MAPSPROG Version 4.1

USER'S GUIDE AND MANUAL

A data input/import, verification/editing, and error-tracking program
for MAPS banding, effort, breeding status, and habitat data.
For use with Windows 3.1 or higher or Windows 95/98/2000/ME/XP

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PREFACE TO MAPSPROG VERSION 4.1

Welcome to MAPSPROG Version 4.1, which allows you to enter (or import), verify, and edit bird-banding data collected at any time during the year, including non-MAPS as well as MAPS data, submit your MAPS data to IBP, and prepare files of all your banding data that can be imported into Band Manager for submission to the Bird Banding Lab. For the first time, beginning with Version 4.0, you can run all of the powerful within- and between-record verification routines contained in MAPSPROG on all of your banding data collected throughout the entire year.

MAPSPROG Version 4.1 contains only two minor changes from Versions 4.0 - 4.0.4. The first involves modifications of the banding data file structure to allow entry of data related to the avian flu monitoring program. This field, named SWAB, is located after the FTHR.PULL column on both the data sheet and in MAPSPROG's data entry and modification forms. The appropriate codes for this field, as described in the MAPS Manual, are:

1 - 1mm swab used to collect the sample from within the cloacal cavity
2 - 2mm swab used to collect the sample from within the cloacal cavity
blank - sample not collected.

The second modification involves a change in the acceptable codes for the FTHR.PULL field in the banding data file. Beginning in 2006, acceptable FTHR.PULL codes are O, when two outer rectrices are pulled (i.e., rectrix 6 from each side), I when one outer and one inner rectrices are pulled (i.e., rectrix 6 from one side and rectrix 1 from the other side), or blank when no rectrices are pulled.

It is also important to note that while MAPSPROG itself has not significantly changed since Version 4.0 was released in 2005, computer hardware and software technology continues to rapidly advance. Notably, a new generation of computer processors and Windows operating systems have recently (Windows XP Pro x64), and/or will soon (Windows Vista), be released which use what is known as 64-bit data storage. Computers with 64-bit processors and operating systems, while faster, do not run older applications that use what is known as 16-bit data storage, including MAPSPROG. Although this has not yet been fully tested, it is our understanding that MAPSPROG, as it currently exists, will not function properly, if at all, on 64-bit machines. We hope to remedy this situation in the near future; until then, please use MAPSPROG on 32-bit machines (e.g., machines operating Windows 98, ME, 2000, XP Home, XP Pro, or XP Media Center).

If you have not yet used MAPSPROG Version 4.0, please review the following three paragraphs discussing the significant changes from Versions 3.8 - 3.8.2 that were incorporated into that release.

First were the changes to the banding data verification procedures to improve the accuracy and validity of assigned ages and sexes. During within-record verification, ages and sexes are checked against data compiled and presented in the bar graphs in Peter Pyle's *Identification Guide to North American Birds, Part I* to ensure that the assigned age and sex are valid for that species in that month. Additionally, the program makes use of feather-tract-specific information from the *Identification Guide* to determine whether the Molt Limit & Plumage fields used to age the bird were from tracts that are useful in aging birds of that species in that month; if only non-indicative

tracts were used to age a bird Second Year (SY) or After Second Year (ASY), the age is changed to After Hatching Year (AHY).

Between-record verification was also revised in Version 4.0 to automate some of the processing of between-record age inconsistences. Many between-record HY-AHY age conflicts within a given year will still need to be resolved manually by the user, but MAPSPROG Version 4.0 automatically resolves most between-record HY-U, AHY-U, SY-ASY, SY-AHY, and ASY-AHY age conflicts within a given year as well as all between-year age conflicts. You may notice that some records have been assigned a specific age (5, 6, 7, or 8) with a How Aged code of 'R' (Recapture) - **the new between-record verification procedures require assigning specific ages whenever possible, based on recapture information.**

Improvements were also made in Version 4.0, based primarily upon input from MAPSPROG users, that (1) allow users to view banding data in NEWMAPS using a browse window; (2) display capture counts for both MAPS and non-MAPS data when transferring banding data to TEMPMAPS; and (3) make the name of the export file created for Band Manager year-specific for easier identification.

