

## NON-BREEDING SITE FIDELITY IN NORTHERN SHRIKES

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**Abstract.**—Band-recovery data were examined for evidence of interseasonal non-breeding site fidelity in the Northern Shrike (*Lanius excubitor*), an irregular, long-distance migrant to the northern temperate zone. Despite the low rate of recapture (0.9%) of banded Northern Shrikes in subsequent years, recovery data revealed that 12 individuals were recaptured at or near their original banding locations 1–3 yr after banding. These data strongly suggest that this species is faithful to winter territories and, possibly, migration stopover sites. Site fidelity may be an important strategy for surviving the non-breeding season in this raptorial passerine.

### FIDELIDAD A LOCALIDADES POR PARTE DE INDIVIDUOS DE *LANIUS EXCUBITOR*

**Sinopsis.**—El recobro de aves anilladas fue utilizado para examinar la evidencia sobre la fidelidad hacia áreas no-reproductivas por parte de individuos de *Lanius excubitor*. Esta ave es un migratorio irregular de largas distancias a la zona templada nortea. Aunque la recaptura fue baja (0.9%) 12 individuos fueron recapturados en o cerca de la localidad de captura 1–3 años luego de haber sido anillados. Esto sugiere que la especie es fiel a los territorios en donde pasa el invierno y posiblemente a los lugares de parada críticos (stopover sites). La fidelidad a localidades puede ser una estrategia importante de esta ave para sobrevivir durante la época no-reproductiva.

The faithfulness of many migratory bird species to breeding sites in successive years is well-documented (Gauthreaux 1982, Greenwood 1980). Experience with a particular locality or territory confers advantages of familiarity with resource availability, avoidance of predation, and site or territorial dominance, all of which may contribute to increased fitness. Site fidelity during the non-breeding season appears to be less common, but has been reported with increasing frequency in a number of migratory species (Gauthreaux 1982). Most evidence has involved obligate long- or medium-distance migrants returning to specific locations or discrete territories in successive winters (e.g., Brooks 1985, Faaborg and Arendt 1984, Holmes and Sherry 1992, Kricher and Davis 1986, Ketterson and Nolan 1982, Schwartz 1964). Much less well known is site faithfulness of transient birds to migratory stopover sites (e.g., Nisbet 1969; but see Winker et al. 1991). In general, populations or species characterized by irruptive or nomadic seasonal movements show little non-breeding site fidelity (Gauthreaux 1982).

The Northern Shrike (*Lanius excubitor*) is a circumboreal species that periodically migrates from its North American breeding range in Alaska and central Canada to as far south as central California, central New Mexico, central Missouri, Pennsylvania, and New Jersey (American Ornithologists' Union 1983). Numbers of migrating shrikes fluctuate annually, and the species has not shown any consistent periodicity in its migratory habits (Davis and Morrison 1988). Although Northern Shrikes occupy

discrete winter territories (i.e., non-overlapping, defended areas) in Idaho (Atkinson 1993), interseasonal fidelity to non-breeding sites has not been reported in North America. In this paper we present evidence, based on band-return data, that some Northern Shrikes may be faithful to both wintering and migratory stopover sites.

#### METHODS

We obtained Northern Shrike banding data for 1955–1992 ( $n = 1866$  records) and recovery data for 1923–1992 ( $n = 45$  records) from the National Biological Service Bird Banding Laboratory (BBL). We also obtained unpublished data on Northern Shrike banding recaptures from individual banders, and we used data collected in 1981–1994 by the Vermont Institute of Natural Science. The locations of all returns and recoveries (see definitions below) were compared to original banding locations to determine the extent of shrike site fidelity. Because the BBL data provide locations only by 10' block of latitude and longitude, it was not possible to determine the precise coordinates of most encounters.

We defined a recovery as an encounter of a banded shrike in a block non-contiguous to that in which the bird was banded, a return as an encounter in the same or an adjacent block in a different winter (October–April), and a repeat as an encounter in the same or an adjacent block within a single winter. Because a bird banded and subsequently encountered in an adjacent 10' block might have moved less than 1 km, and could have moved no more than 38 km, we considered all recoveries from 10' blocks adjacent to those of banding to be returns. For each record in these categories, we calculated the time elapsed between the original banding and subsequent encounter.

