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MAPS Chat

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

Number 14 – March 2014


K. Tranqillo with Blue-crowned Lories


Chestnut-backed Chickadee by A. Nightingale


Cerulean Warbler by Laurie Doss

Molt and Age Codes: a New Paradigm

Danielle Kaschube

Sometimes the best way to ensure a deeper knowledge of a topic is to look at it in a different way. This MAPS Chat gives us a chance to look at molt, and how we age birds, using a new ageing scheme. Peter Pyle shares his experience with birds captured in the Tropical MAPS program (TMAPS) in American Samoa and uses these species to introduce us to this ageing system.

This new coding system will not be implemented into the regular MAPS program but we suggest you try using it on some of the birds you catch this MAPS season. It will help solidify your knowledge of molts and ageing. Click here to read the original research paper. ●

Applying "WRP" Molt and Age Codes at TMAPS Stations: A Case Study Based on American Samoan Landbirds

Peter Pyle

I always enjoy it when we start an IBP bird-banding project in some new corner of the world. In order to collect data on adult survivorship and productivity, two vital-rate mainstays of MAPS, we have to confidently age the birds we capture. Determining age and sex in turn depends on knowing molt strategies. When we start a project in an entirely new place, such as American Samoa, where we don't even know when and for how much of the year each species breeds, determining molt strategies and coding for age can be quite the challenge. I typically start by gleaning as much information as possible from the literature (always meager) on molt strategies of target species, check as many specimens as possible to develop a tentative Age-Sex Manual, and then ground-truth the information in the manual during the first years of banding. The ground-truthing process usually takes at least two years before we have the molt strategy clarified sufficiently to enable confident ageing and then analyses of bird demographics.

In tropical and Southern Hemisphere regions, both of which apply to American Samoa, another challenge is to determine how we will designate age categories. Birds in such regions can, and typically do, breed over January 1st, so the calendar-based system that we are familiar with in the MAPS program does not work. A few years ago colleagues Jared Wolfe, Brandt Ryder, and I devised a new system to handle age-coding in these tropical regions. This is now referred to as the

Also in this issue:

WRP system (Wolfe et al. 2010), and was later modified slightly by Johnson et al (2011). I like this system because it keys off of molt and plumage states irrespective of time of year, thus forcing banders to understand molt strategies to apply the codes. The system is broad enough that it can be tailored to provide a smaller subset of codes for each species, or group of species following the same molt strategy. We were able to devise a modified WRP age-coding system specific to the American Samoan TMAPS project.

The WRP system categorizes birds by first-cycle and later-cycle molt and plumage states. The codes we use in Samoa are listed in the table below. The system also has codes for species with alternate plumages, and for species with distinct third and fourth-year plumages. But we found no evidence for such plumages in Samoan landbirds, so our modified WRP coding (below) does not include these codes.

In order to apply WRP age codes to a species, the molt strategy of the species first needs to be determined, in particular whether or not the preformative molt is or can be absent, partial, or complete, and whether or not prebasic molts can be incomplete. Depending on molt strategy, the number of possible WRP codes for a given species can be reduced. Then, once acceptable codes are determined for a species, we use the same coding for all captures of the species, which makes it easier to later interpret the coding data for age and to perform demographic analyses. And, yes, we have modified our verification programs to catch unacceptable WRP codes for each species! Although this may all seem daunting at first, once we fit our Samoan landbirds to one of four categories according to molt strategy, the WRP-coding followed quite naturally and easily.

