The Institute for Bird Populations

# MAPS Chat

Newsletter of the MAPS Program

Number 6 - February 2002

## Bird Reproduction in Northwest U.S. Linked to Global Climate Phenomena

### MAPS Data Yield Big Results

by Todd Plummer

In August 2000, tourists at the North Pole observed a large hole in the ice where no hole had been seen before. In the last decade, high temperature records have fallen across the United States and Europe. The National Climatic Data Center reports, "In areas where a drought usually accompanies an El Niño, droughts have been more frequent in recent years." Virtually all scientists agree that global warming is real and that the global climate is changing rapidly. Our question is: How do global climate patterns affect birds in the Pacific Northwest.

> How do global climate patterns affect birds in the Pacific Northwest?

We knew from recent literature that temperature fluctuations in North Atlantic surface waters, a phenomenon known as the North Atlantic Oscillation (NAO), and the El Niño/Southern Oscillation (ENSO) have widespread effects on mammals, insects, vegetation and, of course, birds.

We investigated climate effects on the reproductive success of birds in the ecologically important Pacific Northwest bioregion using NAO and ENSO data, provided by NOAA and NASA respectively. For 34 landbird species, we investigated the relationships between these seasonal climate data and ten years of banding data from 33 MAPS stations located on six USDA national forests in Washington and Oregon. This revealed strong relationships between seasonal climate indices (see overleaf *ENSO and NAO: What Are They?*) and annual reproductive indices (ratio of juveniles to adults captured). We found that both springtime ENSO and springtime NAO conditions influenced reproductive success some three months later in the year.

***How do these climate phenomena influence bird population dynamics?*** As Phil Nott, the lead investigator in this study explained, "Oceanic oscillations can influence seasonal weather patterns, such as the onset of spring, the strength and direction of prevailing winds during migration, and the abundance of insects and seeds on both wintering and breeding grounds. In turn, these factors affect the physical condition of adults, which can affect various components of breeding success, such as clutch size, number of clutches, nest success, and survival of juveniles. However, because regional dif-

*Mmmm, lunch.*

## Good News About HSA

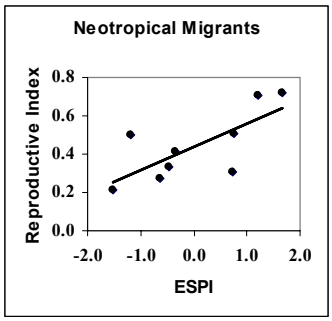
by David F. DeSante, MAPS Program Director

Beginning in the 2002 field season, Habitat Structure Assessments no longer need to be conducted yearly. **All contributors who have completed an assessment at their station do not need to do HSA again for five years**, unless the habitat at their station has undergone a major change (e.g., fire, hurricane, logging, construction, brush-clearing, etc.). We do ask that contributors take a copy of their station map and completed HSA forms into the field each year at the appropriate time and verify that the information is correct, and has not significantly changed. If you haven't yet conducted a Habitat Structure Assessment, please do one this year. You won't need to do it again until 2007.

## In This Issue...

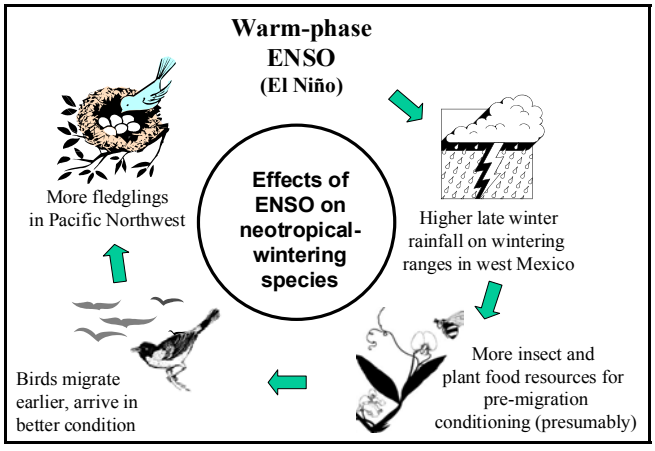
ferences exist in climate-weather relationships and because species overwinter in different regions, we investigated whether the effects of climate on those species that overwinter in the neotropics differ from the effects on species that overwinter in the temperate zone."

