SUMMARY OF MIST-NETTING RESULTS

This summary serves as a check to ensure that all of your capture records — for newly banded, unbanded, and recaptured birds — have been submitted and that the dates and station are correct for each capture. Please complete this form using your raw banding-data sheets at the end of each banding day. Please do not fill out this sheet from your computer file! Remember to count replaced and added bands only once (as recaptures) and to omit lost and destroyed bands. Refer to Figure 9 for an example.

Instructions for completing the Summary of Mist-Netting Results form

Location: Record your four-character location code.

Station: Record your four-character station code.

Intended Period: Record the intended period for the date operated.

Date: Record the month and day of the date operated.

New: Record the number of new individuals banded. Remember, if a bird dies before processing, this individual should be recorded on the data sheet as an unbanded bird. The band that was applied to the individual should be taken off the bird and be recorded as destroyed.

Unbanded: Record the number of birds captured but not banded.

Recaps: Record the number of recaptures. Remember that previously-banded birds that escape or are inadvertently released before the band number is read should be recorded and counted as recaptures (BAND NUMBER remains blank).

Total: Tally the number of new, unbanded, and recaptured birds for each day of operation. At the end of the season, record the totals of these three categories at the bottom of the form.

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2011 MAPS SUMMARY OF MIST-NETTING RESULTS

LOCATION CODE: B I P A STATION CODE: U P E D

MAPS PERIODS

Period One:	May 01 - May 10	Period Six:	June 20 - June 29
Period Two:	May 11 - May 20	Period Seven:	June 30 - July 09
Period Three:	May 21 - May 30	Period Eight:	July 10 - July 19
Period Four:	May 31 - June 09	Period Nine:	July 20 - July 29
Period Five:	June 10 - June 19	Period Ten:	July 30 - August 08

For each banding date, fill in the number of captures on your Banding, Unbanded and Recaptures banding-data sheets. Assign each date to the period for which your banding effort was intended, following the guidelines in the Manual.

Intended Period	Date	New	Un-banded	Recaps	Total
E.g. 3	*05/21*	*12*	*1*	*4*	*17*
4	*05/30*	*15*	*0*	*6*	*21*
3	05/28	14	2	1	17
4	06/05	21	0	3	24
<	06/07	12	0	5	17
5	06/14	30	2	11	43
6	06/24	17	0	9	26
7	07/06	16	0	8	24
8	07/13	18	1	5	24
9	07/25	26	0	6	32
10	08/04	15	2	3	20
Total		169	7	51	227

Intended Period	Date	New	Un-banded	Recaps	Total
Total					

FIGURE 9. Completed MAPS Summary of Mist-Netting Results form.

BREEDING STATUS LIST

Many of the individual adult birds captured in the MAPS program are transients that do not breed at the MAPS station. They include floaters that have not yet acquired a breeding territory, failed breeders searching for a new mate or new breeding territory, and post-breeding individuals dispersing from breeding territories to molting and pre-migration staging areas. Because the presence of such transient individuals negatively biases adult survival rates, we use a transient modification (Pradel *et al*. 1997) of Cormack-Jolly-Seber mark-recapture models (Pollock *et al*. 1990) to estimate the survival rate of resident individuals and the proportion of residents among newly captured birds. We suggest, however, that the proportion of residents in the adult population may be more than a simple nuisance parameter. Rather, we suggest that this proportion may vary in a predictable manner as a function of population change and, thus, may be of fundamental importance to avian population dynamics. In order to obtain the most useful measure of the proportion of residents, we pool data for a given species only from those stations at which the species is a regular or usual breeder, that is, only from those stations where at least one individual of the species was known to be a summer resident attempting to breed during more than half of the years the station has been operating.

As part of MAPS protocol, therefore, we ask MAPS operators to record breeding status information on all species seen or heard during each visit to each station. We ask operators to record anecdotal observations of active nests; birds carrying nesting material, food, or fecal sacs; distraction displays; courtship; copulation; and territorial singing or drumming using a protocol similar to that employed in Breeding Bird Atlas projects. These observations are recorded on the stations' Breeding Status List. Using these data, coupled with capture data, MAPS operators are asked to determine the breeding (summer residency) status of all species at each station each year.

In addition to providing unbiased data on the proportion of residents in the population, this protocol provides a unique and extremely valuable database, one which allows the construction of temporally and spatially explicit species-habitat relationships based on actual breeding status at each of the hundreds of MAPS stations. This database can overcome many of the limitations of traditional species-habitat relationships derived from point-count data. Such limitations are caused by including species as breeders that are in fact only transients at the location in question; and by excluding actual breeding species at the location in question because they are not encountered within the short duration of most point counts.

It is important to understand that what we are asking you to determine by asking for breeding status is **whether or not any portion of at least one breeding territory or home range of a given species includes any portion of the area of your MAPS station.** Remember, breeding status is determined only for the area contained within the boundaries of your MAPS station, NOT the preserve, county, or any other area in which your station is located. Remember also that the boundaries of your station include all of the area extending outward for 100 m from your outermost nets. In general, typical MAPS stations include an area of about 20 ha (50 acres).

Station-specific Breeding Status Lists (Fig.10) are included with the Spring Packet

sent to MAPS operators in early April. Operators of stations from which no previous data have been received by IBP will receive a blank Breeding Status List with the four-letter alpha location code, four-letter alpha station code, unique five-number numerical station code assigned by IBP ("Sta"), and the current year preprinted on the form. Before the season begins, such operators should list in the SPECIES CODE field, in A.O.U. checklist order (A.O.U. 1998), the species alpha codes of all species that are anticipated to be encountered at the station. Operators of stations from which previous MAPS data have been received by IBP will receive a preprinted Breeding Status List that lists all species ever encountered at the station in A.O.U. checklist order. (If data were not submitted using MAPSPROG, species recently added to the list by the operator may not be included on the preprinted list because of a backlog in data entry and processing at IBP). Species that are encountered at the station during the MAPS season, but that are not on the preprinted (or anticipated) list, should be added to the end of the list. At the end of the season, the completed Breeding Status List will thus include all species **detected** at the station during **all** breeding seasons that the station has been operated, not just those species detected during the current year or only those species for which individuals have been captured.

Breeding Status Lists for stations from which previous MAPS data has been received will also contain filled-in BRSTAT codes for each species. The BRSTAT code is the cumulative breeding status at the station for all previous years of operation, a kind of breeding status summary. First time operators' Breeding Status Lists will have a dash preprinted in BRSTAT. For each species, the BRSTAT code represent a summary of all of the yearly breeding status codes. The following BRSTAT codes are in use:

- B - Regular breeder. Summer resident or suspected summer resident during all years the station was operated.
- U - Usual breeder. Summer resident or suspected summer resident for more than ½ of the years the station was operated, but not all years.
- O - Occasional breeder. Summer resident or suspected summer resident for ½ or fewer of the years the station was operated.
- T - Transient. The station lies within the species' breeding range, but no individual of the species was a summer resident at that station during any year.
- A - Altitudinal disperser. A species which breeds only at lower elevations than that of the station and which disperses to higher elevations after breeding.
- M - Migrant. The station falls outside of the species' normal breeding range.
- ? - Unidentified. Individuals of the taxon were not identified to species; no breeding status was assigned.

These codes are provided to inform you of the overall breeding status for each species. It is important that you **determine each new year's breeding status independently of the BRSTAT.**

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2011 MAPS BREEDING STATUS LIST

List all species ever encountered at the station!