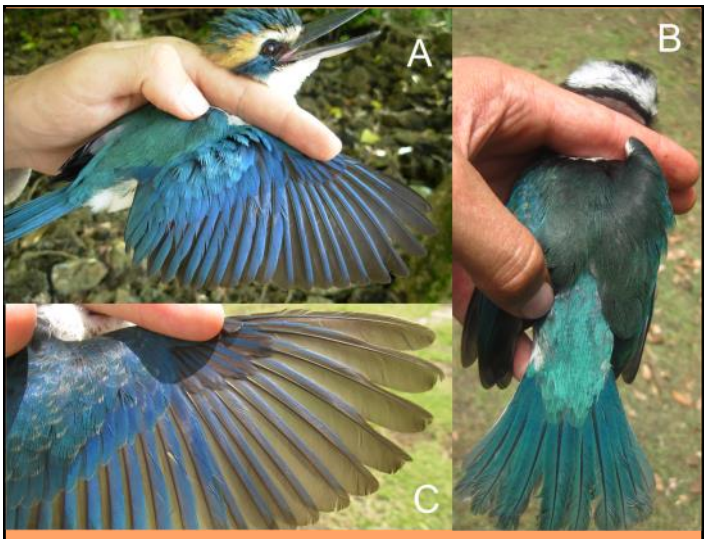

Figure 1. Collared Kingfishers (*Todiramphus chloris*) A) Adult male with bright aqua-blue back and fresh basic blue and dusky flight feathers; B) first-year female with dark green back; C) first-year male showing worn brown and blue primaries and characteristic white-fringed juvenal secondary coverts. Collared Kingfisher appears to lack a preformative molt and has a complete prebasic molt, so WRP codes for these birds would be A) DCB, B) FCJ, and C) FCJ.

One of our Samoan species, Collared Kingfisher (Fig. 1), appears to lack a preformative molt and typically has a complete prebasic molt. Thus the acceptable WRP codes and order by plumage state and age is, simply: FCJ-SPB-DCB-DPB. UPB can also be assigned to molting birds in which the bander is unsure if it is undergoing the second prebasic molt or

WRP codes used in the American Samoan TMAPS Program along with age, molt, and plumage coding on the MAPS banding sheet that typically accompany each code.

WRP	Plumage or Molt Stage	Typical Corresponding MAPS Codes
FCJ	First Cycle Juvenal Plumage	Age=2, BM=0, FM=N, JP=3
FPF	First Cycle undergoing Preformative Molt	Age=2, BM>0 or FM=S, JP=0-2
FCF	First Cycle Formative Plumage	Age=2 or 5, BM=0, FM=N, JP=0
FAJ	Unknown Plumage after Juvenal	Age=1, BM=0, FM=N
UPB	Prebasic Molt unknown if Second Cycle or not	Age=1, FM=S
SPB	Second Cycle undergoing 2nd Prebasic Molt	Age=5, FM=S
SCB	Second Basic Plumage	Age=5, BM=0, FM=N
DCB	Definitive Basic Plumage	Age=6 or 1, FM=N
DPB	Definitive Cycle undergoing Prebasic Molt	Age=6, FM=S
SAB	Basic Plumage or Molt after Second Cycle	Age=7 or 8, FM=S or N
UPU	Molting; unknown if Prefomative or Prebasic	Age=0, FM=S
UCU	Unknown plumage	Age=0, FM=N, BM=0

a later molt. This is the correct code to use when a bird is almost finished with molt, say, growing p10 and s6 and with no older feathers left to assist with determining age. And, of course, UCU is an acceptable code for all species at any time, the equivalent of Age=0 in MAPS, perhaps for a bird that escaped prior to being fully processed. We don't like to see too many UCU's in the data (apropos, "UKU" is Samoan for "hair louse").

Seven of our species, Blue-crowned Lory (Fig. 2), White-rumped Swiftlet (Fig. 3), Samoan Shrikebill (Fig. 4), Wattled Honeyeater (Fig. 5), Cardinal Honeyeater (Fig. 6), Polynesian Starling (Fig. 7), and Samoan Starling (Fig. 7) typically have partial or incomplete preformative molts and complete prebasic molts. The acceptable WRP codes and order by plumage state and age for these is: FCJ-FPF-FCF-SPB-DCB-DPB. As in the kingfisher, both UPB and UCU are also acceptable, as is UPU for a molting bird of unknown age; e.g., undergoing either a preformative or a prebasic molt. We also don't want to mince many UPU's in the data ("UPU" is Samoan for "word").

Four of our species, the migrant Long-tailed Cuckoo and the introduced Red-vented Bulbul, Common Myna, and Jungle Myna have complete preformative and prebasic molts. The acceptable WRP codes and order for these is: FCJ-FPF-FAJ-DCB-DPB. Note the FAJ code would be applied to a Common Bushtit or Wrentit in fall that has undergone the complete preformative molt and skull ossification, and must be coded with age = 0. Plumage-wise, at least we know it had undergone a complete molt, as opposed to UCU,

Figure 3. White-rumped Swiftlet (*Aerodramus spodiopygia*). Swifts are uncommonly captured by MAPS operators but in American Samoa the species is regularly captured. There already more captures of this species in American Samoa than there are in the entire 20-year MAPS data set. Swifts have partial preformative molts and the complete prebasic molts and the broad primaries and evidence of a "molt cline" in the remiges indicate this to be an adult (DCB).

