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TIME-ACTIVITY BUDGET OF NORTHERN PINTAILS USING NONHUNTED RICE FIELDS IN SOUTHWEST LOUISIANA

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Abstract.—Monthly behavioral observations of Northern Pintails (*Anas acuta*) were conducted on five leased tracts of nonhunted private land, each including 60 ha of flooded rice fields, in southwest Louisiana during November–February 1988–1989. Pintails spent 52% of diurnal time resting, 21% feeding, 16% in comfort activities, 6% in locomotion, 4% courting and 1% in other behaviors. Activities differed among months and periods of the day. Pintails used nonhunted rice fields only during the day, departing after sunset. Pintail time budgets in Louisiana approximated those reported in California. Pintails using rice fields during the day, however, fed more than did those roosting on open water pools at Lacassine National Wildlife Refuge (NWR), Louisiana. Small (60 ha), nonhunted rice fields provided wintering Northern Pintails security plus food during the day.

PRESUPUESTO DE ACTIVIDADES COTIDIANAS POR PARTE DE INDIVIDUOS DE *ANAS ACUTA* EN CAMPOS DE ARROZ NO UTILIZADOS PARA CAZAR EN EL SUROESTE DE LOUISIANA

Sinopsis.—Desde noviembre a febrero de 1988–1989 hicimos observaciones mensuales de la conducta de individuos de *Anas acuta* en cinco localidades privadas y libres de cacería, del suroeste de Lousiana. Cada área incluyó un campo de arroz inundado de 60 hectáreas. Los patos emplearon el 52% del tiempo diurno para descansar, 21% para alimentarse, 16% para actividades de confort, 6% para locomoción, 4% para cortejo y 1% para otras actividades. Hubo diferencias en las actividades a través de los meses de estudio y períodos del día. Los patos utilizaron las áreas libres de cacería durante el período diurno y partieron de las mismas con la puesta del sol. El presupuesto de tiempo de las aves de Louisiana se aproximó a los informados en California para la especie. Sin embargo, los patos que utilizaron los campos de arroz se alimentaron más que los que descansaron en pozas del Refugio Nacional de Vida Silvestre de Lacassine. Los pequeños campos de arroz, libres de cacería, proveyeron a los patos invernales de lugares seguros y de alimentación durante el período diurno.

Large numbers of waterfowl use the agricultural regions of southwest Louisiana in winter (Bellrose 1980). Tamisier (1976) documented that wintering waterfowl congregated on undisturbed wetlands in southwest Louisiana during the day and dispersed to surrounding agricultural fields

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at night to forage. After the hunting season began in Louisiana, large numbers of waterfowl concentrated on limited areas closed to hunting (i.e., 400,000 ducks on the Lacassine NWR pool [Y. M. Yakupzack, unpubl. data]). In response to concerns that waterfowl concentrated in limited habitat are susceptible to avian cholera, botulism and other diseases (Friend 1987), the Gulf Coast Joint Venture of the North American Waterfowl Management Plan (U.S. Fish and Wildlife Service and Canadian Wildlife Service 1986) leased private rice fields in southwest Louisiana during winter 1988–1989 to increase refuge areas available to waterfowl. It was unknown, however, whether waterfowl would use these small protected areas. We initiated a study to determine if Northern Pintails (*Anas acuta*) would use small, flooded, nonhunted agricultural habitats. We also determined their behavior and arrival-departure patterns to compare with pintails wintering elsewhere.

METHODS

We flooded (<1 m) 60 ha of harvested rice fields on each of five leased parcels of land in three contiguous parishes in southwest Louisiana during late October and November 1988. These fields were posted and patrolled as nonhunted waterfowl refuges.

We quantified a time-activity budget for Northern Pintails using these fields following methods of Miller (1985). We made diel observations from November 1988 to February 1989, with an equal number of observations made each month only in those of the five areas which were holding ≥50 pintails. We made observations in eight sampling periods during the day: the 30 min prior to sunrise (period 1), five equal time-intervals between sunrise and sunset (periods 2–6), the 30 min following sunset (period 7), and 30 min following sunset to 30 min prior to sunrise (period 8). We sampled from each period on four different days during the last 2 wk of each month. We collected data during three 3-min scans for each sex during periods 2–6, and one 3-min scan for each sex in periods 1 and 7. We conducted pairs of scans (one per sex) at preselected random times during each period sampled. We used a Noctron night vision scope to search for pintails during period 8; however, pintails were not present on study areas at night and we eliminated period 8 from analysis.