***Are neotropical migrants and temperate wintering species affected differently?*** "Yes. Although both phenomena affect 29 of the 34 species studied, El Niño winters, the warm phase of ENSO (*see page 4*), favors the reproductive success of neotropical wintering species over that of temperate wintering species, while the NAO warm phase favors the breeding success of temperate wintering species over that of neotropical wintering birds."



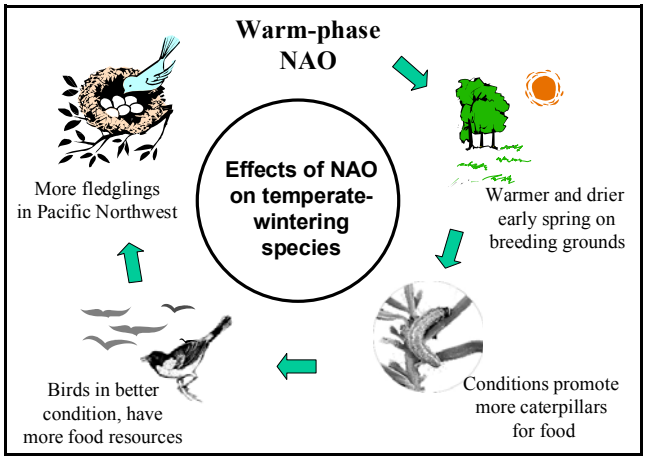

*Correlation between El Nino Southern Oscillation Index (ESPI) and reproductive index of neotropical migrants.*

***But how can El Niño conditions in the springtime affect the breeding success of neotropical migrants three months later and some 5,000 km further north?*** "We don't really know, but we can propose possible mechanisms. For neotropical migrants, El Niño conditions mean more precipitation and lower temperatures, hence, increased soil moisture, across the Pacific slope of Mexico prior to spring migration. Perhaps this produces more new foliage, and hence more insects that allow birds to increase




*The Big Picture I: ENSO and neotropical migrants*

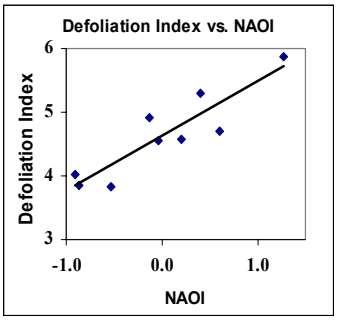
their physical conditioning and better survive the rigors of migration. In addition, by looking at other NOAA datasets we found that winds are more favorable for northward migration after an El Niño winter. It's likely that both of these factors play a role. For the first time, we can say with confidence that



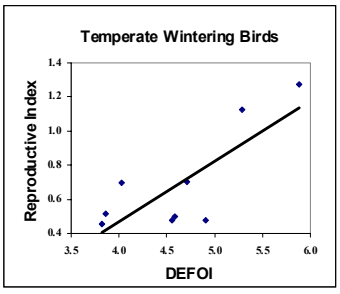

*The Big Picture II: NAO and temperate wintering birds*

weather conditions on the wintering grounds of some neotropical migrants may have more effect on their productivity than conditions on their breeding grounds. That's HUGE."

***Do El Niño conditions similarly affect temperate wintering birds?*** "Well, yes but to a much lesser degree. However, what is also striking about our results is the relationships among NAO, forest defoliation, and reproductive success, especially among temperate wintering birds. From annual surveys conducted by the USDA Forest Service Pacific Northwest Region 1, I constructed annual indices indicating the severity and extent of defoliation in the same six national forests in which our stations are located. Defoliation was due predominantly to the western spruce budworm and the Douglas-fir tussock moth. What I found was that reproductive success, springtime NAO, and defoliation are all highly correlated in this region. (Note the two graphs at right showing the relationship between NAOI and defoliation, and between defoliation and reproductive index.) We know from recent literature that warm-phase NAO activity induces drier, warmer springtime conditions in the Pacific Northwest. The warmer, drier weather leads to increased foliage




*Correlation between NAO Index and defoliation due to insects.*




*Correlation between defoliation index and reproductive index of temperate wintering birds.*

earlier in the year. This provides more new growth to support the spruce budworm larvae that emerge from hibernation in late April, and the tussock moth larvae that hatch in May."

