

## VI. WITHIN-RECORD VERIFICATION OF TEMPMAPS

### A. PREVIEW

You have now transferred your proofed raw banding data into the second MAPSPROG file, TEMPMAPS, and checked it against your raw data. **Any data corrections you undertake that are the result of within-record verification must be done on the records in the “Within-Record Processing” sub-menu, which uses TEMPMAPS; do not go back to the “Enter Data” or “Import Data” menus that use RAWMAPS to make such changes.** This is important, since MAPSPROG keeps track of the source of errors, i.e., whether through within-record or between-record verification checks. Changes made to the data during data entry are not tracked.

The within-record consistency verification routine checks the data in TEMPMAPS for valid codes and within-record consistency as explained in section III of the *User's Guide*. MAPSPROG bases its evaluation of validity and consistency on the data collecting protocols set forth in the *2006 MAPS Manual*; it is likely to identify many more problems in data sets that do not adhere strictly to these guidelines than in those that do. Every error and discrepancy found by the routine generates a one-line message that informs you as to the type of error or discrepancy. The messages are designed to help you look at your data critically in order to correct invalid codes or to reassess determinations in records which contain conflicting or unlikely data combinations. Thus, they generally identify the inconsistency and often offer a suggestion as to a change that might be appropriate.

Discrepancies between two characteristics of a bird, (e.g., cloacal protuberance “3” and skull pneumaticization “2”) often make it difficult to assign a reliable age to the bird. In this example, either the skull score or the breeding condition score is clearly in error, as young birds do not show breeding condition and adults do not show skull scores of two. However, **do not change the skull or the breeding condition score.** Those constitute field data read directly off the bird, and we can never be sure which characteristic was identified correctly and which was identified incorrectly; thus, these scores must never change. Determinations of age and sex, however, are inferences based on these data, and these may be changed in the database to improve the accuracy of the data; in fact, they *must* be changed. This is the basis for verification. In the example, if the bird was not aged “0” (unknown), the program will detect discrepancies and present you with messages indicating their nature, and suggest to you to “research the age.” Without further information, the age must be indeterminable and should be changed to “0.” However, there may be other evidence, such as indicative molt scores or juvenal plumage scores, or a note, or knowledge you have about the bander, that allows you to make a confident age determination despite the contradictory scores. These contradictions may be quite difficult to resolve; your best judgment is required to know which conflicts are best left untouched in the data set and in which cases it is appropriate to modify the primary data. For further details and examples please review section III.

There are messages for critical as well as non-critical errors (section III). For your convenience, these messages are displayed separately during processing. All critical errors must result in some kind of change, as they reflect fundamental problems in the data such as invalid scores or impossible How Aged or How Sexed codes (for example, a juvenile bird can never be aged by skull if the skull is, in fact, completely ossified; "S" must be removed from How Aged, and, if "S" was the only ageing criterion used in such a case, the age determination itself becomes suspect). Remember, the messages reflect the information available in the 1997 *Identification Guide to North American Birds, Part I* by Peter Pyle; thus, for example, for swifts, cloacal protuberance is no longer considered a valid sexing criterion.

**Version 4.0  
allows entry  
and verification  
of year-round  
banding data.**

Beginning with Version 4.0, MAPSPROG is now capable of processing banding records from any time of year. Unlike previous versions that were able to correctly process only data from the MAPS season, Version 4.0 allows the entry and verification of data from spring, summer, fall, and/or winter.

Non-critical errors are discrepancies in the data that represent unlikely combinations of supplementary data and primary determinations. In some cases, they may not identify "errors" at all, but simply represent unusual circumstances. Such messages do not always necessitate a change in the primary data; nevertheless, the discrepancy is identified with a message and the record displayed for checking. All non-critical messages ought to be reviewed and any problematic discrepancies addressed. To ensure that they are looked at, the verification module will prevent you from moving on to the next record without acknowledging them.

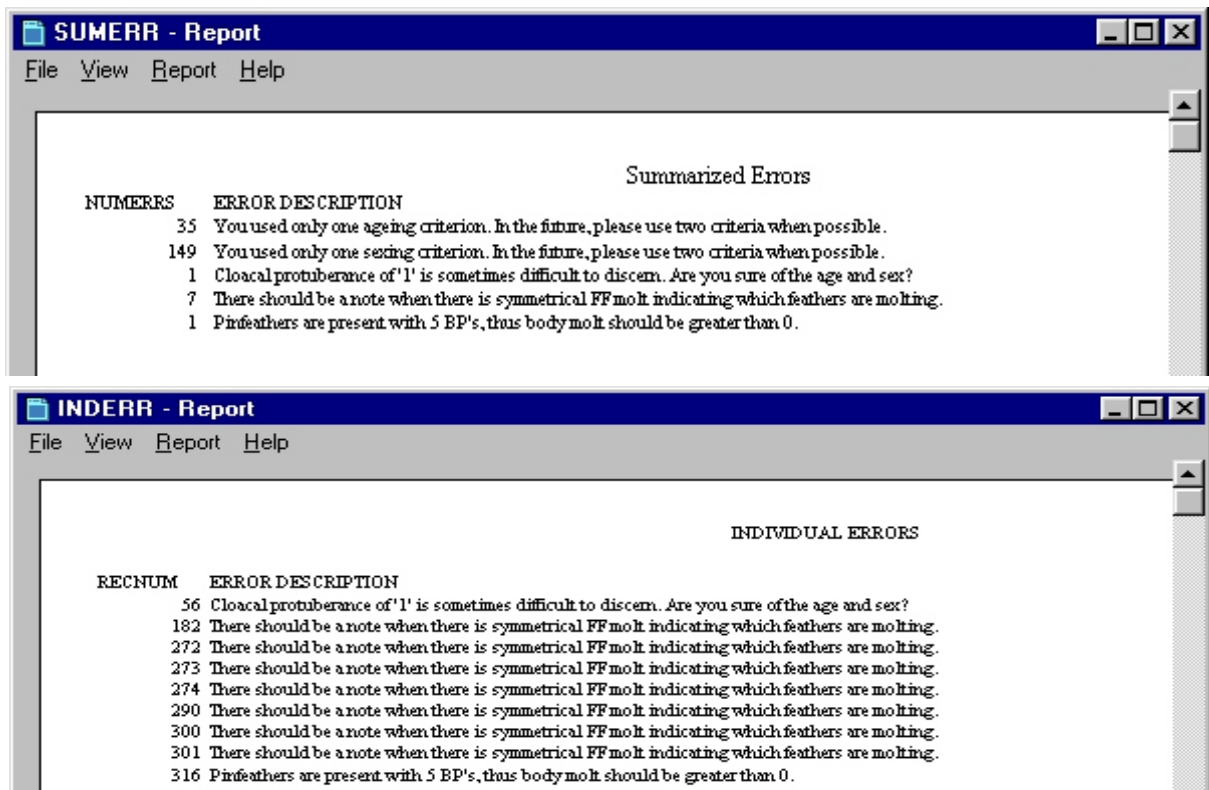
Some messages identify conditions that cannot be modified in the current data set, but provide information or guidance as to ways in which data collection might be improved in future seasons to produce data that are as complete and useful as possible. Such messages include, for example: encouraging banders to use two How Aged or How Sexed codes whenever possible rather than just one; or filling in the net-run time for every record. These messages are presented as a group before the actual verification routine; those that appear in numerous records are indicative of data collection techniques that would probably benefit from increased attention during subsequent data collection.

## B. OPERATION OF WITHIN-RECORD VERIFICATION

### 1. Viewing messages to improve data collection

Begin within-record verification by displaying messages that identify ways to improve data collection. Under the “Within-record Processing” sub-menu in the “Banding Data” drop-down menu, select the first choice, “Messages identifying ways to improve data collection.” The program will then give you an option to view, first, a summary list of errors and, second, an individual listing of errors. Summary lists always consist of a list of each error message generated and the number of records with that error, i.e., the encounter frequency of the error in your data. Individual lists display the error messages generated for each record. Clicking “No” will return you to the main menu. Clicking “Yes” will produce the appropriate one of the two reports displayed below (both report windows have been truncated; the control bar at the bottom of each window is missing).

Should your data file have no room for improvement, a “No error records” warning box will appear; click “OK” twice, and the program will return you to the main menu. Otherwise, as with other lists, you may print the summary list by selecting “Print” in the “File” drop-down menu or by using the printer button at the bottom of the screen. Print out the summarized list for field reference to identify problems with data collection that occurred with some regularity (messages indicating that only one ageing or sexing criterion was used are listed only in the summary report). Be sure to close the windows before moving on. To move on, click “Exit” in the “File” drop-down menu or the “Close” button.



## 2. Checking for valid codes and making global replaces

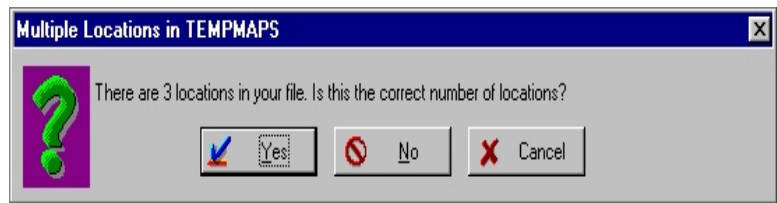
To move on to the next step, select “Check for valid codes” from the “Within-record Processing” sub-menu in the “Banding Data” drop-down menu.

### Making “global replaces”

Beginning with Version 4.0, MAPSPROG includes a new series of checks that locate invalid banding data codes and allows the operator to make “global replaces” to correct common data entry errors. Global replaces are allowed for certain codes in the following fields: LOC, BS, SK, CP, BP, F, BM, FM, FW, JP, STATUS, STATION, TIME, and FP.

### Check the number of locations in TEMPMAPS

If there is more than one location in your banding data file, the adjacent message box will appear, listing the number of locations in TEMPMAPS. If this is not the correct number of

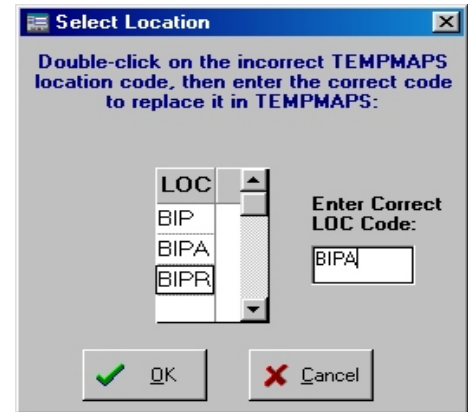


locations, a location code may have been mis-entered, or data from a location may not have been entered yet. Click “No,” and a second message box will appear asking if you would like to view a list of locations in TEMPMAPS and perform a global replace of invalid codes.

