

Sex and Age Bias in American White Pelicans Captured and Collected on Wintering Grounds

Author(s): D. Tommy King, Bronson K. Strickland and Jerrold L. Belant

Source: *Waterbirds*, 33(4):546-549. 2010.

Published By: The Waterbird Society

DOI: 10.1675/063.033.0415

URL: <http://www.bioone.org/doi/full/10.1675/063.033.0415>

BioOne (www.bioone.org) is an electronic aggregator of bioscience research content, and the online home to over 160 journals and books published by not-for-profit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/page/terms_of_use.

Usage of BioOne content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

Sex and Age Bias in American White Pelicans Captured and Collected on Wintering Grounds

D. TOMMY KING^{1,*}, BRONSON K. STRICKLAND² AND JERROLD L. BELANT³

¹U.S. Department of Agriculture, Wildlife Services, National Wildlife Research Center, Mississippi State, MS, 39762, USA

²Department of Wildlife, Fisheries, and Aquaculture, Mississippi State University, Mississippi State, MS, 39762, USA

³Carnivore Ecology Laboratory, Forest and Wildlife Research Center, Mississippi State University, Mississippi State, MS, 39762, USA

*Corresponding author; E-mail: Tommy.King@aphis.usda.gov

Abstract.—While conducting research examining the impact of American White Pelicans (*Pelecanus erythrorhynchos*) on the aquaculture industry in the southeastern United States, an apparent age and sex bias was observed among captured and collected pelicans. Data from 284 pelicans captured or collected at loafing sites located near aquaculture ponds during 1998 to 2009 were analyzed. A sampling bias could suggest segregation of pelicans by sex or age on wintering grounds. Captured pelicans were strongly biased towards immature males (73%) and collected pelicans were male biased (38% Adult Male, 47% Immature Male). Although the underlying mechanisms are not understood, observed pelican use of loafing areas may be related to numerous, readily available prey at aquaculture facilities. Received 21 December 2009, accepted 25 February 2010.

Key words.—age, American White Pelican, capture bias, leg-hold trap, *Pelecanus erythrorhynchos*, rocket net, segregation, sex, southeastern United States.

Waterbirds 33(4): 546-549, 2010

Many researchers have noted sex and age differences in the capture of birds. Welty and Baptista (1988) stated that biased sex ratios in captured birds are fairly common but cautioned that unequal sex ratios may be erroneous. Using published information, they compiled a list of examples of male-biased sex ratios from relatively large samples of birds that were mostly trapped for banding (Welty and Baptista 1988). Capture techniques might also be responsible for age and condition bias in birds (Weatherhead and Greenwood 1981; Borras and Senar 1986; Greenwood *et al.* 1986; Senar 1988; Vanderkist *et al.* 1999).

American White Pelican (*Pelecanus erythrorhynchos*, hereafter pelican) use of aquaculture facilities in the southeastern United States has increased during the last 20 years (King 1997; King 2005). Pelicans often loaf in large flocks on mud flats, flooded fields or abandoned pond levees near the aquaculture facilities (King 1997; King and Michot 2002; King 2005). Pelican use of individual loafing sites may vary season to season, or year to year due to factors such as fluctuating

water levels and human disturbance (King 1997; King and Michot 2002; King 2005). While capturing pelicans (Schemnitz 1996; King *et al.* 1998) for studies evaluating impacts of foraging pelicans on the aquaculture industry, we noticed an apparent age and sex bias among the captured and collected pelicans, which might suggest segregation of age and sex classes among pelicans. Information on American White Pelican segregation based on age or sex on their wintering grounds is lacking (Johnsgard 1993; Knopf and Evans 2004). The objective of this evaluation was to identify any capture bias based on age or sex. Biases could provide insight to possible segregation of age and sex classes of pelicans on the wintering grounds.