***But how do you know that birds eat these insects?*** "According to Torolf Torgersen, who studies forest insects for the Forest Service in the Pacific Northwest, many of the bird species in our study have been observed preying on either or both of the spruce budworm and tussock moth larvae. In fact, when we compared the NAO effect between two groups of birds, "*species known to be predators*" and "*species not known to be predators,*" we found that the effect was much greater among known predators. We can only conclude that during warm-phase NAO years, ample food is available prior to and during the breeding season and allows for increased productivity. Furthermore, another piece of our Pacific Northwest research (soon to be published by Island Press) shows that temperate wintering species in the Pacific Northwest generally nest earlier than neotropical migrants, so perhaps they benefit from the plethora of larvae that appear in April, May, and into June." This is critical information to forest managers. As Torgersen himself said back in 1991, "The need to reduce damage to forests from insect pests suggests that managers view natural enemies (birds and ants) as resources to be conserved and enhanced." This comment points to the need to conserve bird habitat in order to maintain forest health.

***What do you propose to research next?*** "There are so many questions to ask of MAPS data - it's very exciting for me! Obviously, we want to look deeper into the mechanisms proposed above. In fact, we already have some data that support our hypotheses. Also, I recently finished another investigation that gives us a very clear idea of how seasonal weather affects both annual reproductive success and annual survival rates of birds that breed in Texas.

We are all very excited because this is the first time we have been able to relate annual survival rates to weather. We have already submitted a grant proposal to fund research into other regional climate effects on bird populations. Completion of this work will allow us to account for regional climate and weather effects, which will facilitate regional comparisons of the effects of landscape structure on a number of target species. This, in turn will help us achieve our ultimate goal of providing land management recommendations to conserve and enhance bird communities. One obstacle, however, is that many MAPS operators have not yet submitted their 2000 or 2001 data. This limits the number of stations and years that can be included in those studies. I already see patterns in the data, but without all of each year's data, I cannot achieve the precision or statistical power to be confident of our recommendations."

For this study, Phil Nott collaborated with Bruce Ramsay, Remote Sensing Scientist at the National Oceanic and Atmospheric Administration (NOAA), and various regional Forest Service staff.

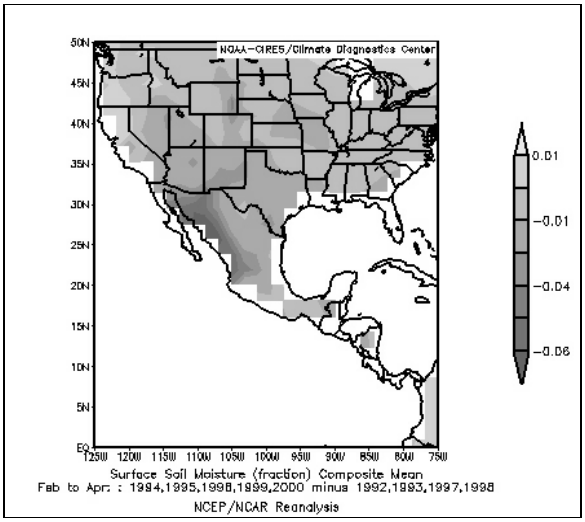
These findings will be published later this year in a paper entitled "Influences of the El Niño/Southern Oscillation and the North Atlantic Oscillation on avian productivity in forests of the Pacific Northwest of North America" in the peer-reviewed journal *Global Ecology and BioGeography* from Blackwell Publishing, Oxford, UK. The paper is co-authored by IBP scientists Dave DeSante, Rodney Seigel, and Peter Pyle.