## MAKING GLOBAL CHANGES

Users who import computerized data may find the summarized errors list particularly useful. The list identifies frequently recurring problems in the data set (such as the use of “9” for data not taken). While some global changes are performed or facilitated in within-record verification, such as changing the “9”s to blanks in supplementary data fields, other recurring problems may remain in the file. Instead of addressing and correcting such errors individually in the subsequent step, “Process within-record consistency errors,” making a global change to your data set first could correct the error much more quickly. Note that if you enter or import a data set that makes use of codes other than MAPS codes, the verification routine is likely to generate a great number of errors if you don’t make global changes. Global changes must be undertaken in your own database application, and the data set with the changes must be re-imported into RAWMAPS. Those who have entered data through MAPSPROG and have a database application that is able to use or convert .dbf (dBASE) files can make global changes in the data set in their own application. The appropriate file to use for making changes is RAWMAPS.dbf, MAPSPROG’s data entry file. Exit the program (“Exit Program” in main menu bar) and make your changes. Then, you should re-import your data file into RAWMAPS to ensure that you have the proper structure (dBASE users may simply make their global changes in RAWMAPS). When you import the changed data, you should **replace** the data in RAWMAPS when the query screen inquires whether you would like to add to or replace the data already in RAWMAPS. You should respond similarly when the corresponding query screen appears in transferring the data from RAWMAPS to TEMPMAPS (**replace** the data in TEMPMAPS). Once you have your revised data in TEMPMAPS, start the within-record verification procedure again.

Clicking “Yes” will produce the adjacent box. View the location codes from TEMPMaps, double-click on the invalid location code to be replaced (make sure that the location code is highlighted), then enter the correct location code in the entryfield.



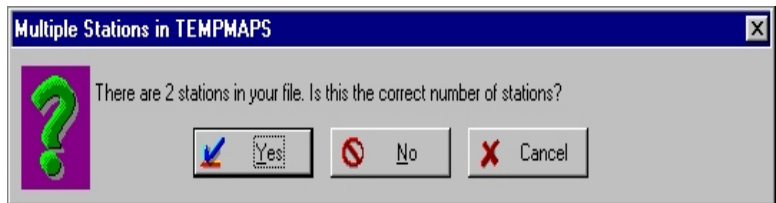
Locate and allow global replaces of invalid location or station codes



The program then checks for invalid location or station codes. If any location or station codes are blank or less than four characters in length, a message box will appear asking you to change

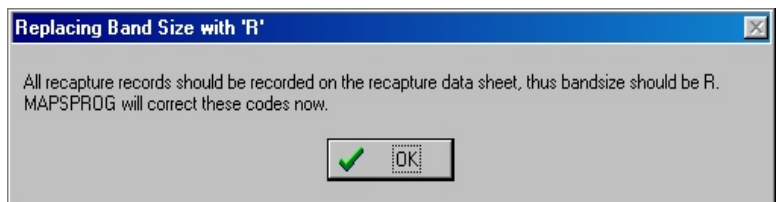
the invalid code. Click “OK” and the box shown above will appear, with the invalid code displayed in the “TEMPMAPS” entryfield. Enter the correct four-character location or station code in the “REPLACE WITH” entryfield, and click “Replace.”

If there is more than one station code in your banding data file, a message box will appear listing the number of stations in TEMPMaps. If this is not the correct number of stations, a station code may have been mis-entered, or data from a station may not have been entered yet. Click “No,” and a second message box will appear asking if you would like to view a list of stations in TEMPMaps. Click “Yes” to display the “Select Station” box (similar to the “Select Location” box shown above), double-click on the incorrect station code, and enter the correct station code in the “Enter Correct Station Code” entryfield.



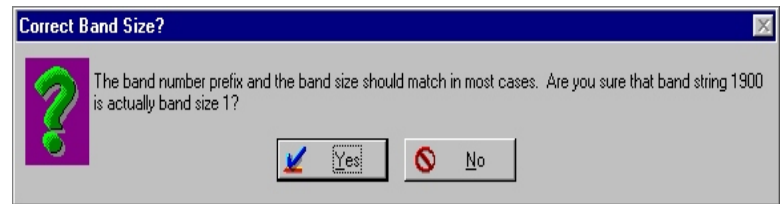
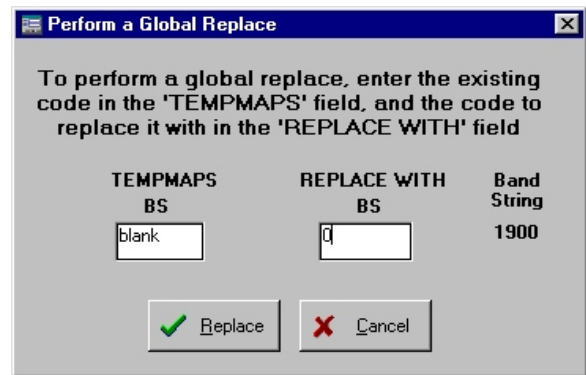
Locate and allow global replaces of blank or invalid band sizes and band size / code combinations

The program next checks that all recaptured birds have a band size of “R,” and all unbanded birds a band size of “U.” If any recaptured or unbanded records do not have a band size of “R” or “U,” respectively, the message box shown above will appear listing the discrepancy, and the program will automatically replace all invalid band size / code combinations.



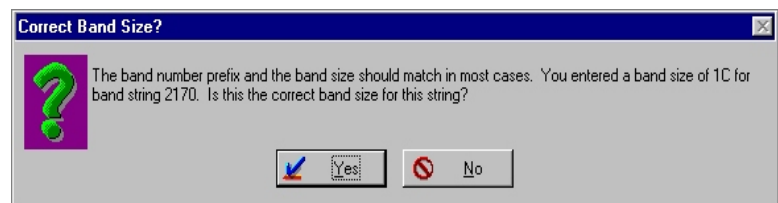
The next check looks for blank band sizes, invalid band sizes, or invalid band size / band string combinations. If there are any blank band sizes, a message box will appear asking

you to enter a valid band size. The “Perform a Global Replace” box (see adjacent) will show the first four digits of the band string for which to enter a band size. Enter the corresponding band size for this string, and click “Replace.” These message boxes will continue to appear until all band sizes have been entered. If you enter a band size that does not correspond with the band string (e.g., band size ‘1’ for a band string that ends in ‘0’), the adjacent message box will appear asking whether the band size entered is the correct size for this string. Generally the fourth digit of the band string is the same as the first digit of the band size, but there are a few exceptions (e.g., band string ‘2010’ is band size ‘1’). If you have entered the correct band size, click “Yes,” otherwise click “No” to return and re-enter the band size for this band string.



If any invalid band size codes are found, a message box will appear asking you to change the invalid band size, and the “Perform a Global Replace” screen (similar to those above) will appear, with the invalid band size in the “TEMPMAPS” field. Enter the correct band size in the “REPLACE WITH” entryfield, and click “Replace.” These message boxes will continue to appear until all invalid band sizes are corrected.

The program next checks for invalid band size / band string combinations. As mentioned above, the fourth digit of the band string is generally the same as the band size, though there are a few exceptions. If a suspected invalid band size / band string combination is found, the message box shown above will appear, asking you whether the band size recorded for this string is correct. If you are certain that you have entered the correct band size, click “Yes,” otherwise click “No” and the “Perform a Global Replace” box (similar to those above) will appear. Enter the correct band size in the “REPLACE WITH” entryfield and click “OK” to continue checking for valid codes.



**Locate and replace all supplementary codes of “9” with blank spaces**

The program then searches for entries of “9” in any of the supplementary data fields (SK, CP, BP, F, BM, FM, FW, and JP). If a code of “9” is found in any of these fields, a message



box similar to that on the previous page will appear, and all entries of "9" will be automatically replaced with a blank space.

**Locate and replace all FM codes of '0' with 'N'**

Birds with no active flight feather molt are sometimes erroneously assigned a flight feather molt code of "0", rather than the correct code, "N". To avoid the tedious process of replacing each code individually, the program will automatically replace all flight feather molt codes of '0' with 'N'.

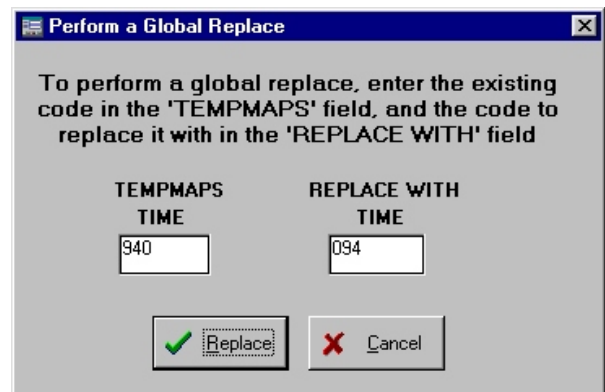
**Locate and replace all invalid status codes**

Similarly, status codes are often left blank, injured birds are assigned a status code of "300" instead of "500", or status codes of "300" are entered for unbanded birds or for lost or destroyed bands. MAPSPROG will automatically perform the following global replaces: all blank status codes for newly-banded or recaptured birds (without a disposition code) will be replaced with "300"; all status codes of "300" for injured birds (those with a disposition code other than "S") will be replaced with "500"; all status codes of "300" or "500" for unbanded birds will be replaced with "000"; and all status codes for lost or destroyed band records will be replaced with blank spaces. A message box similar to that above will inform you of the codes being replaced.



**Locate and allow global replaces of invalid time entries**

Times are often entered without a leading zero (e.g., a time of "094" is instead entered as "940"). The program will locate any time entries larger than "240" (midnight), and a message box will appear asking you to enter a valid time. The adjacent "Perform Global Replace" box will appear, showing the invalid time in the "TEMPMAPS" entryfield. Enter a valid 3-digit time in the "REPLACE WITH" field and click "Replace" to continue.



**Locate and allow global replaces of invalid FP codes**

Finally, the program will check for invalid Feather Pull codes. Birds whose feathers have just been pulled should have a FP code of "P", and all other records should have a blank FP field. If any other codes are found, a message box will appear asking you to enter a FP code of "P" or blank. The "Perform Global Replace" box shown previously will appear, showing the invalid time in the "TEMPMAPS" entryfield. Enter a valid FP code in the "REPLACE WITH" field and click "Replace" to continue.

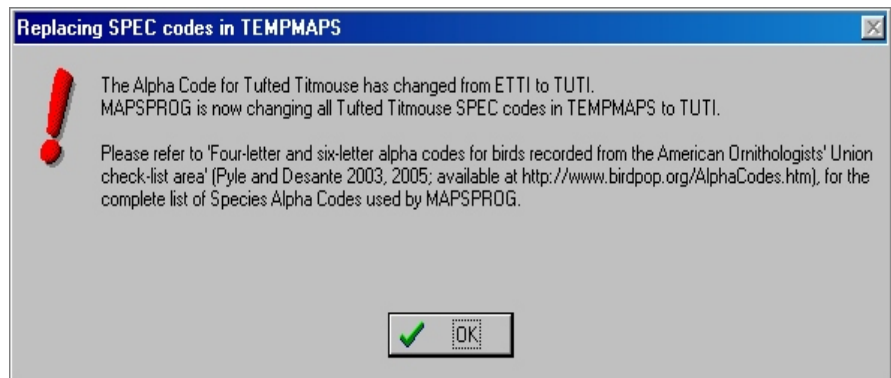
If the "Cancel" button is clicked at any time, a message box will appear asking you to re-run the "Check for valid codes" step before performing within-record verification.