Location: B I P A **Station:** U P E D **Sta:** 1 6 6 9 8

Period Status Codes: Please record only the highest hierarchical breeding status observed during each period C supercedes P and O; P supercedes O), and the appropriate daily sub-codes (hierarchically listed) describing the behavior or observation indicating that status (e.g., Cn, Pc, or Ob). If a species wasn't observed, use a '—'. If a station was operated two or more days in a period, record only the highest breeding status observed.

C = Confirmed Breeder	P = Probable Breeder	O = Observed	— = Absent
n = current year's nest found	**c** = courtship/copulation	**b** = banded/captured	
m = carrying nest material	**t** = other territorial behavior	**e** = encountered	
f = carrying food or fecal sac	**s** = song/drumming	**o** = flyover	
d = distraction display **l** = local bird present			

ENTER DATE (mm/dd) FOR INTENDED PERIOD BELOW

SPECIES CODE	BRSTAT	/	/	05/28	06/05	06/14	06/24	07/06	07/13	07/25	08/04	2011 YEAR STATUS
		1	2	3	4	5	6	7	8	9	10	
HAWO	T			—	—	Ps	Ps	—	—	—	—	L
ACFL	U			Ps	Ps	Ps	Ps	Ob	—	—	Oe	B
YTVI	O			—	—	—	Ps	Ps	—	—	—	L
REVI	B			Ps	Ps	Ps	Cn	Cnf	Ps	Ob	—	B
TRES	T			—	—	Oo	—	—	—	—	Oo	T
CACH	U			Ps	Ps	Ps	Ps	Ps	Ps	Ps	Ps	B
WOTH	B			Ps	Ps	Ps	Ps	Ps	Ps	Oe	Oe	B
GCTH	M			Ob	—	—	—	—	—	—	—	M
AMRO	B			—	Ps	Ps	—	—	Oe	—	—	L
GRCA	B			Ps	Ps	Ps	Ps	Ps	Oe	Oe	—	B
NOPA	O			Oe	Ps	Ps	Ps	Oe	Ps	Ob	Obe	B
YWAR	T			—	—	—	—	—	—	Ob	Obe	T
AMRE	O			—	—	—	—	—	—	Ob	Oe	T
OBSERVER'S INITIALS				CC	CC/ PB	CC	CC/ AB	CC	CC	CC	CC/ AB	

BRSTAT: Cumulative breeding status for all previous years of operation
B = Regular Breeder (all years)
U = Usual Breeder (>½, not all, years)
O = Occasional Breeder (≤½ years)
T = Transient
A= Altitudinal Disperser
M = Migrant
? = Uncertain Species ID

2011 YEAR STATUS: Current year breeding status
B = Breeder
L = Likely Breeder
T = Transient
A = Altitudinal Disperser
H = Higher Altitude (than usual) Breeder
M = Migrant
E = Extralimital Breeder
? = Uncertain Species ID
— = Absent

FIGURE 10. Completed MAPS Breeding Status List

Instructions for completing the Breeding Status List

DATE (mm/dd) FOR INTENDED PERIOD: Record the date the station was operated during each intended period. If the station was operated outside the standard ten days of the period, be sure to enter the date above the period for which the effort was actually intended. Note on Figure 10 that the date 5/30, normally a Period 3 date, was placed above Period 4 because the effort on 5/30 was intended for Period 4. If the station was operated more than one day in a period, summarize the data for that period by recording the highest hierarchical Period Status Code (Table 3) for each species that period.

PERIOD STATUS: The Period Breeding Status (i.e., Confirmed - C; Probable - P, Observed - O) of each species encountered during each period of operation at each station must be recorded on the list for that station, either during the day as the birds are detected or at the end of the day before leaving the field. Record, using upper case letters, the highest

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Table 3. Hierarchical categories of Period Breeding Status (upper case) and associated Daily Behavior Sub-Codes (lower case) for MAPS Breeding Status List

The criteria used to designate Period Breeding Status are as follows:

Confirmed (C): The following criteria confirm a species as a breeder:
- (n) current year's nest found in the study area with eggs or young, in the process of being built, or already depredated or abandoned;
- (m) adult seen gathering or carrying nesting material to a likely nest site in the study area;
- (f) adult seen carrying food or fecal sac to or from a likely nest site in the study area;
- (d) distraction display or injury feigning by an adult bird;
- (l) capture of a young bird incapable of sustained flight (a "local"), or very young (stub-tailed) fledglings being fed by parents in the study area.

Probable (P): The following criteria suggest, but do not confirm a species as a breeder:
- (c) copulation or courtship observed of a species within its breeding range;
- (t) other territorial behavior observed in the study area;
- (s) territorial song or drumming heard.

Observed (O): The following criteria indicate the species was detected, but with no evidence of local breeding:
- (b) bird captured or banded. NOTE: The presence of a brood patch or cloacas protuberance on a single individual is not valid evidence of local breeding;
- (e) bird encountered (seen or heard) in the study area but with no territorial behavior;
- (o) bird encountered flying over the study area.

Absent (—): The species was not encountered during that period.

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hierarchical Period Breeding Status (Table 3 or Fig. 10) detected for each species that period; and, using lower case letters, the appropriate Daily Behavior Sub-Codes (Table 3 or Fig. 10) associated with that Period Breeding Status. Note that sub-codes can only be combined with other sub-codes at the same breeding status level. For example, 'Cf' and 'Obe' are acceptable combinations; 'Cs' and 'Obs' are not. Use a '—' to indicate that a species was not observed in a given period. Finally, note that the certainty of Period Breeding Status codes likely will decrease for most species as the season progresses and breeding behavior diminishes. For example, a species recorded as a probable breeder in May and confirmed as a breeder in June may drop back to a probable breeder in July and show no signs of breeding (or disappear altogether) by August.

YEAR STATUS: The current year breeding status. At the end of the season, review your period status codes and enter the apparent breeding status for the current year for each species in the right-hand column, using one of the following nine categories:

Breeder (B): Summer resident. A Breeder is a species within its normal breeding range that is confirmed or determined to be a breeder or summer resident within the station (i.e., at least one individual was determined to reside at least partly within the station boundary during the breeding season of the year under consideration). It needn't be proven that the species actually bred, or even found a mate. Summer residents outside their normal breeding range should be given the code "E" (see below).

A species automatically qualifies for a Breeder ("B") Year Status if it was given a Confirmed ("C") Period Breeding Status in one or more periods. Thus, a current year's nest found in the study area with eggs or young, in the process of being built, or already abandoned or depredated qualifies the species for a "B" Year Code, as does the sighting of an adult carrying nesting material, food, or a fecal sac to or from a likely nesting site, or doing a distraction display or feigning injury within the station. The sighting of very young (stub-tailed) fledglings being fed by parents within the study area also qualifies the species for a "B" Year Code. Probably the most common means of classifying a species as a Breeder is by the presence of at least one territorial (singing or drumming) male in the study area throughout the breeding season. Note that such territorial behavior is coded "Ps" (probable breeder) for individual periods, but if it occurs over much of the season, the species should be considered a Breeder' ("B") rather than a Likely Breeder ("L"). Multi-period observations of courtship, copulation, or other territorial or mating behaviors also qualifies the species as a Breeder, especially if coupled with song or drumming in other periods. In summary, note that it is acceptable to assign a year status of "B" to a species that exhibits persistent territorial singing during the height of the breeding season, as well as to those confirmed by nest sightings, fledglings or other "hard evidence" of breeding activity.

