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William C. Scharf

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# Wing Length and Sex of Hatch-Year Orchard Orioles Determined from Recaptures

*William C. Scharf*<sup>1</sup>

Department of Biological Science  
Lake Superior State University  
650 West Easterday Avenue  
Sault Ste. Marie, MI 49783

<sup>1</sup>Current address: 6241 Summit Court, Traverse City, MI 49686  
e-mail: wcscharf@charter.net

## ABSTRACT

*I recorded 2250 captures of Orchard Orioles (Icterus spurius) representing 1679 individuals at two locations along the Platte River, Nebraska, during 13 spring-summer seasons from 1992 - 2006. Hatch-year (HY) birds were captured 680 times with 22 of these birds recaptured in subsequent years. Thirteen recaptures were males and nine were females. Comparing wing lengths recorded at first banding as HYs to their later sexually dichromatic plumage showed male HYs with longer wings, but the 74 mm break point between sexes as defined by Pyle (1997) was unsupported by my recaptures. There is a wide overlap of wing lengths*

*between the sexes. In discussion, I postulate that Pyle's measurements from museum specimens may be influenced by shrinkage and, therefore, may be unreliable for field sex determination of HY Orchard Orioles.*

## INTRODUCTION

Orchard Orioles (*Icterus spurius*) are usually single-brooded (Scharf and Kren 1996), but Ligi and Omland (2007) found birds at 33% of nests double brooded in Maryland. They appear to be semi-colonial nesters in prime habitat (Scharf and Kren 1996), where they are classic Neotropical migrants spending only about three months on their temperate nesting grounds. The remainder of the year is spent in passage or on Central and South American wintering grounds (Clawson 1980; Scharf and Kren 1996). Nesting habitat is usually deciduous woody trees and shrubs with primary distribution east of the Rocky Mountains. *Partners*

*In Flight* (Rich et al. 2004) give no special status for Orchard Orioles, although they note that 87% of the population nests north of the Mexican border.

## STUDY AREA AND METHODS

Captures were within 200 m of the Platte River or its impoundments, and locations of net lanes were in shrub or wooded habitats. Netting from 1992 - 2000 was at University of Nebraska's Cedar Point Biological Station (CPBS; 41°12'N, 101°40'W), Keith County, NE, and around Platte River impoundments, Lakes Ogallala and Keystone. From 2001 - 2006, sites in Dawson County, NE, were netted at Cottonwood Ranch of Nebraska Public Power District (40°40'N, 99°27'W), and Jeffrey Island Habitat Area of Central Nebraska Public Power and Irrigation District (40°41'N, 99°39'W).

Nets placed near mulberry (*Morus rubra*) or choke cherries (*Prunus virginiana*) with ripe fruit are very effective for catching hatch-year (HY) Orchard Orioles. Islands with sparse woody vegetation in the Platte River were preferred by all ages of Orchard Orioles over adjacent mainland riparian woodlands (Scharf 2007). Further descriptions of the habitat and associated avifauna can be found in Brown et al. (1996) and Scharf et al. (2008).

Most Orchard Oriole plumages are sexually dichromatic. Second-year (SY) males have the yellow-green coloration of females and HYs, but with a recognizable black bib on the breast. After-second-year (ASY) male Orchard Orioles are characterized by a chestnut colored body with a black back and hood (Scharf and Kren 1996).

Wing chord was measured to the nearest 1 mm as described by Pyle (1997). Measurements were made with a steel wing rule with a perpendicular stop at zero. Two colleagues and I measured wings and we frequently practiced standardizing our technique on the same bird. Sex of birds recaptured as SYs and AHYs was assigned by plumage dichromatism (Scharf and Kren 1996). Measure-

ment of flying HYs recaptured in the same season showed they were still developing, as evidenced by their continued increase in wing length. However, even at wing lengths of less than 70 mm, and obviously under-developed, they were able to fly well enough to be caught in a net, but sometimes needed help finding a perch after banding. I excluded from my analysis one HY with wing chord less than 66 mm for this reason.

Banding records were sorted and statistically analyzed in Minitab 15 (Minitab Inc. 2006). Statistical tests and use of the Central Limit Theorem were taken from Zar (1999).

## RESULTS

I captured and recaptured 2250 Orchard Orioles times representing 1823 first encounters and 1679 individuals banded during 54,744 net-hours (67% at CPBS, and 33% at the central Platte River) during spring and summer of 1992 - 2006. The capture rates varied greatly due to the amount and timing of effort devoted specifically to capturing HYs, which were caught in large numbers during late July and early August. Netting activities stopped in some years before HYs were flying, resulting in lower capture rates. Total number of HYs captured was 680.