### 3. Verifying within-record consistency

To move on to the next step, select the subheading “Verify within-record consistency” from “Verify within-record consistency functions” in the “Within-record Processing” sub-menu in the “Banding Data” drop-down menu.

#### Converting Species Alpha Codes

MAPSPROG first checks that all banding records from 2003 or subsequent years were entered using the species alpha codes described in Pyle and DeSante (2003, 2005) “*Four-letter and six-letter alpha codes for birds recorded from the American Ornithologists’ Union check-list area.*” In the very few cases where the species codes listed in Pyle and DeSante (2003, 2005) differ from those in Pyle (1997) and used by the BBL, most notably the uses of “ROPI” instead of “RODO” for Rock Pigeon (formerly Rock Dove), and “TUTI” instead of “ETTI” for Tufted Titmouse (formerly Eastern Tufted Titmouse), MAPSPROG will automatically convert the codes in TEMPMAPS. If MAPSPROG finds a species alpha codes which needs to be converted, the adjacent message box will appear. **Note: this is only done for records from 2003 or subsequent years - data from 2002 or earlier years should be entered using the codes in Pyle (1997) and will not be changed by MAPSPROG.**



#### Lists are saved until you re-run verification routine

The program then checks every record for internal consistency and automatically flags any records with discrepancies. A counter indicates that checking is in progress; once it reaches the end of the file you are returned to the main menu bar. The program can check about 200 records a minute on a Pentium I, so with very large data files it may take the program a while — a built-in lunch break. The other options under “Verify within-record consistency functions” allow you to view the summarized verification report (indicating the number of records in which the problem was encountered) and the individual record verification report (indicating the problems in each record). The reports list error messages generated during this verification routine. The reports will be stored with no changes until you reactivate “Verify within-record consistency,” even if you have processed and edited records in the meantime. A warning box appears when accessing the individual list that reminds you of this as well. For easy reference the reports may be printed out. View the list of summarized errors to familiarize yourself with the types of errors and discrepancies found in the data file.

#### Making sense of the messages

If in consulting the error messages and during the subsequent processing, you find that you do not understand the reason for a message, please first make sure you understand the appropriate data-gathering guideline for the field in question by reviewing the relevant section

of the 2006 *MAPS Manual*, "Collection and Recording of Banding Data," pp. 30-52. If you find that the error message still does not make sense for the data in the record, you may have discovered a problem in MAPSPROG that we failed to encounter in testing. In such a case, please make a note of the data in the record and the exact message that came up and send it to us with your verified file.

Should the within-record verification routine generate no error or warning messages, both the summarized and individual error lists will show only a "0." In this unlikely event, you are ready to continue with the final step in the within-record verification process, transferring the data in TEMPMAPS to NEWMAPS (B.6., "Transferring TEMPMAPS to NEWMAPS"). In all other situations, you must move on to B.3., "Processing within-record consistency errors."

#### **4. Processing within-record consistency errors**

"Process within-record consistency errors" in the "Within-record Processing" sub-menu in the "Banding Data" drop-down menu provides two options: "Process for the first time" and "Continue Processing started earlier." The second option allows you to interrupt a processing session without losing your place. If you are just beginning to process your within-record errors, select "Process for the first time." A dialogue box will make sure that you have just completed a verification check, i.e., run "Verify within-record consistency"; if so, click "Yes." The within-record verification processing window shown on the next page appears with the first record that generates error messages. From top to bottom, it shows the record number, the entire record as entered or imported, four function buttons and two boxes with the associated critical and non-critical errors.

To process the record, follow these steps:

- a. Read the messages displayed (if messages fill the message boxes, use the scroll bars on the right to view the hidden messages).
- b. Identify and correct any invalid codes.
- c. Find any remaining discrepancies or problems mentioned in the messages.
- d. Using your best judgment and keeping in mind the rules listed at the beginning of this Manual, make appropriate changes to the primary data fields. Again, no changes should be made to supplemental data. Remember, all critical errors require changes (often to AGE, HA [How Aged], SEX, or HS [How Sexed]). Non-critical errors do not necessarily require changes; but you must address them. To ensure that they are considered, they must be suppressed before you may proceed to the next record. To suppress a non-critical message, double-click on the "SUPPRESS" box for that message; when you do, the "N" in the box will change to a "Y" as shown in the example on the next page. If the "SUPPRESS" box disappears, use the scroll bar at the bottom of the box to bring it back

**CHANGE DATA IN TEMPMAPS**

Record Number **2**      LOCATION **BIPA**    BS **0**    PG **1**    C **N**    BAND **193038388**

SPEC **ACFL**    AGE **2**    HA **LS**    SEX **M**    HS **C**    SK **6**    CP **0**    BP **0**    F **2**    BM **3**    FM **S**    FW **0**    JP **2**    WNG **62**

WEIGHT **0.00**    STATUS **300**    DATE **06/25**    TIME **100**    STATION **SMCR**    NET **02**    DISP     NOTE

PPC     SSC     PPF     SSF     TT     RR     BPL     NF     FP **P**    SW **X**

**Help with Error Messages**    [Next Record](#)    [Re-edit record](#)    [Return to Menu](#)

**Critical Errors**

**ERRDESC**

HY birds don't develop breeding condition. Either remove B or C from HS or change AGE to adult.  
 A skull score of 5 or 6 can't be used to age a HY. Change AGE to AHY or remove S from HA.  
 Invalid FP (feather pull) code; valid codes are 0 (2 R6 pulled), 1 (R1 & R6), and blank.  
 Invalid SW (Swab) code; valid codes are 1 (1mm swab used) 2 (2mm swab used), and blank.

**Non-critical errors**

SUPPRESS	ERRDESC
N	Please fill in one or more Molt Limits & Plumage fields when using L or P as ageing criterion.
N	This species can't be sexed male in first-winter plumage. Please change sex to unknown (U).
N	This species' preformative molt does not include flight feathers. Are you sure of the age?

from the left. To access the various fields of the record use your mouse or the “TAB” key. Be sure to make changes in capital letters; turn on Caps-Lock on your keyboard.

Once you have finished editing a record, clicking the “Re-edit record” button will re-run the verification routine on the record *with the changes you have made*. Changes you make to primary data may, of course, result in new critical or non-critical error messages if new discrepancies arise. These will be displayed automatically and must be corrected if they are critical or addressed (and suppressed) if they are non-critical. Continue the verification and editing cycle until no new messages, critical or non-critical, appear. Then click “Next Record” to save the changes to the record and to move on to the next record. The next record with messages is automatically brought up onto the screen; records without discrepancies are skipped. Should you click “Next Record” before all critical errors have been corrected and all non-critical errors have been suppressed, an “Errors Still Remain” box appears; click “OK” and address the messages showing.

#### Retrieving records as originally entered

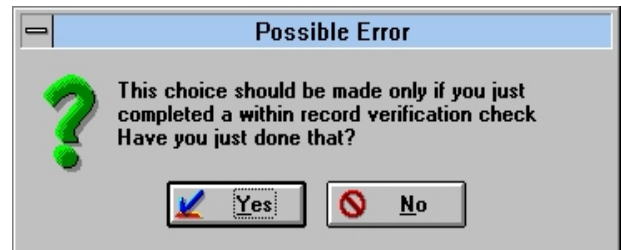
Occasionally, you may find in re-editing a problematic record that you wish to return to the record as it was before you began making changes. Since changes are not saved until you

click “Next Record” you can retrieve the record as you found it when starting your processing by clicking the “Return to menu” button. Then, select the sub-heading “Continue Processing started earlier” from the “Process within-record consistency errors” menu item. The record in question is brought up again in its original form, along with the original messages. If you desire to return to an earlier record with no remaining critical or non-critical messages, use the next menu item, “Edit a single record in TEMPMAPS by record number,” discussed in 4, below.

### Interrupting your work

Processing may be interrupted and MAPSPROG closed without losing the work you have done. Return to the menu and exit the program. When re-entering, be sure to select the subheading “Continue Processing started earlier” in the “Process within-record consistency errors” sub-menu; this will take you to the next record with discrepancies that hasn't yet received your attention.

Selecting “Process for the first time” when you intend to click “Continue Processing started earlier” in the previous two paragraphs may necessitate restarting the verification process. While all corrections made to the data are saved, non-critical messages remaining in the data would need to be suppressed again. Therefore, when you click “Process for the first time,” the warning box on the right appears, allowing you to choose “No” if you should rather select “Continue Processing started earlier” as indicated above.



## 5. Editing records in TEMPMAPS by record number

At some point in working through your file, you may wish to go back to a record you've already edited and purged: further consideration or other evidence may make you wish to reconsider determinations you left or put in a record. Those records can be accessed again by selecting “Edit a single record in TEMPMAPS by record number” and entering the record number at the prompt. Enter a record number and click the “Get Record” button; the remaining functions of the window are as for the Processing window, explained in 3, above.

## 6. Adding a record to TEMPMAPS: processing miscoded mortalities

### Processing new captures that die at the banding station

There is a situation relating to miscoded birds that requires special handling. Some banders misapply the capture code “D” to new captures that die at the banding station after the band is put on the bird but before the bird is released. Such a record should be treated as an unbanded individual and the band should be recorded and scheduled as destroyed. However, sometimes such records remain on the page of new captures and are coded “D” erroneously. In such a case, you must first change the code from “D” to “U” and erase the band number; then you must add a record for the destroyed band (CODE=“D” and bird-related data left

blank, see p. 32 in the *2006 MAPS Manual*) in order to schedule the band. In order to add such a record during within-record verification, select “Add a record to TEMPMaps” from the “Within-record Processing” sub-menu. This function is designed mainly for mistakenly D-coded records. Once you have entered the “D”-coded record, it is subjected to the within-record verification routine; critical errors and non-critical warning messages are displayed as in the within-record processing and must be corrected or addressed, respectively.