Banding data are also useful for determining breeding (summer residency) status. Within-year recaptures or resightings of an adult, at least seven days apart and with at least one occurrence during the height of the breeding season, indicates a summer resident, as does the recapture of an adult during the height of the breeding season over two or more years. Note that the species is given a "B" code for the first and last year that it was captured during the height of the breeding season and for all intervening years. The capture of a single adult in breeding condition (i.e., with a greatly enlarged cloacas protuberance or a heavily

vascularized brood patch) is not sufficient evidence to classify the species as a breeder because failed breeders often wander widely before losing their BPs and CPs. However, several individuals showing breeding characteristics at various times during the season could warrant a "B" designation for the species for the year.

Likely Breeder (L): Probable summer resident. A species within its normal breeding range that was suspected to be a breeder or summer resident but was encountered somewhat infrequently during the breeding season of the year under consideration is classified as a Likely Breeder. This code permits a degree of uncertainty when determining single-year breeding status and need be used only for species that were suspected summer residents *but were encountered infrequently* during the field season. We suspect this may happen with species that reside on the fringes of the station or are difficult to detect. To avoid the uncertainty associated with the status "L," all efforts should be made to assign one of the more definitive status codes to each species whenever possible.

Please note that while continual territorial singing throughout the breeding season would merit a "B" status, singing on only two or three different days may indicate an "L," or even a "T." In such cases, one should consider the likelihood of summer residency in terms of habitat suitability for that species, the dates on which the singing occurs, and any behavioral knowledge of that species. As shown in Figure 10, two instances of a Hairy Woodpecker drumming in June at a station within its breeding range (and with no additional records) likely (but not definitively) indicates summer residency, and thus merits a year status of "L." However, two instances of Swainson's Thrushes singing in May within their breeding range, again with no additional records, would *not* suggest a single-year status of "L," as this species is known to sing during migration and to sing well into the season if a summer resident. The year status, in this latter case, should be "T." When the cumulative breeding status (BRSTAT) is calculated, years coded "L" are treated as if they were coded "B."

Transient (T): A species that breeds in the general area of the station (perhaps even less than a kilometer away) but, because of habitat or patchy distribution, does not breed at the station is classified as a Transient. In order to qualify as a Transient, the station must lie within the breeding range of the species, but no individuals of the species can be thought to be breeders or summer residents within the station (see above definition of "Breeder"). Transient individuals may be adults within their normal breeding range that move through the station during the breeding season but do not establish a territory or home range within the station boundaries. Early in the season, such adult individuals could be birds still in migration, birds that have completed migration but not yet established territories, or birds that might never establish territories that year (floaters). For example, capturing one or two individuals of a rarely observed species in June with well developed CPs or BPs would not permit categorizing that species as anything other than a transient. Mid-season transients could be failed breeders from beyond the station boundary that are simply moving through the station. Later in the season, transient individuals could be adults or young in post-breeding dispersal, or even very early individuals in fall migration. A species may be a Transient at one station within a location and a Breeder at another station.

Altitudinal Disperser (A): A species which breeds only at lower elevations than that of the station and which disperses to higher elevations after breeding. In the Sierra and,

to a lesser extent, the Cascades and other western montane areas, this is a common phenomenon for Orange-crowned Warblers, Nashville Warblers, and House Wrens. In order to qualify as an altitudinal disperser, the station must lie upslope from the breeding range of the species.

Higher Altitude (than normal) Breeder (H): An altitudinal disperser that has resided during the height of the breeding season (not just during the post-breeding period) in a given year above its normal breeding elevation. When the cumulative breeding status (BRSTAT) is calculated, years coded "H" are treated as if they were coded "A."

Migrant (M): The station does not lie within the breeding range of the species, and the species did not reside at the station during the breeding season. Migrant species may pass through the station on migration, or reside through the winter. Specifically, the species' breeding range, as delineated by range maps and descriptions, does not include the specific geographic location of the station. (The primary references we use are the range maps in *The Sibley Field Guide to Birds of Eastern North America* and *The Sibley Field Guide to Birds of Western North America*. We also use National Geographic's *Field Guide to the Birds of North America*, Peterson's *Field Guide to Western Birds* and *Field Guide to Eastern Birds*, and range descriptions in the A.O.U. *Checklist of North American Birds* [1957 for subspecies, 1983, and 1998]; and status codes in DeSante and Pyle's *Distributional Checklist of North American Birds*, 1986).

There is one important exception to the above definition of Migrant. If a station lies within a mountain range at a higher elevation than a given species breeding range, but adults and young of the species habitually move through it during post-breeding and juvenile dispersal, respectively (as in a foothill species that disperses upslope), the species should be classified as an Altitudinal Disperser (A; see above) at the station rather than a Migrant (M). The inclusion of capture data for such species from such stations can provide important information for regional productivity indices. A Migrant status for such a species would cause it to be overlooked during productivity analyses. Finally, do not confuse the terms "Migrant" and "migratory"; migratory species can be classified as Migrants, Altitudinal Dispersers, Transients, Likely Breeders, or Breeders.

Extralimital Breeder (E): A summer-resident species that is outside of its normal breeding range. As with species given a code of "B," it need not be proven that the species actually bred, or even found a mate; merely residing at the station during the breeding season is sufficient to warrant a code of "E." These vagrant individuals are not given a code of "B," as they are unlikely to return in subsequent years; in pooled analyses, a "B" code could bias survivorship estimates for the species. When the cumulative breeding status (BRSTAT) is calculated, years coded "E" are treated as if they were coded "M."

Unidentified (?): This code is used primarily for observed (non-captured) individuals that were not identified to species. Examples include UNGU, UNCR, UNSW. This code is also used if an unidentified individual was captured but not banded, for example UNHU or an unbanded UEFL. A species that has been banded would receive a breeding status of "?" if, during verification, the species identification of an individual became uncertain and no other individuals of that species were encountered in that year.

Absent (—): No individual of the species was detected at the station — neither captured, heard nor seen — for the duration of the MAPS field season in the year under consideration. This code applies both to species previously captured/encountered at the station in a past field season and to those anticipated but not yet encountered.

OBSERVER'S INITIALS: Record the initials of the people involved with collecting breeding status data for each intended period.

Please note that it is very important to classify each species correctly, to the best of your ability, within the boundaries of your station (i.e., within 100 m of nets). Inclusion of data for a species in mark-recapture analyses from stations where it does not regularly or usually breed will deflate estimates of proportion of residents and lower the precision of survival-rate estimates as well. However, transients can be included in the calculation of productivity indices. Bear in mind that the Breeding Status List is annual in nature (i.e., you will consider breeding status of each species on a year-by-year basis) and that a species' year status may change from one year to the next. Generally, such changes will be a species changing from Breeder to Likely Breeder or Transient or vice versa, but occasionally a species can change from an Extralimital Breeder or Migrant to a Breeder or Transient (or vice versa) as its breeding range changes.

It is important to remember to assign a breeding status *each year* to all species *ever captured or encountered* at the station, and not just to those that were captured during the most recent field season.

Occasionally, during the verification process, recapture data or other information come to light that require re-determination of Breeding Status Codes for various species at a station. IBP biologists may change some Year Codes and will want you to examine their changes. Each year during the verification process, therefore, you may receive from IBP a printout of the overall breeding status of all species ever captured and or encountered at your station (Fig. 11). IBP biologists want you to check over the list to see if you agree with all of the codes. The following three additional codes may occur on these printouts that are sent out for your review:

D = The species was only encountered at the station outside of the MAPS season, but the station lies *within* breeding range of the species.

W = The species was only encountered at the station outside of the MAPS season, and the station lies *outside* of the breeding range of species.