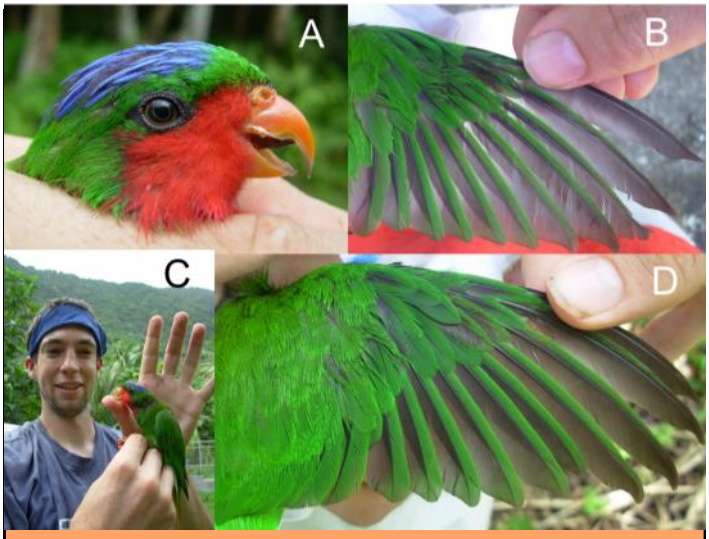

Figure 2. Blue-crowned Lory (*Vini australis*) captured on Ta'u Island. A & C) IBP Biologist Keegan Tranqillo holds his first capture of this species; B) wing of a first-cycle bird showing browner and pointed juvenal primaries; D) wing of an adul bird showing darker, browner, and more-notched basic primaries. This species has a partial preformative molt that includes body feathers and the prebasic molt is complete, so B) was coded FCF and D) was coded DCB.

Figure 4. Samoan Shrikebill (*Clytorhynchus [vitiensis] powelli*) captured for banding on Ta'u Island. A- B) An adult showing broad and glossy rectrices; C- D) one-year-old undergoing its second prebasic molt and showing worn juvenal outer primaries and rectrices. The bird of A-B receives WRP code DCB and that of C-D code SPB. Samoan Shrikebill is part of the widespread Pacific Fiji Shrikebill (*C. vitiensis*) complex but may become split into a Samoan endemic species.

Figure 5. Wattled Honeyeater (*Foulehaio carunculata*). A) Bird in definitive basic plumage; B) wing of adult showing uniform glossy basic feathers; C) wing of a molting one-year-old showing brown and pointed outer primaries. WRP codes for these are A) DCB, B) DCB, and C) SPB. Wattled Honeyeater is our most commonly caught species, with about 600 captures so far during the two-year project.

for which we don't even know this much. For these species UPB is not acceptable but UPU may be a bit more informative than for other categories, indicating for instance a bird growing the last feathers during a complete preformative or prebasic molt.

Finally, four Samoan Columbiformes, Friendly Ground-Dove, Purple-capped Fruit-Dove (Fig. 8), Many-colored Fruit-Dove, and Pacific Pigeon, can have protracted and incomplete preformative and prebasic molts. For these species, the full range of acceptable WRP codes are, in order of appearance, FCJ-FPF-FCF-SPB-SCB-DPB-DCB-SAB, with identifiable plumages depending on what mixture of juvenal, formative, and basic feathers (often secondaries) are present. The SAB code would be equivalent to an ATY woodpecker, indicating a mixture of retained and replaced basic feathers. In this case we decided not to designate TCB (Third Basic Plumage or TY in woodpeckers) as acceptable, because we have so far encountered no doves with all three of juvenal, formative, and basic feathers present, enabling such a designation.

The use of these WRP codes not only overcomes the calendar-year problem associated with MAPS codes, but it gives us additional information on molt and plumage state, and it leads to more refined information on the age of the bird than our current age-coding in MAPS. In this regard, the WRP system is particularly advantageous in species with prolonged or year-round breeding, as occurs to varying extents in Samoa and elsewhere at tropical latitudes. A bird can be coded relative to molt and plumage state, which can then be bracketed more narrowly to age within a calendar year than the annual MAPS age codes.