## 7. Transferring TEMPMaps to NEWMAPS

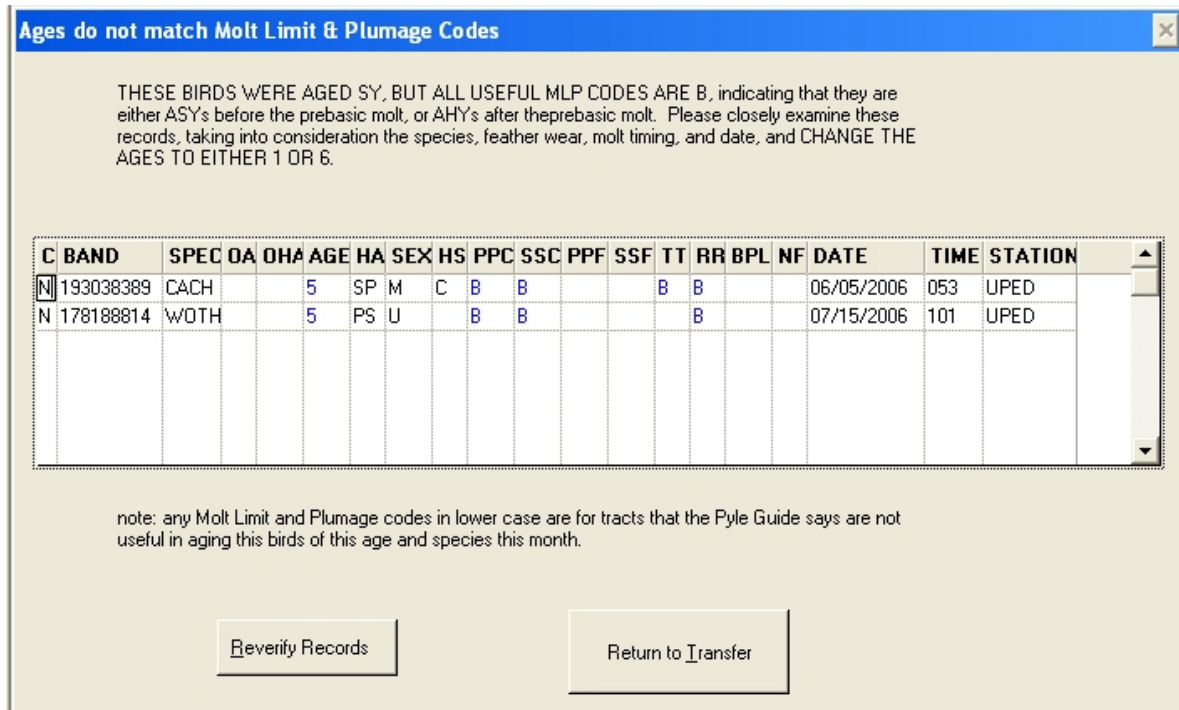
Once you have finished processing (the program will let you know when you have reached the end of the file), you are ready to transfer TEMPMaps into NEWMAPS, the file used by MAPSPROG to conduct between-record consistency verification. The final option, “Transfer Data from TEMPMaps to NEWMAPS,” in the “Within-record Processing” sub-menu performs this transfer. In transferring, the program conducts a final within-record verification to check for critical errors.

### New Within-Record Verification checks in Version 4.0

Beginning with Version 4.0, a new series of within-record verification checks are run during the “Transfer to NEWMAPS” procedure. During this procedure, 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 Limits & 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 specifically age a bird, the age is changed to After Hatching Year (AHY). **Note: these checks are time-consuming, and may take a long time to run on large files or older computers. Please be patient and wait until the checks have completed; a blue progress screen will indicate which checks are being run.**

The program first checks all ages in TEMPMaps against bar graph information from the *Identification Guide* and replaces any ages that are not possible in that month with a default age (1 if it is possible to age the species AHY but not more specifically in that month, 0 if it is not possible to age the bird HY vs. AHY). Next, the program checks the Molt Limits & Plumage fields to determine whether the tracts used to age the bird are useful in that species and month. If a bird’s assigned age conflicts with the Molt Limit and Plumage codes, or if the codes used are not useful for that species, MAPSPROG will generally change the age to match the codes (either to 1 or to a specific age). However, there are a few cases (e.g., SY with all Molt Limits & Plumage codes of ‘B’, which should be changed to either AHY or ASY) where more than one age is possible, and a window similar to that shown on the next page will appear, asking you to look over the record and change the age manually. Follow the directions on the screen and change the ages accordingly. Finally, the program checks all sexes against bar graph information from the *Identification Guide* and replaces any sexes that are not possible in that month with U.

**Append to or replace data in NEWMAPS**



If no errors are found, a series of pop-up boxes appears. The first, titled “Transfer Records,” makes sure you are ready to move on to NEWMAPS and between-record verification. The second, titled “Transfer to NEWMAPS,” indicates whether or not there are already records in NEWMAPS. As there will not be any records in NEWMAPS at the time of the first transfer, proceed by clicking the “Transfer Records” button. For guidance on whether to append or replace when NEWMAPS already contains data, consult the “How do I Proceed if. . .” section in the Introduction to this *User’s Manual*. The third pop-up box indicates that the records have been successfully transferred; click “OK.” The records are now in NEWMAPS and ready for the steps involved in between-record verification.

**Converting Species Alpha Codes**

If “Append Records” is selected when transferring data, and TEMPMaps contains data from 2003 or a subsequent year, MAPSPROG will first convert all species alpha codes in NEWMAPS, whether from years prior or subsequent to 2003, to match those described in Pyle and DeSante (2003, 2005) “Four-letter and six-letter alpha codes for birds recorded from the American Ornithologists’ Union check-list area.” In the very few cases where the species codes listed in Pyle and DeSante (2003, 2005) differ from those in Pyle (1997) and currently used by the BBL (most notably the uses of “ROPI” by Pyle and DeSante (2005) for Rock Pigeon instead of “RODO” by the BBL for Rock Dove, and “TUTI” by Pyle and DeSante (2003) for Tufted Titmouse instead of “ETTI” by the BBL for Eastern Tufted Titmouse), MAPSPROG will automatically convert the codes in NEWMAPS. If MAPSPROG finds a species alpha codes which needs to be converted, a message box will appear informing you of the change (see p. 80 for examples).

Once transferred, the data are actually in both TEMPMAPS and NEWMAPS, as in the previous transfer from RAWMAPS to TEMPMAPS. As you proceed with between-record verification on NEWMAPS, the data you verified and edited for within-record consistency are retained in TEMPMAPS.

As long as any critical errors identified by the within-record verification routine remain in TEMPMAPS, the program will not allow you to proceed to between-record verification. Should you, nevertheless, attempt to transfer the data to NEWMAPS, a warning screen will appear informing you that critical errors remain in the data set. The usual sequence of viewing options for the summary and individual reports of error messages follows; at this point, however, only the critical errors remaining in the database are listed. Should you have critical errors in TEMPMAPS when you attempt to transfer, you have either not completed your processing or appended new records from RAWMAPS prior to transferring. Either re-run the within-record consistency check or print the individual list of records with critical errors and edit just those records by record number. Subheadings under the “Transfer Data from TEMPMAPS to NEWMAPS” allow you to call the error listings up onto the screen again.

## VII. BETWEEN-RECORD VERIFICATION OF NEWMAPS

### A. PREVIEW

This Preview outlines the steps involved in between-record verification and provides background information and tips to conduct the process smoothly. Between-record verification of MAPS data compares multiple records of the same band number (i.e., original banding, repeat, and return records) for data consistency among the records by inspecting the data for code, species, age, sex, date, status, and station as explained in Sections III and IV of the *User's Guide*. Note that "consistency" for these fields entails a variety of meanings: for example, species and sex determinations **cannot** change from record to record, while age determinations and station data **may well** change among records, and code generally **must** change at least once from one record to the next, namely from "N" (new capture) to "R" (recapture). The checks embedded into the program take all of the possible permutations among records into account, including the possible changes in age in between-year returns. Clearly, to perform these checks effectively, the program must conduct them on a file that includes MAPS data from every season in which banding took place. Thus, between-record verification is initiated by appending verified data from previous MAPS seasons to the data you entered or imported and verified for your most recent season (Section B.1.). NEWMAPS, the program's between-record verification data file, will then contain all of your MAPS data from all years of data collection.

The three subsequent steps serve to check and adjust or correct the C (Code) field. First, the program adjusts records with changed or added bands, coded "C" or "A" (Section B.2.). To track birds with changed or added bands accurately in the banding database, all records of an individual bird must show only one band number. The program makes these adjustments to the records automatically, once you enter the band numbers involved. However, the records must be included in the database exactly according to the instructions in the *2006 MAPS Manual* on pp. 32-33 for changed bands and added bands. Review the MAPS Manual and Section B.2., below, to be sure your records are properly coded.

Second, it lists band numbers of recaptures with no original banding record in the database so that you can compare them against your band inventory and schedules (if, however, the band number appears three or more times as a recapture with no original banding record, it is assumed to be correct and is not listed; Section B.3.). Such records may represent birds banded outside of MAPS operation, birds recovered from another banding operation, or birds whose band number was recorded incorrectly, a common error. All of the band numbers appearing in the list must be double-checked to be sure they are not misread band numbers.

Third, it lists those band numbers for which a recapture record predates the original banding record (Section B.4.). These records must be checked and corrected, as they indubitably represent errors. Usually these records are again the result of misread band numbers; in other cases, the code "R" or the date may have been recorded improperly. In any case, these records must be corrected or marked as questionable before proceeding. Band numbers identified in Sections B.3. and B.4. may represent misread band numbers. The band number finder in the "Search for a Bandnumber" menu option in the "Between-record

Processing” sub-menu lists band numbers in decreasing order of similarity to the band number in question and should be used to find matches for possible misread band numbers (see box “Dealing with Misread Band Numbers”, below).

Once records with added and changed bands have been adjusted, first-time-recaptures have been addressed, and recapture records that predate their original capture have been corrected, your data are ready for between-record consistency verification (step B.5.). The program checks the data set for inconsistencies in the fields Code, Species, Age, Sex, Status, and

### DEALING WITH MISREAD BAND NUMBERS

Several of the checks in the between-record processing menu serve to identify misread band numbers: the numbers may lack an associated original banding record; recaptures of the band may predate the original banding record; the records may show conflicts in code (C); or the records may show blatant conflicts in species (or, in some cases, in age or sex) with other records with the same band number. Such blatant species conflicts would be, for example, a change from Gray Catbird to Wood Thrush. Sometimes conflicts between records showing unmistakable sex and/or age classes may indicate a misread band number, such as a change from an ASY male to an HY female Painted Bunting.

For many misread band numbers, it is possible to associate the record in question with the proper original banding record by checking the band number against records with similar band numbers in your banding records. Use the band number finder in the “Search for a Bandnumber” menu option in the “Between-record Processing” sub-menu to scan your MAPS records for records with similar band numbers. When you select “Search for a Bandnumber,” a screen appears allowing you to enter a band number (be sure to enter leading zeros for band prefixes with less than four digits!) and species. Click the “Find similar numbers!” button and a box appears on the screen showing the record you entered at the top followed by a list of records with the same species code and similar band numbers. The records listed are ranked by the percentage similarity between the record’s band number and the band number of the record in question. The first records listed are those most similar and most likely to have been recorded as the band number in question.