METHODS

Pelicans were captured at loafing sites ≤ 5 km from aquaculture facilities in Alabama, Arkansas, Louisiana and Mississippi (Fig. 1) using modified leg-hold traps or rocket nets (King *et al.* 1998) from 2002-2009. The number of pelicans using the loafing sites selected for capture attempts ranged from 20 to 3,000. Because pelicans are wary of disturbance at loafing sites (King 1997; King 2005), care was taken to minimize changes or modifica-

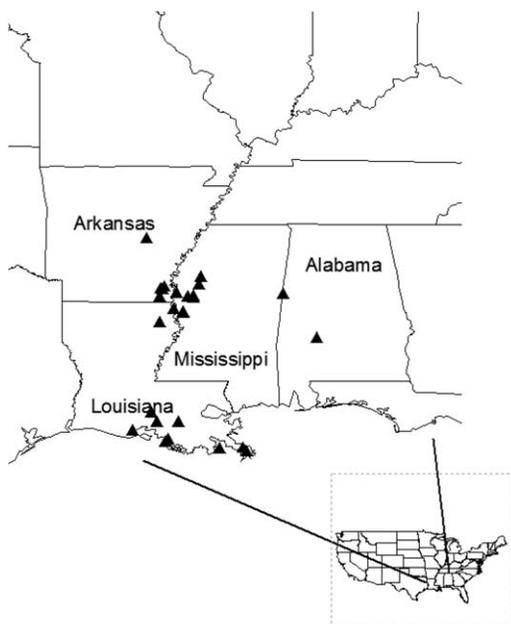


Figure 1. Capture and collection locations for American White Pelicans 1998 to 2009.

tions to the site. We camouflaged rocket nets with available vegetation (e.g. brush or tall grass) or hay. Traps were hidden with dirt and vegetation or submerged in murky water (King *et al.* 1998). We made no effort to selectively capture pelicans by age or sex. We recorded the age (immature or adult) and sex for each captured pelican (see methods below). All pelicans were banded before we released them at the site of capture.

During 1998-1999, we collected pelicans at loafing sites (Fig. 1) adjacent to aquaculture facilities and areas without aquaculture with either a shotgun or center-fired rifle. We made no effort to selectively collect pelicans based on age or sex. For each collected pelican, we recorded the age (immature or adult) and sex (see methods below). Sex determinations were verified during necropsy.

Color of the bill and skin (gular pouch, legs, feet) was used to determine age class (immature or adult) for captured and collected pelicans (Johnsgard 1993; Knopf and Evans 2004). The bill and skin color for immature pelicans ranges from pale pinkish-gray to pale yellow and for adult pelicans the color ranges from dark yellow to orange-red. Pelican gender was determined by culmen length as described by Dorr *et al.* (2005). Pelicans with culmen length of ≥ 310 mm were classified as male and those with culmen length ≤ 309 mm were classified as female (97% accuracy; Dorr *et al.* (2005).

We compared the proportion of adult females, adult males, immature females and immature males that were captured with leg-hold traps versus captured with rocket nets. Sample sizes were inadequate to test sex and age bias by location; however, proportions of sex and age classes across locations appeared similar. Consequently, we pooled samples across locations to examine capture bias using chi-square analysis (Zar 1984) and concluded statistical differences when $\alpha \leq 0.05$.

All procedures involving pelicans were conducted under Institutional Animal Care and Use Committee-approved United States Department of Agriculture, Wildlife Services, National Wildlife Research Center study protocols, Louisiana Department of Wildlife and Fisheries Scientific Collecting Permit LNHP-09-014, a Mississippi Department of Wildlife, Fisheries and Parks Administrative Scientific Collecting Permit, United States Department of Interior Scientific Collecting Permit MB019065-10, and United States Department of Interior Federal Bird Banding Permit 20873.