Remember also that MAPSPROG Versions 4.0 and 4.1 use the revised species alpha codes described in Pyle and DeSante (2003, "*Four-letter and six-letter alpha codes for birds recorded from the American Ornithologists' Union check-list area*"; and 2005, "*Updates to four-letter and six-letter alpha codes based on revisions by the American Ornithologists' Union*", downloadable from *www.birdpop.org*) for banding and breeding status data from 2003 and subsequent years. Although there are very few discrepancies that are likely to be encountered by banders between the species alpha codes described in Pyle and DeSante (2003, 2005) and the alpha codes currently used by the BBL – the most notable being the use of "ROPI" by Pyle and DeSante (2005) instead of "RODO" by the BBL for Rock Pigeon (formerly Rock Dove), and "TUTI" by Pyle and DeSante (2003) instead of "ETTI" by the BBL for Tufted Titmouse (formerly Eastern Tufted Titmouse) – the current version of Band Manager will not recognize those codes which do differ. Because MAPSPROG requires the use of the Pyle and DeSante (2003, 2005) codes for banding and breeding status data from 2003 and subsequent years, a routine is included in MAPSPROG to convert alpha codes which do differ into the current BBL codes in the export.dbf file which is produced when "Create file for Band Manager" is run. **Operators wishing to import a MAPSPROG-produced file into Band Manager must run the "Create file for Band Manager" step and import the EXPORT<YR>.DBF file into Band Manager, rather than using the <LOCA><YR>.DBF or NEWMAPS.DBF files.** Further, **operators using MAPSPROG to enter banding and breeding status data for 2002 and earlier years should use the official BBL species alpha codes according to Pyle 1997 or the list provided by the banding offices. The codes described in Pyle and DeSante (2003, 2005) should be used only for data from 2003 and subsequent years.**

MAPSPROG is designed to be a comprehensive computer program for MAPS station operators, and provides them with an integrated vehicle for submitting complete MAPS data to this continental avian monitoring program. It is critically important that all components of MAPS data, including banding, effort, breeding status, and HSA data, be submitted to IBP in order to ensure accuracy and utility of the data collected at your station. However, the data need not

necessarily be submitted at one time. Banding and effort data should be submitted together, as banding data cannot be verified without corresponding effort data, but breeding status and HSA data may be submitted separately.

There are two parts to this user's document, the **User's Guide to MAPS Data Verification** (Pages 5-13) and the **User's Manual: Detailed Instructions for Using MAPSPROG Version 4.1** (Pages 15-148), in addition to the **Appendices** (Pages 149-172). For operators who have used MAPSPROG and are familiar with the User's Guide and Manual for Version 4.0, the only substantive changes to the Manual are in (1) the description of the operating systems on which MAPSPROG will operate (p. 37); (2) the new SWAB field in the banding data file (p. 43); and (3) the new FTHR.PULL codes (p. 43).

For operators who have used MAPSPROG Version 3.8 or earlier and are familiar with the User's Guide and Manual for Version 3.8, but are not familiar with the revisions incorporated into the Version 4.0 Manual, please review the following sections: (1) the creation of a station list when entering or importing banding data (pp. 42 & 56); (2) the new requirement that the 'NET' field not be blank (p. 44); (3) the change in the marking procedures of non-MAPS data (pp. 47 & 53); (4) the description of the modifications to the "Effort Data Verification" procedure (pp. 67-71); (5) the allowing of the entry and verification of year-round banding data (p. 74); (6) the descriptions of the modifications to the Within-record (pp. 84-86) and Between-record (pp. 95-102) Verification processes; (7) the description of the changes to the "List bandnumbers for which there are only recaptures" step, including the need to run this step twice (pp. 93-94); (8) the description of the"View/Browse records in NEWMAPS" feature (p. 102); (9) the description of the "Create final banding file" procedure (p. 104); and (10) the description of the "Append breeding status file" feature ("Utilites" pp. 21-22, "Breeding Status Data" pp. 107-108).

