

## TORTUGAS TERN BANDING RECORDS BROKEN

(A follow-up to the fine article by James Richardson, "A Tern Banding Project in the Dry Tortugas" (EBBA News 27(1):5-11).

16,000 Sooty Tern chicks and 4,500 Sooty adults were banded in late June on Bush Key, Dry Tortugas, to establish a new record for terns banded on one expedition to these remote islands 70 miles west of Key West. The banding of Sooty and Noddy Terns is a 15 year project cooperative between the National Park Service, the Florida Audubon Society, and the Florida State Museum. There are two trips each year, one in May to band adults, one in June to band both adults and young. Fourteen people participated on invitation in each trip in 1964.

This tern nesting colony is nationally and internationally known as it is the only one for the Sooty and Brown Noddy Terns in North America. As a part of the Fort Jefferson National Monument it is provided adequate protection and supervision by the National Park Service. Banding was started in a limited way in 1936 by Jack C. Russell of Orlando, then a student at the University of Florida and a summer Parks' employee. It was continued on a larger scale from 1937 to 1941 by Florida Audubon personnel, who banded some 13,000 birds during that period. War and other activities brought discontinuance of this work until 1959.

Much that has been unknown about these terns, especially the Sooty Tern, it is anticipated will gradually be revealed as a result of the banding. New longevity records for the species have already been established with the capture of more than 100 birds banded between 1937 and 1940. These, the band numbers disclose, were from 18 to 26 years of age when recaptured. Practically all had been banded as chicks.

The colony, which at one time had declined to a few thousand birds, now harbors at least 100,000 Sooty Terns and more than 2,000 Noddies. The birds survived this year's oil spill from a beached vessel thanks to quick and effective measures of the Park Service.

It is still not known where the birds spend the winter. They disappear in September to appear over the Tortugas again late in the winter, or early spring. Meanwhile banded birds may have been carried by storm to Long Island, N.Y., to Massachusetts, Virginia, or Texas. Others have been found in the West Indies, in Central America and South America. Half a dozen have been picked up in four countries in Africa. Gradually these wanderings are being charted. The background of the tern colony and its population and problems concerning it over the years appeared this year in booklet form, "The Tern of the Dry Tortugas," by William B. Robertson, Jr., published by the Florida State Museum.

EBBA members included in the June tern banding project were William B. Robertson, Dr. Oliver L. Austin, Jr., and R. Connor Tedards.

## A GUIDE TO THE

## AGEING AND SEXING OF WOOD WARBLERS (PARULIDAE) IN FALL

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The purpose of this guide is to encourage banders to ascertain the age and sex of warblers that they band during fall migration. A great deal still remains to be learned about characters for ageing and sexing these birds. It is hoped that at some future date it will be possible to determine the age and sex of every warbler banded. In the meantime, the present summary can be used: (1) to show at a glance which species can be aged and sexed from characters presently available; (2) as a quick reference to detailed descriptions and colored illustrations of each species; (3) to determine the age and/or sex of those species for which this information is known; and (4) for verification of wing measurements and body weights of many species.

Knowledge of the age and sex of banded birds greatly increases the value of banding records, while large scale banding of unaged and unsexed birds contributes relatively little information. On the other hand, erroneous reporting of age or sex makes banding records utterly worthless. For this reason, it is extremely important that ageing and sexing be conducted seriously and accurately.

Reference books and field guides for the identification of birds have been written primarily for species identification, not for the determination of age and sex. It is risky to use colored plates in themselves for the ageing and sexing of birds because in almost all cases the artist does not show all possible plumages, but selects certain ones to be illustrated. One must read detailed descriptions of molts and plumages to learn the distinguishing characters of the various age and sex groups as well as the months of the year when the various plumages are worn.

All field guides have some errors in labeling of plumages and the accuracy of colors is frequently lost in the printing, so banders are urged to consult several references and to read descriptions rather than simply matching their bird to a single colored picture and recording on their forms the caption on that picture. Even museum skins frequently are mislabeled and this greatly complicates the task of determining reliable age and sex characters. Comparatively few museum labels distinguish between adult and immature birds, although state of ossification of the skull could have been used in all cases for ageing specimens of fall warblers. Specimens of known age and known sex are gradually becoming available, especially through efforts of people who salvage specimens from ceilometer and television tower casualties. From these specimens we hope to determine



the most diagnostic characters for ageing and sexing each species as well as the normal amount of variation in these characters.

The following summary is based on examination of museum skins while referring to several texts, principally Chapman (1907), Roberts (1932), and Ridgway (1902). Many characters that are mentioned in these books have not been included in the present summary because they refer to relative differences that overlap between the various age and sex groups. For example, the brilliant yellow of the adult male Pine Warbler is completely unlike the drab immature female; but plumage characters of the adult male overlap with those of the immature male and adult female, and characters of these overlap with the immature female.

Banders can contribute significantly to improving our knowledge of characters for ageing and sexing birds. They have the unique opportunity to capture returns of known age and also to recapture banded birds during the progress of their molts. Also, by watching for changes in eye color and mouth color they have an opportunity to discover characters that cannot be seen on museum skins.

I wish to thank James Baird for critically reading this manuscript and for contributing information on several species.

#### How to Use this Summary

First, become familiar with the contents of this summary before you start your fall netting or trapping. Obtain reference books. If possible, examine specimens so you will recognize the differences that are described.