RESULTS

We captured 32 pelicans with leg-hold traps and 66 pelicans with rocket nets (Fig. 2A, 2B) at 13 loafing sites during winter and spring of 2002-2009. We collected 186 pelicans with firearms (Fig. 2B) from ten different loafing sites during winter through spring 1998-1999. All captures and collections were made during daylight hours. The

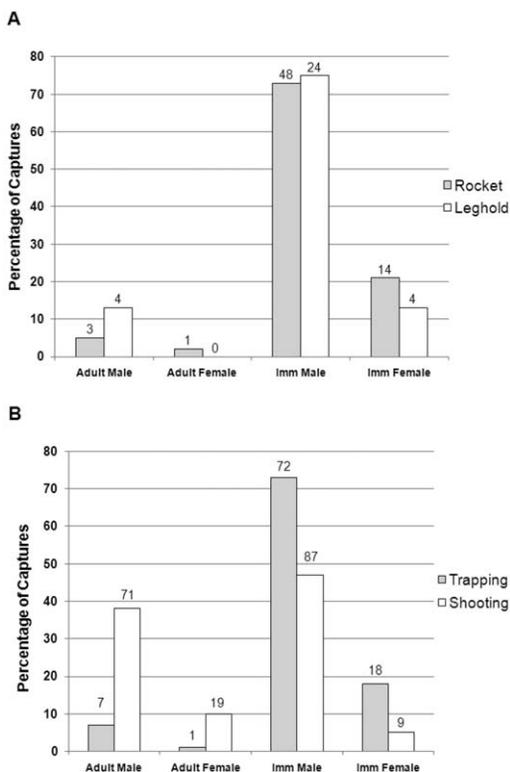


Figure 2. (A) Sex and age class comparison of American White Pelicans captured with leghold traps or rocket net from 2002 to 2009. (B) Sex and age class comparison of American White Pelicans captured (leg-hold trap and rocket nets captures pooled) or shot for food habits study from 1998 to 2009. Numbers above bars represent sample size in each sex and age class category.

percentages of adult female, adult male, immature female and immature male pelicans captured with leg-hold traps versus rocket nets was similar ($\chi^2_3 = 3.30$; $P = 0.348$; Fig. 2A), therefore we pooled all captured pelicans for comparisons with collected pelicans. There was a difference in the percentage of sex and age classes between captured and collected pelicans ($\chi^2_3 = 50.731$; $P < 0.001$). Captured pelicans were biased towards immature males (73%) and collected pelicans were male biased (38% adult male, 47% immature male).

DISCUSSION

Immature male pelicans appeared more vulnerable to capture than female and adult male pelicans. The vulnerability may be due to immature birds typically being more naive than older birds (Welty and Baptista 1988) and therefore less wary of human presence or disturbance at a loafing site. Also, we found that male pelicans were more susceptible to shooting than female pelicans. Possible reasons for the sex bias in both captures and collections of pelicans might be that female and male pelicans segregate at loafing sites or perhaps sexes winter in different geographic areas. Welty and Baptista (1988) and Ketterson and Nolan, Jr. (1979) suggested that bird sex segregation on wintering grounds is often due to differential migration and/or intersexual competition for food.

Glahn *et al.* (1995) found a male bias in Double-crested Cormorants (*Phalacrocorax auritus*) collected in the more aquaculture-intensive areas of the delta region of Mississippi. Similarly, male pelicans may select loafing sites near aquaculture areas taking advantage of the numerous, readily available prey at aquaculture facilities. King and Werner (2001) documented that pelicans foraging at aquaculture facilities were able to obtain their food requirements very quickly compared to pelicans foraging at other habitats.

The reasons for the capture and collection biases that we found remain unclear. Research, perhaps using satellite telemetry to

determine if pelicans of known age and sex are spatially segregated on their wintering grounds might explain our findings. Also, we recommend research to determine if sex ratios of pelicans are male biased at birth or at time of fledging.

ACKNOWLEDGMENTS

The authors thank B. Dorr, G. Ellis, T. Ferguson, P. Fioranelli, A. Gaudé, K. Hanson, J. Harrel, D. LeBlanc, A. Mitchell, R. Singleton, S. Woodruff, the Louisiana Department of Wildlife and Fisheries and numerous land owners for assistance with pelican captures and collections. We thank F. Cunningham, K. Fagerstone and an anonymous reviewer for comments on the manuscript.