When we observed a flock, we chose a starting point by randomly selecting a compass bearing between the right and left edges of the flock. We then scanned a transect (Miller 1983, 1985) through the flock beginning at the selected bearing and moving to the right using a 15–60× spotting scope during the entire 3-min sampling interval. If the right edge of the flock was reached, the scope was moved to the left edge, and the scan was continued for the remainder of the 3 min. We used a portable tape recorder to record the instantaneous behavior of each individual (same sex) scanned. After 3 min, another transect was viewed, and the behaviors of birds of the opposite sex were recorded. Behaviors were categorized as (1) feeding, (2) resting (loafing and sleeping), (3) loco-

motion (swimming, walking or flying), (4) comfort movements (preening, bathing, wing flapping and other comfort activities), (5) courtship (displays and copulation), and (6) other (behaviors not included in the primary categories). The number of birds observed exhibiting a behavior was expressed as a proportion of all birds scanned. During observations (except when actually scanning), time of arrival or departure of all pintails also was recorded.

We used a 3-way-factorial analysis of variance with separate analysis for each behavioral category to assess the effects of sex, month and time of day on individual activities of wintering Northern Pintails (PROC GLM, Statistical Analysis System to perform calculations; SAS Institute, Inc. 1988). We used arcsine transformations of the proportional data to satisfy normality assumptions (Zar 1974). We compared differences among monthly means for each behavior category and among periods within each month with Duncan's Multiple Range Test (Steel and Torrie 1980).

RESULTS

We conducted 544 time-activity observations (136 per month). Percent time spent in behaviors did not differ by sex ($P > 0.05$) except males spent more time courting in December (12%) than females (6%; $P < 0.05$), and we combined sexes for further analysis. Throughout the winter, pintails spent 52% of their diurnal time resting, 21% feeding, 16% in comfort activities, 6% in locomotion, 4% courting and 1% in other behaviors.

Percent time spent in each behavior differed by month ($P < 0.001$; Fig. 1). Pintails fed least in November and most in January and February. Resting was the most prevalent activity each month, and was greatest in November. Locomotion and courtship were greatest in December. Comfort activities in November and December exceeded those in January or February.

Percent time spent in each behavior also differed by diurnal period ($P \leq 0.015$), except for the behavior category other ($P = 0.063$; Fig. 2). Pintails fed, courted and engaged in locomotion and comfort activities more ($P < 0.05$) in early morning (periods 1 and 2) and late afternoon (periods 6 and 7), whereas they rested most ($P < 0.05$) during midday (periods 3–5; Fig. 2).

We observed 21 pintail flocks arriving at (14) or departing from (7) rice fields. Flocks that arrived prior to sunrise averaged 294 birds ($n = 9$, median = 200, SD = 166.7). Flocks that arrived after sunrise and prior to sunset averaged 27 birds ($n = 5$, median = 20, SD = 17.2). All flocks departed after sunset and averaged 343 birds ($n = 7$, median = 300, SD = 151.2). All pintails departed refuge rice fields within one hour after sunset.

DISCUSSION

Wintering pintails in Louisiana congregated on nonhunted rice fields during the day with most flocks arriving on the areas before sunrise and