In attempting to distinguish migration site fidelity from wintering site fidelity, it was not possible to assign individual Northern Shrikes unambiguously to a status as migrants or winterers. Annual variation in the extent and timing of migratory flights (Bailey 1955, Bent 1950, Green and Janssen 1975) undoubtedly causes overlaps in migration and wintering schedules, on an individual and population basis. On the basis of an examination of Northern Shrike sight records from the *Records of Vermont Birds* (1978–1992) and the *Bird Observer* (1980–1993) for the months October, November, March, and April, and from an analysis of the BBL banding data, we established arbitrary cut-off dates of 5 November and 1 April to separate fall and spring migrants, respectively, from wintering birds.

#### RESULTS

*Northern Shrike recoveries.*—Of six banded Northern Shrikes recovered in North America between 1923 and 1992, only two were interstate records. Approximate distances traveled by recovered birds ranged from 20 to 450 km. Five shrikes were recovered in winters subsequent to the ones in which they were banded. Two of these birds were recovered within 20–40 and 40–60 km, respectively, of their original banding sites, suggesting

TABLE 1. Returns of banded Northern Shrikes in North America.

| State or province | 10-minute block <sup>a</sup> | Date of banding | Date of recapture | No. days elapsed | Age at banding |
|-------------------|------------------------------|-----------------|-------------------|------------------|----------------|
| Alaska            | 645-1474                     | 03/14/88        | 03/15/89          | 366              | AHY            |
| Massachusetts     | 423-0731                     | 12/28/74        | 11/02/75          | 309              | U              |
| Michigan          | 461-0854                     | 02/14/36        | 01/23/37          | 342              | AHY            |
| Michigan          | 425-0830                     | 11/09/39        | 03/04/41          | 480              | AHY            |
| Minnesota         | 445-0933                     | 04/15/28        | 04/03/29          | 353              | U              |
| New York          | 422-0782                     | 11/12/77        | 12/12/81          | 1491             | AHY            |
| New York          | 422-0782                     | 12/04/77        | 12/10/78          | 371              | HY             |
| Ontario           | 434-0801 <sup>b</sup>        | 10/23/77        | 02/17/79          | 482              | HY             |
| Quebec            | 452-0740                     | 02/06/54        | 02/20/58          | 1474             | AHY            |
| Quebec            | 452-0732                     | 10/24/55        | 10/25/56          | 366              | AHY            |
| Vermont           | 433-0723                     | 11/04/86        | 11/02/89          | 1093             | HY             |
| Wisconsin         | 444-0875                     | 11/04/84        | 11/01/85          | 363              | HY             |

<sup>a</sup> Location marks the southeast corner of the 10-minute block within which the banding and subsequent encounter occurred, e.g., 433-0723 represents 43°36'N, 72°31'W.

<sup>b</sup> Bird recovered in adjacent 10-minute block 434-0802.

a tendency to return to the same wintering area in successive years. The single within-season recovery was of a shrike banded in north-central North Dakota and shot nearly 4 mo later, some 40–60 km to the west.

*Within-year Site Fidelity.*—We received information on 37 individual Northern Shrikes that were encountered in the same ( $n = 29$ ) or adjacent ( $n = 8$ ) 10' blocks in which they were banded, during the same winter. The period between initial and last encounters ranged from 1–159 d, with a mean repeat interval of 44.8 d (SD = 40.5). The six birds banded in the fall migration period (as defined here) had a significantly shorter repeat interval than the eight birds banded between 6–30 November ( $t = 2.66$ ,  $df = 12$ ,  $P < 0.05$ ).

*Between-year site fidelity.*—Of 17 Northern Shrikes that were recaptured in successive years, 12 (71%) were encountered at or near their original banding locations 1–4 yr after banding (Table 1). Six birds were banded and returned during the winter period (as defined here), three were fall-fall returns, one was a spring-spring return, one was a fall-winter return, and one was a winter-fall return. Nine of these returns were recorded on a calendar date within 1 mo of the original banding date (mean difference = 10.2 d, SD = 9.9). The two shrikes banded and subsequently encountered on calendar dates more than 2 mo apart (Table 1) may have been transients on both sets of dates. Thus, six of the above 12 birds displayed possible fidelity to migration stopover sites. In addition, two shrikes from the BBL sample banded on 6 and 8 November and encountered the following 14 April and 27 March, respectively, may have been site-faithful migrants.

