In a simplistic sense, if more than 875 million warblers die, populations will decline. This is simplistic because, if more birds die during the non-breeding season so that breeding densities the next spring are lowered, reproductive performance of the remaining population may increase, provided that breeding productivity is not already at a maximum given the current quality of the breeding habitat. Clearly, reproductive performance based on breeding habitat quantity and quality can have a huge impact

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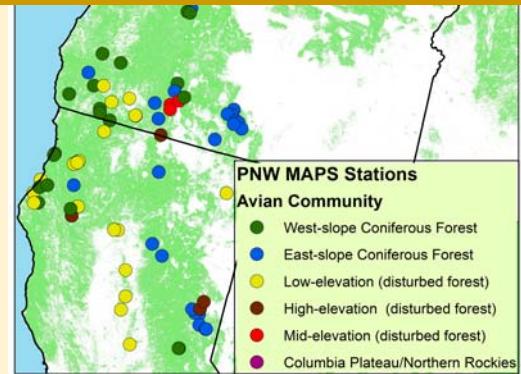
## PROJECT SPOTLIGHT:

# Using Data Basin to publish spatially explicit MAPS results

Phil Nott

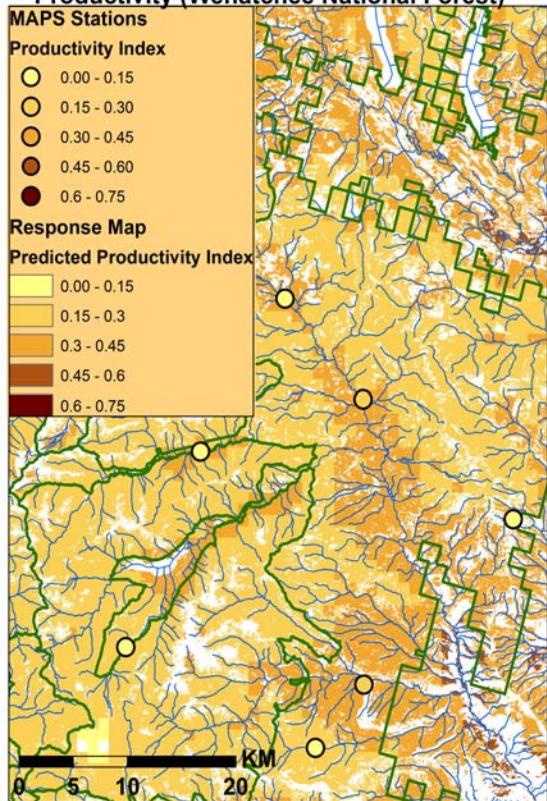
IBP is excited to be using [Data Basin](#) to publish spatially-explicit results of research using MAPS data from two regional studies. Data Basin is a free system that allows conservation planners and researchers to explore, visualize, map and report on patterns of avian demographic and population performance data.

Since 1992 a network of MAPS stations has operated among the forests of Washington, Oregon, and California, mostly on lands under the stewardship of USDA Forest Service Region Six or the Bureau of Land Management. These stations have collected detailed data from over 330,000 individual landbirds representing 150+ species.



**The results of analyzing these data are available as station- and species-specific data files from IBP's website.** These data and models can be mapped online and superimposed on various spatial datasets through the Conservation Biology Institute's Data Basin GIS server. This interface allows users to alter the map layout, zoom into areas of interest and download images for reports.

**Swainson's Thrush - Observed and Predicted Productivity (Wenatchee National Forest)**



## Species-landscape Models

Combining several datasets and databases available on Data Basin facilitated the creation of a library of regional datasets to provide covariates in regional models of species responses to landscape pattern. These models were spatially extended across the region to provide maps of predicted avian population responses to landscape pattern.

The selected model for Swainson's Thrush productivity index (ratio of hatch-year individuals to adults) included responses to elevation (negative), 2km canopy cover context (negative), and stream density (positive). The resulting map of the Rogue River region of southwest Oregon (left) shows dark orange and brown regions representing predictions of high productivity indices, associated with lower-elevation streamside habitat (990m-resolution cells) with more open canopy cover.