IBP welcomes the following people to the growing community of MAPS contributors in 2001. Many thanks to all of you for your interest and hard work*:* **Marshall A. Brooks,** Rocky Mount NC; **Jeffrey Cooper,** Fredericksburg VA; **Laurie Doss,** Kent CT; **Joan Hagar,** Corvallis OR; **Joel Horman,** Ridge NY; **Nelson Hoskins,** Ottumwa IA; **Sherry Hudson,** Alviso CA; **Jeff Keeler,** Black Mountain NC; **Mark LaBarr,** Huntington VT; **Thomas LeBlanc,** Portville NY; **Steven Lohr,** Shaw AFB SC; **Phil Magasich,** Anglewood NJ; **Rad Mayfield,** Ellenboro NC; **Peter Nye,** Delmar NY; **Patricia Pelkowski,** Oyster Bay NY; **Jose Luis Rangel,** Vancouver BC; **Walter Sakai,** Santa Monica CA; **Ty Smucker,** Missoula MT; **Jonathon Stober,** Newton GA; **Linda Welch,** Milbridge ME.

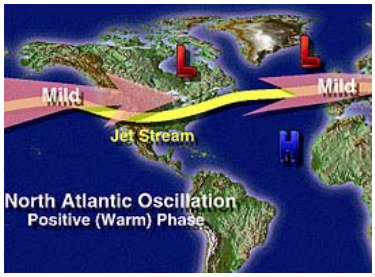

# ENSO and NAO... What Are They?

Global short-term climate variability is associated with phases of coupled oceanic and atmospheric phenomena including the El Niño Southern Oscillation (ENSO) and The North Atlantic Oscillation (NAO). These large-scale changes in the atmospheric wave and jet stream patterns influence temperature, rainfall, storm tracks, and jet stream location and intensity over vast areas. Research shows that both ENSO- and NAO-induced seasonal weather conditions can affect primary productivity (as seen in tree ring data) and insect abundance. Both of these factors likely influence avian reproductive success.

**The El Niño Southern Oscillation (ENSO)** describes climate conditions fluctuating between the extremes of El Niño years (e.g., 1992, 1997, 1998) and La Niña years (e.g., 1994-96, 1999). During El Niño winters the surface waters of the subtropical and tropical Pacific Ocean between South America and the international dateline are abnormally warm. As a result, between February and April the weather in western Mexico, the wintering grounds for many neotropical migrant birds, tends to be cooler and wetter (or hotter and drier in La Niña years). This effect diminishes as you move north into the wintering ranges of temperate wintering birds where weather patterns are more influenced by the North Atlantic Oscil-lation.




*Dark area in West Mexico indicates decreased soil moisture during ENSO negative years (La Nina), hence increased soil moisture during El Nino years .*

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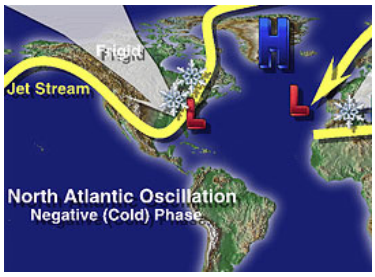


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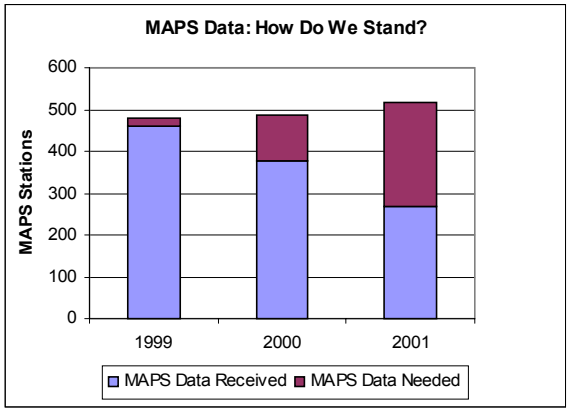
*North Atlantic Oscillation weather patterns in both warm-phase and cold-phase years. Note the mild conditions in Pacific Northwest during warm-phase years and cold conditions in cold-phase years.*