The one drawback to the WRP system as compared with the MAPS system is that, because molts and plumages of tropical species can be so protracted in timing, birds given the same WRP code can be many months (up to a year) apart in age. For example, a 2-month-old, early-hatched FCF bird that has just finished the preformative molt (HY in MAPS) may occur at the same time as a 11-month old, later-hatched FCF bird that has not begun the second prebasic molt yet (SY in MAPS). To overcome this problem we have continued to assign MAPS age codes as best as possible, but we apply these codes depending on whether we think the bird is more or less than six months old, using wear of the outer primaries as our primary gauge. In the above example, the 2-month old FCF would get age code 2 (HY) and the 11-month old FCF would get age code 5 (SY), and these birds are treated differently in demographic analyses involving age.

There is no reason why the WRP system can't also be applied to North American landbirds caught at MAPS stations. The four broad molt and plumage categories listed above might apply to, for instance, Sharp-shinned Hawk, Swainson's Thrush, Wrentit, and

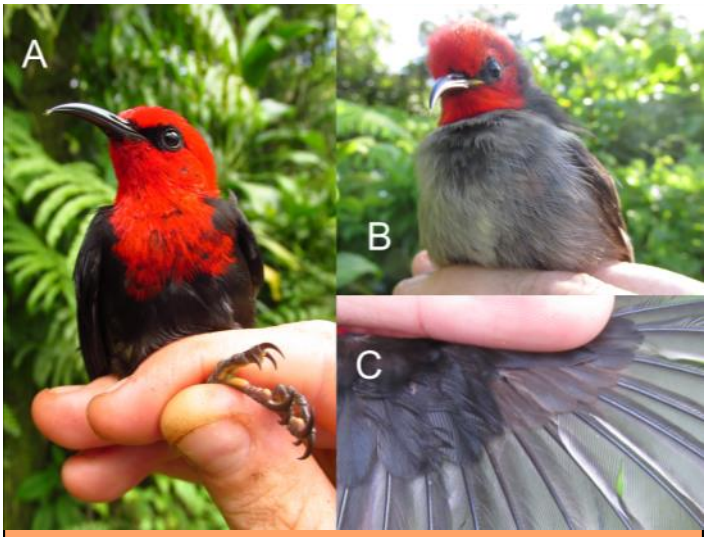

Figure 6. Cardinal Honeyeater (*Myzomela cardinalis*). A) Adult male; B) mostly-juvenal plumaged bird molting in red head feathers; C) formative-plumaged birds showing retained juvenal inner primary coverts. This species undergoes an interesting incomplete preformative molt including most or all primaries, secondaries, and rectrices, but retaining at least some juvenal inner primary coverts. We code these birds A) DCB, B) FPF, and C) FCF.

Figure 7. Polynesian (*Aplonis tabuensis*) and **Samoan** (*A. atrifusca*) **starlings**. A) Adult Polynesian Starling on Tutuila (those on Ta'u lack streaks to the underparts); B) adult male Samoan Starling; C) first-cycle Polynesian Starling showing molt limits, with most nedian coverts and one inner greater covert replaced (Samoan Starling shows similar limits after the preformative molt). These are coded: A-B) DCB and C) FCF.

Figure 8. Purple-capped Fruit-Dove (*Ptilinopus porphyraceus*). A-C) Adult male (A&C) and female (B) showing colorful plumage and basic wing feathers including deeply notched outer primary and two generations of basic secondaries; D) juvenile showing entirely green head and yellow fringing to juvenal secondary coverts. Birds in A-C receive WRP code SAB (due to mixed generations of basic secondaries) and the bird in D receives WRP code FCJ.

Downy Woodpecker, and a single additional category would be needed to incorporate prealternate molts and alternate plumages (e.g., for Yellow Warbler). The WRP system gives us more information on molt and plumage state, although this information can generally be inferred from other MAPS codes (Table on page 2). Best of all, however, use of the WRP system will help MAPS banders to think about and understand specific molt strategies to apply the codes, always a very good thing when it comes to ageing banded birds. ●

Literature Cited

Johnson, E. I., J. D. Wolfe, T. B. Ryder, and P. Pyle. 2011. Modifications to a molt-based ageing system proposed by Wolfe et al. (2010). Journal of Field Ornithology 82:421-423.