#### DISCUSSION

*Within-year site fidelity.*—Atkinson (1993) documented regular territory occupancy by wintering Northern Shrikes in Idaho. The territories of 12

known-identity shrikes averaged 216 ha, with core activity areas slightly larger than 50 ha, and were occupied for periods of up to 4 mo. Winter territoriality in this species has also been documented in Great Britain (Halliday 1970, Hewson 1970, Mester 1965) and Sweden (Olsson 1984). Territoriality or home range occupancy are known for other species of birds that winter in north-temperate zones (e.g., Snowy Owl [*Nyctea scandiaca*], Boxall and Lein 1982; Townsend's Solitaire [*Myadestes townsendi*], Lederer 1977), as well as for Loggerhead Shrikes (*Lanius ludovicianus*) (Smith 1973) and Brown Shrikes (*Lanius cristatus*) (Pantuwana et al. 1969). The BBL data presented here corroborate Atkinson's findings and suggest that occupancy of a home range or territory occurs regularly in overwintering Northern Shrikes in North America.

*Between-year site fidelity.*—Despite the extremely low between-year recapture rate (0.9%) of Northern Shrikes banded during the non-breeding period, these few data suggest that inter-year fidelity to specific wintering and migration sites does occur. Several factors may contribute to a low return rate in this species, and thus to an underestimate of its site-faithfulness. Northern Shrikes are irregular migrants, typically occurring at low densities and at times of year when few banding operations are active. Most banded shrikes are captured in baited traps or mist nets, and avoidance by experienced birds may preclude the identification of some site-faithful individuals. We received two reports of banded but unidentified Northern Shrikes that appeared at sites where shrikes had previously been banded in different seasons. These may well have been site-faithful birds. Finally, because banding return data are not routinely reported to the BBL, it is unlikely that we received all known records of Northern Shrike returns.

Six banded shrikes provided evidence of winter site fidelity. Although there is no indication that any of these birds partially or wholly overwintered at the sites of encounter in any year, their returns suggest a tendency to reoccupy areas that had provided adequate resources in previous winters. In Great Britain and Sweden, Northern Shrikes have been reported to inhabit the same sites in successive winters (Boyd 1957, Olsson 1981, 1984, Tucker 1942). Evidence of fidelity to wintering sites, based on band returns, has also been recorded for Red-backed Shrikes (*Lanius collurio*) in Africa (Skead 1973) and Brown Shrikes (*Lanius cristatus*) in Thailand (Pantuwana et al. 1969).

Fixation to wintering sites has been shown in Snowy Owls, diurnal predators that similarly breed at high latitudes and move south with varying degrees of regularity. Follen and Luepke (1980) recaptured two of 12 (16.7%) Snowy Owls in Wisconsin during the winter following banding. Oeming (1958) documented returns of three Snowy Owls in Alberta but did not report the number of birds banded. Chevalier (1987, 1989) and Smith (1994) recorded return rates of 2.4% (1/42) and 3.2% (6/186) for Snowy Owls banded at Kennedy and Logan International Airports, respectively. Kerlinger et al. (1985) showed that Snowy Owls regularly winter in the northern Great Plains and Midwest regions of North Amer-

ica, but are irruptive migrants on both the east and west coasts. Fidelity to wintering sites may be more pronounced (or simply more often documented) in species or populations that undergo regular migrations, as suggested above for Snowy Owls. Northern Shrike numbers appear to fluctuate annually over most of their winter range, often asynchronously (Cade 1967, Root 1988), and these fluctuations may account in part for the low return rate documented here.