**The North Atlantic Oscillation (NAO)** influences weather conditions at northerly latitudes. When the surface waters of the North Atlantic are warmer than normal (warm-phase NAO), the eastern U.S. experiences mild, wet winters, and cold, dry, snowy winters during cold-phase NAO. Over the last few decades the warming trend in the North Atlantic is consistent with reports of a receding tundra line and rapidly melting glaciers at northerly latitudes. While scientists debate the potential ecological and economic disasters that might result from substantial melting of the massive Greenland ice sheet, the bugs continue to thrive in the Pacific Northwest - much to the delight of the birds that breed there.

## Many thanks...

...to the MAPS operators who have submitted their 2001 data. As the graph shows, we have received almost all the data for 1999. However, over 100 stations (!!) have not yet submitted their 2000 data and half of the 2001 data is still outstanding. No, not *that* kind of outstanding.

**Please**, if you have not sent in your 2000 or 2001 data, send them now. We desperately need them to begin our analysis. Go to that filing cabinet, pull out those data sheets, and stick them in an envelope addressed to IBP. What? You're still reading?



## Joe Bird Calls for Timely Data

by Hillary Smith

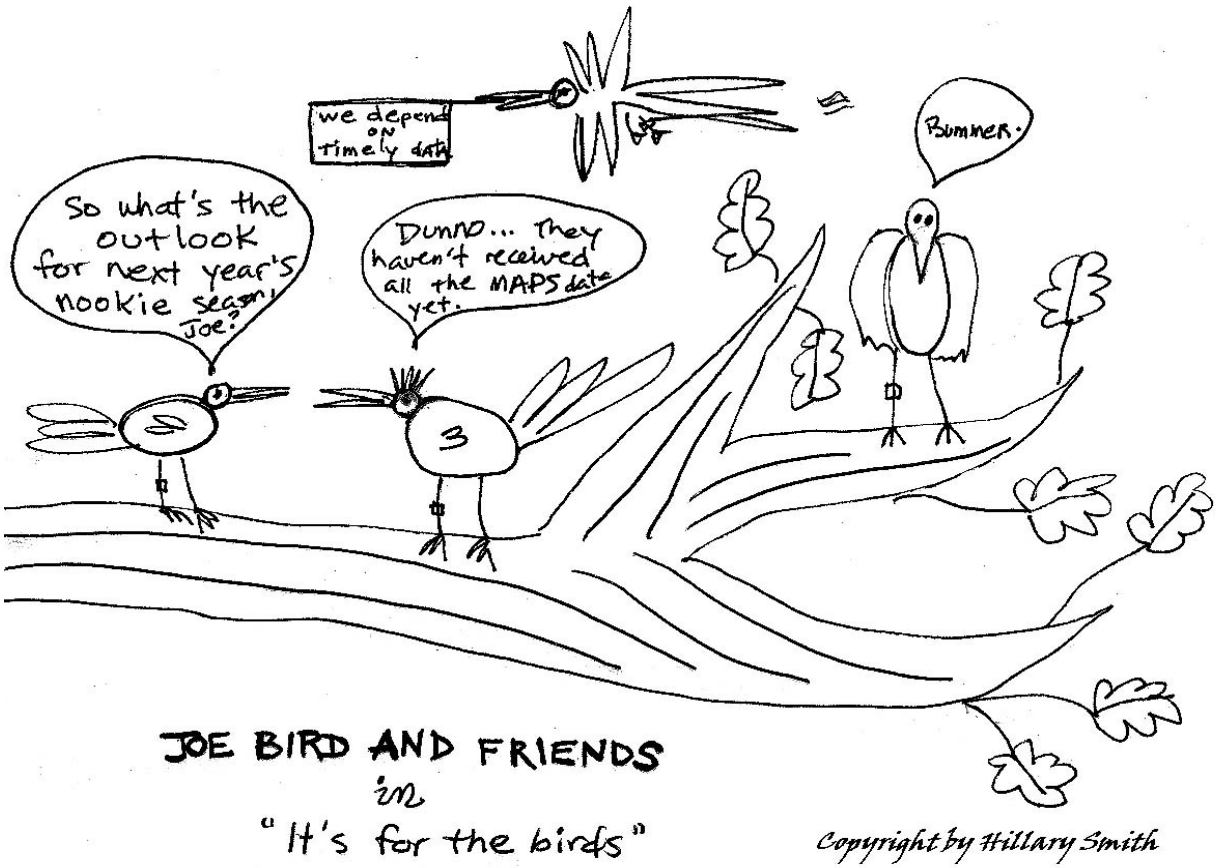
Hello, everybody. Joe Bird would like you all to come out of hibernation for a moment, just long enough to visit with him and his pals down in west Mexico. So pull up a chair, pour some tea, and have a listen....