Second, be sure your identification to species is correct, as this is not a key to species. The "Quick Reference List" gives page references to illustrations and to descriptions in several of the books that are best for verifying species identification. If you have any question as to species identification it would be desirable to check the table of wing measurements and perhaps also the body weights to be sure your bird falls within the measurements of its species.

Third, check the "Quick Reference List" to see whether the Species Summaries that follow have any information that will be helpful in ageing or sexing a particular species.

Fourth, determine if possible whether your bird is an adult with a completely ossified skull or an immature with an incompletely ossified skull (see Norris, Bird-Banding 32: 55-57, Jan. 1961). If you are not familiar with the "skulling" technique, try it first with warblers that can be aged by plumage characters. Once you have mastered the art of skull examination you should be able to age all fall warblers from this character alone.

Fifth, whether or not you have been able to age your bird by "skulling," refer next to the Species Summaries for age and sex characters. If the "Quick Reference List" indicates that the bird in question can be aged and sexed and if you are still uncertain as to the age or sex of your bird, consult the references.

Sixth, watch for additional distinguishing characters and record these to improve the summaries for your own use. Also, please be sure to report additions and corrections so that other banders can benefit from the results of your experience.

#### Quick Reference List (Table 1)

This list contains the AOU numbers and the names of all species of warblers that occur regularly in the United States and/or Canada. The species are listed in 1957 Check-List order. The first species in each genus is capitalized. Closely related or similar species are grouped together by means of horizontal lines to facilitate finding a given species on the list.

An "X" in the "No info" column means that there is no species summary for that species in this guide. These birds may be aged by checking skull ossification and when the age is known it may be possible in some cases to sex those individuals with extreme measurements or extreme plumage characters. It may also be possible to sex some individuals by direct comparison with correctly labeled museum skins.

A "P" in the "Sex all birds" or "Age all birds" column means that plumage characters for sexing or ageing are given in the species summaries. Because of individual variation in the birds as well as in the experience of banders there may be some individuals that cannot be aged or sexed with certainty by plumage characters. The importance of checking skins and references and working with experienced banders cannot be overemphasized.

An "S" in the "Age all birds" column means that ageing must be done by skull examination. Even those birds marked "P" should have their age verified by skull examination if possible.

Under "Can do by plumage" are listed certain birds that can be recognized by plumage. These may or may not be in addition to birds checked in other columns.

Page references to colored illustrations and to plumage descriptions in five standard texts are listed in the right half of Table 1. See the first section of References (page 215) for the titles of these books by Chapman, Forbush, Peterson, Roberts, and Griscom.



Table 1. Quick Reference List of Fall Warblers

AOU	Species	No info	Sex all birds	Age all birds	Can do by plumage	Page numbers in standard references								
						Illustrations				Descriptions				
						Cha	For	Pet	Rob	Gri	Cha	For	Pet	Rob
636	BLACK-AND-WHITE		P	S	AM,IM	38	196	186	65	32	38	197	184	677
637	PROTHONOTARY		P	S	AM	50	196	195	65	25	54	200	185	668
638	SWAINSON'S	X		S		64		183		37	44		185	
639	WORM-EATING			P		64	196	183		32	48	203	185	
642	GOLDEN-WINGED		P	S	AM,IM	72	206	187	65	52	60	207	188	677
641	Blue-winged			S	IF	72	206	187	65	52	65	205	188	666
640	Bachman's		P	P		64		187		37	77		189	
647	Tennessee			P		86	206	195	66	64	83	223	189	684
646	Orange-crowned	X		S		86	206	195	66	64	86	221	190	669
645	Nashville			S	AM	86	206	195	66	64	92	218	191	669
644	Virginia's	X		S		98		262W		57	98		249W	
647.1	Colima	X		S				262W		57			249W	
643	Lucy's	X		S		98		262W		57	100		250W	
648	PARULA		P	S		104	196	194	65	69	103	225	191	671
649	Olive-backed	X		S		104		262W		84	109		250W	
651	OLIVE			S	AM	98		262W		89	110		251W	
652	YELLOW			S	AM	Fr	228	194	67	96	113	230	191	672
657	Magnolia			S	AM,IF	126	242	194	67	101	121	242	192	674
650	Cape May		P	S	AM,IM	214	228	194	66	116	128	228	192	675
654	Black-thr. Blue		P	P		112	228	195	67	121	133	233	193	676
655	Myrtle			S	AM,IF	118	228	194	67	128	141	237	193	680
656	Audubon's	X		S		118	228	247W		128	147	241	253W	
665	Black-thr. Gray			S	AM,IF	152	254	247W		133	151	262	253W	
668	Townsend's		P	P		170		247W		148	154	267	253W	
667	Black-thr. Green			S	AM	162	254	194	68	160	157	264	196	678
666	Golden-cheeked			S		162		247W		133	162	263	254W	
669	Hermit			S	AM	170		247W		148	167		255W	
658	Cerulean			P	AM	112	242	183	68	153	170	246	196	681
662	Blackburnian		P	P		50	254	194	68	153	175	256	197	673
663	Yellow-throated	X		S		152		186		69	180	259	197	
664	Grace's	X		S		152		247W		89	185		255W	
659	Chestnut-sided			S		138	242	194	69	180	187	248	200	679
660	Bay-breasted			S	AM	138	242	194	69	165	192	251	200	675
661	Blackpoll			S	IM,AF	38	254	194	69	165	196	254	201	680
671	Pine			S		296	268	194	68	160	201	267	201	667
670	Kirtland's	X		S		126		186		185	206	267	202	
673	Prairie		P	P		Fr	268	194		185	209	273	203	
672	Palm	X		S		214	268	194	72	192	213	270	203	671
674	OVENBIRD			P		226	268	183	72	197	219	276	204	682
675	No. Waterthrush			P		226	268	183	70	197	230	280	204	683
676	La. Waterthrush			P		226	268	183	70	197	226	284	205	682
677	KENTUCKY			P	AM	236	286	187		212	235	286	205	
678	Connecticut			P	AM	236	286	195	71	217	241	289	205	678
679	Mourning		P	P		244	286	195	71	217	244	292	206	679
680	MacGillivray's		P	P		244		262W		217	249		259W	
681	YELLOW-THROAT		P	P		252	286	195	71	224	251	294	206	669
683	YELLOW-ER. CHAT	X		S		264	286	183	70	229	264	298	207	671
690	RED-FACED	X		S		296		262W		249	285		260W	
684	HOODED		P	S		264	302	195		212	269	302	207	
685	Milson's		P	S		280	302	195	70	244	274	305	207	668
686	Canada			S	AM	280	302	195	70	244	280	307	208	674
687	AM. REDSTART		P	S	AM,IM	288	302	183	72	256	287	309	208	676
688	Painted Redstart	X		S		288		262W		249	295		261W	