Check to see if the data for your questionable recapture record match data (species, age, sex, skull, molting patterns and feather wear [taking date into consideration], wing, weight, station, net) for the other records listed. Remember that particular numbers etched into the bands, such as “1” and “7”; or “6,” “8” and “9”; or “5,” “6” and “9,” often appear similar. It may also be worth checking other records in your band inventory not included in NEWMAPS.

If you can identify a banding record that provides a good match to the record in question, change the band number for the recapture record in question to match the original. Exit the band number finder by clicking on the “Return to Main Menu” button, and change the band number using the “Edit records in NEWMAPS for between-record consistency” menu item in the “Between-record Processing” sub-menu (Section B.5.). If you have already run the between-record verification routine (“Verify between-record consistency of data”), you must run it again in order to compare the record with the reassigned band number to other records with that band

Station among all records with the same band number. Error messages are displayed in both summarized and individual reports. All the records identified on the individual list must then be checked and most will require editing. In some cases — in particular, when species conflicts arise (and sometimes with conflicts in age or sex as in the Painted Bunting example) — the underlying problem may be a misread band number in the recapture record. See the box, “Dealing with Misread Band Numbers” and review section IV, Banding Data File Structures in MAPSPROG in the *User's Guide*. Questionable records, for which species or band number remain unresolvable, must be marked using the program's marking routine.

**Throughout this process of correcting the species, age and sex determinations, keep in mind that no information is lost when changes are made: the original data fields always store the in-field determinations whenever SPEC, AGE, or SEX are changed.**

Once all erroneous records are corrected and all unresolved records have been marked, the verification of your banding data is complete; no inconsistencies or conflicts unaccounted for should remain in your data. You are ready to produce files of your verified data for all years to submit to IBP and for your personal use.

**AGE and SEX  
conflicts  
between  
previously  
verified records  
and current  
records**

As you consider records from previous years in your record comparisons, be aware that those data were thoroughly verified and all within-record and between-record inconsistencies purged, using both the techniques and programs developed by IBP over the past sixteen years as well as the verification routines in MAPSPROG. Nevertheless, data verified years ago were verified according to ageing and sexing information then available. Those standards are subject to change as new information, such as the *Identification Guide to North American Birds, Part 1* by Peter Pyle, is published and disseminated throughout the banding community. Appropriate ageing and sexing criteria published in the *Identification Guide* were incorporated into MAPSPROG 4.0 but were not widely in use when data from earlier years were collected and verified. The modernized verification procedures may identify errors different from those the outdated verification procedures did in otherwise identical records. When comparing such records during between-record verification, it is important to defer to the standards applied to the later data. For example, a Vaux's Swift sexed male by cloacal protuberance in 1997 would not have triggered any corrections during verification in that year; a record of the same individual recaptured in 1998 and sexed using the same criterion, however, would be flagged by the program and the sex would end up as unknown, as CP is no longer considered a reliable sexing criterion for swifts. During between-record verification, these records will come up with conflicting sex. In such cases, because of the new information available, the sex for the 1997 record should be changed to match the 1998 record. As acceptable standards for ageing and sexing continue to evolve, we intend to adapt the verification routines as well. Should you be privy to validated ageing or sexing criteria that contradict the information available in the *Identification Guide*, the Bird Banding Laboratory's standard, the appropriate HA and HS codes should be “O” for “Other” and be accompanied by a note.

## B. OPERATION OF BETWEEN-RECORD VERIFICATION

### 1. Appending data files from previous years

If there are MAPS data from previous years at your station(s), you must conduct between-record verification on a NEWMAPS file that includes MAPS data from all years. If you used MAPSPROG in a previous year, you should append your most recent <LOCA><YR> (e.g., BIPA04.dbf) file to NEWMAPS, unless you have received an updated file from IBP, in which case you should append that file. Because each final <LOCA><YR> file contains verified data for all years of operation up to and including the year listed in the name, you should **only** append the most recent <LOCA><YR> file to NEWMAPS (e.g., when verifying 2006 data, append **only** your <LOCA>05.dbf file; if you were to append <LOCA>04 as well you would end up with duplicate records in NEWMAPS). If you did not use MAPSPROG in the previous year and have unverified raw or computerized data from one or more years and would like to verify all of it together, follow procedure B.1.b., "Appending Unverified Data." You may undertake between-record verification at any time, with any data you have transferred to NEWMAPS; this is useful in order to get feedback after a few banding days on between-record problems in your data set. However, you must run between-record verification again, once all data from the current year have been accumulated in NEWMAPS.

#### a. Appending Verified Data Files

Once you have transferred your data from TEMPMaps to NEWMAPS and are ready to append data from previous years, select "Append data files to NEWMAPS" from the "Between-record Processing" sub-menu. Windows' visual directory box, called "Open Table," appears. Using your mouse, select the appropriate drive and file or type in the file and path of the file you would like to append. Clicking "OK" will append the file to your current data and sort the resulting NEWMAPS file by band number and date. The program will first check that the location(s) in the file being appended matches the location(s) in NEWMAPS. If the file contains a location not in NEWMAPS, a message box will appear notifying you of the discrepancy and asking if you still wish to append the file. If you do indeed want to append a file with a different location code, click "Yes" to append the file. Otherwise, click "No" and resolve the discrepancy, then re-run "Append data files to NEWMAPS." A dialogue box will indicate that the file has been transferred.

#### b. Appending Unverified Data

Once you have transferred data to NEWMAPS, you may begin data entry on another set of data, including data from another year. Unlike in NEWMAPS, you cannot enter or process data from two years in RAWMaps or TEMPMaps at once. For security, you may use the "Utilities" drop-down menu to create a backup copy of the NEWMAPS database or when presented with that option during the transfer from TEMPMaps to NEWMAPS. Return to data entry or data importing and repeat the steps through transferring data to NEWMAPS on another set of data, always choosing to **replace** the data already in RAWMaps or TEMPMaps whenever given the option to replace or append. Once you have completed within-record verification on the new set, select "Transfer data from TEMPMaps to NEWMAPS." At this point, elect to **append** your data to the data already in NEWMAPS.

Repeat this process until all of your years of data have been appended together into NEWMAPS. You are then ready to proceed with a complete data file.

### Converting Species Alpha Codes

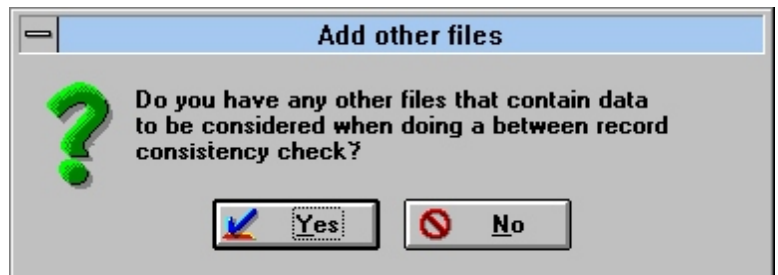
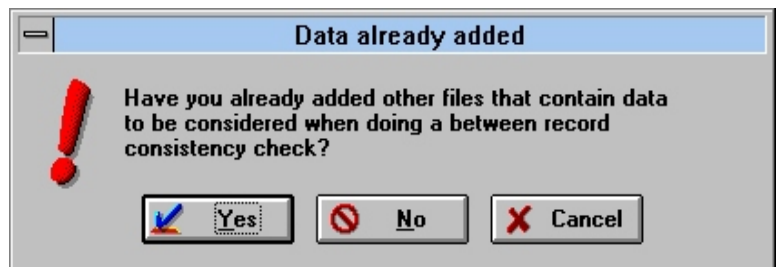
When verifying data from 2003 or subsequent years, MAPSPROG will convert all species alpha codes in NEWMAPS, whether from years prior or subsequent to 2003, to match those described in Pyle and DeSante (2003, 2005), after the verified data have been imported. In the very few cases where the species codes listed in Pyle and DeSante (2003, 2005) differ from those in Pyle (1997) and used by the BBL, most notably the uses of "ROPI" instead of "RODO" for Rock Pigeon (formerly Rock Dove), and "TUTI" instead of "ETTI" for Tufted Titmouse (formerly Eastern Tufted Titmouse), MAPSPROG will automatically convert the codes in NEWMAPS. If MAPSPROG finds a species alpha codes which needs to be converted, a message box will appear informing you of the change (see p. 80 for examples).

## 2. Processing changed and added bands

If you had no changed or added bands among the data records you entered or imported into MAPSPROG, proceed directly to step 3., "Checking recaptures with no original banding record." If you exchanged any bands during the field season (i.e., where C [Code] equals "C") or added one or more bands to a banded bird (i.e., where C [Code] equals "A"), select the second choice in the "Between-record Processing" sub-menu, "Process all Changed and Added bands" once you have your complete data set in NEWMAPS. Initially, a dialogue box, on the right, will double-check to make sure you have added verified data from previous years.

Should you click "No," the dialogue box on the right appears asking if you'd like to add data files. Answering "Yes" at this box will produce the "Open Table" box discussed in 1.a., above,

"Appending Verified Data Files." Answer "No" to continue processing changed and added band records without appending an additional file.



Once all files have been added, the program checks NEWMAPS to make sure that there are two changed or added band records for each instance. If an uneven number of changed or added bands are found, the adjacent error message will appear asking you to resolve this problem before processing added or changed bands. If you have already processed some added or changed bands there will be an uneven number of records in the file - click "Yes" to continue processing other records. If you have not yet processed added or changed band records, the program will not work and you must correct the file before continuing.

If there are an even number of changed or added band records, a dialogue box for changed and added bands appears (shown adjacent).

Entering added bands into the screen

Check your raw data or proofing print-outs for the appropriate band numbers. Indicate whether the records refer to changed or added bands by clicking on the appropriate circle associated with each phrase in the "Process Added or Changed Bands" dialogue box. Enter the two numbers into the spaces provided. If you have changed bands, be sure to enter the removed band as

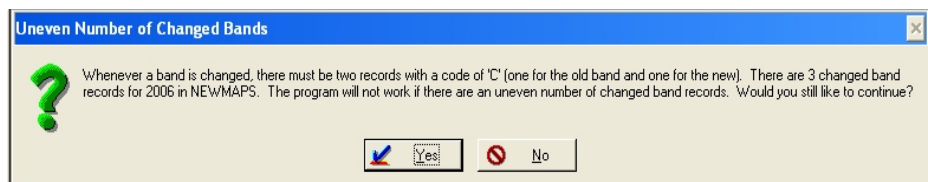
"Old Bandnumber" and the new band as "New Bandnumber." If you have added a band, it is best to enter the band just applied as the new band (it should remain readable longer); however, if you recapture a bird with two bands it should not make a difference which are identified as the old and new numbers. Once you have entered the numbers, click the "Process Bands" button. The program automatically changes the records to better track the individual birds.