The rest of the Manual remains unchanged or has been changed only slightly to provide clarification. The specifics of the presentation have been adjusted to reflect menu changes in the program. Use the Table of Contents to locate instructions for particular aspects of the process, old or new. As always, if it has been a year or more since you have used the program, we recommend that you review Section III, "The Overall Strategy for Verifying and Editing MAPS Data," in the **User's Guide**, as well as Section I.E, "General Procedures for Using MAPSPROG 4.1," in the **User's Manual**. **NEW MAPSPROG USERS SHOULD READ AND UNDERSTAND THE USER'S GUIDE AND USER'S MANUAL BEFORE EXECUTING AND USING MAPSPROG!**

USER'S GUIDE TO MAPS DATA VERIFICATION

I. WHY VERIFY MAPS DATA?

There are two important reasons why MAPS data must be verified. The first is obvious — to make the data collected by the MAPS Program as accurate as possible. Inaccurate data will lead to erroneous indices and estimates of adult population size, post-breeding productivity, adult survival rates, and recruitment rates into the adult populations. Erroneous indices and estimates will, in turn, lead to erroneous conclusions and, ultimately, to erroneous suggestions as to the proximal causes of population declines. Inaccurate data also will lead to inappropriate recommendations for future research and management strategies designed to stabilize and reverse trends of those landbird populations that are declining, and to enhance trends for those populations that appear to be stable but are potentially threatened because of small population size or limited range or habitat requirements. Erroneous data also will make data analysis difficult or impossible. All of our analytical programs require properly coded data; improperly coded data generally cause the analytical programs to crash.

From an analytical standpoint, therefore, the accuracy of the following determinations in each data record are crucial and must be verified: capture code; band number; species code; age; how aged; sex; how sexed; date, time, and location of capture (including station code and net number); disposition (i.e., whether the bird was released alive and in such a condition that its future survival was not compromised); and whether or not any feathers were pulled. We refer to these determinations as the **primary MAPS data**, the data upon which all of our subsequent analyses depend. These data fields are the ones that may be subject to modification based on other information provided during that capture and comparisons with other records of the same band number. In addition, MAPS operators are also asked to collect **supplemental data**, including: skull pneumaticization; breeding condition (cloacal protuberance and brood patch); molt, wear, and plumage status (body molt, flight-feather molt, primary feather wear, juvenal plumage, and the eight molt limits and plumage fields); wingchord; body mass; and fat class. The major purpose for collecting this supplemental information is to provide a means for verifying the accuracy of the species, age, and sex determinations. These supplemental data, if collected accurately and in a standardized manner, also can provide invaluable information as to spatial (geographic) and temporal variation in the timing and extent of breeding and molt and the physiological condition of the bird. Finally, these supplemental data, reflecting information taken directly from the bird in hand, should **not** be modified, but should mirror precisely what is on the field data sheets.

The second reason for verifying MAPS data is to provide a means for estimating the kinds and numbers of errors that may exist in the MAPS data set after verification. As will be elaborated later, one of the important steps in data verification is called between-record consistency. This step checks that records sharing a given band number do not change species or sex or regress in age. As you will see when you run the program, this step detects potential errors in band number, species, age, and sex determinations, as well as code (C), status, and station errors. In order to detect these errors, however, the bird wearing a given band number must be recaptured at least once. Because not all birds banded in the MAPS Program are recaptured (in fact, only about 30% of the adult birds and somewhat less than 10% of the young birds are ever recaptured), only a relatively small proportion of the actual errors will ever be detected. However, the proportion of errors actually detected through the between-record verification routine, compared to the

proportion of birds ever recaptured, will allow us to estimate the number of errors that may remain in the data set after verification. This information is fundamental for assessing the precision of our indices and estimates. Equally important, this information allows us to track the error rate over time and to evaluate the effectiveness of efforts designed to improve the accuracy of the data.