Species SummariesBLACK-AND-WHITE WARBLER

Ad. Male. Cheek black. Sides distinctly streaked with black. Under-tail coverts not buffy.

Im. Male. Cheek pale gray. Sides distinctly streaked with black. Undertail coverts not buffy.

Female. Cheek buffy or pale gray. Sides with blurry streaks. Undertail coverts buffy. Female is difficult to age except by skull examination, but see Bird-Banding Manual, page G-A. O. U. 636 (Baird) for differences between ad. female and im. female.

PROTHONOTARY WARBLER

Ad. Male. Brilliant yellow of head contrasts sharply with greenish back. Skull ossified.

Ad. Female. No sharp contrast between head and back. Skull ossified.  
Im. Like adult female but skull not ossified.

WORM-EATING WARBLER

Ad. Tertiaries uniform color throughout. Skull ossified.

Im. Tertiaries lightly tipped with rusty. Skull not ossified.

GOLDEN-WINGED WARBLER

Ad. Male. Throat and chin black.

Im. Male. Throat black or black tipped with grayish, but chin white, connecting the white stripes on the sides of the throat.

Female. Throat gray; determine age by skull examination.

BLUE-WINGED WARBLER

Ad. Male. Forehead and much of crown yellow, contrasting with olive-green hindneck and back. Eye-stripe black. Skull ossified. Not always separable from ad. female.

Im. Male. Forehead yellow. Eye-stripe black or dusky. Skull not ossified.

Ad. Female. Forehead yellow. Eye-stripe black or dusky. Skull ossified. Birds with ossified skulls and with dusky eye-stripes can safely be called adult females.

Im. Female. Forehead greenish like back; patch of diffused yellow on crown. Dusky eye-stripe. Skull not ossified.

BACHMAN'S WARBLER

Ad. Male. Breast black, feathers tipped with yellow or grayish. Crown feathers black, broadly tipped with gray.

Im. Male. Breast as in adult male. No black on crown.

Ad. Female. Dusky wash (rarely black patch) on upper breast, yellow on lower breast. Belly pale buffy.

Im. Female. Like ad. female but lower breast and upper belly dusky yellowish; lower belly brownish. Loes just tinged with yellow.



TENNESSEE WARBLER

Ad. Male. Head gray or brownish. Wing 64 mm. or more. Skull ossified.

Im. Male. Head bright green, back very green, wing 64 mm. or more.

Skull not ossified.

Ad. Female. Head gray or brownish. Wing 62 mm. or less. Skull ossified.

Im. Female. Head bright green, back very green, wing 61 mm. or less.

Skull not ossified. (Goodpasture)

NASHVILLE WARBLER

Ad. Male. Much reddish-brown on crown, not completely veiled by gray tips of crown feathers. White eye-ring, bright yellow underparts. Gray on sides of head. Skull ossified.

Im. Male. Reddish-brown crown patch small but distinct; usually completely veiled. Eye-ring, sides of head, and underparts much as in ad. male. Skull not ossified.

Ad. Female. Crown with little or no reddish-brown. Plumage duller than ad. male. Skull ossified.

Im. Female. No concealed reddish-brown on crown. Skull not ossified. (Tordoff and Mengel).

OLIVE WARBLER

Ad. Male. Head, neck, and breast orange-brown. Skull ossified.

Ad. Female. Head, neck and breast dull olive-yellow. Skull ossified.

Im. Like ad. female but skull not ossified.

PARULA WARBLER

Ad. Male. Distinct dark breast band present. Skull ossified.

Im. Male. Dark breast band present. Skull not ossified.

Ad. Female. Breast yellow with very little if any indication of dark band. Skull ossified.

Im. Female. Breast yellow with very little if any indication of dark band. Skull not ossified.

YELLOW WARBLER.

Ad. Male. Birds with appreciable reddish-brown streaking below and ossified skulls can safely be called ad. males. Some ad. males lack the streaking, so birds with little or no streaking cannot be sexed.