Such maps provide the potential for assessing the impact of landscape-scale management and alternate climate change scenarios on landbird communities of Pacific Northwest forests.

A selection of maps showing a range of different MAPS results were created in Data Basin and incorporated in the following online material.

[http://www.birdpop.org/db/example\\_maps.htm](http://www.birdpop.org/db/example_maps.htm)

on population size and trend, and is, after all, the factor that we as a bird conservation community expend the most effort and resources to affect.

On first glance, it would seem that we could increase the population size of any species by either increasing its productivity (birth rate) or decreasing its mortality (death rate). In practice, however, such may not be the case. If a species' population is limited by the amount of breeding habitat, efforts to reduce the species mortality on migration (e.g., by reducing collisions with lighted buildings or tall TV towers) may provide only a limited and temporary increase in population size because, although more birds may survive to the next breeding season, no more than before will be able to breed and there will thus be no increase in the number of



young produced. Alternatively, if a species' population size is limited by density-dependent mortality on the wintering grounds, efforts to enhance breeding habitat (e.g., by controlling nest parasites, such as cowbirds, or by decreasing the amount of edge habitat and thus the numbers of edge-based nest predators) may not result in an increased population size because the additional young produced each year will die during the winter months. Thus, truly effective conservation requires that we understand and address the limiting factors that actually drive population changes. Providing such information for North American landbirds was, in fact, the initial goal for the establishment of the MAPS program.

On-going analyses of 15 years (1992-2006) of MAPS data by IBP biologists will soon result in the production of a monograph and website titled "Vital Rates of North American Landbirds: Identifying the Proximate Demographic Causes of Population Trends." This effort addresses more than 100 species of landbirds, including Neotropical-wintering migrant, temperate-wintering migrant, and permanent resident species. Some important results of this work to date show that recruitment (the number of new birds entering the population each year, which

includes both recruitment of the previous year's young and immigration of adults) is generally more important than adult survival in driving both annual variation in population changes and spatial variation in population trends. We also found, however, that adult survival is relatively more important in driving population trends for Neotropical migrants and for declining species than for other species groups defined by migration strategy or overall population trend. Furthermore, for some migratory warblers and other landbird species, survival of young through their first non-breeding season appears more important than productivity in driving both the temporal and spatial variation in recruitment and, thus, in population trends. For such species, the crucial question then becomes, can we reduce non-breeding season mortality?

Some of the great unknowns are exactly when during the annual cycle most mortality occurs, and what are the factors influencing that mortality and when do they exert their effect? For example, what happens to young birds between the time they become independent of their parents and when they leave for fall migration? Both MAPS data and other recent research suggest that many forest-breeding birds seek out dense, early successional habitat during this time period, indicating that this habitat must be protected and enhanced to maximize both adult and first-year survival. This provides evidence that some amount of second growth, or openings interspersed among tracts of more mature forest, may be needed to provide all of the summer season habitat requirements for forest-breeding species. More and better forest management may help enhance survival during this period.



And then there is mortality during migration. Survival analyses of Black-throated Blue Warblers breeding and wintering in high quality habitats suggest that most mortality occurs not on the breeding or wintering grounds, but rather during migration. To some extent, we can influence habitat conditions for birds during migration, perhaps for example, by reducing the numbers killed in collisions with tall TV towers. This can only be considered a positive achievement, although as yet we have no good understanding of the importance of this mortality factor relative to all of the other forces affecting the

full-year life cycles of our priority birds. It is also true that most potential warbler mortality during migration results from adverse weather conditions and is stochastic in nature. The extent of the actual mortality in such cases, however, may well depend on the body condition of the individuals exposed to the adverse weather and, thus, may depend on weather and habitat conditions just prior to migration, which, in the case of spring migration, is the winter season.

