Implications of Migration Chronology upon Waterfowl Harvest Opportunities in Florida

Frank Montalbano III, *Florida Game and Fresh Water Fish Commission, Tallahassee FL 32301*

Fred A. Johnson, *Florida Game and Fresh Water Fish Commission, Okeechobee FL 33474*

Abstract: Duck migration chronology was determined for 11 national wildlife refuges (NWRs) in Florida during 1976–81. Mean monthly population indices differed by month, with peak populations occurring in December. Extension of the duck hunting season framework until 31 January, with a concurrent reduction of season days in December probably would reduce the statewide duck harvest. Implications of this harvest strategy are discussed in terms of hunter satisfaction and possible duck population impacts.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 40:470–475

The U.S. Fish and Wildlife Service (USFWS) regulates the states' selections of waterfowl hunting season dates in part through establishment of earliest and latest permissible hunting dates; a period identified as the season "framework dates." States select an USFWS authorized number of days for a "season" within the framework dates (USFWS 1975:70). With minor exceptions, the last day permitted in the season in the United States was 20 January from 1972 through 1984 [file data, Office of Migratory Bird Management (OMBM), USFWS]. Recently, a number of southern states in both the Atlantic and Mississippi Flyways have shown an interest in extending the framework to 31 January (file data, OMBM, USFWS).

The view expressed by Martinson (1975:189) "that someone else, somewhere else is getting the breaks" with respect to duck harvest is widespread among waterfowl hunters in the south. Hunters believe that they are missing out on the best hunting because the season closes prior to arrival of peak duck populations on southern wintering areas [file data, Florida Game and Fresh Water Fish Commission (GFC)]. Public interest in a season extension was stimulated in 1979 when the USFWS granted an experimental framework extension in Mississippi. Season extension in Mississippi did not increase harvest or the state's proportion of the Mississippi Flyway harvest, yet was enthusiastically accepted by hunters (R. K. Wells, unpubl. rep., Miss. Dep. Wildl. Conserv., Jackson, Miss. 1983). We tested the hypothesis that peak duck populations occur in Florida following season closure and assessed predicted effects of a framework extension on harvest opportunity and duck populations.

We acknowledge cooperation of USFWS NWR personnel, particularly H. E. Poitevint and J. E. Takekawa, for compiling and making available waterfowl population survey data. D. H. Brakhage, B. J. Gruver, D. A. Johnson, R. E. Kirby, and an anonymous referee provided suggestions on manuscript preparation.

Methods

Weekly waterfowl surveys conducted on NWRs (Bellrose 1976:23–24) are compiled in "Monthly Waterfowl Populations" reports. Data were obtained for 11 Florida NWRs (Fig. 1) for October 1976–September 1981. We follow Bellrose (1976:24) in considering temporal changes in duck population levels on refuges representative of migration chronology for regions in which the refuges occur.

Differences in refuge size, location, survey methodology, and population density contribute to dramatic differences in total duck population estimates among the refuges. Because of our focus on statewide migration chronology, we sought to prevent domination of our analyses by refuges with higher population counts. We developed a monthly population index (MPI) for each refuge, defined as the maximum population estimate for each month, divided by the sum of maximum population estimates for the 12-month period July through June. MPI's for May, June, July, and August were then dropped to increase independence, a critical assumption for the following analyses of variance (anova). We tested the assumption that MPIs were normally distributed by examining D statistics and measures of skewness and kurtosis (SAS 1982:575–583).

We used a two-way anova to test whether the mean MPI differed among months ($N = 8$) and refuges ($N = 11$) (main effects). The interaction (month x refuge)

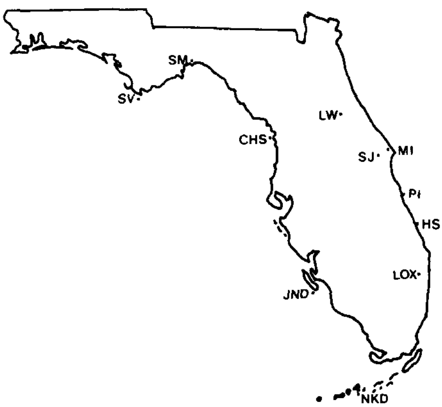

Figure 1. Location of 11 national wildlife refuges in Florida included in migrational chronology study: St. Vincent-SV; St. Marks-SM; Chassahowitzka-CHS; Lake Woodruff-LW; St. Johns-SJ; Merritt Island-MI; Pelican Island-PI; Hobe Sound-HS; Loxahatchee-LOX; J. N. "Ding" Darling-JND; National Key Deer-NKD.

mean square served as a basis for inferences regarding similarities in migration chronology among refuges. A second two-way anova was used to test the hypothesis that differences in mean MPIs were independent of whether refuges were open ($N = 3$) or closed ($N = 8$) to public waterfowl hunting. We performed a third two-way anova to test if differences in mean MPIs were consistent among waterfowl species ($N = 6$). F-statistics were used to test significance of main and interaction effects.