II. WHY SHOULD MAPS CONTRIBUTORS VERIFY AND EDIT THEIR OWN DATA?

Again, there are two important reasons why MAPS contributors should verify and edit their own data. First, MAPS contributors know more about their data than anyone else: the circumstances under which they were collected, how the dynamics of life-cycle patterns in that particular season affected them, and the experience and skills of their field personnel. Thus, MAPS contributors will be able to do a more accurate and efficient job of verifying and editing their data than anyone else. IBP biologists, as second parties verifying and editing the data, often have questions regarding data conflicts that may arise. Obtaining answers to these questions can, at times, be difficult and time-consuming, especially if, in verifying the data from approximately 500 stations, the verification of a given station's data does not occur until late in the winter or early spring. Many times, the biologist performing verification at IBP has to make a decision as to which of two or more conflicting criteria holds more validity; this decision often has to be made without any insight as to the experience and skill of the field personnel who collected the data. We believe that most of the decisions we make in such cases are appropriate but acknowledge that our verification of MAPS contributors' data can, at times, introduce new errors into the data. Because MAPS contributors know more about their data than anyone else, they are in a much better position than we to make informed and timely decisions regarding conflicts that arise.

The second reason MAPS operators should verify their own data is to see, firsthand, actual and potential errors in the data collected. Seeing these conflicts in the data can serve as an opportunity for improving data collection. When operators verify and edit their own data, they encounter the same errors and conflicts that IBP biologists encounter when verifying their data. We hope that such encounters will encourage them to identify, examine, and improve those data collection techniques used by field personnel that may contribute to the errors and conflicts encountered. Such self-improvement in data collection can result only in better data.

III. THE OVERALL STRATEGY FOR VERIFYING AND EDITING MAPS DATA

The strategy for verifying and editing MAPS data has three components. In MAPSPROG, the first two components are accomplished in one procedure. The first component is to verify the *proper coding* of all data entered or imported into MAPSPROG. This is straightforward: MAPSPROG holds a listing of all valid codes for each of the fields in the database and, for each field, compares the codes entered or imported with those listings. Valid codes are the principal codes listed in the *2006 MAPS Manual*. If MAPSPROG encounters an invalid code, it will display an error message, and the error must be corrected. The program will not allow you to continue on to the next procedure as long as invalid codes remain in the data. Such an error, one that prevents you from continuing, is called a **critical error**. All invalid codes constitute critical errors.

The second component of the verification and editing process is to verify the *within-record consistency* of the data. In this step, various supplemental data for a given record are compared to the determinations of the primary data for that record to ensure within-record consistency. For example, skull pneumaticization is compared with age determination (e.g., an adult (AHY) bird generally should have a "5" or "6" skull, while a young (HY) bird generally should have a "0" through "4" skull during the MAPS season); cloacal protuberance and brood patch are compared with both age and sex determinations (e.g., a bird with a "3" CP generally should be an AHY male, while a bird with a "3" BP generally should be an AHY female); etc. All within-record discrepancies encountered are flagged and error or warning messages are displayed. Most within-record discrepancies are considered **non-critical errors**; that is, MAPSPROG will allow you to go on to the next step even if within-record discrepancies exist. The rationale for this is that, presumably, you have corrected the primary determinations (BAND, SPEC, AGE, HA, SEX, HS) based on your consideration of all the supplementary data for that record together; conflicts may, nevertheless, remain in the data set. However, ageing or sexing criteria representing supplemental data that conflict with the record's age or sex determination, are considered critical errors as well. For example, if for a given bird you determine AGE="1" and the bird has SK="0," you are really ageing the bird adult *despite* its skull. Therefore, it should not be aged by skull, i.e., HA should not contain "S." If HA does include "S" in such a case, MAPSPROG will prevent you from moving on to the next step until "S" is removed from HA, because such conflicts are considered critical errors. Similar situations arise with other supplementary data and both pairs of fields: SEX and HS as well as AGE and HA. In the absence of a note explaining the reason for the conflict, you must make a decision whether to retain the conflict and delete the offending HA or HS criterion, or to change the AGE or SEX to conform to the field data, such as pneumaticization or breeding condition, based on all the evidence available to you. **You must not, of course, modify valid supplementary data collected in the field, even when it contradicts primary determinations.**