Im. Aged only by incomplete ossification.

MAGNOLIA WARBLER

Ad. Male. Upper tail coverts black. Cap and nape gray. Nearly all back feathers with large black central spots (nearly concealed). Prominent black streaks on sides of breast and sides of belly (streaks wider than width of tarsus). Skull ossified.

Im. Male. Similar to ad. female and best told from it by unossified skull. Upper tail coverts black, broadly tipped with green but with much black showing. Cap and nape brownish.

Ad. Female. Upper tail coverts black, broadly tipped with gray but with much black showing. Cap and nape gray with slight brown wash.

Feathers of upper back without black centers. Feathers of lower back (just anterior to yellow rump) with large black central spots. Narrow black streaks (narrower than width of tarsus) restricted mostly to sides of lower belly. Green of back extends up to neck where it contrasts with brownish-gray head. Skull ossified.

Im. Female. Upper tail coverts with dusky or black centers, broadly tipped with gray or greenish so the black is mostly concealed. Cap and nape brownish. Black of back feathers lacking or nearly so. Indistinct streaks on sides. Skull not ossified.

CAPE MAY WARBLER

Ad. Male. Crown feathers black, tipped with gray. Some chestnut on ear patches. Single broad white wing-bar. Skull ossified.

Im. Male. Crown olive-gray. Ear patches mostly olive-gray but generally with some yellow. Single broad white wing-bar. Breast yellow with black streaks. Skull not ossified.

Ad. Female. Little yellow on breast. Head grayish-olive. Two narrow dusky wing-bars. Skull ossified.

Im. Female. Little if any yellow on breast. Head grayish-olive. Two narrow dusky wing-bars. Skull not ossified.

BLACK-THROATED BLUE WARBLER

Ad. Male. Blue back and black throat. Alula covert edged with blue. Skull ossified.

Im. Male. Like ad. male, but alula covert edged with greenish. Chin often (perhaps always) with some white feathers. Skull not ossified.

Ad. Female. Dusky olive-green above. Underparts pale buffy yellowish. Facial mask gray, eye-stripe whitish, forehead and bend of wing bluish, undertail coverts cream. Skull ossified.

Im. Female. Like ad. female but facial mask dark olive, eye-stripe buffy, forehead greenish, no blue at bend of wing, undertail coverts yellowish. Skull not ossified.

MYRTLE WARBLER

Ad. Male. Forehead generally bluish (feathers black in center with edges mostly bluish gray). Yellow spots at side of breast. Lower back (just anterior to yellow on rump) bluish gray. Upper tail coverts black with blue-gray edging. Upper wing bar whitish. Skull ossified.

Im. Male. Forehead brown. Yellow spots at side of breast. Streaking on back and underparts distinct. Upper tail coverts black with blue-gray edges. Upper wing bar whitish. Skull not ossified.

Ad. Female. Forehead brown. Yellow spots at side of breast. Streaking on back and underparts distinct. Upper tail coverts with reduced black center and with brownish-gray edges. Upper wing bar brownish white. Skull ossified.

Im. Female. Forehead brown. Spot at side of breast small and pale orange-yellow. Streaking on back, breast, and sides indistinct (blurred). Upper tail coverts brown or with black center reduced or absent. Upper wing bar brownish white. Skull not ossified.



BLACK-THROATED GRAY WARBLER

Ad. Male. Black throat, chin, cheek and crown. Back gray, faintly tinged with brown, sparsely streaked with black. Skull ossified.

Im. Male. Chin white. Throat black, mottled with white. No white on secondaries. Black crown largely concealed by grayish-brown edges. Back feathers with broad black centers. Cheek black, gray, or a mixture of black and gray. Skull not ossified.

Ad. Female. Chin white. Throat black, mottled with white. No white on secondaries. Black crown largely concealed by grayish-brown edges. Back feathers with broad black centers. Cheek black, gray, or a mixture of black and gray. Skull ossified.

Im. Female. Cheek grayish-brown. Crown feathers with narrow central black streak, concealed by grayish-brown edges. Sides with narrower streaks. Back strongly tinged with brown and with little or no black streaking. Skull not ossified.

TOWNSEND'S WARBLER

Ad. Male. Crown black, largely concealed by olive-green tips. Cheeks black with narrow greenish tips. Broad white wing-bars. Chin, throat and upper breast feathers black, edged with yellow.

Im. Male. Cheeks and crown olive. Chin, throat and breast mostly yellow. Narrow white wing-bars.

Ad. Female. Cheek olive. Crown black, nearly concealed by broad olive edges. Chin and breast bright yellow. Throat mottled black and yellow. Broad white wing-bars.

Im. Female. Crown and cheek olive. Dull yellow wash on chin and breast. Throat dusky. Two narrow wing-bars.

BLACK-THROATED GREEN WARBLER

Ad. Male. Throat and chin black, tipped with white or yellowish. Skull ossified.

Ad. Female. Chin and upper throat mostly yellow or whitish. Skull ossified.

Im. Chin and upper throat mostly yellow or whitish. Skull not ossified.

HERMIT WARBLER

Ad. Male. Throat black, veiled with whitish. Skull ossified.

Ad. Female. Throat buffy. Skull ossified.

Im. Throat buffy. Skull not ossified.

CERULEAN WARBLER

Ad. Male. Crown bright blue. Partial or complete breast band. Sides streaked. Much black on upper tail coverts. Skull ossified.

