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OBSERVATIONS ON THE EVENING DEPARTURE AND ACTIVITY OF WINTERING SHORT-EARED OWLS IN NEW JERSEY

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ABSTRACT.—Wintering Short-eared Owls (*Asio flammeus*) were primarily crepuscular and nocturnal. Roost departure occurred most frequently after sunset (83%) with most exceptions occurring on heavily overcast days. Owls usually departed singly or in tandem and engaged in a steady direct flight, presumably to a predetermined hunting area. Hunting was rarely initiated near the roost site. Night observations up to 5 hr after sunset revealed that owls hunted continuously into the night and were not merely crepuscular. Despite their reputation as an on-the-wing predator, extended periods of perch-hunting were often observed after sunset, particularly on windless nights. Active hunting from perches was evidenced by a continual series of pounces and hunting flights that were launched from the same or nearby perches. Owls responded on 3 of 5 trials to broadcasts of prerecorded Short-eared Owl calls with vocalizations and/or vigorous circling flights over the calling station.

The Short-eared Owl (*Asio flammeus*) is primarily nocturnal during the winter months, and hence relatively few attempts have been made to study activity patterns and behavior of the species on wintering grounds (e.g., Short and Drew 1962; Clark 1975; Marr and McWhirter 1982). In this paper I present information on evening roost departure, social interactions and hunting activities of wintering Short-eared Owls in New Jersey.

STUDY AREA AND METHODS

The primary study site was an inland tidal marsh known as the Hackensack Meadowlands (Lyndhurst, Bergen Co.) previously described in detail (Bosakowski 1984). Briefly, the marshes are dominated by common reed (*Phragmites communis*) and are surrounded by dense urban development. Several active and inactive landfill mounds are present in the marsh as well as many warehouses, rights-of-way, and occasional light industry. Weather data were obtained from the National Weather Service, Newark International Airport, located 13 km south of the study area.

During the winters of 1982 and 1983, 25 hr of observation were made on 22 different evenings. I usually arrived at least 0.5 hr before sunset to make observations at dusk at a known roosting area (Bosakowski 1986). Observations were continued until at least 0.5 hr after sunset and occasionally up to 1.5 hr. From a 3 m mound, I recorded the number, location, activity, flight direction, and time that owls emerged for initial evening flight. During late winter 1988, an additional 22 hr of observation were conducted on 7 evenings from late afternoon up to 5 hr after sunset in this same general study area, plus 5 hr at the "Sod Farms" of Pine Island (Orange Co., NY), 2 hr at Great Swamp National Wildlife Refuge (Morris Co , NJ), and 2 hr at a Hightstown roost (Monmouth Co , NJ). Evening roost arrival times of coexisting Northern Harriers (*Circus cyaneus*) in the Meadowlands site were previously reported (Bosakowski 1983).

On 5 different nights, I played prerecorded Short-eared Owl "barking" calls (A Guide to Bird Songs of Eastern and Central North America, Peterson Field Guide Series Record, Houghton Mifflin Co., Boston) at known Short-eared Owl locations for at least 8 min. Taped calls were broadcast at full volume with a portable 7 watt-output cassette tape-recorder placed on the roof of a parked vehicle with observers inside.

RESULTS AND DISCUSSION

Evening Departure. Short-eared Owls were highly crepuscular and nocturnal in the Meadowlands study area. I observed evening departures on 22 occasions with departures ranging between 28 min before–24 min after sunset, although the majority of owls (45 of 54 = 83.3%) emerged after sunset (Fig. 1) which is very similar to the 81.9% which Clark (1975) observed. On 3 evenings owls departed before sunset, but the sky was heavily overcast (total sky cover rating 10 of 10, National Weather Service). Hendrickson and Swan (1938:585) stated "the birds were observed to hunt on several occasions as early as 3 p.m. on a cloudy day and just before sunset on a clear day."