How MAPSPROG processes added and changed records

Just for your information: when the program processes records with changed or added bands, it changes the band number for all records of this bird to the **new** band number. Thus, all records in the database — including any future recaptures of that bird — will be tracked by the new band number. Further, for changed bands, one of the duplicate "C"-coded records is changed to an "R"-coded record, while the other remains as a "C" record with the **old** band number in the "BAND" field; the "C"-coded record identifies when that bird's band was changed. For added bands, one of the duplicate "A"-coded records is changed to an "R"-coded record, while the other remains as an "A" record with the old band number in the "BAND" field and the new band number in the "OBAND" field. Thus, the record coded "A" serves to associate the two band numbers should, in the future, the newer band fail to be recorded; the other record, coded "R," serves to track that capture of the bird in the context of its capture history.

Proper recording for changed or added bands

If your file does not include the appropriate "C"- or "A"-coded duplicate records or if one of the records is missing, a message box will inform you of the problem. Review the sections on changed and added bands in the *2006 MAPS Manual*, pp. 32-33. In brief, this section explains that the capture during which a band is changed or added (or when a bird is recaptured with two bands) must be recorded twice on the data sheets: once as a recapture with the old band number and once as a new bird with the new band number (or twice as a recapture, once for each band number, if the bird was caught with two bands). The field "C" (Code) for both records must read "C" if the bands were changed or "A" if a band was added. Thus,



except for the band number, band size (data sheet type) and page number, both records must be identical. Should you find you need to make adjustments to existing records or add new C- or A-coded records, you must make those adjustments in TEMPMAPS and retransfer the file to NEWMAPS. Once both records are in the database correctly, the program will make the appropriate changes described above after prompting you for the original and new band numbers (or simply the two band numbers on a recapture carrying two bands).

Consult your raw data and proofing print-outs to identify what changes need to be made in order to make the changed or added records conform to the correct pattern. Any changes that are necessary (records edited or added) must be made back in TEMPMAPS, so that the within-record validity of the records can be checked. To change records, return to “Edit a single record in TEMPMAPS by record number” in the “Within-record Processing” sub-menu; to add a record, click “Add a record to TEMPMAPS” in the “Within-record Processing” sub-menu. Once you’ve made your changes and additions, be sure to reverify the TEMPMAPS records correcting any problems identified. Once errors are purged, retransfer the entire TEMPMAPS file with the changed and/or new records to NEWMAPS. You should elect to *replace* the records in NEWMAPS instead of appending, so that you do not duplicate the records remaining in NEWMAPS. Once the corrected file is in NEWMAPS, repeat step B.1 of between-record verification, re-appending data files from previous years. Then proceed with processing changed and added bands. We recommend processing all changed and added bands at one time initially, in order to identify those records that need to be changed and/or added. If all changed and added records were entered according to MAPS protocol, you can move on to the next step directly.

### 3. Checking recaptures with no original banding record

In the “Between-record Processing” sub-menu, select “List bandnumbers for which there are only recaptures” and the subheading “List for Current year.” “Current year” here designates the most recent year of data in your data file. This generates a list (it may take a little time) of record and band numbers from the *current* year for which NEWMAPS contains exactly one or two recapture records that are not associated with an original banding record. Once you run the check, a box on-screen explains why there may be recapture records without an original banding record (“first-time recaptures”). After reading the information in this box, please click “OK” and another screen will appear showing the list of first-time recaptures in your data. If such a list appears, you must print the list and attempt to resolve all of the first-time recaptures on the list. If your data set contains no first-time recaptures, a dialogue box will appear, “No Unexplained Recapture Records”; simply click “OK” to return to the main menu. Beginning with Version 4.0, the adjacent message will appear upon closing the report window, informing you that you need to run this procedure a second time (see “Confirm that you checked for misread band numbers”, next page).

Print list of  
first-time  
recaptures



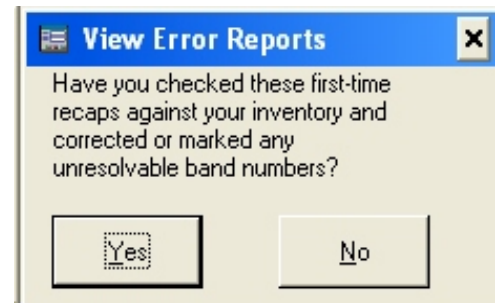
**Check for misread band numbers**

Band numbers that appear on the list generally are of bands for which the original banding record is not in the file being verified, either because they were applied outside of standard MAPS operations or, if all non-MAPS data for the current year are included in the file, were banded outside the MAPS Program during a previous year. They may also be recoveries of birds banded by someone else, or they may simply be misread band numbers. It is this latter possibility that we are trying to eliminate. Thus, if any records are generated by this routine, please check the list against your banding schedules, data sheets, and/or band inventory to ensure that the band numbers are appropriate and have already been used. If band numbers are on this list that are not in your inventory of used bands, you must assess whether the number represents a recovery from another bander or a misread band number. Please use the band number finder in the “Search for a Bandnumber” menu option in the “Between-record Processing” sub-menu to scan your banding records for records with similar band numbers (see the “Dealing with Misread Band Numbers” box on page 86). If you have no similar band numbers with matching data, you most likely have a recovery from another banding station which should be reported to the Bird-Banding Laboratory of the USGS/Biological Resources Division. You should correct invalid band numbers in the “Edit records in NEWMAPS for between-record consistency” option in the “Between-record Processing” sub-menu (see below: 5. “Between-record Verification”). In some cases, changes may be necessary to the field C (code); these changes also may be made in the editing mode.

**Confirm that you checked for misread band numbers**

After you have determined that all first-time recaps are valid (i.e., were previously banded by you or are valid foreign recaptures), or you have corrected any misread band numbers or marked questionable band numbers with a “?” in the N field, you must again select “List bandnumbers for which there are only recaptures” and the subheading “List for Current year” from the “Between-record Processing” sub-menu. This time you will get a revised list of first-time recaptures; upon closing this report window the adjacent box will appear asking whether or not you have checked these records. If you have checked the records, click “Yes;” if you were unable to check them, click “No.”

The other subheading, “List for Previous years only,” displays recapture records with no associated original banding records from years *other* than the most recent. Activate this option only if the data set in NEWMAPS includes multiple years of *unverified* data, i.e., if you have appended into NEWMAPS data from multiple years that you entered or imported into RAWMAPS. Users that received their previous years’ data sets directly from IBP need not run this routine on previous years’ data, and, obviously, those whose current data represents the first year of operation need not do so either (of course, those who activate this option must *also* check recapture records in the current year). The procedure is identical to that described above, for the current year.



#### 4. Checking recaptures predating their original banding record

Select “List Recaptures that predate their new record” from the “Between-record Processing” sub-menu. This generates a list of band numbers for which the date recorded for a recapture of that band number (Code equals “R”) precedes the date recorded for the original capture of the bird receiving that band (Code equals “N”). This situation is rare but always represents an error. All of the records with these band numbers in the database should be checked and the problem identified and corrected. If your data set includes no such records, a “Good Job” box appears; click “OK” and proceed to the next step. If there are such records, the offending band numbers will be displayed in a box under “BAND”; view all of the records sharing the band number by selecting “Edit records in NEWMAPS for between-record consistency” in the “Between-record Processing” menu, entering the band number, and clicking the “Get Records” button (for more on using this function, see the next section, “Between-record verification”). Check the dates of the records and find the records on the raw data sheets to help identify the source of the problem. Once you have found the source of the problem, make the appropriate corrections in the edit mode, following the instructions in the next section on editing records for between-record inconsistencies and saving changes.

Check for  
misread band  
numbers

#### 5. Between-record verification

The next step consists of verifying the between-record consistency of the following fields: C (Code), SPEC (species alpha-code), AGE, SEX, STATUS and STATION. Initiate the between-record verification routine by selecting “Verify between-record consistency of data” in the “Between-record Processing” sub-menu. Initially, the same sequence of dialogue boxes as in “Process all Changed and Added Bands” (step B.2.) appears, ensuring that you have appended your data from previous years.

Once you have responded to that sequence of screens, the program performs the between-record verification routine on the NEWMAPS data file. With large files, this can take several minutes without a clear indication that the program is running. In running the routine, it checks for consistency in the fields listed above among *adjacent* records sharing a band number; age consistency, however, is checked among *all* records sharing a band number since adjacent records may show no inconsistency even when non-adjacent records do. If no inconsistencies are detected between the records, a “No errors” dialogue box appears; click “OK” and proceed to step C, “Creating a Final, Verified Banding Data File.” Inconsistencies are detected when two records with the same band number show conflicts in (i.e., impossible combinations of) code, species, age, or sex. Changes in status or station are unlikely and often in error and thus are also identified as conflicts. All records with an inconsistency are automatically flagged by the program for purposes of error-tracking; each inconsistency also produces an error message to help you identify and resolve the conflicts. As in within-record verification, these messages can be displayed in both a summarized and an individual list of errors. The summarized list indicates the number of times a given inconsistency between two records was encountered in your database (thus, an inconsistency between two records counts only once). The individual error list displays the messages identifying each inconsistency encountered for each band number (not record number, as in within-record verification) and

must be printed for reference as you proceed to rectify the inconsistencies (as before, select “Print” from the “File” menu or click on the printer button at the bottom of the window). All the records identified on the print-out must be checked and most must be edited. Be sure to close the summary windows before proceeding; if the windows remain open, they may cause the program to shut down; simply reopen the program and restart where you left off.

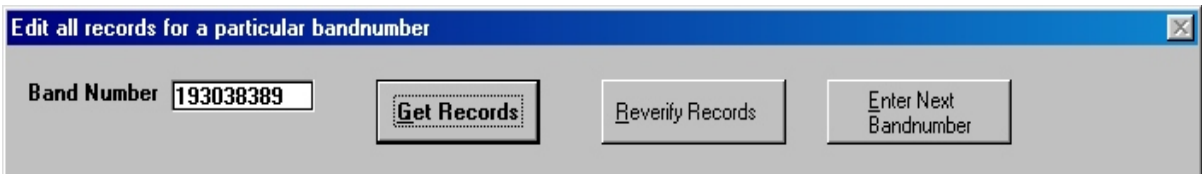
**Many age inconsistencies automatically resolved in V4.0+**

Beginning with Version 4.0, many between-record HY-U, AHY-U, SY-ASY, SY-AHY, and ASY-AHY AGE inconsistencies within any year, and all between-year AGE inconsistencies will be resolved automatically by the program. However, you will still need to manually resolve many HY-AHY, SY-ASY, and SY (or ASY)-AHY AGE inconsistencies found during the current MAPS season and all between record SEX or SPEC inconsistencies.