LITERATURE CITED

- Borras, A. and J. C. Senar. 1986. Sex, age and condition bias of decoy trapped Citril Finches (*Serinus citronella*). *Miscellaneous Zoology* 10: 403-406.
- Dorr, B. S., D. T. King, J. B. Harrel, P. Gerard and M. G. Spalding. 2005. The use of culmen length to determine sex of American White Pelicans (*Pelecanus erythrorhynchos*). *Waterbirds* 28 (Special Publication 1): 102-106.
- Glahn, J. F., P. J. Dixon, G. A. Littauer and R. B. McCoy. 1995. Food habits of Double-crested Cormorants wintering in the delta region of Mississippi. *Colonial Waterbirds* 18 (Special Publication 1): 158-167.
- Greenwood, H., R. G. Clark and P. J. Weatherhead. 1986. Condition bias of hunter shot mallards (*Anas platyrhynchos*). *Canadian Journal of Zoology* 64: 599-601.
- Johnsgard, P. A. 1993. *Cormorants, Darters, and Pelicans of the World*. Smithsonian Institution, Washington, D.C.
- Ketterson, E. D. and V. Nolan, Jr. 1979. Seasonal, annual, and geographic variation in sex ratio of wintering populations of Dark-eyed Juncos (*Junco hyemalis*). *Auk* 96: 532-536.
- King, D. T. 1997. American White Pelicans: the latest avian problem for catfish producers. *Proceedings of the Eastern Wildlife Damage Management Conference* 7: 31-35.
- King, D. T., J. D. Paulson, D. J. LeBlanc and K. Bruce. 1998. Two capture techniques for American White Pelicans and Great Blue Herons. *Colonial Waterbirds* 21: 258-60.
- King, D. T. and S. J. Werner. 2001. Daily activity budgets and population size of American White Pelicans wintering in south Louisiana and the delta region of Mississippi. *Waterbirds* 24: 250-254.
- King, D. T. and T. C. Michot. 2002. Distribution, abundance, and habitat use of American White Pelicans wintering in south Louisiana and the delta region of Mississippi. *Waterbirds* 24: 410-416.
- King, D. T. 2005. Interactions between American White Pelicans and commercial aquaculture in the southeastern United States: An overview. *In* *Biology and Conservation of the American White Pelican* (D. W. Anderson, D. T. King and J. Coulson, Eds.). *Waterbirds* 28 (Special Publication 1): 83-86.

- King, D. T., J. L. Belant, J. B. Harrel and J. F. Glahn. 2010. Superabundant food at catfish aquaculture facilities improves body condition in American White Pelicans. *Waterbirds* 33: 221-227.
- Knopf, F. L. and R. M. Evans. 2004. American White Pelican (*Pelecanus erythrorhynchos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. <<http://bna.birds.cornell.edu/bna/species/057doi:10.2173/bna.57>, accessed 10 September 2008.
- Schemnitz, S. D. 1996. Capturing and handling wild animals. Pages 111-112 in *Research and Management techniques for wildlife and habitats*. Fifth Edition, Revised (T. A. Bookhout, Ed.). The Wildlife Society, Bethesda, Maryland.
- Senar, J. C. 1988. Trapping finches with the Yunick platform trap: the residence bias. *Journal of Field Ornithology* 59: 381-384.
- Vanderkist, B. A., X. Xue, R. Griffiths, K. Martin, W. Beauchamp and T. D. Williams. 1999. Evidence of male-bias in capture samples of Marbled Murrelets from genetic studies in British Columbia. *Condor* 101: 398-402.
- Weatherhead, J. P. and H. Greenwood. 1981. Age and condition bias of decoy-trapped birds. *Journal of Field Ornithology* 52: 10-15.
- Welty, J. C. and L. Baptista. 1988. *The Life of Birds*, Fourth Edition. Harcourt Brace Jovanovich College Publishers, New York, New York.
- Zar, J. H. 1984. *Biostatistical Analysis*, Second Edition. Prentice Hall, Englewood Cliffs, New Jersey.