Despite 8 winters of field work in the Meadowlands area, I have only observed 1 Short-eared Owl flying during mid-day. However, the owl was being mobbed by an American Crow (*Corvus brachyrynchos*) and may have been flushed. The owl quickly dove for cover and was never observed hunting. At the Great Swamp site I observed 2 owls emerge just after sunset while waiting at a known roost site. At the Hightstown roost 1 owl emerged just after sunset. At the Sod Farms site, I observed from 3–6 owls on 3 evenings. On the first observation day, owls were actively hunting and flying at about 90 min before sunset even though the sky was partly sunny. How-

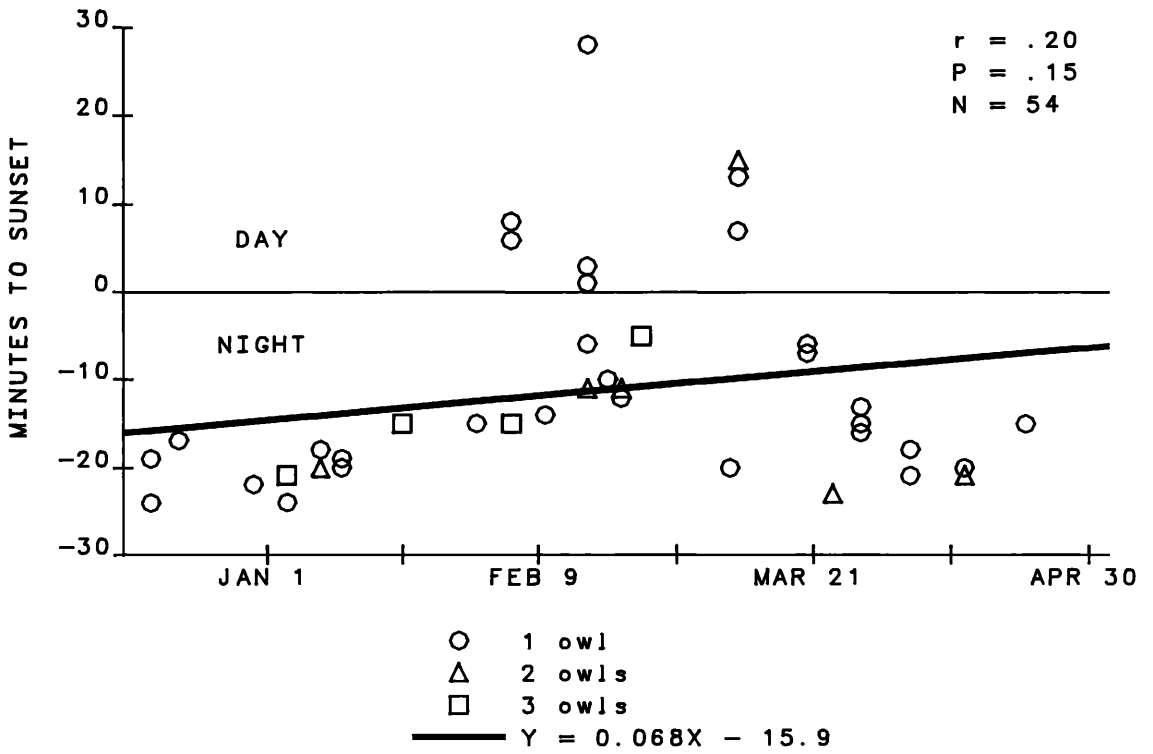

Figure 1. Short-eared Owl roost departure times relative to sunset. Data are combined from the winters 1981–2 and 1982–3. For computation, 12 December was considered day 0 with tic marks displayed at 20-day intervals

ever, on 2 subsequent observation days, owls emerged just at or shortly after sunset.

I observed a slight tendency for roost departures to occur closer to sunset and greater variability as the season progressed toward spring (Fig. 1). This slight change may be due to increasing day length which shortens the available time period for nocturnal activities. Clark (1975) also found a similar tendency, but owls in his study area emerged slightly earlier relative to sunset. In either study, evening departure from winter roosts was usually quite close to sunset. These results are in close agreement with studies in other owl species which show that the initial activity or roost departure is closely correlated with time of sunset (Glass and Nielsen 1967; Smith and Murphy 1973; Fuller 1979; Wijnandts 1984). Light cycle has been clearly demonstrated as the primary synchronizer of circadian rhythms and diel cycles (reviewed by Marler and Hamilton 1966) although Tester (1987) has shown some marked seasonal plasticity in activity periods of several free-ranging animal species depending on important ecological/ethological events (e.g., care of young, courtship, hut building). While the Short-eared Owl is frequently diurnal during the nesting season (Bent 1938; Pitelka et al. 1955), my studies have shown the species to be primarily nocturnal in winter which generally agrees with the observations of Clark (1975) and the Craigheads (1956). Although winter roost departure times are often closely allied with sunset, Short-eared Owls occasionally showed some plasticity by departing earlier on overcast days (this study) and later during inclement weather (Clark 1975).