Wolfe, J.D., T.B. Ryder, and P. Pyle. 2010. Using molt cycles to categorize age in tropical birds: An integrative system. Journal of Field Ornithology 81:186-194.

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New MAPS Operators Join the Flock — Welcome!

The following operators joined the MAPS Program during 2013 or early in 2014. Most are beginning operations at a new station but others have inherited a previously operated station. We look forward to including them as part of the MAPS banding community for many years to come. A warm welcome!

Donnie Claunch Casper, WY ● **Dan Cox** Frankfort, KY ● **Albert Dalziel** Love, SK ● **Rene Hanson** Casper, WY ● **Craig Hensley** Spring Branch, TX ● **Mary Holleback** Newburg, WI ● **Timothy Kita** Nazareth, PA ● **Kevin Krasnow** JACKSON, WY ● **Jo Anna Lutmerding** Upper Marlboro, MD ● **Sarah E. Mabey** Hiram, OH ● **Carl Martin Emmaus**, PA ● **Theresa McKenzie** Richmond Hill, ON ● **Fergus Nicoll** Fitzroy Harbour, ON ● **Michelene O'Connor** Milwaukee, WI ● **Glenn Reed** Richmond Hill, ON ● **Amélie Roberto-Charron** Edmonton, AB ● **Scott Rush** Mississippi State, MS ● **Susan Smith-Pagano** Rochester, NY ● **Beth Theisen** Lima, OH ● **Gwen Tietz** Lethbridge, AB ● **Jennifer Wilcox** Trabuco Canyon, CA ●

MAPS Operator Profile:

As MAPS operators, you spend numerous hours in the field collecting data, then entering and verifying it, before passing it on to us at IBP. Through short notes, phone calls and your data, we get to know you over the years but often you don't get to know one another. We wanted to devote some space and make some connections between all of you who are so important to us and the program. In this MAPS Chat we introduce a Canadian bird observatory and some of their people and projects.

Rocky Point Bird Observatory

Ann Nightingale, Co-president & MAPS Bander
Victoria, British Columbia, Canada


Ann Nightingale

2014 marks the 20th anniversary of Rocky Point Bird Observatory's (RPBO) fall passerine migration program, and its 11th year participating in the MAPS program. In 2003, board member Paul Levesque introduced us to MAPS, and we opened two sites, one at Rocky Point and the second on the campus of Royal Roads University. The two sites were similar in many ways, but differed considerably in the amount of disturbance. The Rocky Point site was on remote military land with very limited access; the campus site was open to the public (and their dogs), and was quite close to a residential area. As expected, we found the more remote site yielded more captures and greater diversity, although some species, such as Red-breasted Sapsucker and Bewick's Wren, were more populous on campus.

RPBO is a member of the Canadian Migration Monitoring Network and our work is primarily done by volunteers, although there have been a few years in which we have raised enough funds to pay for the MAPS bander-in-charge. Rick Schortinghuis, long-

time RPBO volunteer and licensed bander assumed this position three years ago. The MAPS project has been very popular with volunteers and in 2012, Jo Motek took on the responsibility of administrative coordination. The program has provided training opportunities for hundreds of participants, from tweens to retirees, many of whom have continued to support our other projects. We generally have more volunteers on hand on MAPS days than on migration days because we need to return the birds to their capture sites. The new helpers are especially happy to get to release the birds. An average day at one of our sites yields about 30 birds, which may not seem like a lot, but with the extra data required over and above what we collect


Rick Shortinghuis

IBP Bird Banding Classes

Each year IBP teaches several bander training classes for both beginning and advanced banders. There are two courses currently scheduled for 2014.

Summer 2014

Two banding classes will be held at the Wolf Ridge Environmental Learning Center in northeastern Minnesota this summer. The advanced class will be held June 16 - 20, 2014 and the beginner will be held June 22 - 29, 2014. Please contact the class host, Peter Harris or check out the banding class page at Wolf Ridge for more information about the classes and information on how to register.