The sex and wing length of 22 recaptured Orchard Orioles originally banded as HY is shown in Fig. 1. Thirteen of the recaptures were males, eight were ASY and five were SY; the nine females were all aged as AHY prior to my adoption of Pyle's (1997) primary covert molt limit for aging, to which I will propose modification elsewhere.

Male HY Orchard Orioles (Fig. 1) have significantly longer wings (mean = 77.3 mm, SE = 0.41, n = 13) than females (mean = 75.0 mm, SE = 0.55, n = 9; two sample t-test,  $P < 0.05$ ). The wing lengths of HY Orchard Orioles captured 1992 - 2006 are plotted in Fig. 2 (mean = 75.5 mm, SE = 0.09, range 66 - 83 mm). A two-sample t-test between the known sex birds in Fig. 1 and the unidentified sex birds in Fig. 2 was not significantly

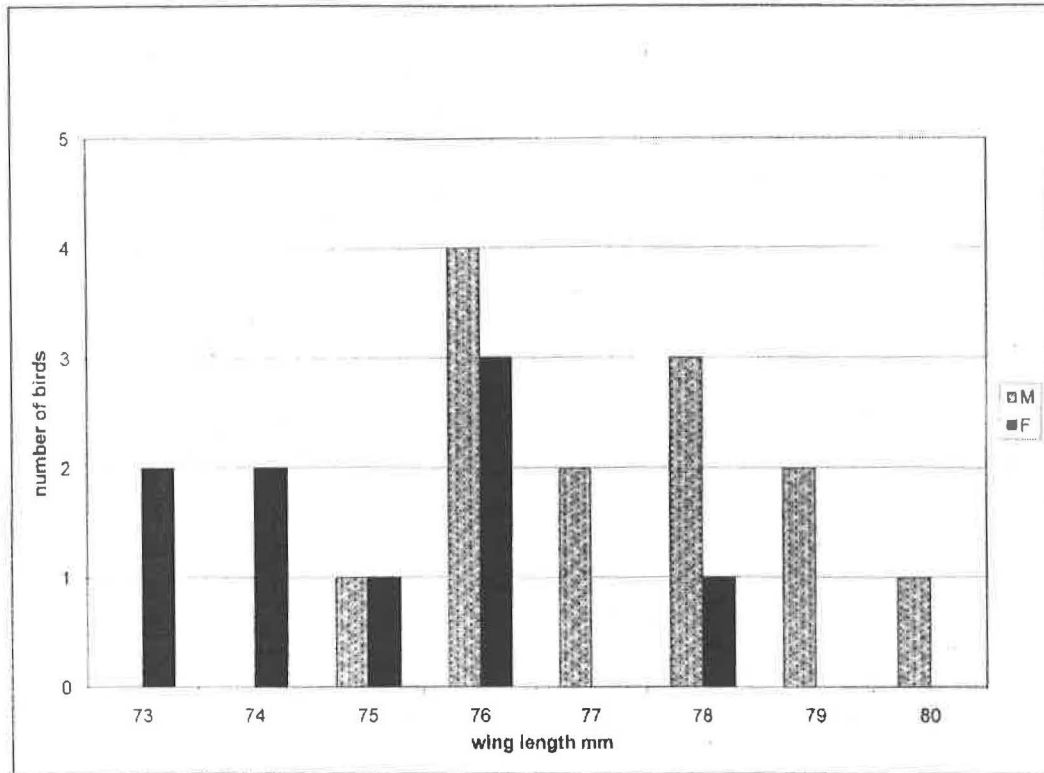


Fig. 1. Wing length in mm of HY Orchard Orioles that were sexed subsequently by SY or ASY plumage.