@ = The Breeding Status List is missing or incomplete for this species this year.

Printout of Breeding Status Year Codes for Operator Review

FILE: 16698s09
LOCATION: BIPA
STATION: UPED

B = Breeder (Summer Resident) L = Likely Breeder T = Transient
A = Altitudinal Disperser H = Higher Altitude (than normal) Breeder
M = Migrant E = Extralimital Breeder ? = Uncertain Species ID
D = Species only encountered outside MAPS season, but station lies within breeding range of species
W = Species only encountered outside MAPS season, but station lies outside breeding range of species
@ = Breeding Status List missing or incomplete - = Absent

Record#	spec	bs02	bs03	bs04	bs05	bs06	bs07	bs08	bs09	bs10
1	GBHE	-	-	-	-	-	-	T	T	-
2	TUVU	@	T	T	T	-	T	-	T	T
3	WODU	@	B	L	-	T	B	B	L	B
4	SSHA	-	-	W	-	-	M	-	-	M
5	RSHA	@	D	-	-	-	-	-	-	-
6	NOBO	B	B	B	B	B	B	B	L	B
7	MODO	B	B	B	B	T	B	B	B	B
8	YBCU	B	L	T	B	-	L	L	L	L
9	EASO	T	T	T	T	T	-	-	-	-
10	CHSW	@	T	T	T	-	T	T	L	T
11	RTHU	T	T	T	B	B	B	B	B	T
12	RBWO	B	B	B	B	B	B	B	B	B
13	HAWO	T	-	T	-	T	-	-	T	T
14	ACFL	T	T	L	B	L	T	B	T	L
15	YTVI	T	T	L	T	L	T	T	T	L
16	REVI	B	B	B	B	B	B	B	B	B
17	TRES	T	T	-	T	T	T	-	T	T
18	CACH	L	L	-	B	B	-	L	B	L
19	WOTH	L	L	B	B	B	B	B	B	B
20	SWTH	-	-	M	-	-	-	-	-	M
21	AMRO	B	B	L	B	L	L	B	B	B
22	GRCA	B	B	L	B	B	B	B	B	B
23	NOPA	-	L	-	B	T	T	L	T	L
24	YWAR	-	-	T	-	-	-	T	T	-
25	AMRE	-	-	-	T	T	L	T	T	T
26	NOWA	-	-	-	-	E	-	-	-	-
27	COYE	B	B	B	B	B	B	B	B	B
28	HOWA	B	B	T	T	B	T	-	T	-
29	YBCH	B	T	-	T	-	B	-	-	T
30	EATO	B	B	B	B	B	B	B	B	B
31	CHSP	@	T	T	T	-	B	B	B	B
32	UNSP	-	-	-	?	-	-	-	?	-
33	NOCA	B	B	B	L	L	B	B	B	B
34	INBU	T	T	B	T	L	T	L	B	L
35	BHCO	-	L	T	L	-	L	B	L	L
36	AMGO	B	B	B	B	B	B	B	B	L

FIGURE 11. Species breeding status history for a MAPS station.

DATA SUBMISSION

Making sure the required data from each station become a part of the compiled MAPS database is the final — and crucial — step in operating a MAPS station. To maximize the use that can be made of the data, all elements listed below must be included. It is also important to ensure that data submission occurs within a reasonable amount of time; delays hold up analyses, prevent us from providing you with timely feedback, and require us to spend time rounding up outstanding data.

What data to submit

Each year, for each location, MAPS operators must submit the following data:

- Banding data for newly banded birds
- Banding data for recaptured birds
- Banding data for unbanded birds
- Summary of mist-netting effort data for each station
- Summary of mist-netting results data for each station (if not using MAPSPROG)
- Breeding status data for each station

Habitat Structure Assessment (HSA) data (including the station map) must also be submitted for each station during its first year of operation and every five years following (i.e., sixth year, eleventh year, etc.). However, if substantial habitat change has occurred within five years as a result rapid succession or catastrophic events (anthropogenic or natural), a revised HSA, along with the creation of a revised station map, should be completed. A revised station map should also be submitted anytime that nets are moved. Be sure to show the locations of the old, as well as the new, nets. Refer to the HSA Protocol (Nott *et al*. 2003; which can be downloaded from the IBP website) for directions on how to create the station map.

In addition, submit a completed Standard Net Opening and Closing Times sheet for each station at the end of the first season of operation and after any season in which any of the standard operating times are changed, that is, whenever you have changed any of the times at which you plan to operate your station in the future.

How to submit MAPS data

Currently, data may be submitted to the MAPS program in three ways: electronically using MAPSPROG, electronically not using MAPSPROG, or non-electronically by submitting hard (paper) copies of all data.

Submitting data through MAPSPROG: Coinciding with the Bird Banding Offices' effort to institute electronic data submission for banding schedules, IBP has developed a Windows-based data entry/import, verification/editing, and error-tracking program called MAPSPROG for submitting MAPS data to IBP. We strongly encourage all operators to submit their 2011 data using MAPSPROG, which was introduced on p. 17. MAPSPROG

includes modules to enter and verify your banding, effort, breeding status, and habitat structure assessment data collected during the 2011 MAPS season. MAPSPROG is designed to mimic the data verification procedures that have been developed by IBP over the last 20 years and have been applied to every set of MAPS data contributed to the MAPS program. The checks embedded in the program will allow you to see and correct any errors or inconsistencies that occur in your own data and will help you to improve your data collection. Moreover, submission of data through MAPSPROG will, in the long run, reduce the amount of time IBP biologists must spend in verifying data from the nearly 400 MAPS stations operated each year, thus allowing them more time and resources to focus on analyses aimed at understanding the causes of population declines in landbirds and at formulating management and conservation strategies for them.

The most current version of **MAPSPROG, Version 4.2.1**, is available for download from the MAPSPROG web page http://www.birdpop.org/mapsprog.htm. **Do NOT use any MAPSPROG version prior to 4.2.1 with your 2011 data. To ensure that you have the latest version of the program, open the program and click on the "Utilities" drop down menu header. You will see "Version 4.2.1" below the "Utilities" header if you have updated the program to 4.2.1.**

For stations that have run for more than one year, proper use of MAPSPROG requires that recapture records from the current year be checked against banding data from previous years in order to correct discrepancies among recaptures and to screen recaptures for possible misread band numbers. Follow the instructions in "**MAPSPROG Version 4.1: User's Guide and Manual**" (Froehlich *et al*. 2006), which is also available for download from the MAPSPROG web page, to append the data from previous years to your NEWMAPS file at the appropriate stage in the process (between-record verification). All operators who ran station(s) in 2010 should append their <LOCA>10 file to NEWMAPS. Those who used MAPSPROG in 2010 should use their MAPSPROG-created <LOCA>10 file unless they have been sent an updated file from IBP. Operators whose station(s) ran in 2010 and who did not use MAPSPROG should contact IBP for a file containing their previous years' data.