*Migration site fidelity.*—Although detailed data on the circumstances of most shrike banding encounters were unavailable, migration site fidelity is suggested by the Minnesota, Vermont, Wisconsin, and one of the Quebec birds (Table 2). The Vermont shrike was almost certainly a migrant in both years. It was not known to linger in the vicinity of the banding site, being encountered only on the two capture dates. The early and nearly synchronous encounters of the Quebec shrike during consecutive Octobers also suggest fixation to a fall migration site. The two captures of a Minnesota shrike in consecutive Aprils suggest that some birds may be faithful to spring migration stopover sites. There is also evidence that some Northern Shrikes show fidelity to a particular site during both spring and fall migrations. Three birds banded in early November and reported from the same or nearby locations in March and April may have been site-faithful migrants. A shrike banded in Ottawa, Ontario on 9 Nov. 1985 (just outside our arbitrary fall migration cut-off date) and retrapped on 13 Apr. 1986 may have been a transient on both dates.

Migration site fidelity has been documented most frequently in species, such as many shorebirds, that concentrate at a limited number of stopover sites (Evans and Townshend 1988, Knorr 1973, Smith and Houghton 1984, Thomas 1987). Among passerines, migratory site fixation appears to be very rare (Nisbet 1969; Winker et al. 1991; V. Nolan, Jr., pers. comm.). Although not previously reported for Northern Shrikes, Moreau (1961) documented returns of six Woodchat Shrikes (*Lanius senator*) among a total of 4995 (0.12%) banded during spring migration in Tunisia.

The few confirmed banding returns of Northern Shrikes reported here suggest that site fidelity may be an important part of the species' overwintering strategy. In areas of predictable prey abundance, site familiarity and exclusive access to resources may be crucial to non-breeding season survival. Individual shrikes that are unable to maintain home ranges or that exploit prey densities too low to support continuous occupancy of a discrete area may be forced to move repeatedly and face reduced chances of overwinter survival.

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## LITERATURE CITED

- AMERICAN ORNITHOLOGISTS' UNION. 1983. Check-list of North American birds, 6th ed. American Ornithologists' Union, Washington, D.C. 877 pp.
- ATKINSON, E. C. 1993. Winter territories and night roosts of Northern Shrikes in Idaho. *Condor* 95:515-527.
- BAILEY, W. 1955. Birds in Massachusetts. When and where to find them. South Lancaster: The College Press. 234 pp.
- BENT, A. C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. Natl. Mus. Bull. 197.
- BOXALL, P. C., AND M. R. LEIN. 1982. Territoriality and habitat selection of female snowy owls (*Nyctea scandiaca*) in winter. *Can. J. Zool.* 60:2344-2350.
- BOYD, A. W. 1957. Return of Great Grey Shrike to winter territory. *Brit. Birds* 50:271-272.
- BROOKS, E. W. 1985. Fidelity of an American Tree Sparrow. *J. Field Ornithol.* 56:406-407.
- CADE, T. J. 1967. Ecological and behavioral aspects of predation by the Northern Shrike. *Living Bird* 6:43-86.
- CHEVALIER, S. 1987. A significant return and recovery of a Snowy Owl. *N. Amer. Bird Bander* 12:102.
- . 1989. Kennedy airport Snowy Owls: an update. *N. Am. Bird Bander* 14:73-74.
- DAVIS, D. E., AND M. L. MORRISON. 1988. Changes in cyclic patterns of abundance in four avian species. *Am. Birds* 41:1341-1343, 1345-1347.
- EVANS P. V., AND D. J. TOWNSHEND. 1988. Site faithfulness of waders away from the breeding grounds: how individual migration patterns are established. *Proc. XIX Intern. Ornithol. Cong.* 594-603.
- FAABORG, J., AND W. J. ARENDT. 1984. Population sizes and philopatry of winter resident warblers in Puerto Rico. *J. Field Ornithol.* 55:376-378.
- FOLLEN, D., SR., AND K. LUEPKE. 1980. Snowy Owl recaptures. *Inland Bird Banding* 52:60.
- GAUTHREAU, S. A., JR. 1982. The ecology and evolution of avian migration systems. *Avian Biol.* 6:93-168.
- GREEN, J. C., AND R. B. JANSSEN. 1975. Minnesota birds—where, when, and how many. Minneapolis: Univ. of Minnesota Press. 217 pp.
- GREENWOOD, P. J. 1980. Mating systems, philopatry and dispersal in birds and mammals. *Anim. Behav.* 28:1140-1162.
- HALLIDAY, K. C. R. 1970. Notes on a Great Grey Shrike wintering in Lanarkshire. *Scottish Birds* 6:22-23.
- HEWSON, R. 1970. Winter home range and feeding habitats of a Great Grey Shrike in Morayshire. *Scottish Birds* 6:18-25.
- HOLMES, R. T., AND T. W. SHERRY. 1992. Site fidelity of migratory warblers in temperate breeding and Neotropical wintering areas: implications for population dynamics, habitat selection, and conservation. Pp. 563-575, in J. M. Hagan, III, and D. W. Johnson, eds. *Ecology and conservation of Neotropical migrant landbirds*. Smithsonian Institution, Washington, D.C.
- KERLINGER, P., M. R. LEIN, AND B. J. SEVICK. 1985. Distribution and population fluctuations of wintering snowy owls. *Can. J. Zool.* 63:1829-1833.
- KETTERSON, E. D., AND V. NOLAN, JR. 1982. The role of migration and winter mortality in the life history of a temperate-zone migrant, the Dark-eyed Junco, as determined from demographic analyses of winter populations. *Auk* 99:243-259.
- KNORR, B. 1973. Returns of transient shorebirds. *EBBA News* 34:9-19.
- KRICHER, J. C., AND W. E. DAVIS, JR. 1986. Returns and winter-site fidelity of North American migrants banded in Belize, Central America. *J. Field Ornithol.* 57:48-52.
- LEDERER, R. J. 1977. Winter feeding territories in the Townsend's Solitaire. *Bird-Banding* 48:11-18.
- MESTER, H. 1965. Feeding habits of Great Gray Shrike in winter. *Brit. Birds* 58:375-383.