"Ahem, welcome to my tree, friends. Well, not MY tree, but OUR tree - yours, mine, and all furred, feathered, and frocked critters of the earth. As I'm sure you're aware, it is winter here in the northern hemisphere and my friends and I await the latest word from the scientists at IBP on the outlook for our reproductive success for the next season. This issue, to which I'm sure many of you can relate, deeply concerns us. Obviously, reproductive success is the very thing that perpetuates us as living creatures.

"We birds are quite curious about these short-term predictive models currently being banded, rather *bandied* about at IBP's home office. These models could give to the folks who manage forests, meadows, and shrub lands on our breeding grounds a "heads up" on how to help sustain us. So you see, this is crucial stuff - the real nitty-gritty, as they say. It's taken some time and hard work by you, but the problem of how to find causes of fluctuations in avian productivity and survival is sprouting a handle, something to grasp, something to help the folks in charge be judicious stewards of the lands that belong to us all.

"Because (as I am told) these initial models will be dealing with me and my cousins in the short-term, and because global climate change is happening as we chirp, **it is essential that IBP receive each year's data in a timely manner, certainly no later than the following year's breeding season.** We, in turn, will continue to fill your nets with chattering life, your ears with birdsong, and your hearts with joy. So you see, we depend on you and you depend on us. What a wonderful world. "

Thank you, Joe Bird. And thank you, MAPS contributors. I leave you with one final thought: As the lead climate article in this issue of MAPS Chat points out, the weather in West Mexico influences avian reproductive success in the Pacific Northwest. Such different, magnificent places! With this knowledge, one begins to realize the wondrous, intricately woven fabric of our world. Where there is diversity, there is also commonality. Hurray for our small planet and for birds without borders! Please get those MAPS data into IBP so our scientists can further understand the connections between climate and bird productivity for the benefit of all birds everywhere.



# The Blessings of MAPSPROG

by Nicole Michel

MAPSPROG. For many of you, this word probably conjures up memories of hours spent hunched over a keyboard, diligently entering data, dodging error messages, and triumphantly cheering when, at long last, the final file has been created. In fact, the number of participants in this yearly ritual has increased at a phenomenal rate. In 1998 a handful of operators tested Version 2.0, but 3 years and 4 versions later, 80% of the 2001 data submitted to date has been entered using MAPSPROG. Give yourselves a pat on the back - your dedication, patience, and effort is greatly appreciated. Thanks to you, discoveries such as the link between climate trends and avian productivity, discussed earlier in this newsletter, are possible.

Now I know that many of you are wondering how navigating a data-entry program helps researchers at IBP discover the factors driving avian productivity trends. There are actually many different ways that MAPSPROG contributes to this effort. First of all, data that are entered and verified by an operator are far more accurate than data verified by an office biologist. When data are verified in the office and a discrepancy is found, such as a bird being called a Yellow Warbler in 1999 and a Common Yellowthroat in 2000, both records often have to be marked "unknown" and cannot be used in analyses. You know the birds, nets, and habitats at your station, and if you find any such discrepancies, conflicts, or incomplete data, you can use your knowledge of the station, and perhaps even your memory of that bird, to make better decisions than someone who has never visited the site. More accurate data and a greater number of records that can be used in analyses yield more accurate and precise results, which in turn give greater strength to management recommendations based upon those results.