The third component of the verification and editing process is to verify the *between-record consistency* of the data. In this component, the code (C), species (SPEC), age (AGE), sex (SEX), status (STATUS), and station (STATION) determinations are compared for each sequential pair of records having the same band number (BAND), and any discrepancies in these fields are flagged and an error message is displayed. Discrepancies in SPEC, AGE, or SEX are critical

errors and must be corrected or marked before a verified file can be created. However, you should note that when you change one of the two records flagged to make these fields consistent between the two records, a new inconsistency may result between the changed record and another previous or subsequent record for the same band number.

Finally, it is extremely important to note that **all SUPPLEMENTAL DATA taken in the field (i.e., skull pneumaticization, cloacal protuberance, brood patch, fat, body molt, flight-feather molt, flight-feather wear, juvenal plumage, wing chord, weight, and the ten adult ageing fields) must NEVER be changed at any time during the verification process.** This is crucial because, if a subsequent between-record verification step finds a discrepancy, it will be very important to know what the supplemental data, **as taken in the field**, actually were. For example, assume that a given record had a skull pneumaticization of "0," a cloacal protuberance of "1," and an age of "1" (AHY). The within-record component will identify and flag the discrepancy between SK="0" and AGE="1." In editing this record, you might trust the CP="1" more than the SK="0" and decide that the bird really was an adult. If so, you should **not** change the skull to "6." Now assume that you recaptured this individual on a subsequent MAPS visit, and that the data for that record were SK="0," CP="0," and AGE="2" (HY). If you had changed the SK of the first record to "6," you would have two records showing conflicts between SK and CP, and would have no indication as to which to trust. The fact is, however, that SK actually was coded "0" in the field on both occasions and CP was coded "0" once and "1" once. Thus, the weight of the evidence clearly points to the bird being AGE="2." For this reason, the **supplementary data always must reflect what was taken in the field, and you must never change supplementary data** (unless, of course, the supplementary data involved a data entry error and you changed it to reflect what was actually taken in the field).

IV. BANDING DATA FILE STRUCTURES IN MAPSPROG

In progressing through the banding data verification process, MAPSPROG passes your data through three data files called RAWMAPS.dbf, TEMPMAPS.dbf, and NEWMAPS.dbf (or simply RAWMAPS, TEMPMAPS, and NEWMAPS). RAWMAPS is the file into which the raw data is entered or imported; TEMPMAPS is the file in which MAPSPROG conducts the first two components of verification, proper coding and within-record consistency checking; and NEWMAPS is the file in which MAPSPROG conducts the final component of verification, between-record consistency checking (see Section III).

These three files make use of two file structures that are closely related: the MAPS banding-data file structure and the MAPS data-analysis file structure. You are undoubtedly familiar with the MAPS banding-data file structure, as it has been evolving with the MAPS Program since its inception and closely reflects the MAPS data sheets. This is the structure used by RAWMAPS; the current, 2006 structure is presented in Appendix I to this Manual. The MAPS data-analysis file structure used by TEMPMAPS and NEWMAPS is similar to the banding-data structure in that all the fields present in the banding-data structure are also present, in essentially the same order, in the data-analysis structure. It differs from the banding-data structure in that it includes several additional fields. The file structure for the MAPS data-analysis file is presented in Appendix II. **Consult Appendix III for a complete list of definitions for each of the valid codes that may appear in each field of the MAPS banding-data and/or data-analysis files.** Many of the additional fields in the MAPS data-analysis file are used only for data preparation and/or data analysis and need not concern you. A few of the additional fields, however, are critical for data verification and editing, and you must understand how they work. These include original band number (OBAND), original species (OSP), original age (OA), original how-aged (OHA), original sex (OS), and original how-sexed (OHS). These fields are used whenever it becomes necessary to change determinations in the respective band number (BAND), species (SPEC), age (AGE), how-aged (HA), sex (SEX), or how-sexed (HS) fields. In such cases, the original determinations, taken in the field, are entered automatically by MAPSPROG into the respective "original" (e.g., OA) fields. Once an entry is made in any of the "original" fields, it must never be changed, and, indeed, MAPSPROG will not allow you to change it, because it represents the determination made in the field. Moreover, if at a later time the original determination was found to have been correct after all, the data in the "original" field would not be changed or deleted because its presence indicates that at some time there was a different determination made for this record.