**Ages must be consistent within and between years in V4.0+**

Additionally, beginning with Version 4.0, all ages assigned an individual bird must be entirely consistent within each year, and must progress logically between years, using the most specific age possible. For example, if a bird was aged ‘2’ or ‘4’ in 2004, all records in 2004 must be either ‘2’ or ‘4’, all 2005 records must be ‘5’ (NOT ‘1’, as allowed with prior versions), and all records from 2006 and later years must be ‘6’ (again NOT ‘1’).

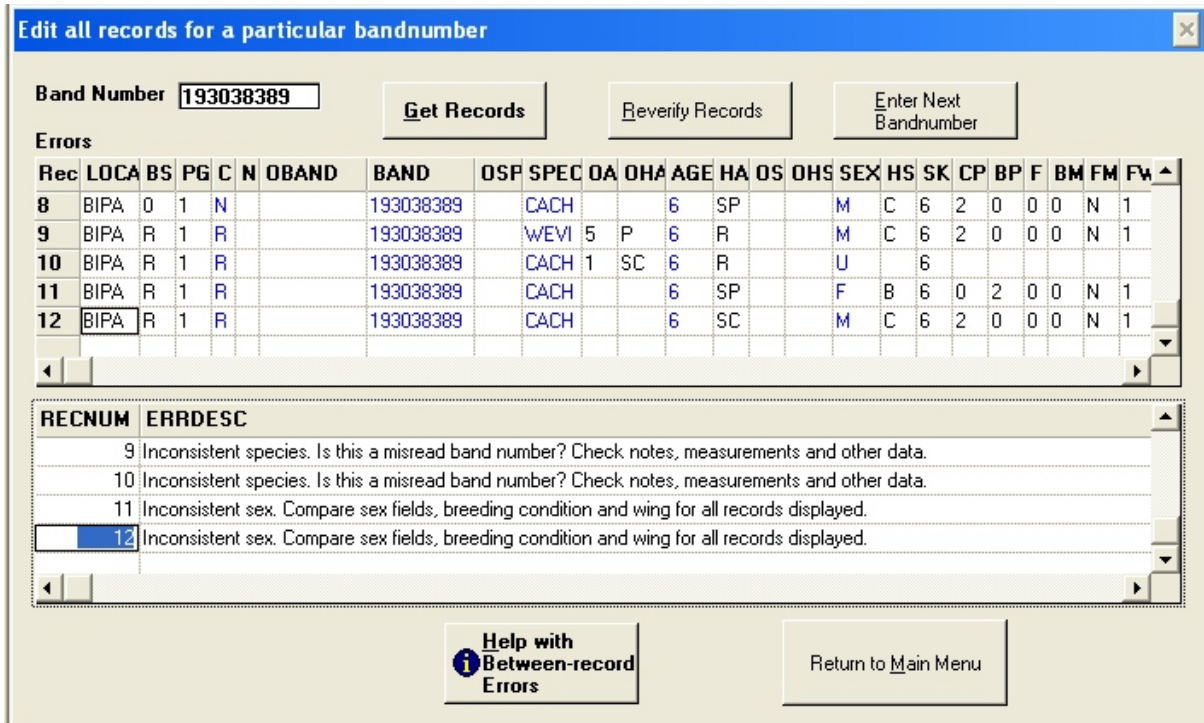
Once you have your print-out of the individual error list, select “Edit records in NEWMAPS for between-record consistency,” the next option in the “Between-record Processing” sub-menu. The box shown above appears, requesting the first band number for editing (the box is only partially displayed here and a sample band number has been entered).



**Enter leading zeros into Edit screen**

Enter the first band number appearing on your individual summary print-out and click “Get Records.” Be sure to enter leading zeros for band numbers with less than nine digits; the program prints the band numbers without the leading zeros on the reports even when the records were saved with them. Two boxes then appear in the window, one with all the records sharing that band number, the other displaying the messages associated with each record number (see next page).

Because an inconsistency always occurs between data in two records, the error messages in the box generally appear in pairs, identifying the two records showing the inconsistency, SEX for records 6 and 7 for example. In cases in which inconsistencies are detected between three consecutive records — SPEC in records 3, 4, and 5 in the example — the message is not shown twice for the record in the middle, which, technically, conflicts with both the previous *and* the subsequent one and thus could be listed twice.



**Rearrange order of fields for comparing records**

Click the scroll bars on the side of the boxes with your mouse to view all of the records and messages; the scroll bar below the window containing records can be activated to view the remaining fields in the records. The records box displays many fields at once. In order to view certain fields (such as C [Code], AGE, SEX, and DATE) together for the purpose of comparing multiple records, it may be convenient to move the fields closer together. You can temporarily rearrange the order of the fields by using your mouse to click on a column header (the pointer morphs into a hand) and moving the column to the new, desired position. The fields can also be widened or narrowed as needed by clicking on and moving the double-headed line that appears when you use the mouse to point at the line between field names in the column header. Pressing the “TAB” key moves the cursor from button to button and to the browse window. The “ENTER” key moves the cursor forward through the browse window field-by-field, while the arrow keys move forward and backward through the fields in the browse window character-by-character.

The records box contains all the records in NEWMAPS for the band number entered. This is important, as you will need to consult all records that share that band number in their entirety in order to reach a decision regarding any necessary changes. The only fields that may be changed in this step are C (Code), BAND, SPEC, AGE, SEX, STATUS, DATE and STATION. As in within-record verification, data read directly off the bird, such as pneumaticization score, molt patterns and fat, should not and, in this step, cannot be changed. Be sure to make changes in capital letters only; turn on Caps-Lock on your keyboard.

Messages identifying conflicts between two given records appear hierarchically, with only the most significant discrepancy displayed for each pair of records upon running the verification routine the first time. Thus, for example, species conflicts supersede age and sex conflicts which, in turn, supersede station and status changes. In the example depicted, records 7 and

8, caught in the same year, show only a species conflict in the message box, though their ages also conflict; if both records indeed refer to the same bird (i.e., if one of them is not a misread band number), then the age discrepancy will show up during re-verification once the species code of the incorrect record matches the other record. Furthermore, for certain combinations of records for a given band number, not all conflicts in adult ages between non-adjacent records may be displayed initially. Therefore, to make sure all inconsistencies between records sharing a band number are addressed, the procedure is: 1) make corrections based on the messages displayed; 2) re-verify the records with the changes you have made and address any new errors that appear; 3) repeat this process until only inconsistencies in status and station among the records remain. If unresolvable species conflicts remain (or unresolvable age or sex conflicts as in the Painted Bunting example in the box “Dealing with Misread Band Numbers”), the offending records must be marked; see B.6. “Marking records,” below. Should you make an entry in any of the fields that is not an acceptable MAPS code, messages will appear in the message box to alert you once you re-verify.

Follow these steps to make changes and re-verify:

- a. Type in the band number for the records you would like to check and click the “Get Records” button or press “ENTER” when the “Get Records” button is highlighted.
- b. Read the messages that appear. Guided by the error messages and considering all of the information available in the entire capture history of that band number, assess the conflicts identified in the messages and determine how to resolve them: except for valid status and station changes, all conflicts must either lead to corrections in one or more records or the questionable records must be marked (see sections III and IV in the *User's Guide* and the rules in the Introduction of the *Manual*). To assist you, the guidelines governing data consistency are summarized in the box, “Guidelines governing between-record verification editing.” The messages generated by the program reflect violations of these guidelines. Often clues in the raw data can help in correcting the problems identified: notes, the previous and subsequent records, the bander, the legibility of the handwriting — all of these may contribute to your decision concerning conflict resolution. Because changes may well result in new conflicts between other records displayed, be aware that changes in records other than the ones originally identified in the message box may ultimately be necessary.
- c. Should you find no changes are necessary (i.e., there are only valid status or station changes among the records) and you would like to process the next inconsistency identified on your print-out, click the “Enter Next Bandnumber” button. This will return the cursor to the band number box and highlight the band number. Use the “BACKSPACE” key to delete the band number and enter an entirely new band number, or use the mouse to place the cursor within the band number to alter just a few of the digits displayed. If you find records with species conflicts (or age and sex conflicts between unmistakable plumages) that are truly unresolvable, click the “Return to Main Menu” button and mark the records in question as described in the next section, B.6. “Marking records,” before proceeding with between-record verification on other records.

**Conflict  
resolution**

**GUIDELINES GOVERNING BETWEEN-RECORD VERIFICATION EDITING**

- C (Code):** There must be no more than one N-coded record. D- and L-coded records may not share a band number with any other records. R-coded records must postdate N-coded records. C- and A-coded records must follow the guidelines described in B.2.
- SPEC:** The four-letter species code should be identical for all records displayed. If it is not and the true species identification of the bird in one or more of the records cannot be ascertained, the questionable record(s) must be marked (see "Marking Records").
- (Species)**
- AGE:** Age determinations must be consistent within a year, and, for between-year recaptures, the progression in age must be logical. Thus, within a year, birds may change from "4" (local) to "2" (HY) and back, but not from "4" or "2" to any AHY designation ("1" [AHY], "5" [SY], "6" [ASY], "7" [TY] or "8" [ATY]). Likewise, within-year captures may not change from "1" or "5-8" to "4" or "2;" neither may they vary between "5" and "6," nor among "5," "7," and "8." However, variation between "1" (After Hatching Year) and the more precise adult age codes ("5" through "8") is not considered inconsistent, nor is variation between "6" and "7" or between "6" and "8." Between-year recaptures, of course, must advance in age. Birds aged "2" or "4" cannot show a capture in any previous year. Those aged with any of the year-specific codes ("2," "4," "5," or "7") may not show the same age in subsequent years. All birds must advance in age according to the following scheme: birds aged "2" or "4" in one year must become "1" or "5" the next; these must become "1," "6" or "7" in the next year; and in the year after that and all subsequent years, they must be "1," "6" or "8." A capture with an age of "0" (unknown) is considered inconsistent only with known-aged captures of the same band number *in the same year*; if the known-aged captures occur in subsequent years, the age of the unknown-age record must not be changed. When conflicts necessitate changes in records with specific adult ages ("5" through "8"), the age should revert to "1," the most encompassing adult age, unless information within the record (in the adult ageing fields) justifies a change to another specific adult age.
- Note: Beginning with Version 4.0, many between-record HY-U, AHY-U, SY-ASY, SY-AHY, and ASY-AHY AGE inconsistencies within any year, and all between-year AGE inconsistencies will be resolved automatically by the program. However, you will still need to manually resolve many HY-AHY, SY-ASY, and SY (or ASY)-AHY AGE inconsistencies found during the current MAPS season and all between record SEX or SPEC inconsistencies.**
- SEX:** Sex determinations must not change among records. All records for a band number must show the same sex determination, "M," "F," or "U."
- STATUS:** Changes in status from one capture to the next are not common and are thus worth investigating. For this purpose band numbers with status changes between records are displayed. Valid changes in status may remain in the data.
- STATION:** Changes in station within your location from one capture to the next are not common and are thus worth investigating. Sometimes, they signal a misrecorded date or station or a misread band number, particularly if the stations are far apart. Therefore, band numbers with station changes between records are displayed and should be critically examined. Valid station changes between records may remain in the data.

