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What Do We Know? A Literature Review of the Eastern Coyote

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ABSTRACT Coyotes (*Canis latrans*) have expanded into the eastern United States over the last 100 years. Increases in their distribution and abundance have been documented and concerns about their presence in urban areas and their impact on both native wildlife and domestic livestock are growing. These effects require further investigation and may require changes to management strategies. Two documents, a book and a technical bulletin, provide general overviews of the biology of eastern coyotes. However, these documents are not comprehensive, and are either not readily available or were published >15 years ago. We provide a comprehensive review of the existing literature to illuminate gaps in our knowledge that can be used to direct future research.

KEY WORDS *Canis latrans*, conflict, eastern coyote, range, research needs, review, summary.

Around the turn of the century, coyotes began moving eastward from their historic range (Moore and Parker 1992), and now occur in all eastern states and Canadian provinces (Moore and Parker 1992, Bekoff and Gese 2003). State wildlife agencies continue to report increases in the number of coyotes harvested since colonization, suggesting their numbers have continued to increase, although there is no additional demographic data to support this. As coyote populations have increased in the east, so have conflicts. In 2005, 35,000 cattle and calves worth > \$20 million dollars were lost to coyotes in the eastern U.S., 3 times the number of animals lost to coyotes 14 years earlier in 1991 (NASS 1992; 2006). Not only are coyotes affecting domestic livestock as seen in increased depredation reports, but coyotes are also having an impact on native wildlife populations. Coyotes are preying on white-tailed deer (*Odocoileus virginianus*) fawns in summer (Kilgo et al. 2010) and adult deer in the winter (Patterson and Messier 2000). These effects require further investigation and may require changes to white-tailed deer management strategies. Expanding coyote populations are even posing a threat to the recovery of endangered red wolves (*Canis rufus*) (Adams et al. 2003) and an endangered population of caribou (*Rangifer tarandus*) (Crete and Desrosiers 1995, Boisjoly et al. 2010).

METHODS

We defined the eastern coyote as those residing east of the Mississippi River and east of Canada's Hudson Bay, areas that coyotes did not inhabit prior to European settlement.

We used several search engines to assure a comprehensive review of the literature including AGRICOLA, BIOSIS, WorldCat, and Wildlife and Ecological Studies Worldwide. Additional references were found by inspecting the literature cited section of each reference obtained. Due to the limited information available on the eastern coyote, we included theses and dissertations, unpublished manuscripts, and gray literature in the form of reports. To categorize documents and provide an indication of information available on eastern coyotes we assigned keywords to each reference, independent of the keywords provided by the author(s). We made no attempt to assess the quality of the research.

WHAT DO WE KNOW?

The search process generated >360 documents including books, book chapters, conference proceedings, peer reviewed papers, theses and dissertations. The resulting annotated bibliography is included with the disc copy of the 14th WDM Conference proceedings.

Many (~27%) of these documents are unpublished theses, dissertations, or gray literature. We assigned a total of 76 keywords: 36 ecological terms, 27 geographic terms, 13 key species names to the documents.

Only a small percentage, (~15%), of keywords were assigned to >31 documents (Figure 1). These keywords were all ecological terms (Table 1). Unfortunately, the results of eastern coyote studies often have high level of uncertainty and a low strength of inference. Even when larger numbers of studies exist on a given top-

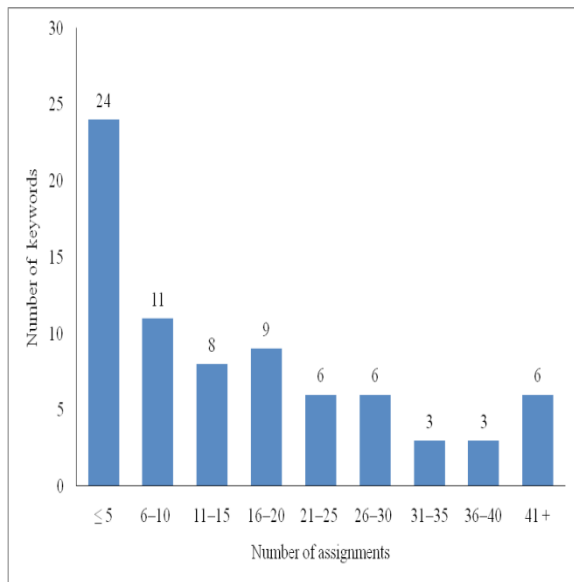


Figure 1. Number of times keywords were assigned to a document.

ic, sample sizes are small and results are difficult to compare given differences in geography, seasonality, and methodology.