Ad. Female. No breast band. Greenish back, unstreaked. No streaks on sides. No black on upper tail coverts. Yellow wash on belly. Skull ossified.

Im. No trace of breast band. Suggestion of streaked sides. Black on upper tail coverts. Skull not ossified.

BLACKBURNIAN WARBLER

Ad. Male. Prominent black streaks on sides (streaks wider than width of tarsus). Crown and hindneck black, feathers narrowly (narrower than width of tarsus) margined with yellow-brown. Yellow spot at center of crown.

Im. Male. Sides with distinct narrow streaks (narrower than tarsus). Crown feathers with black centers, broadly margined (wider than tarsus) with yellow-brown. Yellow spot in center of crown. Shoulders dull black.

Ad. Female. Sides with indistinct (blurry) streaking. Crown olive-brown; dull black, if present on head feathers, restricted to tiny spots near shafts. Crown spot pale yellow, nearly concealed. Shoulder gray. Basal quarter of outer web of outer tail feather white.

Im. Female. Like ad. female, but shoulder olive-brown. Basal quarter of outer web of outer tail feather dark. Plumage variable. Possible some individuals cannot be aged by these characters. Check skull ossification to be sure.

CHESTNUT-SIDED WARBLER

Ad. Male. Considerable chestnut on flanks. Skull ossified. Not safely separable from ad. female.

Im. Male. Chestnut on flanks very restricted or lacking. Skull not ossified. Those individuals with trace of chestnut on sides and unossified skulls can safely be aged and sexed.

Ad. Female. Chestnut on sides restricted or lacking. Safely told only when chestnut is lacking. Skull ossified.

Im. Female. Chestnut always lacking. Skull not ossified. Not safely separable from some im. males.

BAY-BREASTED WARBLER

Ad. Male. Patches of chestnut on crown, breast and sides. Secondaries edged with gray or dull white. Skull ossified.

Ad. Female. No chestnut in crown. Greenish cast to edges of secondaries. Generally some chestnut on flanks but absence of chestnut is not diagnostic. Skull ossified.

Im. No chestnut in crown. Greenish cast to edges of secondaries. Male generally has chestnut tinge on flanks, female generally does not, but this is not presently considered a safe character for sexing. Males generally have faint streaking on the crown where females generally have none; males have more distinct streaking on back than females. Skull not ossified. Immature Bay-breasts should not be sexed unless all plumage characters are present and measurements are extreme.

BLACKPOLL WARBLER

Ad. Male. In most ad. males the alula covert is edged with white or clear gray. Primary coverts and greater secondary coverts dark sooty. Rump and upper tail coverts with dark centers to most of the feathers, forming streaks which are wider and sharper than those on the lower back. Some females have the same character so sexing should not be attempted unless wing chord measures 75 mm. or above. Skull ossified.



Im. Male. Alula covert always (?) edged with green. Primary coverts brownish, contrasting with dark sooty greater secondary coverts and alula. Rump and upper tail coverts with dark centers to most feathers, forming streaks which are wider and sharper than those on the lower back. Skull not ossified. Birds with these characters are believed safely ageable and sexable as im. males.

Ad. Female. Primary coverts and greater secondary coverts dark sooty. Rump unstreaked and no more than six blurred or hair-like streaks on the upper tail coverts. Skull ossified. Birds with the above characters are believed ageable and sexable.

Im. Female. Primary coverts brownish, contrasting with dark sooty greater secondary coverts and alula. Rump unstreaked and no more than six blurred or hair-like streaks on the upper tail coverts. Skull not ossified. Since some im. males have the characters described for im. female, it is not safe to sex im. females unless the wing chord is 66 mm. or less. (Baird)

#### PINE WARBLER

Adults. Skull ossified. Birds with bright yellow breasts can safely be sexed as males, those with very dull breasts as females. Birds in intermediate plumage should not be sexed.

Im. Skull not ossified. Birds with bright yellow breasts are safely males, those with very little or no yellow are females. Except for birds in extreme plumage, sexing should not be attempted.

#### PRAIRIE WARBLER

Ad. Male. Face yellow with black markings. Prominent reddish-chestnut spots on back.

Im. Male. Face gray or white; with concealed chestnut spots on back.

Ad. Female. Face yellow with olive markings. Back spots absent or small and inconspicuous.

Im. Female. Face gray or white. Back without concealed spots. Additional details compiled by Val Nolan are available on request from the Bird-Banding Office.

#### OVENBIRD

Ad. Tertials without rusty tips. Skull ossified.

Im. Tertials with rusty tips. Skull not ossified.

#### NORTHERN WATERTHRUSH

Ad. Tertials without narrow buffy or rusty tips. One or more outer tail feathers on each side with narrow white tips on inner web (best seen from above, against dark background); white tips more conspicuous in males than in females, but not a safe character for sexing. Skull ossified.

Im. Tertials with narrow buffy or rusty tips. White generally lacking from tips of outer tail feathers. See Bird-Banding Manual, p.G-A.O.U. 675 (Eaton).

#### LOUISIANA WATERTHRUSH

Ad. Same characters as Northern Waterthrush.

Im. Same characters as Northern Waterthrush. See Bird-Banding Manual, p. G-A. O. U. 676 (Eaton).

#### KENTUCKY WARBLER

Ad. Male. Crown feathers black, broadly tipped with gray; only a faint tinge of brown in feather tips. Velvety black stripe on sides of neck extending down nearly to bend of wing. Skull ossified.