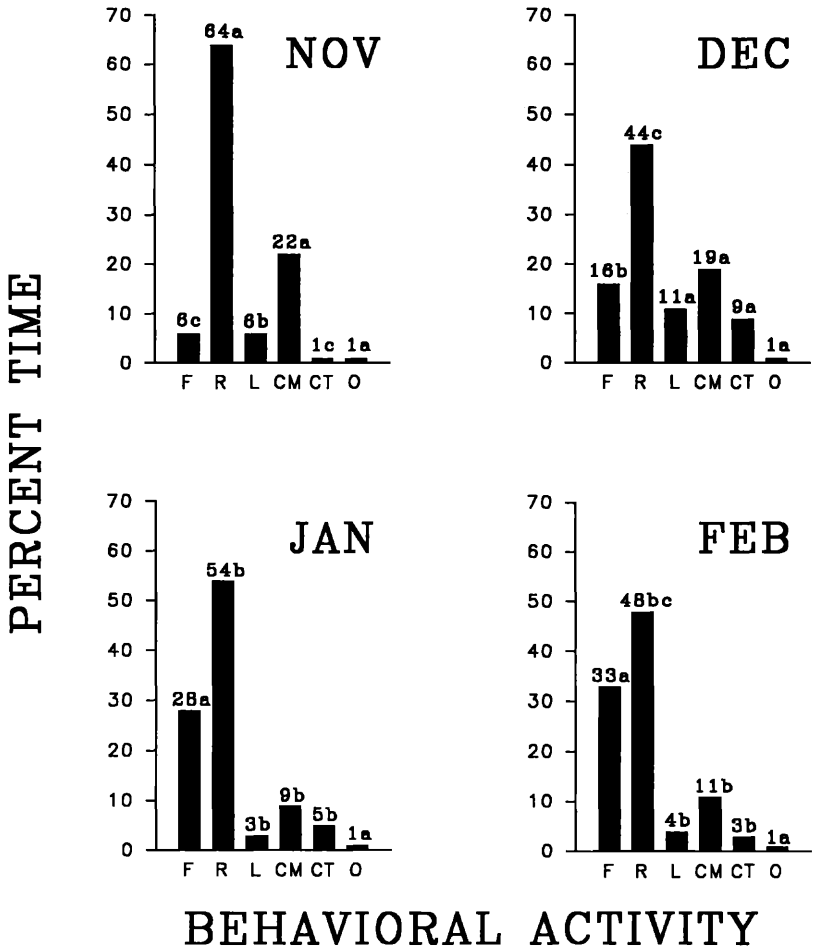

FIGURE 1. Percentage of time spent in feeding (F), resting (R), locomotion (L), comfort (CM), courtship (CT) and other (O) behaviors during each month by pintails wintering in southwest Louisiana rice fields, November 1988–February 1989. Within behaviors, those sharing the same letter among months are not different ($P > 0.05$).

leaving shortly after sunset. Pintails spent the first (periods 1 and 2) and last (periods 6 and 7) hours of daylight in active behaviors: feeding, courting, preening, and in locomotion. During midday (periods 3–5), pintails primarily rested. Tamisier (1976) and Miller (1985) observed similar patterns.

Tamisier (1976) speculated that although waterfowl concentrate on nonhunted areas during the hunting season, diurnal congregation and nocturnal dispersal of wintering waterfowl was not an adaptation to hunting pressure because it was observed prior to and following hunting