To ensure that first-time MAPSPROG users are using the program appropriately, IBP will compare their MAPSPROG output files against output verified by IBP biologist using IBP's traditional verification procedures. Once this comparison is completed, IBP will provide feedback on the results by certifying those operators whose results closely match ours and by providing recommendations to those whose results suggest that they encountered considerable difficulties with the program. To undertake these comparisons, we require paper copies of all data sheets and a copy of RAWMAPS, the initial raw data file produced by MAPSPROG, regardless of whether the data were entered or imported into it. To make sure we receive RAWMAPS, follow the instructions in the "Submitting Verified Data Files to IBP" section in the MAPSPROG Version 4.1 User's Guide when submitting data files. **It is extremely important to proof your RAWMAPS file against your raw data before using MAPSPROG to verify it. MAPSPROG will facilitate this proofing by allowing you to print out your RAWMAPS file.** Thus, all first time MAPSPROG users, and those who have not yet been certified, must submit paper copies (we prefer originals, but clear photocopies, including notes, are acceptable) of all their MAPS data for the year being submitted (including their Summary of Results form). Once a MAPSPROG user is certified,

we anticipate that the user will continue to submit her/his MAPS data using MAPSPROG and that her/his MAPSPROG output files will be reliable. Certified MAPSPROG users need not submit paper copies of any MAPS data (except any revised Standard Net Opening and Closing Forms or revised stations maps). Please contact Ron Taylor at rtaylor@birdpop.org or 415-663-1436 or Danielle Kaschube at dkaschube@birdpop.org or 609-625-0767 if you have questions regarding the use of MAPSPROG.

Once the Bird Banding Offices require banding schedules be submitted electronically, IBP will require MAPS data to be submitted using MAPSPROG. The Bird Banding Offices released BANDIT to replace BAND MANAGER, but are not yet requiring the use of BANDIT by all banders. As of the release of this manual (April 2011), BANDIT easily imports the file created by MAPSPROG, but MAPSPROG can also create a banding file for import into BAND MANAGER if you have not yet switched to BANDIT. Documentation is available on our website on how to import your MAPSPROG file into BANDIT as well as Band Manager. If you get frustrated, please contact us for assistance. We don't want you to have to enter your data twice (once into MAPSRPOG and once for BBL submission) and think it is useful for you to submit MAPSPROG-verified data to the Bird Banding Offices.

The MAPSPROG version 4.2.1 output file, export<yr>.dbf (e.g. export11.dbf), will contain all added, changed, lost, destroyed, and new records for the current year only. Additionally, in those very few cases where the species alpha codes in Pyle and DeSante (2003, 2005, 2006) differ from those used by the BBL (e.g., "TUTI" instead of "ETTI"), the alpha codes will be converted to BBL codes in the export.dbf file. **Please use the export<yr>.dbf file instead of the <loca><yr> file when importing 2004 or later data into BANDIT or BAND MANAGER, to avoid importing a file with alpha codes not recognized by the BBL**. In the meantime, we'd like to persuade all MAPS operators to use MAPSPROG for their data.

Submitting banding data in electronic format other than through MAPSPROG: IBP can also accept electronic banding data as an e-mail attachment or on a CD in any of three formats: dBase (we use Visual dBase 5.7), Excel, or ASCII. Data for all stations and for all band sizes and capture codes should be merged into a single file. Please use the template we provide online for entering banding, effort and breeding status data into Excel. It can be downloaded at http://www.birdpop.org/DownloadSoftware/MAPStemplate.zip. Using this template will allow us to more easily import your data into our databases.

If you are entering your data using Access, please export each table within the database as a separate Excel spreadsheet. If you are entering your data using some other program, such as Paradox, Quattro Pro, or a word-processing program, please convert the file to dBase or ASCII. It is often safer to convert to ASCII rather than directly to dBase, especially from Paradox or Quattro Pro. Refer to your program's documentation for instructions on making this conversion.

Table 4 shows the file structure that must be used when submitting electronic banding data not entered using MAPSPROG. Following are explanations of the fields listed in Table 4; for further details on the codes used, consult the "Collection and Recording of Banding Data" section of this manual. All character fields should be entered left-justified and numeric fields right-justified.

LOC - Location. Enter your four-character location code.
BS - Band size. The purpose of this and the following field is to enable us to find original data easily. Records on 'Unbanded' and 'Recapture' sheets should be entered with band sizes 'U' and 'R', respectively. Unbanded birds on new-band sheets should be given the band size for the sheet
PG - Page number.
C - Capture code.
BAND - Band number (always nine digits long).
SPEC - Four-letter species alpha code.
SPEC6 - Six-letter species alpha code (this field is not used for MAPS data).
AGE - Age.
HA - How aged.
SEX - Sex.
HS - How sexed.
SK - Skull.
CP - Cloacas protuberance.
BP - Brood patch.
F - Fat.
BM - Body molt.
FM - Flight-feather molt.
FW - Flight-feather wear.
JP - Juvenile plumage.
WNG - Wing chord.
WEIGHT - Body mass.
STATUS - Status.
DATE - In dBase, enter as MM/DD/YYYY. In a text file, enter as YYYYMMDD.
TIME - Omit the final '0'.
STATION - Station code.
NET - Original net designation. Enter your net number (preferably two digits) or ? if net number is unknown, left justified
DISP - Disposition.
NOTE - Enter the note number if the record has a note. Otherwise, leave blank.
PPC - Primary coverts.
SSC - Secondary coverts.
PPF - Primaries.
SSF - Secondaries.
TT - Tertials.
RR - Rectrices.
HD - forehead; crown; nape; supercilium; eye ring; eyeline; auricular, subauricular, submoustachial, and malar stripes; and lores (this field was only used for MAPS data from 1998 through 2003).

UPP - back, scapulars, rump, and uppertail coverts (this field was only used for MAPS data from 1998 through 2003).

UNP - chin, throat, breast, belly, sides, flanks, and undertail coverts (this field was only used for MAPS data from 1998 through 2003).

BPL - Includes all feather tracts of the head, upperparts and underparts (this field is to be used for MAPS data in and subsequent to 2004).

NF - all non-feather parts including bill, mouth, eye, legs, and feet. A note is required if this column is used.

FTHR. PULL - Enter 'O' if the outer two rectrices were pulled or 'I' if an inner and outer rectrix were pulled. If no feathers were pulled, leave this field blank.

SWAB - Enter the size of the cloacas swab with which the sample was collected. If no sample was collected, leave this field blank.

COLOR - Color band sequence (this field is not used for MAPS data).

It is imperative that character fields be entered as character fields. dBase will put '0' into a blank numeric field by default, and there is a big difference between blank and zero! Before submitting electronic banding data, it is extremely important that you proof your electronic file against the banding-data sheets for data-entry errors. When submitting electronic data not using MAPSPROG, **please remember to send paper copies of all data sheets not included in your electronic file, e.g., paper copies of your Summary of Effort, Summary of Results, and Breeding Status List for each station.** PDF scans of the non-entered data sheets can be emailed if you prefer not to send hard copies.

Submitting paper copies of banding data: Operators who are unable to use MAPSPROG and are unable to submit electronic data must submit paper copies (originals are preferred, but photocopies or PDF scans, including notes, are acceptable) of all of the forms mentioned above, **including completed Banding Data Sheets for newly banded birds, unbanded birds, and recaptured birds; completed Summary of Mist-Netting Effort forms for each station, completed Summary of Mist-Netting Results forms for each station, and completed Breeding Status Lists for each station each year**. In addition, such operators must submit paper copies of their completed HSA forms and the associated station map for each station (once every five years or more often if substantial habitat change has occurred), and their Standard Net Opening and Closing Times form (after the first season and whenever they change their standard operation). Please do not staple data sheets together or put them in binders when submitting data.

Due date

MAPS operators are requested to return their completed data sheets and map(s) to The Institute for Bird Populations as soon as possible after the completion of the season. In general, the due date is September 15. The due date for operators using MAPSPROG is October 15. Data will be accepted after these dates, but late data, especially from long-standing stations, compromise our ability to conduct analyses and prepare reports on schedule. However, we would rather receive complete, proofed, carefully-compiled data packets a little late than incomplete or sloppy packets submitted on schedule.