Results and Discussion

Sample MPIs for 5 (January, February, April, October, December) of the 8 months were derived from normal distributions ($P > 0.08$). The remaining MPIs, while not normally distributed ($P < 0.04$), did not have severely skewed distributions. Only very skewed distributions have a marked effect on the significance level of the F-test (Sokal and Rohlf 1969:377). We concluded that our analyses were not invalidated by non-normality.

Mean MPI differed by month for all refuges ($F = 68.9$, df = 7/352, $P < 0.01$). Generally, peak waterfowl populations in Florida occurred during December, followed by January, November, February, and March (Fig. 2). However, the interaction mean square (month x refuge) suggested that this pattern was not consistent among refuges ($F = 2.3$, df = 70/352, $P < 0.01$). Differences in mean MPIs were not dependent on whether refuges were open or closed to hunting ($F = 0.6$, df = 7/424, $P = 0.8$). Therefore, geographic location and species composition of refuges probably contributed more to variability in migration chronology. South Florida refuges (e.g., Loxahatchee, J. N. "Ding" Darling, National Key Deer) seemed to exhibit later peak winter concentrations than those refuges farther north. Mean MPI was highest in December on 7 of 11 refuges and was higher overall ($P < 0.1$) than that for January.

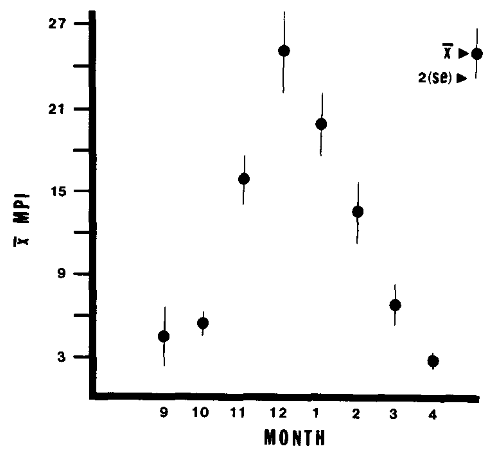

Figure 2. Mean Monthly Population Index (MPI = peak monthly population/peak monthly populations) for 11 national wildlife refuges in Florida, 1976–1980.

Table 1. Mean MPI (peak monthly population/Σ peak monthly populations) on 11 national wildlife refuges 1976–80 for the 6 most dominant migratory species in Florida's waterfowl harvest.

Species	Month							
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Ring-necked duck (*Aythya collaris*)	0.2	1.9	17.9	31.6	22.6	19.7	5.1	0.9
Blue-winged teal (*Anas discors*)	9.6	12.9	17.1	16.6	13.8	10.7	9.4	4.5
Wood duck (*Aix sponsa*)	5.9	7.4	22.9	10.7	10.1	7.3	6.5	5.7
Scaup (*Aythya* spp.)	0.2	1.1	11.2	32.2	30.2	17.7	5.9	1.4
Green-winged teal (*Anas crecca*)	0.9	3.6	13.4	29.4	19.8	24.6	6.8	1.4
American wigeon (*Anas americana*)	0.4	4.7	19.7	28.5	22.6	16.4	6.0	1.8
Aggregate	3.0	5.4	16.8	25.0	19.9	16.2	6.7	2.6

Generally, migration chronology for the 6 numerically dominant migratory species in the Florida harvest (Carney et al. 1983) tracked that for all species (Table 1). As with all species combined, mean MPI for these 6 species differed by month (F = 115.7, df = 7/2192, $P < 0.01$), but the interaction (month x species) mean square suggested that differences were not consistent among species (F = 8.2, df = 35/2192, $P < 0.01$). Blue-winged teal (*Anas discors*) and wood ducks (*Aix sponsa*) diverged the most from the overall pattern. Differences were due to the protracted migration pattern of blue-winged teal (Bellrose 1976) and the year-round occurrence of resident wood ducks.