During winter, many forest-breeding warbler species appear to be habitat generalists, but closer investigation often reveals that they are specialists that happen to survive well in certain types of human-modified habitats. Nonetheless, some of these species do seem to do reasonably well in winter. Species that specialize in habitats under siege, however, such as Louisiana Waterthrush alongside clear running streams or Kentucky Warblers in



primary rainforests along the Caribbean slope of Mexico and Central America, may suffer population regulation based primarily on condition on their wintering grounds. If it turns out that overwintering survival is the primary factor affecting population trends for some of our long-distance migratory landbirds, and analyses of MAPS data suggest that this indeed is the case for a number of species, we must address these difficult issues or risk losing these species entirely. IBP's MoSI (Monitoreo de Sobrevivencia Invernal) program was established specifically to help understand the winter habitat characteristics that promote good late-season body condition and high overwintering survival rates in Neotropical-wintering migratory landbird species.

Thinking about the full annual cycle of a landbird species and attempting to address all of the myriad factors that can influence its vital rates seems like a daunting task. We can make this task manageable, however, by first determining the vital rates that actually regulate a species' population size and trends, and then determining the critical environmental factors that influence those vital rates. In this way we can provide direction to our conservation efforts in the most time- and resource-effective manner possible. Clearly, understanding the vital rates and limiting factors that regulate the size and trends of landbird populations is the most

important and challenging research issue that we face today as we try to enhance the effectiveness of our bird conservation efforts.

Without a doubt, the MAPS program has played, and will continue to play, a major role in advancing this understanding and in achieving the successful management and conservation of our beloved landbirds. It is with a huge measure of gratitude that we here at IBP, and the avian conservation community as a whole, acknowledge and thank you, the MAPS station operators who provide the basic data that is fueling these efforts, and urge you to continue your important work. •

## **New MAPS operators join the flock — Welcome!**

*The following operators joined the MAPS Program during 2010 or very early in 2011. Most are beginning operations at a new station but others have inherited a previously operated station. We look forward to including them as part of the MAPS banding community for many years to come. A warm welcome!*

**Ross Brittain, Indianapolis, IN** • **Dr. Renee Carleton, Mt. Berry, GA** • **Robin Corcoran, Kodiak, AK** • **Scott Crosbie, Carmichael, CA** • **Dominique Dufault, Mont-Saint-Hilaire, QC** • **John Dickson, Tallulah, LA** • **Julia Elliot, Marietta, GA** • **Jeff Ewelt, Red Lodge, MT** • **Paul Fehringer, Delevan, NY** • **Greg Feinberg, St Louis Park, MN** • **Stephen Fettig, Los Alamos, NM** • **Charles O. Floyd, San Angelo, TX** • **Megan Fylling, Missoula, MT** • **Megan Garfinkel, Trabuco Canyon, CA** • **Joe Gartner, Hector, MN** • **Cyndi Gates, Brooksville, FL** • **Janice S. Greene, Springfield, MO** • **Dave Grosshuesch, Grand Marais, MN** • **Jess A. Gwinn, Solsberry, IN** • **Kate Healy, Spokane Valley, WA** • **Tom Heath, Plano, TX** • **Linda Kennedy, Elgin, AZ** • **Thomas J. Klotzbach, Waterport, NY** • **Brandon Kovach** • **Brian Kraskiewicz, Wheaton, IL** • **G. Rad Mayfield, Ill., Orono, ME** • **Brian Nelson, Ord, NE** • **Heidi Newsome, Burbank, WA** • **Mark Oestreich, St Louis Park, MN** • **Matt Poole, Paducah, TX** • **Bill Radke, Douglas, AZ** • **Marco Restani, St. Cloud, MN** • **Amy Scarpignato, Arcata, CA** • **Laura Sommers, Albany, NY** • **Jeff Vonkienast, Prospect, OR** • **Hillary White, Salt Lake City, UT** • **Christopher R. Wilson, Carmel, CA** • **Heidi Wolter, St Louis Park, MN** • **Judy Woods, Greenville, TX**