Interspecific Interactions. Avoidance of interference interactions with diurnal raptors (Jaksic 1982) could be another factor affecting the emergence time of owls in the Meadowlands study area. The owls I observed were roosting within 100 m of a communal roost of 6–9 Northern Harriers (Bosakowski 1983) and usually emerged just after the last harrier had entered the roost for the night (Fig. 2). It is tempting to speculate that this nearly com-

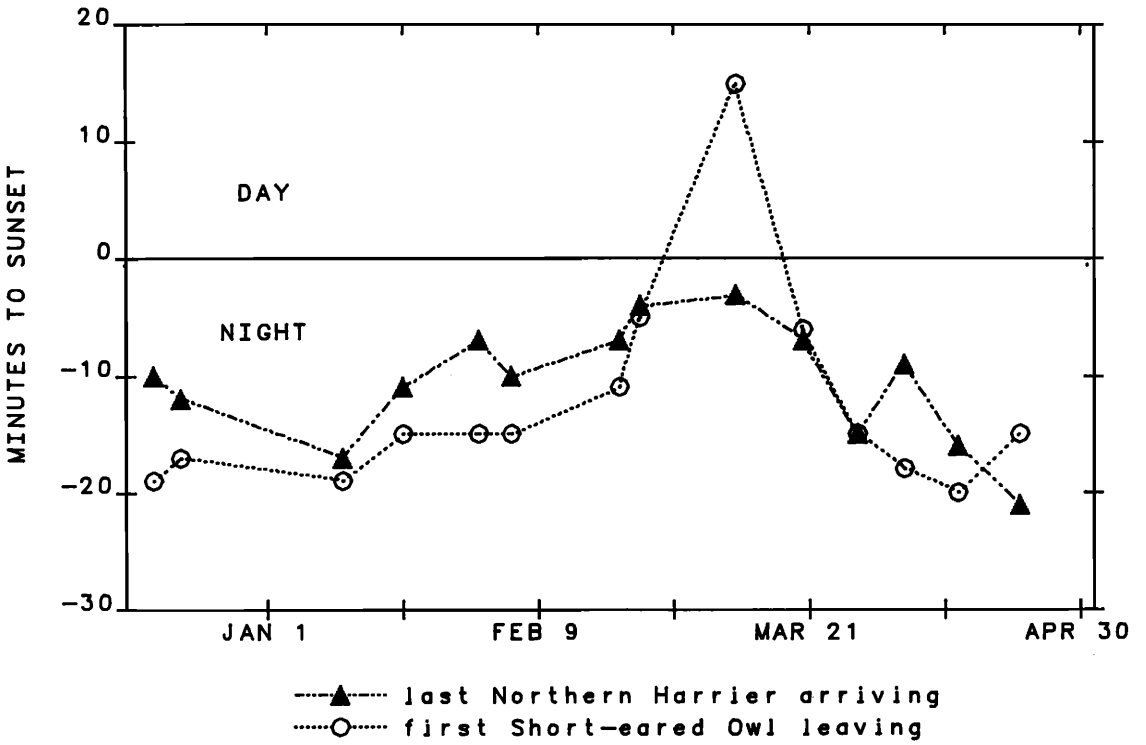

Figure 2. Minimal temporal overlap between Short-eared Owls and Northern Harriers at nearby winter roosts in 1983.

plete lack of temporal overlap was intentional on the part of the owls. Clark (1975) and Watson (1977) have noted frequent agonistic encounters and piracy between harriers and Short-eared Owls. The minimal temporal overlap observed in the Meadowlands area permitted only 2 interspecific agonistic encounters [1 Northern Harrier, 1 Rough-legged Hawk (*Buteo lagopus*)] and suggests a benefit of temporal avoidance. In contrast, at least 3 agonistic encounters with neighboring harriers were observed when owls hunted in the late afternoon at the Sod Farms site.

