

## COMMENTARY

### DISPERSAL TERMINOLOGY: CHANGING DEFINITIONS IN MIDFLIGHT?

IAN G. WARKENTIN, *Department of Veterinary Anatomy, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W0, Canada.*

PAUL C. JAMES, *Saskatchewan Museum of Natural History, Wascana Park, Regina, Saskatchewan S4P 3V7, Canada.*

The development of coherent terminology is critical to the dissemination of knowledge. Without a clear understanding of the meaning behind the words used, much could be lost in any attempt to exchange information between the author and reader. In ornithology, as in all other branches of the sciences, words and phrases have been developed and defined as needed to describe the phenomena we encounter. When necessary, the definitions are changed in response to new circumstances, or when new information becomes available that requires clarification of the terminology employed. However, care must be taken to prevent confusion when words are redefined, particularly when the previous definition of a word remains in wide usage, and/or when other valid words already exist to represent the new definition.

Belthoff and Ritchison's (1989) paper on dispersal in Eastern Screech-Owls (*Otus asio*), discussed the movements of radio-tagged juveniles between their natal territories, which they left in July, and the locations of final radio contact made the following fall, winter, and spring. The duration of contact with these birds varied. The majority of final relocations were made in late fall, but one bird was found breeding the following spring and a second was thought to be breeding at that time. In their introduction, Belthoff and Ritchison (1989) initially defined natal dispersal as "movement from natal to first breeding site," following Greenwood (1980). This definition of natal dispersal is commonly accepted and the authors of many recently published papers have utilized this definition in the analyses of their data (Drilling and Thompson 1988, Haig and Oring 1988, Bowen et al. 1989, James et al. 1989, Small and Rusch 1989, Thompson and Hale 1989). However, Belthoff and Ritchison (1989) also proposed an alternative working definition for natal dispersal as, "the permanent movement of individuals to a new location irrespective of whether or not they reproduced after dispersal."

There are several problems with this working definition, beginning with a point which Belthoff and Ritchison (1989) acknowledged; this definition matches that of Greenwood's (1980) term "gross dispersal." The authors also failed to define "permanent" on the basis of any time period or behavioral pattern in the development of their terminology. We assumed, since Eastern Screech-Owls of this population are apparently

nonmigratory and capable of breeding in their first year, that a permanent movement would place these birds in a potential breeding location. In addition, Belthoff and Ritchison (1989) advised caution in the interpretation of their data because of the limited number of birds in their sample which were alive to enter the breeding population the following spring. They also pointed out that at least two owls in their sample made further movements from their wintering areas after spending several months in specific home ranges. It was suggested that some young may have been forced to disperse further in response to the movements of adjacent adults, or to locate potential mates. Thus, the location of a young owl even in mid- or late winter may not reflect true "natal dispersal" following either definition suggested by Belthoff and Ritchison (1989). Contrary to the definition of natal dispersal proposed by Greenwood (1980), their data included few individuals which bred or had the potential to breed. Nor was there a strong indication that these birds had undergone permanent movement to new areas which would not be extended by further dispersal in spring before breeding. Thus, much of the data failed to meet the criteria outlined in their working definition.

Alternative terminology is available which would have been more appropriate to the type of data collected by Belthoff and Ritchison. Given the similarity between Belthoff and Ritchison's (1989) definition of natal dispersal and the original definition of Greenwood (1980) for gross dispersal, perhaps they should have titled their paper "Gross dispersal of Eastern Screech-Owls." Other possibilities can be found in the literature. Various papers have considered similar data in terms of postfledging dispersal (i.e., movements of the young after they become independent of their parents and leave the natal territory to move to the overwintering range; Alonso et al. 1987, Eden 1987, Bull et al. 1988), or the similarly defined "juvenile dispersal" (Gonzalez et al. 1989). Or, they might have employed the descriptor "winter dispersal" (movement from natal areas to wintering sites), as has been used by Haig and Oring (1988) and Warkentin et al. (1990).

Use of the term "natal dispersal" in this paper is confusing because of the overlap between the working definition proposed by Belthoff and Ritchison (1989) and that of a word already defined in the literature (i.e., gross dispersal as defined by Greenwood, 1980). It is also misleading because their definition fails to include a component which is widely accepted as being associated with this terminology, i.e., that the birds must be in a position to breed or to potentially breed after dispersal is completed. In fact only 12.5% (2 of 16) of these birds were known to survive to the breeding season of the following year. Thus, over 80% of their sample were not known to carry out the full extent of natal dispersal as it is more commonly defined, and many of these birds may not have completed their dispersal to future breeding areas at the time of the last telemetry relocation.

In the case of Belthoff and Ritchison's (1989) paper, it would have been more appropriate to have used either the original terminology of Greenwood (1980; gross dispersal); or make use of one of the alternative terms available which are more applicable to the work carried out rather than attempting to redefine proper and accepted terminology.

We thank J. Hudson and J. K. Schmutz for helpful editorial comments.

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*The Condor* 92:803-804  
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#### NATAL DISPERSAL: GREENWOOD (1980) REVISITED

JAMES R. BELTHOFF, *Department of Biological Sciences, Clemson University, Clemson, SC 29634.*  
GARY RITCHISON, *Department of Biological Sciences, Eastern Kentucky University, Richmond, KY 40475.*

Howard (1960) defined dispersal as "the movement the animal makes from its point of origin to the place where it reproduces or would have reproduced if it had survived and found a mate." Greenwood (1980) reasoned that this movement referred only to juveniles undergoing a permanent movement from birth place to first breeding site or potential breeding site and could more correctly be termed "natal dispersal." Greenwood (1980) further observed that this definition of natal dispersal did not specify that the dispersal be reproductively successful. To make this distinction, Greenwood (1980) suggested that natal dispersal could be classified as either gross (the permanent movement of individuals to a new location irrespective of whether or not they reproduce after dispersing) or effective (an individual reproduces following dispersal). Belthoff and Ritchison (1989) examined the movements of juvenile

Eastern Screech-Owls (*Otus asio*) from their birth sites and referred to such movements as natal dispersal. Belthoff and Ritchison (1989, p. 254) defined natal dispersal operationally as "the permanent movement of individuals to a new location irrespective of whether or not they reproduced after dispersal" and noted that their definition of natal dispersal matched one of Greenwood's (1980) definitions of natal dispersal, i.e., gross dispersal.

Warkentin and James (1990) believe it is incorrect to use natal dispersal as a synonym of gross dispersal while it is correct to use natal dispersal as a synonym for effective dispersal. As described above, we felt that Greenwood's (1980) definition of natal dispersal encompassed both gross dispersal and effective dispersal. Thus, although we may have misinterpreted Greenwood (1980), it was not our intention, as Warkentin and James (1990) accused, to "redefine proper and accepted terminology."

Warkentin and James (1990) also observed that Belthoff and Ritchison (1989) defined natal dispersal as a "permanent movement" but failed to define the term "permanent." As noted above, we used the original language of Greenwood (1980) in our working definition of natal dispersal, and Greenwood (1980) also failed to define "permanent." However, we assumed that (1) Greenwood (1980) used the term to indicate that once young leave their natal territories they never return and, (2) therefore, no definition was needed. We