Where to send data

MAPSPROG files or other electronic files can be e-mailed to our data manager Ron Taylor at rtaylor@birdpop.org or the MAPS Coordinator, Danielle Kaschube, at dkaschube@birdpop.org.

Hard copy data packets should be addressed to: MAPS Data Manager, The Institute for Bird Populations. Our mailing address is P.O. Box 1346, Point Reyes Station, CA 94956-1346 USA. Our shipping address is 11435 State Route 1, Suite 23, Point Reyes Station, CA 94956 USA.

We will acknowledge receipt of your data; if you do not hear from us within a month of sending your data, chances are we did not receive them!

Table 4. MAPS Banding-data file structure for 2011 data

Field	Field Name	Type	Width	Dec	Description
1	LOC	Character	4		Location code
2	BS	Character	2		Band size
3	PG	Character	3		Data page number
4	C	Character	1		Capture code
5	BAND	Character	9		Band number
6	SPEC	Character	4		Four-letter species alpha code
7	SPEC6	Character	6		*Six-letter species alpha code
8	AGE	Character	1		Age
9	HA	Character	2		How aged
10	SEX	Character	1		Sex
11	HS	Character	2		How sexed
12	SK	Character	1		Skull pneumatization
13	CP	Character	1		Cloacas protuberance score
14	BP	Character	1		Brood patch score
15	F	Character	1		Fat content score
16	BM	Character	1		Body molt score
17	FM	Character	1		Flight feather molt score
18	FW	Character	1		Flight feather wear score
19	JP	Character	1		Juvenile plumage score
20	WNG	Numeric	3	0	Wing chord
21	WEIGHT	Numeric	5	1	Body mass
22	STATUS	Character	3		Status upon release
23	DATE	Date	8		Capture date
24	TIME	Character	3		Time of capture
25	STATION	Character	4		Station code
26	NET	Character	4		Net
27	DISP	Character	1		Disposition on release
28	NOTE	Character	2		Notes on data sheet
29	PPC	Character	1		Feather generations in primary coverts
30	SSC	Character	1		Feather generations in secondary coverts
31	PPF	Character	1		Feather generations in primaries
32	SSF	Character	1		Feather generations in secondaries
33	TT	Character	1		Feather generations in tertials
34	RR	Character	1		Feather generations in rectrices
35	HD	Character	1		**Age class of head feathers
36	UPP	Character	1		**Age class of upperpart feathers
37	UNP	Character	1		**Age class of underpart feathers
38	BPL	Character	1		***Feather generations in body plumage
39	NF	Character	1		Generation indicated by non-feather parts
40	FP	Character	1		Feather pull status
41	SW	Character	1		Cloacas swab status
42	COLOR	Character	5		*Color band sequence

* - These fields (SPEC6 and COLOR) are not used for MAPS data.

** - These fields (HD, UPP, UNP) were only used for MAPS data from 1998 through 2003.

*** - This field (BPL) is to be used for MAPS data in and subsequent to 2004.

LITERATURE CITED

American Ornithologists' Union. 1957. *Check-list of North American Birds. 5th edition*. American Ornithologists' Union, Washington, DC.

American Ornithologists' Union. 1983. *Check-list of North American Birds. 6th edition*. American Ornithologists' Union, Washington, DC.

American Ornithologists' Union. 1998. *Check-list of North American Birds. 7th edition*. American Ornithologists' Union, Washington, DC.

Anders, A.D., D.C. Dearborn, J. Faaborg, and F.R. Thompson III. 1997. Juvenile survival in a population of neotropical migrant birds. *Conservation Biology* 11:698-707.

Baillie, S.R. 1990. Integrated population monitoring of breeding birds in Britain and Ireland. *Ibis* 132:151-166.

Baillie, S.R., R.E. Green, M. Boddy, and S.T. Buckland. 1986. *An Evaluation of the Constant Effort Sites Scheme*. British Trust for Ornithology, Thetford, UK.

Bird Banding Offices. 1991. *North American Bird Banding Manual, Vol. II*. U.S. Fish and Wildlife Service, Washington, DC, and Canadian Wildlife Service, Ottawa, ON.

Brown, L.R. 1991. *State of the World, 1992*. Worldwatch Institute, Washington, DC.

Burton, K.M., and D.F. DeSante. 2004. Effects of mist-netting frequency on capture rates at monitoring Avian Productivity and Survivorship (MAPS) stations. Pp. 7-11 *in* Ralph, C.J., and E.H. Dunn, eds. *Monitoring Bird Populations Using Mist Nets*. *Studies in Avian Biology* 29.

Butcher, G., and S. Droege. 1992. *Needs Assessment: Monitoring Neotropical Migratory Birds*. Neotropical Migratory Birds Conservation Program. 58 pp.

Clobert, J., J.-D. Lebreton, and D. Allaine. 1987. A general approach to survival rate estimation by recaptures or resightings of marked birds. *Ardea* 75:133-142.

DeSante, D.F. 1992. Monitoring Avian Productivity and Survivorship (MAPS): a sharp, rather than blunt, tool for monitoring and assessing landbird populations. Pp. 511-521 *in* McCullough, D.C., and R.H. Barrett, eds. *Wildlife 2001: Populations*. Elsevier Applied Science, London, UK.

DeSante, D.F. 1995. Suggestions for future directions for studies of marked migratory landbirds from the perspective of a practitioner in population management and conservation. *Journal Applied Statistics* 22:949-965.

DeSante, D.F. 1996. General Evaluation of the Monitoring Avian Productivity and Survivorship (MAPS) Program *in*: *An Evaluation of the Monitoring Avian Productivity and Survivorship (MAPS) Program*. The Institute for Bird Populations, Point Reyes Station, CA. 128 pp.

DeSante, D.F. 2000. Patterns of productivity and survivorship from the MAPS Program. Pp. 166-177 *in* Bonney, R., D.N. Pashley, R.J. Cooper, and L. Niles, eds. *Strategies for Bird Conservation: the Partners in Flight Planning Process*. Proceedings of the Third Partners in Flight Workshop; 1995 October 1-5; Cape May, NJ. Proceedings RMRS-P-16. Ogden, UT: USDA, Forest Service, Rocky Mountains Research Station.

DeSante, D.F., K.M. Burton, J.F. Saracco, and B.L. Walker. 1995. Productivity indices and survival rate estimates from MAPS, a continent-wide programme of constant-effort mist netting in North America. *Journal Applied Statistics* 22:935-947.

DeSante, D.F., K.M. Burton, and D.R. O'Grady. 1996. The Monitoring Avian and Productivity and Survivorship (MAPS) Program fourth and fifth annual report (1993 and 1994). *Bird Populations* 3:67-120.

DeSante, D.F., and D.R. Kaschube. 2006. The Monitoring Avian Productivity and Survivorship (MAPS) program 1999, 2000, and 2001 report. *Bird Populations* 7:23-89.

DeSante, D.F., and D.R. Kaschube. 2007. The Monitoring Avian Productivity and Survivorship (MAPS) program 2002 and 2003 report. *Bird Populations* 8:46-115.

DeSante, D.F., and D.R. Kaschube. 2009. The Monitoring Avian Productivity and Survivorship (MAPS) program 2004, 2005, and 2006 report. *Bird Populations* 9:86-169.

DeSante, D.F., D.R. Kaschube, and T.S. Sillett. 2003a. *Evaluation of the first ten years of the Monitoring Avian Productivity and Survivorship (MAPS) program in Alaska and adjacent Canada, Part 1. General results*. The Institute for Bird Populations, Point Reyes Station, CA. 226 pp.