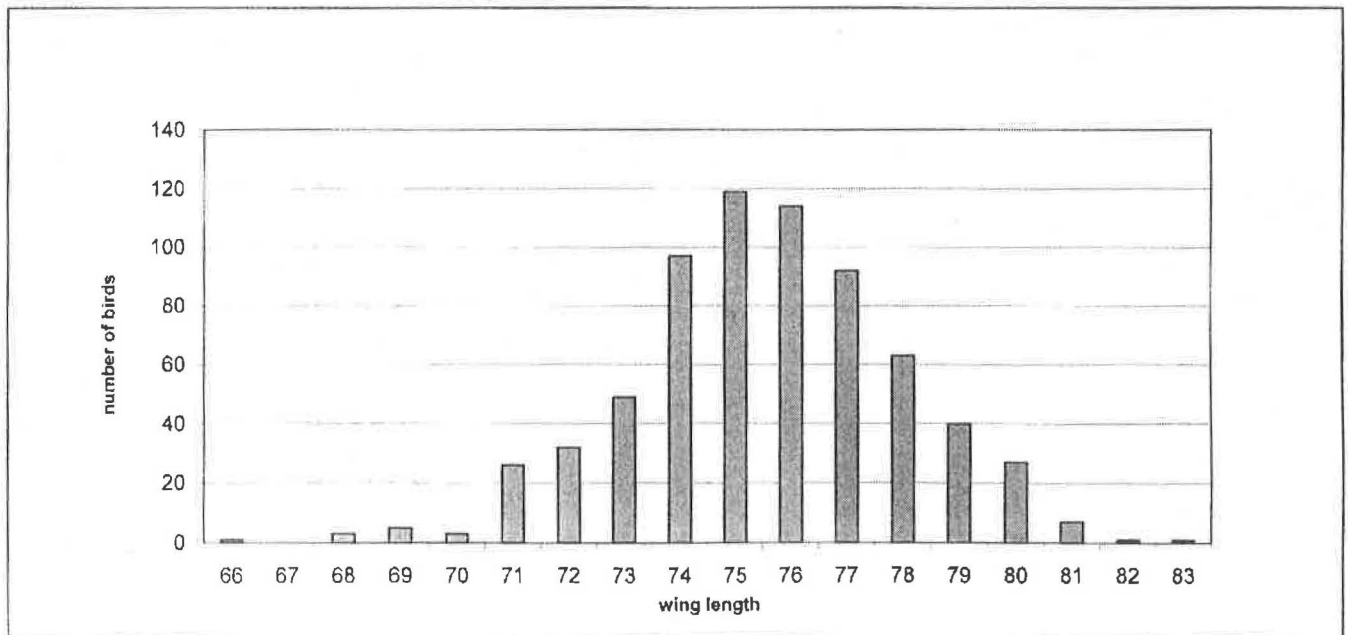


Fig. 2. Wing lengths of 680 HY Orchard Orioles from western and central Nebraska.

different (equal variance,  $P = 0.107$ ). This suggests that the smaller sample of 22 was representative of the whole.

Thirteen of the recaptures were males and all had wing lengths greater than 74 mm. These male HYs would have been sexed correctly according to Pyle (1997). However, of nine females, only two (22%) had wings less than 74 mm and would have been correctly sexed. Two were unsexable with 74 mm wings and five (56%) would have been sexed incorrectly using the criterion of Pyle (1997).

## DISCUSSION

Comparing wing lengths recorded at first banding of HY Orchard Orioles to their gender a year or more later, with sex determined by dichromatic plumage, revealed that male HYs often have longer wings, but that the overlap of wing lengths between the sexes as HYs is wide (Fig. 1). Pyle (1997) has declared the separation of Orchard Oriole of HY sexes by wing length to be at 74 mm, or 73 mm in Pyle et al. (1987). Pyle's (1997) and the Pyle et al. (1987) wing length separations are unsupported by wing lengths of my recaptures (Fig. 1). If 74 mm was the pivotal point for sexing HY Orchard Orioles, the sample of five of nine recaptured females with >75 mm wing length negate that idea (Fig. 1). Also, if 74 mm was a functional pivot between the sexes, then for a sample of unsexed HYs (Fig. 2.), I would expect the mean to be 74 mm; but that is clearly not the case when looking at Fig. 1. The midpoint between male and female means is 76.1 mm. Additionally, for a midpoint of 74 mm (Pyle 1997) or 76.1 mm (this study) to be valid for sexing, the means of normally distributed data, like wing length, must be at least two standard deviations (SD) from the midpoint according to the Central Limit Theorem (Zar 1999). Wing lengths of 74 mm and below are female with 79 and above male; 75 - 78 mm are unknown sex, but this would not be very useful because only the extremes could be sexed.

Using 76.1 mm from this study, for example, the Central Limit Theorem would predict considerable

overlap (Table 1) with a result of many incorrect sex designations. Given a mean of 74 mm and a SD of 1.5 mm (approximate value from this study), the means for males would be 77 mm and females 71 mm to separate the sexes adequately. This spread leaves 2.5% of the data in each tail, so that even with a mean lying two SD from the midpoint, 5% of all birds would be sexed incorrectly.