Data that are entered and verified by an operator are far more accurate than data verified by an office biologist.

Secondly, by using MAPSPROG, the time between data collection and data analysis is greatly reduced. Because the data is already verified when it arrives in the office, IBP staff need to spend far less time cleaning up the file before it can be used in analyses. In turn, this frees up staff time, which can then be used to conduct additional analyses. Over the past 12 years, you have helped to amass a momentous data set that is large and diverse enough to yield statistical strength to analyses of patterns in vital rates, and to allow many other fascinating analyses of national, regional, and species-specific importance.

Due to our large data set, we have baseline information that allows us to quickly identify variations in the patterns of vital rates (both over time and between different locations), as well as the extent and causes of these changes. However analyses are only as strong as the data they are based on, and we are dependent on receiving accurate data in a timely fashion. With the recent acceleration in climate change, timeliness is becoming even more important.

We all have read the headlines - "Glaciers in the Andes melting," "Warmest winter in 50 years," "Global ocean temperatures rising." It is becoming clear that the global climate is changing, and changing at a rate far quicker than ever seen in the history of this planet. But what is not yet clear, or at least has not yet been fully publicized, is what sort of effect these climate changes are having, and will continue to have, on global ecosystems. Sudden changes in climate have been known to drastically impact bird populations, for example the drastic decrease in the numbers of adult Carolina Wrens encountered in the northeast after the unusually cold winter of 1995/1996. Long-term climate changes, such as those mentioned earlier in this newsletter, also have an impact on the vital rates of birds. But in order to make this link between climate and bird populations known, we need to be out there, collecting the data, verifying it, and preparing these analyses for publication. Timely and accurate data lead to stronger results, which in turn yields both awareness of the impacts of climate change as well as funding, so that we can continue monitoring and analyzing the effects of climate change on bird populations.

That is where MAPSPROG comes in. By increasing the accuracy of the data, and decreasing the turnaround time between data collection and analysis, MAPSPROG increases the strength, precision, and relevance of our analyses and subsequent recommendations, thus furthering the goal of avian conservation.

**MAPS Quick Tips and Tidbits**

When using MAPSPROG: If you come across an age discrepancy in between-record verification (for example, a bird is aged second-year (SY) and after-second-year (ASY) in the same season), change both ages to the more general category of after-hatch-year (AHY) instead of a more specific age of SY or ASY.

# How I Fell Into a Black Hole and Survived

by Mellissa Winfield

Making the transition from field work to an office position at IBP is a step that some people might never consider. As a MAPS intern who had just experienced my first, somewhat chaotic season of banding and collecting breeding data, I was tempted to enter the black hole, to ask, "Where does the data go?" and "Who and what are involved in interpreting and analyzing the data so that meaningful land management strategies can be identified?" After taking a position as a staff biologist at IBP, I soon discovered the complex system at work behind the scenes. One of my new duties was preparing the data for later analysis. Preparation includes verifying MAPS data by running the raw data through various computer programs designed to identify conflicts both within year and between years, verifying and recalculating effort, and determining breeding status for all birds caught or encountered at each MAPS station. Performing these three steps afforded me some insight into the types of data problems one can expect to encounter during the field season. These, of course, are the same steps that you undertake when you run your data through MAPSPROG.

A surprising part of my new duties involved verifying my own data. As a MAPS intern, I knew firsthand the immediate problems of data collection: being rushed for time, data sheets getting wet, partners entering in the wrong information (not to say that *my* partner actually did), and the list goes on *ad nauseam*. However, as I found out, many of the problems arose from MAPS operators misinterpreting the morphological clues of the bird in the hand, and matching those clues with their own previous experiences and information in the 'Pyle guide'. Common data conflicts that come to light during verification include errors in ageing and sexing, reading recapture band numbers, and tallying new, recaptured, and unbanded birds at the end of the day . While some species are harder to age and sex than others (for example, Red-breasted Sapsuckers or Swainson's Thrushes), there are usually some clues to help make the right call. For example, say you have a bird with heavy body molt, but no apparent flight feather molt. That bird is most likely a hatch-year bird molting into first basic plumage. Most after-hatch-year birds going through a pre-basic molt would molt body and flight feathers simultaneously.