Approximately 32% of keywords were assigned ≤5 times, illuminating the extent to which information on the eastern coyote is deficient (Figure 1). Keywords assigned ≤5 times were most often names of species (e.g., raccoon, *Procyon lotor*) and geographic terms (e.g., Virginia). The number of studies conducted in a given state or province appears to correspond somewhat with the number of years that coyotes have been present in a given geographic area. For example, the mid-Atlantic region, which encompasses areas of the states of Delaware, Maryland, North Carolina, Pennsylvania, Virginia, and West Virginia, was the last area of the eastern continental U.S. to be colonized by coyotes (Parker 1995) and has the fewest number

Table 1. Keywords assigned to >31 documents

Keyword	Number of "Hits"
Diet	102
Habitat	62
Home Range	60
Morphology	54
Movements	49
Behavior	45
Hybrid	40
Genetics	39
Range	37
Predation	35
Urban	32
Sociality	32

of studies (Figure 2). In contrast, states with large numbers of studies were colonized by coyotes earlier (e.g., Illinois, Tennessee) or have an individual researcher focusing their efforts on coyotes (e.g., Maine, Massachusetts).

CONCLUSION

A review of the literature illuminated deficiencies in the quality and quantity of information in all areas of eastern coyote ecology. This is compounded by the fact that a significant number of documents on eastern coyotes are unpublished or not readily available. We expected to assign several keywords that

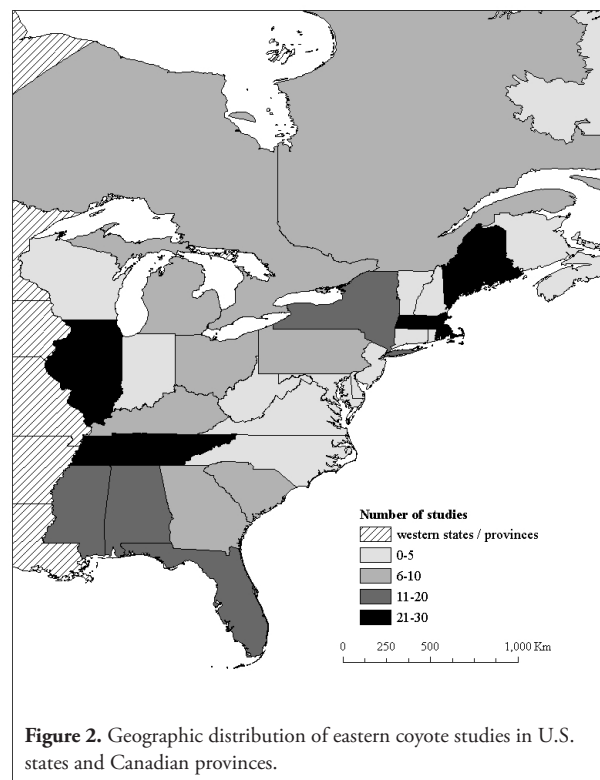


Figure 2. Geographic distribution of eastern coyote studies in U.S. states and Canadian provinces.

never appeared in the literature. The lack of these ecological terms (e.g., exotic species), geographical terms (e.g., Delaware, Maryland, and Rhode Island) and key species names (e.g., shorebird) suggest these areas should be priorities of future research. Information about populations, social behavior, home range, and foraging ecology are of particular priority as this information is vital for wildlife managers to understand and address their impacts.

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