**Table 1. Predicted Range for Measurements in mm.**

Sex	N	Mean	SD	Mean +2 SD	Mean -2 SD
Female	9	75.0	1.66	78.32	71.68
Male	13	77.3	1.49	80.30	74.32

Juvenal plumage wear was not a factor in my HY measurements. All HY flight feathers were fresh. Perhaps wear could be a factor later on in the molt cycle on the wintering ground. However, Pyle (1997) provides no dates for his measurements. Alternatively, the central and western Nebraska Orchard Oriole populations may, due to genetic factors, have substantially different dimensions from the specimens that Pyle et al. (1987) and Pyle (1997) measured.

Despite the fact that specimens tend to shrink as they dry, shrinkage has been disregarded with museum-based measurements used as if they are relevant to living birds (Pyle 1997 and Pyle et al. 1987). The differences between museum and live specimens can amount to as much as 4% in some body components (Winker 1993). I conjecture that shrinkage of museum specimen HY Orchard Orioles may have resulted in Pyle (1997) and Pyle et al. (1987) designating a wing measurement of 74 mm as the dividing point between HY sexes. Winker (1993) showed that shrinkage in linear measurements required correction factors in Tennessee Warblers (*Vermivora peregrina*) and "Traill's" Flycatchers (*Empidonax traillii* and *E. alnorum*). Wilson and Mc Cracken (2008) showed shrinkage in Cinnamon Teal (*Anas cyanoptera*) that was significant in five of seven measurements and offered correction factors for converting museum specimen measurements to live birds.



Mueller (1990) reported that a shrinkage value of 1.72% would comprise 34% of wing length differences between male and female Northern Saw-whet Owls (*Aegolius acadicus*). However, even if the mean of the sexes were decreased by shrinkage, the spread between the means is not sufficient to enable banders to use one measurement for sexing HY birds.

I suggest that banders not use the HY sexing measurements from Pyle et al. (1987) and Pyle (1997) for Orchard Orioles until further verification of the measurements is made. I expand this caution for suspending the use of Pyle et al. (1987) and Pyle (1997) further to any other species for which living birds have not been compared with museum specimen measurements.

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## Sexing California Clapper Rails using Morphological Measurements

Cory T. Overton<sup>1,4</sup>, Michael L. Casazza<sup>1</sup>, John Y. Takekawa<sup>2</sup>, and Tobias M. Rohmer<sup>3</sup>

<sup>1</sup>U.S. Geological Survey, Western Ecological Research Center, Dixon Field Station, 6924 Tremont Road, Dixon, CA 95620

<sup>2</sup>U.S. Geological Survey, Western Ecological Research Center, San Francisco Bay Estuary Field Station, 505 Azuar Drive, Vallejo, CA 94592

<sup>3</sup>University of California, Davis, 1 Shields Avenue, Davis, CA. 95616

<sup>4</sup> Corresponding author.  
e-mail: [coverton@usgs.gov](mailto:coverton@usgs.gov)

### ABSTRACT

*California Clapper Rails* (*Rallus longirostris obsoletus*) have monomorphic plumage, a trait that makes identification of sex difficult without extensive behavioral observation or genetic testing. Using 31 Clapper Rails (22 females, 9 males), caught in south San Francisco Bay, CA, and using easily measurable morphological characteristics, we developed a discriminant function to distinguish sex. We then validated this function on 33 additional rails. Seven morphological measurements were considered, resulting in three which were selected in the discriminate function: culmen length, tarsometatarsus length, and flat wing length. We had no classification errors for the development or testing datasets either with resubstitution or cross-validation procedures. Male California

Clapper Rails were 6-22% larger than females for individual morphological traits, and the largest difference was in body mass. Variables in our discriminant function closely match variables developed for sexing Clapper Rails of Gulf Coast populations. However, a universal discriminant function to sex all Clapper Rail subspecies is not likely because of large and inconsistent differences in morphological traits among subspecies.

### INTRODUCTION

Identifying the sex of wild birds on the basis of morphological measurements can be difficult or impossible to accomplish for birds with monomorphic plumage and little size dimorphism. Although many alternative techniques can be used to determine the sex of individuals, these techniques are often either too time-consuming (behavioral sampling), expensive (genetic sampling), or disruptive (laparotomy) to be useful in the field. As an alternative to these often problematic techniques, individuals with relatively little size dimorphism can often be sexed using the mathematical approach of discriminant function analysis (Amat et al. 1993, Bluso et al. 2006, Perkins 2007, Ackerman et al. 2008). Discriminant function analysis, when applied to unknown individuals, describes the best combination of variables to distinguish between two known groups (e.g., male and female) (Khattree and Naik 2000). Morphological characteristics collected at the time of capture, such as mass, culmen, tarsus and wing length, are convenient candidate variables for use in discriminant functions. Discriminant functions that