Some examples will serve to demonstrate how these "original" fields are used. Assume a bird (e.g., a Song Sparrow) was captured in July with no trace of juvenal plumage but for which the extent of skull pneumaticization could not be determined. The bird was given AGE="0" and HA=" ". Now assume that the bird was recaptured about 10 days later and, because the skull appeared to show no pneumaticization (SK="0"), the bird was given AGE="2" and HA="S ". The between-record verification routine of MAPSPROG will present these two records for correction because of the age discrepancy. In editing the data you might trust the second skull pneumaticization code and thus decide that the bird was a HY bird. The two records would then appear as:

First capture: OA="0"; OHA=" "; AGE="2"; HA="R "; and
Second capture: OA=" "; OHA=" "; AGE="2"; HA="S ".

Note that when you change AGE of the first record, MAPSPROG will automatically place the original age and how-aged determinations in OA and OHA of the first record, respectively, and will automatically place an "R " in the HA field of the first record to indicate that the age determination of that record was derived from recapture information.

Alternatively, you might not trust the second skull pneumaticization code of "0" and thus decide that the age of this individual must really remain unknown. In this case, the two records would be:

First capture: OA=" "; OHA=" "; AGE="0"; HA=" "; and
Second capture: OA="2"; OHA="S "; AGE="0"; HA="R ".

In this case, MAPSPROG will automatically place the original age and how-aged determinations in OA and OHA of the second record, respectively, and will automatically place an "R " in HA in the second record, again to indicate that the age determination for this record relied on recapture (actually, previous capture) information.

Now assume that this Song Sparrow was captured a third time in a subsequent visit and this time the skull appeared to be completely pneumaticized (SK="6"). Now, when verifying the data, you might decide that you can trust this third skull code because (presumably) the minute dots characteristic of a fully pneumaticized skull were seen and you believe that the SK="0" determination made on the second capture was in error. Thus, you believe that the bird was an adult all along. The three records would now appear as:

First capture: OA="0"; OHA=" "; AGE="1"; HA="R ";
Second capture: OA="2"; OHA="S "; AGE="1"; HA="R "; and
Third capture: OA=" "; OHA=" "; AGE="1"; HA="S ".

Alternatively, because of the conflicting skull information, you might decide not to trust either of the skull determinations. In this case, the three records would appear as:

First capture: OA=" "; OHA=" "; AGE="0"; HA=" ";
Second capture: OA="2"; OHA="S "; AGE="0"; HA="R "; and
Third capture: OA="1"; OHA="S "; AGE="0"; HA="R ".

This example illustrates three points: first, that you need to see all capture records for a given individual to make the best BAND, SPEC, AGE, or SEX determinations; second, that retaining and displaying the original, in-the-field determinations is crucial for making the most accurate determinations; and third, that **the final BAND, SPEC, AGE, and SEX determinations must be consistent for all records of each individual.** The reason for this last requirement is that calculations of productivity indices and annual survivorship estimates typically make use of only the first (or, in some transient-model survivorship calculations, the first and second) capture records of each individual each year. Thus, it is imperative that all records for a given individual reflect the final, most accurate, BAND, SPEC, AGE, and SEX determinations for that individual. This means that when you encounter a between-record discrepancy in SPEC, AGE, or SEX, you must examine all records for that individual and change all records that do not agree with your final determination.

It should also be pointed out that placing an "R " in HA or HS provides a means for tracking the errors that were detected through the between-record verification process and, subsequently, for determining the remaining, after-verification error rate for AGE and/or SEX in your data set. Because MAPSPROG automatically places an "R " in HA or HS when AGE or SEX is changed as a result of between-record verification, you do not need to be concerned with these "R"s.