DeSante, D.F., D.R. Kaschube, and T.S. Sillett. 2003b. *Evaluation of the first ten years of the Monitoring Avian Productivity and Survivorship (MAPS) program in Alaska and adjacent Canada, Part 2. Statistical power to detect temporal trends and spatial differences in survival of landbirds*. The Institute for Bird Populations, Point Reyes Station, CA. 50 pp.

DeSante, D.F., D.R. Kaschube, J.F. Saracco, and J.E. Hines. 2009. Power to detect differences and trends in apparent survival rates. *Bird Populations* 9:29-41.

DeSante, D.F., M.P. Nott, and D.R. O'Grady. 2001. Identifying the proximate demographic cause(s) of population change by modelling spatial variation in productivity, survivorship, and population trends. *Ardea* 89 (special issue): 185-207.

DeSante, D.F., M.P. Nott, and D.R. Kaschube. 2004b. *MAPS stations on National Wildlife Refuges in the USFWS Pacific Region*. The Institute for Bird Populations, Point Reyes Station, CA. 57 pp.

DeSante, D.F., M.P. Nott, and D.R. Kaschube. 2005. Monitoring, modeling, and management: Why base avian management on vital rates and how should it be done? Pp. 795-804 *in* Ralph, C.J., and T.D. Rich, eds. *Bird Conservation Implementation and Integration in the Americas*. USDA Forest Service Gen. Tech. Rep. PSW-191.

DeSante, D.F., and D.R. O'Grady. 2000. The Monitoring Avian Productivity and Survivorship (MAPS) Program 1997 and 1998 report. *Bird Populations* 5: 49-101.

DeSante, D.F., D.R. O'Grady, K.M. Burton, P. Velez, D. Froehlich, E.E. Feuss, H. Smith, and E.D. Ruhlen. 1998. The Monitoring Avian Productivity and Survivorship (MAPS) Program Sixth and Seventh Annual Report (1995 and 1996). *Bird Populations* 4:69-122.

DeSante, D.F., D.R. O'Grady, and P. Pyle. 1999. Measures of productivity and survival derived from standardized mist-netting are consistent with observed population trends. *Bird Study* 46(suppl):S178-188.

DeSante, D., and P. Pyle. 1986. *Distributional Checklist of North American Birds*. Volume 1: United States and Canada. Artemisia Press, Lee Vining, CA.

DeSante, D.F., and D.K. Rosenberg. 1998. What do we need to monitor in order to manage landbirds? Pp. 93-106 *in* Marzluff, J.M., and R. Sallabanks, eds. *Avian Conservation: Research and Management*. Island Press, Washington, DC.

DeSante, D.F., and J.F. Saracco. 2009. Power of the MAPS program to detect differences and trends in survival and a vision for program growth. *Bird Populations* 9:42-75.

DeSante, D.F., J.F. Saracco, D.R. O'Grady, K.M. Burton, and B.L. Walker. 2004a. Methodological considerations of the Monitoring Avian Productivity and Survivorship (MAPS) program. Pp. 28-45 *in* Ralph, C.J., and E.H. Dunn, eds. *Monitoring Bird Populations Using Mist Nets*. *Studies in Avian Biology* 29.

DeSante, D.F., J.F. Saracco, P. Pyle, D.R. Kaschube, and M.K. Chambers. 2008. *Integrating the MAPS program into Coordinated Bird Monitoring in the Northeast (U. S. Fish and Wildlife Service Region 5)*. The Institute for Bird Populations, Point Reyes Station, CA. 99 pp.

DeSante, D.F., O.E. Williams, and K.M. Burton. 1993. The Monitoring Avian Productivity and Survivorship (MAPS) Program: overview and progress. Pp. 208-222 *in* Finch, D.M., and P.W. Stangel, eds. *Status and Management of Neotropical Migratory Birds*. USDA Forest Service Gen. Tech. Rep. RM-229.

Froehlich, D. 2003. *Ageing North American Landbirds by Molt Limits and Plumage Criteria: a Photographic Companion to the Identification Guide to North American Birds, Part I.* Slate Creek Press, Bolinas, CA. 51 pp

Froehlich, D., N. Michel, D.F. DeSante, and P. Velez. 2006. *MAPSPROG Version 4.1. User's Guide and Manual*. The Institute for Bird Populations, Point Reyes Station, CA. 163 pp

Geissler, P. 1997. Review of the Monitoring Avian Productivity and Survivorship (MAPS) Program *in*: *An Evaluation of the Monitoring Avian Productivity and Survivorship (MAPS) Program*. The Institute for Bird Populations, Pt Reyes Sta, CA.

Hines, J.E., W.L. Kendall, and J.D. Nichols. 2003. On the use of the robust design with transient capture-recapture models. *Auk* 120:1151-1158

Holmes, R.T., and T.W. Sherry. 1988. Assessing population trends of New Hampshire forest birds: local vs. regional trends. *Auk* 105:756-768.

Howell, S.N.G., C. Corbin, P. Pyle, and D.I. Rogers. 2003. The first basic problem: a review of molt and plumage homologies. *Condor* 105:635-653.

Hutto, R.L. 1988. Is tropical deforestation responsible for the reported decline in neotropical migrant populations? *American Birds* 42:375-379.

Knopf, F.L. 1994. Avian assemblages on altered grasslands. *Studies in Avian Biology* 15:247-257.

Lebreton, J.-D, K.P. Burnham, J. Clobert, and D.R. Anderson. 1992. Modeling survival and testing biological hypotheses using marked animals: a unified approach with case studies. *Ecol. Monogr*. 62:67-118.

Morton, E.S., and R. Greenberg. 1989. The outlook for migratory songbirds: "future shock" for birders. *American Birds* 43:178-183.

National Geographic Society. 1999. *Field Guide to the Birds of North America. 3rd edition*. National Geographic Society, Washington, DC.

Nott, M.P. 2000. *Identifying management actions on DoD installations to reverse declines in Neotropical birds*. The Institute for Bird Populations, Pt. Reyes Sta., CA. 18 pp.

Nott, M.P., and D.F. DeSante. 2002. Demographic monitoring and the identification of transients in mark-recapture models. Pp. 727-736 *in* J.M. Scott, P.J. Heglund, M.L. Morrison, *et al*., (eds.), *Predicting Species Occurrences: Issues of Scale and Accuracy*. Island Press, New York

Nott, M.P., D.F. DeSante, R.B. Siegel, and P. Pyle. 2002. Influences of the El Niño/Southern Oscillation and the North Atlantic Oscillation on avian productivity in forests of the Pacific Northwest of North America. *Global Ecology and Biogeography* 11:333-342.

Nott, M.P., D.F. DeSante, and N. Michel. 2003a. *Management Strategies for Reversing Declines in Landbirds of Conservation Concern: a Landscape-Scale Analysis of MAPS Data*. The Institute for Bird Populations, Point Reyes Station, CA 357 pp.

Nott, M.P., D.F. DeSante, and N. Michel. 2003b. *Monitoring Avian Productivity and Survivorship (MAPS) Habitat Structure Assessment (HSA) Protocol*. The Institute for Bird Populations, Point Reyes Station, CA. 42 pp.

Nott, M.P., D.F. DeSante, P. Pyle, and N. Michel. 2005. *Managing Landbird Populations in Forests of the Pacific Northwest: Formulating Population Management Guidelines from Landscape-scale Ecological Analyses of MAPS Data from Avian Communities on Seven National Forests in the Pacific Northwest*. The Institute for Bird Populations, Point Reyes Station, CA 163 pp. + appendices.