IBP instructors are still available for 2014 if you would like to host a class at your facility. See our training web page for more information.

during migration, can seem quite busy! Needless to say, the 80-bird days really keep us on our toes.

One of the biggest challenges of conducting research on someone else's land is that researchers rarely control access or use of the property. As a result, we've dealt with habitat changes (i.e. the removal of invasive species), problematic access restrictions, vandalism, and inevitably, the need to changes sites. After five years of MAPS, our Royal Roads University site was discontinued, and two years later, we were denied access to the military land during the MAPS season. We were grateful to Capital Regional District Parks for permission to conduct MAPS at a park near to the Rocky Point location, and three years ago, added Madrona Farm, a heritage organic agricultural property to our sites. Unfortunately, we may not be able to continue at the farm in 2014. As we look for a new MAPS site, we will be especially mindful of the potential of the site for long-term monitoring. On the bright side, these too-frequent changes have helped us hone our habitat structure assessment skills!


Red-winged Blackbird @ RPBO

Species most frequently encountered during MAPS on southern Vancouver Island include, Chestnut-backed Chickadee, American Robin, Song Sparrow, Bewick's Wren, Rufous Hummingbird, Orange-crowned Warbler, Pacific-slope Flycatcher, White-crowned Sparrow, and Wilson's Warbler. We've also turned up our share of rarities to this area, including the region's second ever Chestnut-sided Warbler, and fourth ever Black and White Warbler.

One of the aspects of MAPS that inspires our field crew is the chance of recapturing "our" birds. Of the approximately 5000 birds we've banded in this program, more than 600 have been recaptured, and many have been from previous years. However, our most spectacular encounter wasn't physically recaptured at all! Local photographers have been trying to capture band numbers with their very long lenses, and in December 2013, Cathy O'Connor was able to confirm a resighting of a Red-winged Blackbird more than nine years after it was banded only a few kilometers away.

In addition to fall migration monitoring and MAPS, RPBO also conducts Northern Saw-whet Owl banding on Vancouver Island in the fall, and is a partner in a nestbox program in Oregon in the spring. We have an extensive hummingbird banding project throughout British Columbia, with collaborators beyond our provincial borders, and in 2013 began a geolocator project studying wintering Fox Sparrows.●

The Importance of Mentoring Volunteers

Jo Motek
RPBO's MAPS Coordinator and Board Member


Jo Motek

When I began as a volunteer with RPBO in 2010, I didn't know a Wilson's Warbler from a Fox Sparrow. I did know that I wanted to spend my retirement outdoors as much as possible, and looked for opportunities to participate in Citizen Science. My husband worked with Ann Nightingale, and she invited us both to visit the Fall Migration site at Rocky Point. I was awestruck by the diversity and numbers of birds that were gathered there, and impressed that they had been studied at this site for almost twenty years. After that very first day we were hooked, and felt very privileged to have an opportunity to participate.

It didn't take long to realize how much I lacked in skill and knowledge compared to others working at the station and I began to have doubts that I belonged there. Ann took us both under her "wing", helping to build confidence as extractors and, more importantly, openly sharing all aspects of the program and processes, so we began to get a sense of the big picture and to feel a part of the continuum and future of the organization. Inspired by Ann to do more, my husband took on updating the website and joined the RPBO board. And in 2012 when the call went out for a MAPS coordinator, I gladly volunteered for the role. Now that I'm no longer the greenhorn, I make it a priority to share my skill and knowledge with the newer volunteers and to make them feel welcome and valued.

I've learned while working with RPBO as an inexperienced volunteer that it's easy to become discouraged while you're learning the ropes, and that a mentor can mean the difference between giving up and becoming a committed member of the organization. ●