Between-record errors in BAND and SPEC are tracked by means of five additional fields, V1, OV1, VYR, OVYR and N, that are part of the data-analysis file structure. Whenever MAPSPROG encounters a discrepancy between species determinations in two sequential records for the same band number in a given year, it automatically places an "SP" in the V1 field for both records. If, in editing the data, you change the species determination in one of these records, MAPSPROG will automatically place the original SPEC determination in the OSP field for that record. Thus, if OSP and SPEC differ for a given record, and "SP" occurs in the V1 field, then we know that a species determination error was made for that record and that the error was caught and addressed during the between-record verification process.

If, on the other hand, you decide that the species determinations were correct for both records, but that the band number was misread for one of the two records (which could cause the apparent species discrepancy), and if you are able to determine what the actual band number was, you should replace BAND for that record with the correct band number. MAPSPROG will then automatically place the originally-recorded band number in OBAND, and will overwrite the "SP" in the V1 field with "BN," thus indicating that the between-record discrepancy in SPEC was caused by a misread band number, rather than by an error in species determination. As an aside, you should note that MAPSPROG also places "A," "S," "ST," or "SS" code in V1 if it encounters between-record discrepancies in AGE, SEX, STATION, or STATUS, respectively; however, if it previously encounters a species discrepancy, the "SP" will be retained in OV1 and the new tracking code will be saved in V1. The actual checking hierarchy for error tracking is "2" (two newly banded records for the same band number or two recaptures of the same band number with the same date, time and net), "BN," "DL" (destroyed/lost band and a captured bird with the same band number), "SP," "NM" (species sequence number [NUMB] discrepancy), "A," "S," "ST," and "SS." Again, however, you need not concern yourselves directly with the V1 codes as MAPSPROG enters them automatically. In addition, analogous fields in the MAPS data-analysis file structure (VYR and OVYR) are used for flagging between-year discrepancies.

In other situations where a SPEC discrepancy exists (caused either by a species misidentification or a misread band number), you may be confident of one of the two records (because of other corroborating recapture data), but be unable to determine the correct band number or species for the other record. In such a situation, the N field of the record for which species or band number is in error must receive a "?". The "?" in the N field flags the record so that it is not included in any of our analyses of productivity or survivorship. MAPSPROG provides a simple routine for inserting these question marks into the N field.

In yet other situations where a species discrepancy exists, you may not be able to determine whether the discrepancy was caused by a misread band number or a species misidentification, or even which of the two SPEC codes was correct. For example, suppose a given band number was recorded as being placed on a HY Song Sparrow in juvenal plumage; the only other record of that

band number was recorded as being recaptured a week later on a HY Lincoln's Sparrow also in juvenal plumage. Several HY Lincoln's Sparrows also in juvenal plumage were banded from the same string of bands, and the wing chord that was recorded for both conflicting records fell in the overlap zone between the two species. At least three scenarios are possible and, perhaps, equally likely for the two conflicting records of that band number: (1) the band numbers were read correctly but both encounters were of a Song Sparrow; (2) the band numbers were read correctly but both encounters were of a Lincoln's Sparrow, or (3) both species determinations were correct but the band number of the recapture was misread. Because you cannot be confident of the species determination for either record of this band number (nor be confident of the band number of the recapture record), the N field of both records must receive a "?".

The important point here is that you must not leave a between-record AGE or SEX discrepancy in your final verified and edited database unless a SPEC discrepancy also exists between the two conflicting records; and, furthermore, you must not leave a SPEC discrepancy in the final verified and edited database unless one or the other (or both) of the conflicting records has a "?" in the N field. Fortunately, MAPSPROG provides a simple routine to enter these question marks. Keep in mind: even if you find that you must change SPEC, AGE or SEX in order to make every record of an individual bird consistent, the original, inconsistent determinations are not only stored by the database but are also displayed whenever the records are called up. No information is lost.