Peach, W.J., S.R. Baillie, and D.E. Balmer. 1998. Long-term changes in the abundance of passerines in Britain and Ireland as measured by constant effort mist-netting. *Bird Study* 45:257-275.

Peach, W., S. Baillie, and L. Underhill. 1991.Survival of British Sedge Warblers Acrocephalus schoenobaenus in relation to west African rainfall. *Ibis* 133:300-305.

Peach, W.J., S.T. Buckland, and S.R. Baillie. 1990. Estimating survival rates using mark-recapture data from multiple ringing sites. *The Ring* 13:87-102.

Peach, W.J., S.T. Buckland, and S.R. Baillie. 1996. The use of constant effort mist-netting to measure between-year changes in the abundance and productivity of common passerines. *Bird Study* 43:142-156.

Peterjohn, B.G., J.R. Sauer, and C.S. Robbins. 1995. Population trends from the North American Breeding Bird Survey. Pp. 3-39 *in* T.E. Martin and D.M. Finch (eds.), *Ecology and Management of Neotropical Migratory Birds*. Oxford University Press, New York, NY.

Peterson, R.T. 1980. *Peterson Field Guide: Eastern Birds*. 4th edition. Houghton Mifflin Comp., Boston, MA.

Peterson, R.T. 1990. *Peterson Field Guide: Western Birds*. 3rd edition. Houghton Mifflin Comp., Boston, MA.

Pollock, K.H., J.-D. Nichols, C. Brownie, and J.E. Hines. 1990. Statistical inference for capture-recapture experiments. *Wildlife Monographs* 107.

Pradel, R. 1996. Utilization of capture-mark-recapture for the study of recruitment and population growth rate. *Biometrics* 52:703-709.

Pradel, R., J.E. Hines, J.-D. Lebreton, and J.D. Nichols. 1997. Capture-recapture survival models taking account of transients. *Biometrics* 53:60-72.

Pyle, P. 1997. *Identification Guide to North American Birds*, Part 1. Slate Creek Press, Bolinas, CA.

Pyle, P. 2004. New terminology will help you understand molt. *MAPS Chat* 7:2,8.

Pyle, P., and D.F. DeSante. 2003. Four-letter and six-letter alpha codes for birds recorded from the American Ornithologist's Union check-list area. *North American Bird Bander* 28:64-79.

Pyle, P., and D.F. DeSante. 2005. Updates to four-letter and six-letter alpha codes based on Revisions by the American Ornithologists' Union. *North American Bird Bander* 30:70-72.

Pyle, P., and D.F. DeSante. 2006. Updates to four-letter and six-letter alpha codes based on Revisions by the American Ornithologists' Union. *North American Bird Bander* 31:193-195.

Pyle, P., D.F. DeSante, M.P. Nott, and D.R. Kaschube. 2005. *The MAPS program in the Pacific Northwest: Current status and future directions*. The Institute for Bird Populations, Point Reyes Station, CA. 106 pp.

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. *Handbook of Field Methods for Monitoring Landbirds*. USDA Forest Service Gen. Tech. Report PSW-GTR-144.

Robbins, C.S., J.R. Sauer, R.S. Greenberg, and S. Droege. 1989. Population declines in North American birds that migrate to the neotropics. *Proc. Nat. Acad. Sci*. (USA) 86:7658-7662.

Robinson, R.A., R. Julliard, and J.F. Saracco. 2009. Constant effort: studying avian population processes using standardised ringing. *Ringing & Migration* 24:199-204.

Rosenberg, D.K., D.F. DeSante, K.S. McKelvey, and J.E. Hines. 1999. Monitoring survival rates of Swainson's Thrush *Catharus ustulatus* at multiple spatial scales. *Bird Study* 46(suppl): S198-208.

Saracco, J. 2004. Changes in the use of the "adults only" (now called "molt limits and plumage" fields: a more intuitive and informative approach to ageing birds. *MAPS Chat* 7:3-5.

Saracco, J.F., and D.F. DeSante. 2008. *Identifying proximate causes of population trends in migratory birds*. The Institute for Bird Populations, Point Reyes Station, CA. 44 pp.

Saracco, J.F., D.F. DeSante, D.R. Kaschube, J.E. Hines, M.P. Nott, and R.B. Siegel. 2006. *An analysis of the Monitoring Avian Productivity and Survivorship (MAPS) program and a vision for its integration into North American Coordinated Bird Monitoring*. The Institute for Bird Populations, Point Reyes Station, CA. 87 pp.

Saracco, J.F., D.F. DeSante, and D.R. Kaschube. 2008. Assessing landbird monitoring programs and demographic causes of population trends. *Journal of Wildlife Management* 72:1665-1673.

Saracco, J.F., D.F. DeSante, M.P. Nott, W.M. Hochachka, S Kelling, and D. Fink. 2009a. Integrated bird monitoring and the Avian Knowledge Network: Using multiple data resources to understand spatio-temporal variation in demographic processes and abundance. Pp. 659-661 *in* Rich, T.D., C. Arizmendi, D.W. Demarest, and C. Thompson (eds.), *Proceedings of the 4th International Partners in Flight Conference: Tundra to Tropics*. 13-16 February 2008. McAllen, Texas. Partners in Flight.

Saracco, J.F., D.F. DeSante, M.P. Nott, and D.R. Kaschube. 2009b. Using MAPS and MoSI to monitor landbirds and inform conservation. Pp. 651-658 *in* Rich, T.D., C. Arizmendi, D.W. Demarest, and C. Thompson (eds.), *Proceedings of the 4th International Partners in Flight Conference: Tundra to Tropics*. 13-16 February 2008. McAllen, Texas. Partners in Flight.

Saracco, J.F., J.A. Royle, D.F. DeSante, and B. Gardner. 2010. Modeling spatial variation in avian survival and residency probabilities. *Ecology* 91(7):1885-1891.

Saracco, J.F., J.A. Royle, D.F. DeSante, and B. Gardner. 2011. Spatial modeling of survival and residency and application to the Monitoring Avian Productivity and Survivorship program. *Journal of Ornithology* in press. doi: 10.1007/s10336-010-0565-1

Sibley, D.A 2003. *The Sibley Field Guide to Birds of Eastern North America*. Alfred A. Knopf, New York.

Sibley, D.A. 2003. *The Sibley Field Guide to Birds of Western North America*. Alfred A. Knopf, New York.

Temple, S.A., and J.A. Wiens. 1989. Bird populations and environmental changes: can birds be bio-indicators? *American Birds* 43:260-270.

Terborgh, J. 1989. *Where Have All the Birds Gone? Essays on the Biology and Conservation of Birds that Migrate to the American Tropics*. Princeton University Press, Princeton, NJ.

Vega Rivera, J.H., J.H. Rappole, W.J. McShea, and C.A. Haas. 1998. Wood Thrush postfledging movements and habitat use in northern Virginia. *Condor* 100:69-78.

White, G.C. 1983. Numerical estimation of survival rates from band-recovery and biotelemetry data. *J. Wildlife Management* 47:716-728.

White, G.C., and K.P. Burnham. 1999. Program Mark: survival estimation from populations of marked animals. *Bird Study* 46(suppl.):120-138.

Wilcove, D.S. 1985. Nest predation in forest tracts and the decline of migratory songbirds. *Ecology* 66:1211-1212.

Yunick, R.P. 1979. Variation in skull pneumatization patterns of certain passerines. *North American Bird Bander* 4:145-147.