Im. Male. Crown feathers black, broadly tipped with olive-brown. Small dull black area below eye. Some birds may be indistinguishable from im. female. Skull not ossified.

Ad. Female. Crown like ad. male, but duller black. Area below eye gray-black with narrow greenish feather edgings. Skull ossified.

Im. Female. Crown olive-brown. Facial line olive (no black). Some birds may be indistinguishable from im. male. Skull not ossified.

#### CONNECTICUT WARBLER

Ad. Male. Throat and upper breast slaty gray, feathers faintly tipped with brownish. Eye-ring white.

Ad. Female. Upper breast olive-brown. Paler on throat. Eye-ring white.

Im. Upper breast olive-brown, paler on throat. Eye-ring buffy. Sexes of im. birds hard to determine. Wing measurements in table 2 may be distorted by inclusion of birds that were sexed incorrectly. Measurements of birds sexed internally are especially needed for this species. See Bird-Banding Manual, p. G-A.O.U. 678 (Blake and Baird).

#### MOURNING WARBLER

Ad. Male. Breast black, throat gray. No eye-ring.

Im. Male. Breast and throat yellowish with grayish feathers laterally. Eye-ring incomplete, narrow, whitish.

Ad. Female. Breast and throat gray-brown. Eye-ring incomplete, narrow whitish.

Im. Female. Breast and throat yellowish, breast dusky-olive laterally. Eye-ring incomplete, yellowish or buffy. See Banding Manual, p. G-A.O.U. 679 (Blake and Baird).

#### MACGILLIVRAY'S WARBLER

Ad. Male. Crown bluish-slate, tipped with brownish. Throat mottled with black, gray and white. Lores black. Broken eye-ring white.

Im. Male. Crown olive-brown without slate. Lores grayish or brownish. Throat and breast brownish-gray or yellowish-gray. Eye ring?

Ad. Female. Crown and lores gray. Throat pale gray. Broken eye-ring white.

Im. Female. Crown olive-brown without slate. Lores pale buffy-gray. Broken eye-ring tinged with buff. Throat and breast buff with little or no gray.



YELLOWTHROAT

Ad. Male. Black mask present with pale gray feather edgings. Forehead black, margined above with gray. Lores black. Throat bright yellow. Skull ossified.

Im. Male. At least traces of black mask unless bird is still in juvenal plumage. Forehead brown or rusty. Lores brownish or blackish with faint yellow tinge. Throat bright yellow. Skull not ossified.

Ad. Female. No trace of black mask. Throat yellow. Skull ossified.

Im. Female. No trace of black mask. Throat orange-yellow. Skull not ossified.

HOODED WARBLER

Ad. Male. Complete black hood. Skull ossified.

Im. Male. Complete black hood. Skull not ossified.

Ad. Female. Black hood absent or incomplete. Skull ossified.

Im. Female. Black hood absent or incomplete. Skull not ossified.

WILSON'S WARBLER

Ad. Male. Complete black cap (more than 11 mm. front to back), with or without narrow greenish feather edgings. Skull ossified.

Im. Male. Like ad. male but generally with narrow greenish feather edgings on black cap. Skull not ossified.

Ad. Female. Black cap lacking or concealed or restricted to about 8 mm. or less. Possibly a few individuals have a complete black cap; any with full black cap and wing under 52 mm. should be questioned. Skull ossified.

Im. Female. Like ad. female but skull not ossified.

CANADA WARBLER

Ad. Male. Distinct black speckles on forehead and crown. Very prominent black necklace (spots narrowly tipped with yellow). Skull ossified.

Ad. Female. Forehead greenish. Necklace blurred. Skull ossified.

Im. Forehead greenish. Necklace blurred, sometimes very indistinct. Skull not ossified.

AMERICAN REDSTART

Ad. Male. Black head and back; patches on wings, tail and sides of breast salmon-red as in spring. Skull ossified.

Im. Male. Patches at side of breast generally orange-yellow, contrasting with yellow underwing. Some individuals have rusty cast on back. Skull not ossified.

Ad. Female. Breast patches lemon yellow (more green than orange), matching yellow underwing. Skull ossified.

Im. Female. Breast patches lemon yellow (more green than orange), matching yellow underwing. Skull not ossified.

Some Preliminary Wing Lengths and Body Weights

The next three pages contain a summary of some of the wing length and body weight data gathered through Operation Recovery. The wing chord measurements are in millimeters, the body weights in grams. Except when otherwise specified only September birds have been used for this table. When large samples were available, data from only one or two eastern stations (Ocean City, Md., Block Island and Newport, R. I., and/or Nantucket, Mass.) were used. When samples were small, data from all stations were used. Much larger samples of wing lengths and weights for many species should be available in a few years thanks to the recent increase in use of the "skulling" method.

The Nashville and Mourning Warbler weights were taken from Tordoff and Mengel (1956). Wing lengths of Tennessee Warblers were taken from Goodpasture (1963). Wing chord measurements and weights of Blackpoll Warblers were supplied by James Baird. Wing measurements of adult Louisiana Waterthrushes and Kentucky Warblers were taken during May, June, and July at the Patuxent Wildlife Research Center in Maryland, as too few September measurements were available.