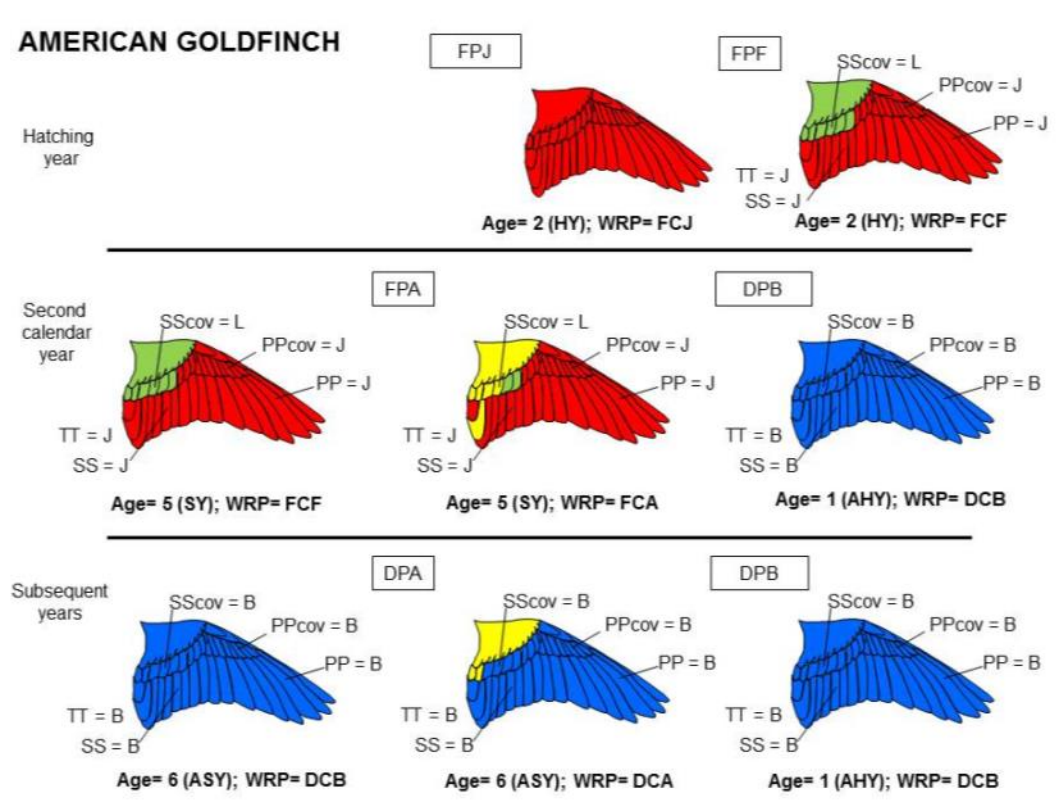
Molt Limits and Plumage Fields: Applying WRP Codes to a North American Example

Danielle Kaschube, MAPS Coordinator

I have a love/hate relationship with American Goldfinches (AMGO). They are cheery little birds that I enjoy having at the feeders in my backyard for most of the year. However, I always feel a small wave of dread when I see one in the net or one come out of a bird bag. When I age a bird I like to have an unambiguous age I can explain, but AMGOs are very subtle and unambiguous ageing is rare. I hope the hints below will help make ageing AMGOs a little easier.

I also wanted to take this opportunity to apply the WRP codes on a species of North American migrant that many of us capture in our nets. ●

WRP Codes Used for American Goldfinch Along with MAPS Age Code.		
WRP	**Plumage or Molt Stage**	**Corresponding AGE Code**
FCJ	First Cycle, Juvenal plumage	Age=2
FPF	First cycle, undergoing PreFormative molt	Age=2 (or 5)
FCF	First Cycle, Formative plumage	Age=2 or 5
FPA	First cycle, undergoing PreAlternate molt	Age=5
FCA	First Cycle, Alternate plumage	Age=5
DPB	Definitive cycle undergoing PreBasic molt	Age=5 or 1
DCB	Definitive Cycle Basic plumage	Age=1 or 6
DPA	Definitive cycle, undergoing PreAlternate molt	Age=6
DCA	Definitive Cycle, Alternate plumage	Age=6 or 1



Click on image to link to larger PDF image


Female AMGO WRP=FCA


Female AMGO WRP=DCA

A couple of hints for ageing:

1) The carpal covert, if retained, on HY and SY birds is usually buff tipped. After the second prebasic molt this covert is usually untipped (or sometimes white tipped).
2) The contrast between replaced and retained secondary and/or primary coverts can be very subtle. Look carefully and in good light.
3) The shape and amount of white on the rectrices is very helpful.

Other sites with AMGO photos and hints:

Powdermill Nature Reserve's: "In hand Ageing and Sexing Techniques: Molt Pattern Shortcuts and Summaries" Power-Point presentation.

McGill Bird Observatory Photo Library: great photos and ageing hints for many species