While some birds are harder to interpret than others, as nature likes to keep things variable, some mistakes are easily avoided. I now appreciate the value of taking time in the field to deal properly with issues like lost or destroyed bands, of making notes (the more the better!), and of transcribing band numbers accurately. The reward is consistent data that is easy to interpret. It would save so much time and frustration during verification if MAPS operators would simply proofread the data each night to look for errors such as mis-entered station codes, dates, and status codes, as well as obvious conflicts (for example, assigning sex as male by cloacal protuberance (CP) with no value entered into the CP column). And finally, the simple task of correctly adding up the number of birds is a highly undervalued skill!

Those of us here in the IBP office think very highly of MAPS operators who hand in good data at the end of the season. We appreciate it VERY MUCH. Secondly, and more importantly for the birds, we need good data to make confident analyses and solid recommendations for applying land management strategies. And that, ultimately, is what the MAPS project is striving for: to ensure that our precious Wilson's Warblers, Red-breasted Sapsuckers, Northern Cardinals, and so many more are here for as long as their evolutionary paths allow.

# INTERNSHIPS

**MAPS Interns, anyone?**

IBP needs your help recruiting MAPS interns for this coming field season. If you know any able-bodied and hardworking souls looking for the thrills and excitement of bird banding, ask them to please contact

Mellissa Winfield
415-663-2051
email: mwinfield@birdpop.org

See our website for more details!
**www.birdpop.org**

We are also looking for interns for the following non-MAPS projects for 2002:

1. Conducting point counts in western national parks.
2. Studying wildfire effects on Sierra Nevada birds.
3. Surveying Great Gray Owls in the southern Sierra Nevada.
4. Classifying plant communities throughout the Sierra Nevada.

To apply or for more information, contact

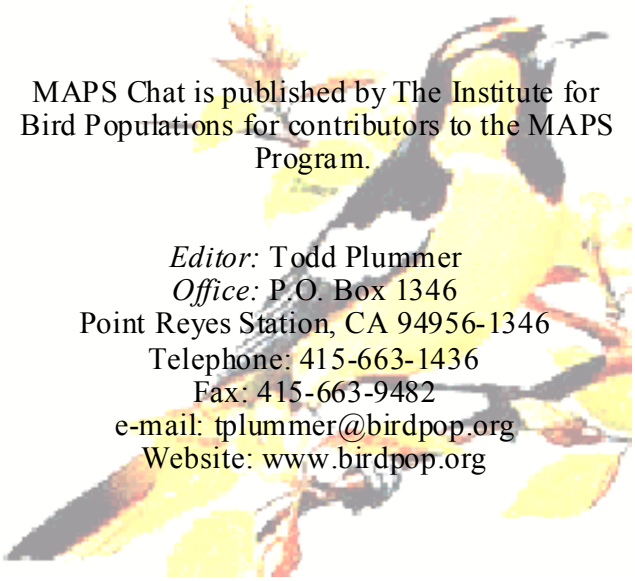
Bob Wilkerson
415-663-2051
email: bwilkerson@birdpop.org

**MAPS Feeder**

* IBP bids warm welcome to three new staffers hired last fall: **Sara Martin** and **Mellissa Winfield**, both Staff Biologists working on MAPS, and **Todd Plummer**, Information, Outreach, and Development Coordinator. Sara and Mellissa served as MAPS interns prior to taking full-time positions with IBP. Todd has a background in writing and research in avian population dynamics in the Southeast.

* Do you know any banders that are NOT operating MAPS stations? Share your MAPS experiences and this newsletter with them and encourage them to become part of the monitoring elite!

* Congratulations to MAPS veterans **Ken Convery** and **Abigail Vitale** who are engaged to be married. They met while Ken was an IBP biologist in the east a few years back and Abi was an intern. We wish them well on their mutual banding and many happy recaptures.



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