Table 2 shows for each sample of known age/or sex the number of birds measured (n), the average (mean) wing length and body weight ( $\bar{x}$ ), the standard deviation (S.D.), and the computed minimum and maximum limits within which 19 out of 20 birds would be expected to occur.



Table 2. Wing Chords and Body Weights

Species	Age	Sex	Wing				Weight			
			n	x	S.D.	min. - max.	n	x	S.D.	min. - max.
Black-&-white	A	M	28	69.8	1.63	66.4 - 73.1	18	11.62	1.70	8.0 - 15.2
	I	M	58	68.6	2.14	64.3 - 72.9	54	10.45	1.31	7.8 - 13.1
	A	F	27	65.8	3.43	58.8 - 72.9	17	11.04	1.41	8.0 - 14.0
	I	F	41	66.3	1.30	63.7 - 69.0	38	10.34	1.11	8.1 - 12.6
Prothonotary (May)	A	M	17	72.3	1.70	68.7 - 75.9				
	A	F	5	67.8		R66. - 70.				
	other		7	71.0		R68. - 74.	10	14.90	2.38	9.5 - 20.3
Swainson's (May)	A	M	4	73.5		R71. - 76.				
	A	F	2	67.0		R66. - 68.				
Worm-eating	A		1	70.0			1	13.0		
	I		9	69.2		R66. - 71.	5	12.84		R11.0 - 17.0
Golden-winged	M		2	63.0		R62. - 64	2	10.0		R9.0 - 11.0
	F		1	59.0						
Blue-winged	all		5	61.0		R59. - 62.	6	10.1		R8.1 - 11.2
Tennessee (Goodpasture)	A	M	20	65.3	1.03	63.1 - 67.5				
	I	M	16	64.6	1.26	61.9 - 67.3				
	A	F	27	61.0	1.13	58.7 - 63.4				
	I	F	26	60.2	1.36	57.4 - 63.0	58	9.07	0.93	7.2 - 10.9
all										
Orange-crowned (Sept-Oct)	all		21	60.2	2.69	54.6 - 65.8	17	9.44	1.07	7.2 - 11.7
Nashville  (Tordoff & Mengel, Kans)	A		10	60.5	2.58	54.7 - 66.3				
	I		15	58.3	2.66	52.6 - 64.0				
	A	M					45	9.66	1.02	7.6 - 11.7
	I	M					46	9.29	0.89	7.5 - 11.1
	A	F					31	9.29	1.01	7.3 - 11.3
I	F					52	8.90	0.85	7.2 - 10.6	
Parula	M		15	59.7	2.69	54.0 - 65.5	12	9.12	1.17	6.5 - 11.7
	F		5	56.0		R54. - 57.	4	7.75		R7.1 - 8.5
Yellow (Aug)	A	M	8	64.1		R60. - 68.	5	10.72		R9.8 - 12.3
	I		85	59.7	2.35	55.0 - 64.4	85	10.12	1.03	8.1 - 12.2
Magnolia	A	M	39	60.0	1.48	57.0 - 63.0	39	8.54	0.60	7.3 - 9.8
	A	F	13	58.0	1.53	54.7 - 61.3	13	8.24	0.18	7.8 - 8.6
	I		90	58.6	2.64	53.3 - 63.8	53	8.09	0.84	6.4 - 9.8
Cape May	A	M	20	67.2	2.19	62.6 - 71.8	11	11.58	2.11	6.9 - 16.3
	I	M	16	67.5	1.79	63.7 - 71.3	10	11.01	2.61	5.1 - 16.9
	F		27	65.4	2.15	60.9 - 69.8	22	10.98	2.58	5.6 - 16.4

Table 2. Wing Chords and Body Weights (cont'd)