Initial Activity. On 22 evenings at the Meadowlands site, I observed a total of 54 instances of owls emerging from their ground roosting sites in the marsh. In most cases the initial flight was diagnostic as owls would suddenly emerge from the reeds and immediately ascend to an altitude of 15–20 m. At this point, owls would normally engage in a steady direct flight with unchanging altitude, sometimes in tandem (11 times), presumably en route to a predetermined hunting site. Only occasionally did hunting begin immediately at the roost departure site.

Nocturnal Activity. Kemp (1982) reported that Short-eared Owls have been seen by car headlights hunting in total darkness (no data or source given). Clark (1975) suggested that some hunting takes place at night for he was able to 'squeak them in' at various times of the night in areas where he knew birds often hunted. In my study, observations of nocturnal activities were aided by the use of car headlights, streetlights, flashlights, or scanning for owl silhouettes on moonlit nights or against the glow of city lights on the horizon. I made night observations up to 5 hr after sunset (2230 H) and observed that the owls hunted throughout the period on at least 7 nights. These observations help support the notion that the species is not merely crepuscular, but nocturnal as well.

Short-eared Owls used a combination of flying and perch-sitting as hunting methods. On-the-wing hunting was used conspicuously more on windy nights

as would be expected on the basis of flight energetics (Schnell 1967). Low coursing flights were made over the reeds, typically 2–4 m above the ground similar to that previously described in detail by Clark (1975). Only 4 observations of hover hunting were observed; 2 owls hovered about 15 m above ground adjacent to streetlights. Clark (1975) observed frequent use of hovering and suggested that this hunting strategy perhaps correlated with low prey density. Lack of suitable perch sites could also induce such behavior, for hovering is often used extensively by wintering Red-tailed Hawks (*Buteo jamaicensis*) hunting in open *Phragmites* marsh or on top of sanitary landfills (pers. obs.).

Perch hunting was used for extended periods when wind speed was near zero. Short-eared Owls chose a variety of elevated perch sites (total 33) including bare-topped telephone poles (14), telephone wires (7), saplings (4), fence posts (3), broken-off tree stubs (2), bent steel cable (1), high-tension wire (1), metal sign (1) and once on a Wood Duck (*Aix sponsa*) box. Often an owl would make several short flights or pounces returning frequently to the same perch. On 1 windless night, a Short-eared Owl was observed perching atop a telephone pole for at least 87 min during which time it made 4 unsuccessful pounces (the owl was still perched when I left at 2007 H). On another windless night, an owl was observed at 5 different perches during a 25 min period and then proceeded to make 7 additional hunting flights from the same telephone pole during the next 75 min period (ending at 2145 H). Clark (1975:35) stated that "Short-eared Owls accomplish an undetermined, but probably small, amount of hunting from a perch." My observations, accomplished before and after dark, suggest that perch-hunting plays a more significant role than previously thought, especially after dark, and could represent the primary hunting method used during periods of low wind velocity.

Social Interactions. Few agonistic interactions were observed between owls in the study areas. I observed 1 case of attempted piracy, 1 skirmish at the Sod Farms site on 20 February 1988, and 1 brief encounter, possibly courtship-related, on 10 March 1983 at the Meadowlands site. Similarly, other investigators did not usually notice any significant agonistic interactions until March (Short and Drew 1962) or late February when breeding territories are first defended (Clark 1975). In the Sod Farms site up to 6 owls were seen hunting simultaneously before dark with no apparent territoriality. Clark (1975) has noted as many as 6 owls hunting the same 20 ha field in winter. Vocalizations were rarely heard in the field (2 times). However, on 5 different nights, I broadcasted taped Short-eared Owl calls at known Short-eared Owl locations and owls responded on 3 nights. The owls typically responded within 10 s–3 min with several vigorous circling flights over the vehicle. On 2 occasions, owls also responded vocally to the tape by producing the same call—several short series of 3 barking notes ("wrak, wrak, wrak"). Owl response quickly waned in less than 2–3 min and could not be induced again despite continued or periodic broadcasting at the same location. On 2 unsuccessful nights, the vehicle was in view of a perched owl which only reacted by frequent glancing at the broadcast site. Since the owls I studied did not appear to be territorial, the vigorous response to playback may have been due to social curiosity and mate seeking. I am not aware of any previous reports of call playback techniques to detect Short-eared Owls, but the present results suggest that this method could be a useful management tool for population surveys and identifying Short-eared Owl habitat.

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