**Duplicate records**

- d. Data can only be changed in the fields C (Code), BAND, SPEC, AGE, SEX, STATUS, DATE and STATION, those highlighted in blue on color Monitors. (Data entry errors to other fields, which should have been corrected during proofing, must be corrected back in within-record verification; between-record verification steps, beginning with the transfer to NEWMAPS, must be reinitiated). To make a change to one of the listed fields, use your mouse or the arrow keys to select the problem field and make the change. **To save the change, you must move off the record you changed, either with the up or down arrow keys or by clicking on another record with your mouse.** Once you have moved off the record, click the “Reverify Records” button; this will rerun the verification module on the records with the changes you have made. To mark a record with an unresolvable species conflict or an unresolvable age or sex conflict between unmistakable plumages (thus suggesting a misread band number), see Section B.6. “Marking records.” Species conflicts tend to represent misread band numbers while age or sex conflicts tend to represent misidentifications in one or more records and will resolve to a known or unknown age or sex for all the records. To delete duplicate records see Section B.7. “Deleting duplicate records.” When faced with duplicate records, be sure to note the record number for the record to be deleted as displayed in the records box in the editing window, since you can only delete records by record number.

- e. Once you click “Reverify Records,” new messages identifying new or other inconsistencies may appear in the message box. Correct these, **remembering to move off the record to save the corrections**, and click the “Reverify records” button again. Repeat this process until the adjacent message box appears, or until only station and status changes that you have already addressed or error messages identifying errors in records you have marked with a “?” appear in the message box. For your convenience, “N,” the marking field described in B.6., is displayed directly after the field “C.” However, records must be marked using the protocol described in Section B.6. If the “No Errors” box (shown adjacent) appears, click “OK.”



- f. Then click on the “Enter next bandnumber” button and enter the next band number from the individual error list print-out. If you begin making changes to a record and decide you’d like to start over again without saving the changes you’ve made, simply click the “Return to Main Menu” button before re-verifying the record and begin the editing process again. While it is not possible to start from scratch again once you have re-verified the record, the information originally in BAND, SPEC, AGE, and SEX is always retained and available for consultation in the original fields (OBAND, OSP, OA, and OS) whenever the data in the corresponding field are changed. Furthermore, you can always reverse the changes you have made, should new conflicts brought up by a reverification routine make you reconsider a previous change. If a

field contains a code equivalent to its "O"-field, it simply indicates that at some point there was some evidence suggesting that a change to the field was appropriate and that this conclusion was reversed upon further consideration or with further information in a new recapture record. It is perfectly acceptable, even desirable, for the database to reflect such progressions.

Common errors found in recapture data through the between-record verification routine are conflicts in species, age, and sex. For analyses, it is crucial that all records sharing a band number be identical in species and sex and show an appropriate progression in age. Thus, even records of HY bird sexed Unknown in one year recaptured with sex known in subsequent years should be changed to the known sex. This way, all analyses can make use of the best sex information available for each individual bird.

**In-field determinations are stored in the "O" (original) fields and can help resolve conflicts**

**The meaning of "R" in the HA and HS fields**

What happens to the original in-field determinations? As you will notice during re-editing, when these fields are changed and the "Reverify Records" button is clicked, the program moves the original data (taken in the field) into the respective OBAND, OSP, OA, OHA, OS, and OHS fields. This is done so that the original, in-field determinations remain available in future between-record comparisons: the data as entered on the data sheet are always immediately apparent. Furthermore, "R" is automatically entered into the HA and HS fields when AGE or SEX is changed. It is imperative that "R" remain in these fields in order to assess error rates. For a more detailed discussion of the extra fields and their use, see Section IV, "Banding Data File Structures in MAPSPROG," in the *User's Guide*. Note that species conflicts may be the result of either species misidentifications or misread band numbers. Before making a decision about which error was involved, be sure to use the band number finder in the "Search for a Bandnumber" menu option in the "Between-record Processing" sub-menu to compare questionable records to other records with similar band numbers in order to match possible misread band numbers to their most probable source records.

**Other possible conflicts**

Other errors identified by the between-record verification routine are duplicate records, errors in band numbers (as explained above), errors involving destroyed or lost bands that share the same band number with captured birds, and bands that changed status and/or stations. These are conflicts in C (and in C with respect to date), SPEC (in those situations where the conflicting species identifications were correct and the shared band number was misread), STATUS and STATION. Assess the conflict and determine what measure to take: whether to correct one or more of the records, to mark one or more of the records as questionable, or to leave the conflict in the case of valid status and station changes.

**Resolve species or sex for previously marked birds**

You may find that a record from a previous year appears with a "?" in the N field and with SPEC in conflict with a recapture from the current year. If so, it presents a rare opportunity to resolve the identity of a record that has been a mystery up until then. If the mystery can be resolved, be sure to use the "Marking records" feature to remove the "?".

Once you have dealt with all band numbers listed on your individual error list print-out, marked all unresolvable conflicts, and deleted duplicate records, you are ready to move on to producing data files for IBP and your own use.

## 6. Marking records

Note band numbers for in-field verification

Sometimes, conflicts in code and species (and occasionally in age and sex as in the Painted Bunting example given in the box "Dealing with Misread Band Numbers") remain unresolvable. The band number may actually have been recorded incorrectly, or the species may have been misidentified during one of the captures of the bird. In either case, if you harbor reservations concerning the validity of the species identification and/or band number recorded for one or more of these records, it (or they) must be specially marked in the database, as explained in Section IV of the *User's Guide*. We recommend making note of such band numbers on your recapture field sheet, so that the individual carrying the band in question can be scrutinized for species, age, and sex should it ever be recaptured.

Saving changes

To mark such records, select "Mark Record with questionable species or band numbers" from the "Between-record Processing" sub-menu. The box that appears is similar to the "Edit all records for a particular band number" box that appears when editing NEWMAPS. Enter the band number of the records with the unresolvable conflict and click "Get Records." As before, all records with that band number are shown, and the N field, the one used to mark questionable records, is displayed between the C and OBAND fields. Identify the record or records which remain questionable and, using the mouse, place the cursor in the N field of the requisite records and enter a "?". Records that show no conflicts with others in species, age, or sex must not be marked, but note that when two records are in conflict, both of them need not necessarily be marked. Only one of them may be uncertain, particularly if there are further recaptures of the band number corroborating the determination given in the other record and it proves impossible to identify another record with matching data and a similar band number. To unmark a resolved record, simply delete the "?" in the N field. **Be sure to use the arrow keys or the mouse to move off the record you marked or unmarked to save the changes you made.**

## 7. View / Browse records in NEWMAPS

A new feature was added to Version 4.0 allowing operators to view the records in NEWMAPS in a Browse window. This screen allows you to scroll through and look at all records in the file; however you can not make any changes to data in any fields. If you need to make changes to a record, use "Edit records in NEWMAPS for between-record consistency."

## 8. Deleting duplicate records

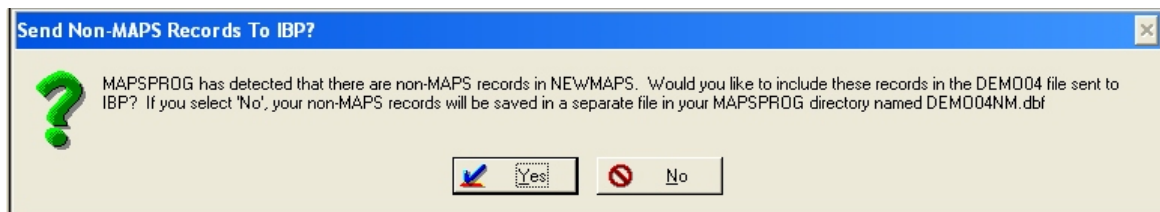
To delete duplicate records, select “Delete a record from NEWMAPS” in the “Between-record Processing” sub-menu. Type in the number of a record you wish to delete from the records box in the editing window and press the “Retrieve and Delete This Record” button. The screen displays the whole record for confirmation; you cannot make any changes. If the record is the one you’d like to delete, proceed with the deletion as indicated by the warning and dialogue boxes. Once you have deleted a record, the remaining records in the file are renumbered once you click the “Return to Main Menu” button. Thus, here (as opposed to during data entry or importing), you can make your deletions of duplicate records as you find them, because the record numbers are not printed on your error lists, but appear on the screen in the messages boxes as you verify and edit records sharing band numbers. **Once you have made your deletion, be sure to exit the “Delete a Record” window by clicking the “Return to Main Menu” button; this is the procedure that will actually remove the records selected for deletion from the file and renumber the remaining ones.**

### C. CREATING A FINAL, VERIFIED BANDING DATA FILE

Once you have completed between-record verification, the final step is to create, from NEWMAPS, a banding data file for submission to IBP and for your own use. In the “Final Functions” sub-menu of the “Banding Data” drop-down menu, select “Create a dBASE file to submit to IBP.” This reinitiates the between-record verification routine. If critical errors (i.e., age or sex discrepancies or unmarked species discrepancies) remain in NEWMAPS, you will be informed that these need to be addressed before the file can be created. Simply repeat section B.5., “Between-record verification.”

#### Choose whether or not to submit non-MAPS data to IBP

Beginning with Version 4.0, MAPSPROG gives you the option of saving non-MAPS data in a separate file which will not be submitted to IBP. After all critical errors have been resolved, the program will check for any non-MAPS records in the current year. If non-MAPS records exist, the message box below will appear, asking whether you wish to include these records in the file to be sent to IBP.



If you select “Yes,” the program will create a single dBASE file of NEWMAPS for IBP, named using the four-letter Location code along with the two-digit year for the most recent year of data in your database and a “.dbf” extension. If NEWMAPS contains multiple location codes, the file will be named using the location code of the last record in the file, though it will still contain the data for all locations entered.

If you select “No,” the program will create two dBASE files, one - containing solely the MAPS data - named as described above and the second - containing only non-MAPS data - named using the four-letter Location code followed by the two-digit year, followed by the letters “NM” and a “.dbf” extension. Only the MAPS file needs to be sent to IBP

To produce a data file of NEWMAPS for your own use, highlight “Create an ASCII or Delimited textfile from NEWMAPS” from the “Final Functions” sub-menu and choose between an ASCII or a delimited text file. As before, you are notified if critical conflicts remain in NEWMAPS. If your file is problem-free, you can produce either a text file or a comma-delimited file (with a comma as field separator and quotation marks as character delimiter) in the IBP data analysis structure, which contains the fields listed in Appendix II. You may use whatever name you like and store it wherever it is most convenient to you. This file will contain all data in NEWMAPS, including both MAPS and non-MAPS records (if any occur in the file). **Be sure to save a copy of this file in case the file you submit to IBP is corrupted or is lost in the mail.**