# Molt Limits and Plumage fields: Codes R and M – When to Use Them?

Ron Taylor

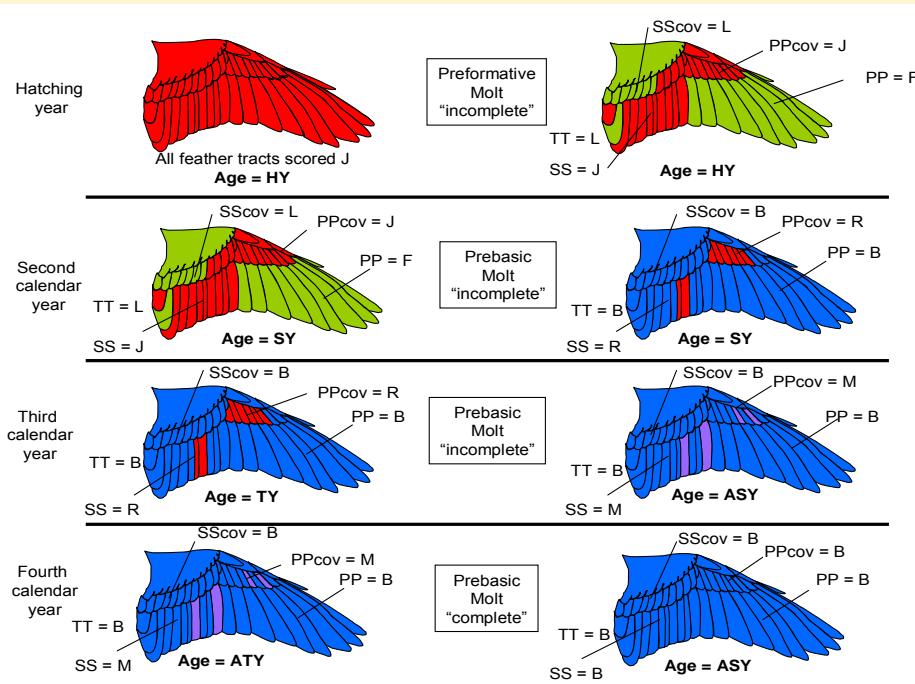
As the person who receives all of the MAPS data into our system at IBP, I see thousands of banding records every season. Most records pass by without concern, but if a comment is needed, it is usually regarding the Molt Limits & Plumage fields so I thought that it would be helpful to provide some guidance. The codes 'R' and 'M' seem to cause the most confusion so I will discuss them here.

These codes are generally reserved for the near-passerine species (e.g., woodpeckers) which can be aged to TY or ATY during the MAPS season because they have incomplete prebasic molts, i.e., all body and some, but not all, flight feathers are replaced. In woodpeckers, an incomplete prebasic molt in the bird's second year will often result in some juvenal feathers being retained. We use a code of 'R' to describe cases in which juvenile and basic feathers are present in the same tract after a molt has completed. These birds can be aged SY/TY.

During subsequent prebasic molts, some feathers are replaced and a very few others retained. Depending on which feathers are replaced, some individuals will have two generations of basic feathers in the same tract. Code 'M' is used when two generations of basic feathers are present in the same tract and these birds can be aged ASY/ATY. Code 'M' is always used if there are multiple generations of fully grown basic feathers, even in the rare case when there are still juvenal feathers present.

Most passerines replace all feathers during the prebasic molt. Any juvenal, formative, alternate, or previous-generation basic feathers that were present before the prebasic molt will be replaced with a single generation of basic feathers during the prebasic. Therefore, the codes R and M are not usable for passerines except for very rare cases.

Most operators do a great job filling in the Molt Limits & Plumage fields. You should all feel very proud to have learned both the molt and coding systems! Even though you are pros, we still think a review of the code definitions in the [MAPS Manual](#) at the beginning of each MAPS season is a good way to get you into banding mode. Enjoy the 2011 season!



Click on illustration to see larger version

The illustration above shows just one example of a molt progression. Because of the great variability of molt in woodpeckers there are many possible permutations. Some **helpful hints from Peter Pyle** regarding woodpecker molt:

- 1) There is a lot of variation in the numbers of feathers replaced in the secondary coverts and tertials during the pre-formative and in the secondaries and primary covers during the prebasics.
- 2) All primaries and rectrices are usually replaced during the preformative (except ACWO and LEWO).
- 3) Limits in the secondary coverts only occur after the preformative, but some birds can replace all coverts.
- 4) Incomplete molts in woodpeckers usually occur in the secondaries and primary covers
- 5) Basic feathers can be retained in any position in a tract, unlike retained juvenal feathers that show specific patterns.