Species	Age	Sex	Wing				Weight			
			n	x	S.D.	min. - max.	n	x	S.D.	min. - max.
Black-thr. Blue	M		90	63.9	1.67	60.5 - 67.2	84	10.30	1.93	6.5 - 14.1
	F		78	61.2	1.77	57.7 - 64.8	77	9.41	1.54	6.3 - 12.5
Myrtle (Baird-- fat class 0)	A	M	23	73.9	1.72	70.3 - 77.4	10	12.47	0.39	11.6 - 13.4
	I	M	199	71.6	1.49	68.6 - 74.5	162	12.08	0.21	11.7 - 12.5
	A	F	29	69.2	1.60	65.9 - 72.5	8	12.03		R10.5 - 13.7
	I	F	116	67.7	1.50	64.7 - 70.6	76	11.44	0.15	11.2 - 11.8
Black-thr. Green	A	M	15	63.7	2.32	58.7 - 68.7	7	8.57		R7.4 - 9.6
	I	M	9	62.7		R60. - 68.	6	9.40		R7.9 - 10.3
	I	F	5	60.6		R59. - 63.	4	8.85		R8.5 - 9.4
Blackburnian	M		8	67.9		R65. - 73.	6	10.05		R9.1 - 10.8
	F		5	64.8		R63. - 66.	5	9.64		R9.2 - 10.0
Chestnut-sided	all		57	62.3	2.70	56.9 - 67.7	44	9.66	1.33	7.0 - 12.3
Bay-breasted	A	M	9	74.3	1.67	70.5 - 78.2	6	11.82		R9.9 - 13.4
	I		21	72.0	1.73	68.4 - 75.6	10	11.62	2.42	6.2 - 17.1
Blackpoll (Baird-- fat class 0)	A	M	89	73.2	2.10	69.0 - 77.3	90	11.81	0.84	10.1 - 13.5
	I	M	101	71.0	2.26	66.5 - 75.5	64	11.32	0.78	9.7 - 12.9
	A	F	109	70.5	1.82	66.9 - 74.1	47	11.31	0.73	9.8 - 12.8
	I	F	96	69.3	1.83	65.6 - 72.9	89	11.20	0.75	9.7 - 12.7
(Baird-- fat class "4")	A	M					86	15.99	2.06	11.9 - 20.1
	I	M					12	16.37	1.83	12.3 - 20.4
	A	F					58	16.19	2.02	12.1 - 20.3
	I	F					28	15.12	1.68	11.7 - 18.6
Pine	all		15	71.8	3.05	65.3 - 78.3	5	11.60		R9.3 - 12.8
Prairie	A	M	2	56.0		R55. - 57.	2	7.25		R7.1 - 7.4
	I	M	14	55.5	1.41	52.4 - 58.6	11	8.28	1.27	5.4 - 11.1
	A	F	4	53.5		R52. - 54.	3	6.8		R6.2 - 7.5
	I	F	12	52.9	1.68	49.2 - 56.6	10	8.10	0.95	5.9 - 10.3
Palm	all		258	62.7	3.16	56.5 - 68.9	235	10.25	0.73	8.8 - 11.7
Ovenbird	A		29	75.7	3.00	69.6 - 81.9	13	20.39	1.88	16.3 - 24.5
	I		77	73.7	2.74	68.3 - 79.2	45	19.20	2.12	14.9 - 23.5
N. Waterthrush	A		33	75.8	2.68	70.4 - 81.3	27	17.57	2.35	12.7 - 22.4
	I		75	74.2	2.50	69.3 - 79.2	71	16.92	1.65	13.6 - 20.2
La. Waterthrush (summer)	A	M	15	81.6	1.89	77.5 - 85.7				
	A	F	9	77.8	1.73	73.7 - 81.8				



Table 2. Wing Chords and Weights (cont'd)

Species	Age	Sex	Wing					Weight						
			n	x	S.D.	min.	max.	n	x	S.D.	min.	max.		
Kentucky (May-June)	A	M	50	70.7	2.24	66.2	-	75.2	8	14.31		12.8	-	15.4
	A	F	50	66.7	1.96	62.7	-	70.6	6	14.83		13.5	-	16.0
Connecticut	A	M	16	71.7	0.97	69.6	-	73.8	9	17.99		12.0	-	24.0
	I	M	19	69.4	1.93	65.4	-	73.5	18	13.95	1.89	10.0	-	17.9
	A	F	7	70.7		R69.	-	72.	6	15.12		11.5	-	21.0
	I	F	20	68.9	1.97	64.8	-	73.0	16	16.88	3.08	10.3	-	23.4
Mourning (Tordoff & Mengel, Kans.)	I		9	58.2		R52.	-	61.	6	11.77		10.0	-	13.3
	A	M							3	13.77		12.9	-	15.2
	I	M							27	13.72	1.43	10.9	-	16.6
	A	F							33	12.45	1.08	10.3	-	14.6
	I	F							30	12.75	1.32	10.1	-	15.4
Yellowthroat	A	M	33	56.0	2.34	51.3	-	60.8	23	10.49	1.29	7.8	-	13.2
	I	M	91	54.4	2.11	50.2	-	58.6	71	10.41	1.96	6.5	-	14.3
	A	F	18	53.6	2.68	48.0	-	59.2	6	10.00		9.2	-	10.5
	I	F	30	51.7	1.50	48.7	-	54.8	24	10.08	0.93	8.2	-	12.0
Yellow-br. Chat	A		8	76.5	3.59	68.0	-	85.0	3	26.80		23.0	-	28.9
	I		36	74.3	2.92	68.4	-	80.2	43	26.08	2.54	20.9	-	31.2
Hooded (June)	M		20	66.2	1.70	62.6	-	69.7	7	11.51		10.3	-	13.8
	M								7	10.10		8.9	-	11.2
	F		3	65.0		R64.	-	66.	3	9.93		9.2	-	10.3
Wilson's	M		38	55.1	1.41	52.2	-	58.0	37	7.54	0.62	6.3	-	8.8
	F		10	53.4	0.94	51.3	-	55.5	11	7.36	0.62	6.0	-	8.7
Canada	A	M	6	65.0		R62.	-	66.	3	10.67		9.2	-	12.5
	I		26	63.1	2.56	57.8	-	68.4	19	10.58	1.55	7.3	-	13.8
Am. Redstart	A	M	38	64.2	2.17	59.8	-	68.6	30	9.44	1.37	6.6	-	12.2
	I	M	246	62.5	1.91	58.7	-	66.2	240	8.21	1.07	6.1	-	10.3
		F	298	60.9	2.52	56.0	-	65.9	260	7.97	1.15	5.7	-	10.2

n = number of birds in sample.

x = mean (average) of all birds in sample.

S.D. = standard deviation.

min. = 2 standard deviations below the mean (= theoretical limit of 95% of sample.)

max. = 2 standard deviations above the mean (= theoretical limit of 95% of sample.)

R = observed range of measurements if sample size is less than 10.

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#### State and Regional References

Many State bird books and regional guides contain descriptions and/or color plates of all species normally found in certain areas. You should be familiar with those for your part of the country.

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