Recent proposals have focused on the extension of "framework" dates rather than seeking extensions in the number of season days permitted within the framework. Thus, states contemplating later seasons under a framework extension would face the prospect of reducing a corresponding number of days from their "pre-extension" seasons. Information on the temporal occurrence of peak populations within months, as well as a comparison of peak populations among months, are thus useful in the season selection process. Dates of occurrence of peak population are generally not recorded during refuge surveys. However, we assumed that peak populations occur late in the month on the ascending portion of the population curve (September–November) and early in the month on the descending portion of the curve (January–April) (Fig. 2). Thus, MPI for November (15.8) can be viewed as a minimum index of mean population level for 1 December, while MPI for February (13.5) can be used as a minimum estimator of mean abundance on 31 January.

These data indicate that opportunities for duck harvest in Florida were greatest in December, followed in order by January, November, and February. They also suggest that mean population levels were higher in early December than in late

January. Therefore, the early December through mid–January period offers optimal waterfowl harvest opportunity in Florida within the constraint of the 50-day season option available between 1974 and 1984 (file data, OMBM, USFWS). However, February mean MPIs for ring-necked ducks (*Aythya collaris*), scaup (*Aythya* spp.), and green-winged teal (*Anas crecca*) are higher than those for November, suggesting that late January hunting could improve opportunities to harvest these species (Table 1).

Between 1973 and 1984, Florida chose a split season option, opening on the Wednesday prior to Thanksgiving, and continuing for approximately 2 weeks. Following a 6–12 day closure in early December, the season extended to a date closely approaching the latest permitted (20 January). The practice of opening the season prior to Thanksgiving and closing in early December effectively reduced harvest opportunities because closed dates in December were associated with higher average waterfowl populations than those occurring during open dates in November. Nevertheless, the Thanksgiving weekend duck hunt has become a social affair among Florida sportsmen. The increased opportunity to hunt associated with November holidays may justify a late November opening. However, reopening the second phase of the season later in December and extending the season to 31 January as proposed by a substantial segment of waterfowl hunters would almost certainly reduce harvest opportunity. Chamberlain (1960:34) contradicted this view in his advocacy of a Florida framework extension. However, his conclusions were based on an analysis of duck population data for a limited portion of the state and based in part upon outdated inferences regarding traditional duck hunting methods in Florida (Chamberlain 1960:34, 42).

Our attention has focused on an assessment of migration chronology and recreational opportunities afforded by various season dates. As managers, we are also concerned with impact of harvest strategy on the resource. The anticipated reduction in harvest associated with late January hunting might have a beneficial impact on duck populations if a net increase in species' survival rates resulted. However, changes in the sex and age composition and/or the reproductive status of the harvested population may be of greater significance in terms of population impacts than the number of birds taken. It is, therefore, essential that full consideration be given to these potential changes in the characteristics of the harvested population in season framework extension proposals.

Findings proved useful in responding to public demands for a season framework extension. The dichotomy between actual and perceived temporal changes in duck abundance illustrates the need for objective assessment of migration chronology as an initial response to public pressure for framework adjustments. NWR population records offer an existing data source to support similiar assessments in other states.

Literature Cited

Bellrose, F. C. 1976. Ducks, geese, and swans of North America. Stackpole Books, Harrisburg, Pa. 544pp.

Carney, S. M., M. F. Sorensen, and E. M. Martin. 1983. Distribution of waterfowl species harvested in states and counties during 1971–80 hunting seasons. U.S. Fish Wildl. Serv., Special Sci. Rep. Wildl. 254. 114pp.

Chamberlain, E. B., Jr. 1960. Florida waterfowl populations, habitats and management. Florida Game and Fresh Water Fish Comm., Tech. Bul. 7. 62pp.

Martinson, K. 1975. Resume of harvest—comparisons of Canada, Mexico, and the United States. Proc. Internat. Waterfowl Symp. 1:189–192.

SAS Institute Inc. 1982. SAS user's guide: basics, 1982 edition. SAS Inst. Inc., Cary, N.C. 921pp.

Sokal, R. R. and F. J. Rohlf. 1969. Biometry: the principles and practice of statistics in biological research. W. H. Freeman and Co., San Francisco, Calif. 776pp.

U.S. Fish and Wildlife Service. 1975. Final environmental statement, issuance of annual regulations permitting the sport hunting of migratory birds. U.S. Fish Wildl. Serv., FEIS 75–54. 710pp.