- MOREAU, R. E. 1961. Problems of Mediterranean-Saharan migration. *Ibis* 103(A):373-427 and 580-623.
- NISBET, I. C. T. 1969. Returns of transients: results of an inquiry. *EBBA News* 32:269-274.
- OEMING, A. F. 1958. Recoveries in Alberta of banded snowy owls. *Can. Field-Nat.* 72:171-172.
- OLSSON, V. 1981. Varfagelns *Lanius excubitor* flyttning och övervintringsområde. *Vår Fågelvärld* 40:447-454.
- . 1984. [Winter habits of the Great Grey Shrike *Lanius excubitor*. I. Habitat.] *Varfagelns Lanius excubitor* vintervanor. *Vår Fågelvärld*. 43:113-124.
- PANTUWATANA, S., S. IMLARP, AND J. T. MARSHALL, JR. 1969. Vertebrate ecology of Bang Phra. *Nat. Hist. Bull. Siam Soc.* 23:161-162.
- ROOT, T. L. 1988. Energy constraints on avian distributions and abundances. *Ecology* 69:330-339.
- SCHWARTZ, P. 1964. The Northern Waterthrush in Venezuela. *Living Bird* 3:169-184.
- SKEAD, D. M. 1973. Red-backed Shrikes returning to the same wintering grounds. *Ostrich* 44:81.
- SMITH, S. M. 1973. An aggressive display and related behavior in the Loggerhead Shrike. *Auk* 90:287-298.
- SMITH, P. W., AND N. T. HOUGHTON. 1984. Fidelity of Semipalmated Plovers to a migration stopover area. *J. Field Ornithol.* 55:247-249.
- SMITH, N. 1994. A decade of Snowy Owls at Logan Airport. *Bird Observer* 22:28-33.
- THOMAS, B. T. 1987. Spring shorebird migration through central Venezuela. *Wilson Bull.* 99:571-578.
- TUCKER, B. W. 1942. The Berkhamsted Grey Shrike. *Brit. Birds* 36:51-53.
- WINKER, K., WARNER, D. W., AND A. R. WEISBROD. 1991. Unprecedented stopover site fidelity in a Tennessee Warbler. *Wilson Bull.* 103:512-514.

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