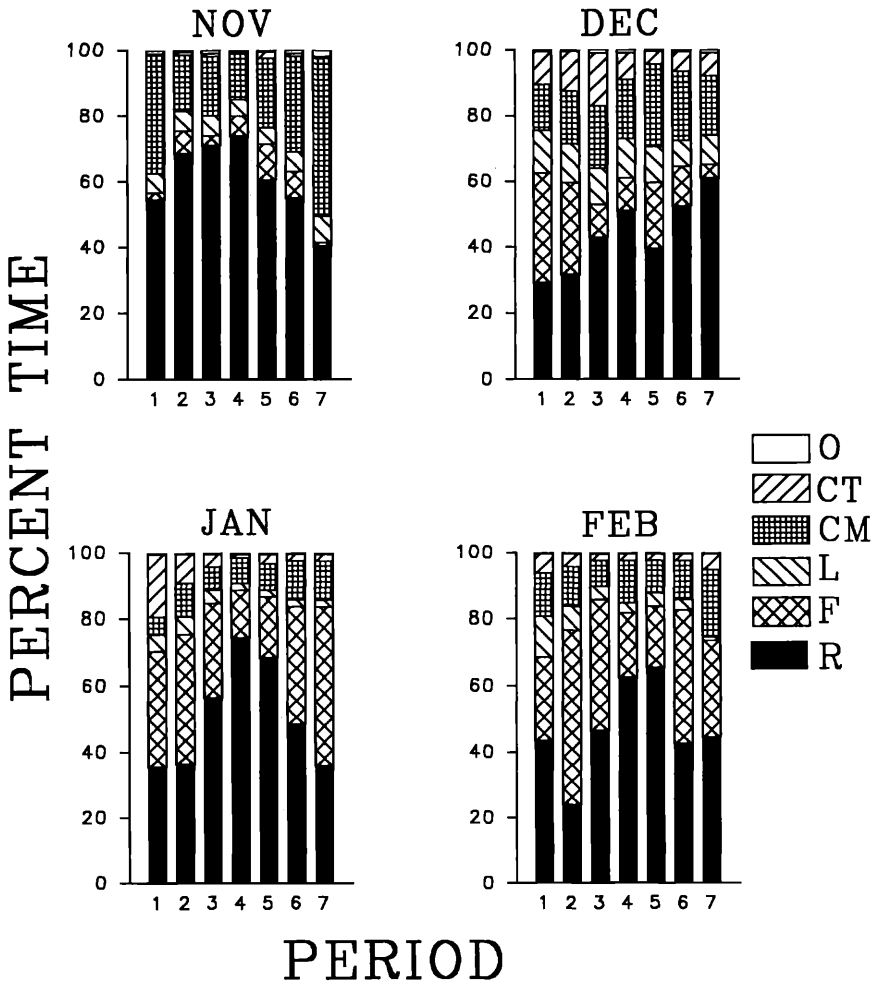

FIGURE 2. Percentage of time spent in resting (R), feeding (F), locomotion (L), comfort (CM), courtship (CT) and other (O) behaviors during each of seven diurnal periods by pintails wintering in southwest Louisiana rice fields, November 1988–February 1989. Period 1 = the 30 min prior to sunrise, periods 2–6 = equal time periods from sunrise to sunset, and period 7 = the 30 min following sunset.

season. This behavior may have evolved to enhance courtship opportunities and to protect individuals from avian predation. For example, 23 of 30 disturbances of pintails that we observed were caused by raptors, primarily Northern Harriers (*Circus cyaneus*). Harriers often harassed groups of ducks every 5–10 min throughout the day. We also saw both harriers and Red-tailed Hawks (*Buteo jamaicensis*) eating ducks in rice fields. Peregrine Falcons (*Falco peregrinus*) also hunted over rice fields.

By congregating in large numbers, pintails may increase their chances of detecting predators while decreasing each individual's chance of being captured (Hamilton 1971). High visibility in open-water areas also may increase opportunity for courtship.

Flooded, nonhunted rice fields provided daytime roosts for pintails before, during and after hunting season. Behaviors of pintails in nonhunted areas, rice fields in California (Miller 1985) and Louisiana (this study), and on the permanent deep-water habitat of the 6475-ha Lacassine NWR pool (Tamisier 1976), have been recorded. Pintails used each of these refuge areas primarily as daytime roosts then dispersed at night. There were behavioral differences, however, between pintails using rice fields during the day and those using the Lacassine pool.

Pintails roosting on nonhunted rice fields spent more time feeding during diurnal periods, Louisiana (21%) and California (18%), than those on the Lacassine NWR pool (5%). This difference may be due to the availability of waste grains and invertebrate foods in flooded rice fields (Harmon et al. 1960, Hobaugh 1984, Miller 1987, Miller et al. 1989). Availability of foods may be critical in late winter when energy needs and foraging effort of waterfowl must increase as birds prepare for migration and reproduction (McLandress and Raveling 1981). Pintails roosting on the Lacassine NWR pool may need to increase nocturnal foraging effort or change diurnal habitats to build spring body reserves, as Tamisier (1976) saw almost no diurnal feeding by pintails on the pool in any winter month. In contrast, pintails roosting on Louisiana rice fields increased daytime foraging from 6% in November to 33% in February.

MANAGEMENT IMPLICATIONS

Our study demonstrated that wintering pintails will use small, nonhunted wetlands as well as large permanent areas such as the Lacassine NWR pool. Shallowly flooded agricultural fields may prove more attractive habitat to wintering pintails than permanent open-water pools because agricultural fields provide the security of open-water plus availability of food during the day.

The proper choice of rice fields for refuges could significantly enhance their benefit to wintering pintails. Creating these habitats near established refuges might help to disperse birds from crowded refuges and decrease the possibility of large-scale die-offs from disease. Waterfowl managers should encourage landowners to flood and protect harvested rice fields and to leave this land inundated throughout winter.

Agricultural fields attract and hold waterfowl throughout North America (i.e., grain fields in Manitoba and Saskatchewan, Bossenmaier and Marshall 1958, Clark and Greenwood 1987; corn fields in Nebraska and Texas, Baldassarre and Bolen 1984, Jorde et al. 1983; and rice fields in Louisiana and California, Harmon et al. 1960, Miller 1987, Miller et al. 1989). Flooding and protecting agricultural fields may increase their

value to migratory birds by creating both roosting and feeding habitat. Judicious leasing of private flooded agricultural fields would complement existing refuge areas for waterfowl and other migratory birds.

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