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Coyote Vocal Responsiveness to Broadcast Auditory Stimuli in South Central Indiana

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Introduction

Coyotes (*Canis latrans*) were present in Indiana at the time of pioneer settlement, but were uncommon in most sections of the state until the 1960's (7). At that time, populations dramatically increased (8) and during the 1970's, total number of coyote pelts purchased by resident fur buyers increased 2-3x from one harvest season to the next. In the early 1970's, annual pelt sales were less than 100 but averaged over 2,000 by the end of the decade (6).

Coyote harvest data are useful indices of coyote distribution and abundance, but total harvests are strongly influenced by shifts in hunting and trapping pressure that may result from fluctuations in pelt values (4). Alternative means of obtaining measures of coyote populations are necessary for management purposes.

Aerial counts, scent-station surveys, and broadcasts of electronic siren wails or coyote-howl recordings to detect coyotes have been reported for some western states (1, 2, 3, 11, 12). The use of electronic siren wails, tape recorded wolf (*Canis lupus*) howls, and human howling to elicit coyote vocalizations have also been attempted in the Northeast (5, 10). This paper reports on the frequency of coyote vocalizations elicited through the use of playbacks of cassette-recorded siren wails, coyote howls, and train whistles from June 1986 through May 1987 in south-central Indiana.

Methods

Four test routes were established in portions of Lawrence, Orange, and Martin counties (Figure 1). Nine listening points (stops) were established at approximately 3.2-km intervals along each test route utilizing topographic features conducive to listening efficiency. Testing design was established to evaluate seasonal vocal responsiveness of coyotes to each of the three auditory stimuli. The order in which each test route was conducted was randomly selected each season with each route tested three times per season. Stimulus-type selection was also randomly established for each route test with each stimulus broadcast three times along each nine-stop route. Seasonal test intervals were spring (March, April, May); summer (June, July, August); fall (September, October, November); winter (December, January, February). Stimulus broadcasting was conducted as a two-trial test at each stop. A twenty-second segment of the cassette-taped stimulus was broadcast followed by a two-minute listening period, then rebroadcast and followed by a one-minute listening period. A positive response was recorded when one or more coyotes vocalized during either, or both, listening intervals.

Testing began from 30-60 minutes after sunset and was completed within 90 minutes. Tests were scheduled at the rate of one route per week, but adverse weather patterns necessitated occasional departure from this schedule.

Broadcasts of the auditory stimuli were through a portable cassette-tape player linked to a Model S-610 Perma Power Half-Mile Hailer 12-watt speaker manufactured by Perma Power Electronics, Inc. of Chicago, Illinois.

Log linear analysis of categorical data were initially used to test interaction be-

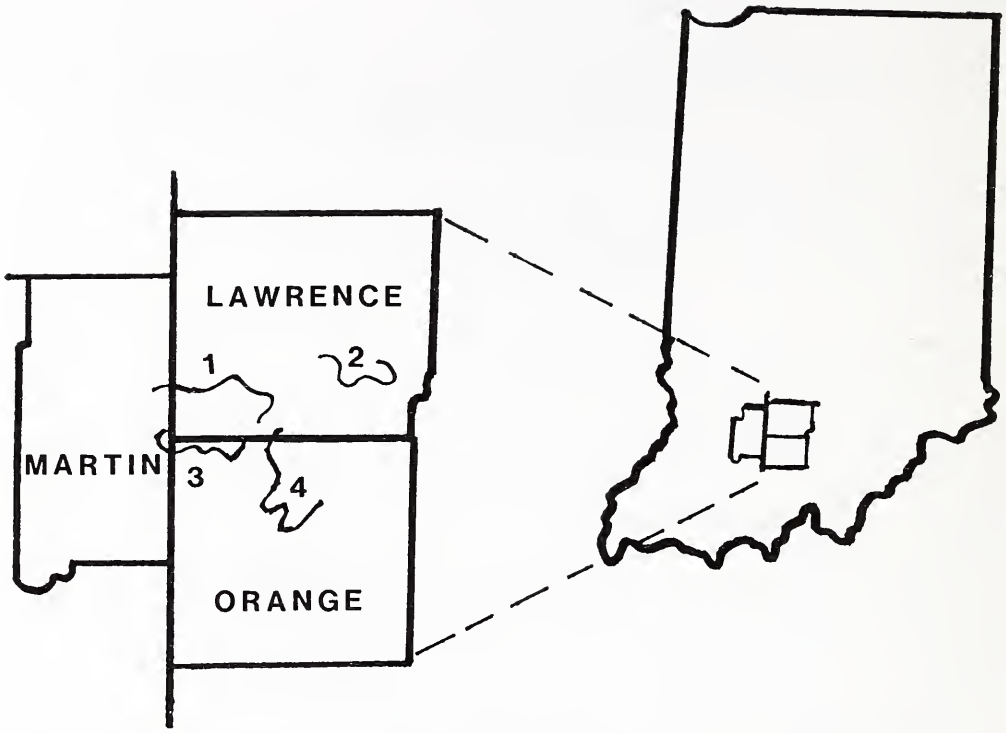

FIGURE 1. Locations of coyote vocal response test routes in south-central Indiana: Huron Route (1), Lawrenceport Route (2), Scarlet Route (3), Orangeville Route (4).

tween season and stimulus effects. Chi-square tests were calculated to evaluate significance of the main effects.

Results

One or more coyote group vocalizations were heard following 26 (6%) of the 432 broadcasts of the auditory stimuli (Table 1). Most elicited vocalizations (65%) followed tests of the coyote bark-howl and group yip-howl stimulus. Twenty-seven per cent of elicited vocalizations followed playbacks of the siren wail stimulus, and only 8% of the elicited vocalizations followed tests of the train whistle recording. Variation in vocal response levels among the three types of auditory stimuli were significant ($P < 0.001$).

Significant variation in coyote responsiveness ($P < 0.05$) occurred among the four seasons (Table 1). More responses (46%) were obtained in summer tests than in the fall (27%), spring (15%), or winter season (3%). The number of coyote vocalizations obtained among the four test routes was quite uniform. Overall response rates ranged from 4.6-6.5%, and variation in response levels among the routes was not significant ($P > 0.90$). Vocal responses were too few to permit evaluation of whether coyote responsiveness to stimulus type was consistent across seasons.

Discussion

Although the overall vocal response rate (VRR) by coyotes to broadcasts of the three types of auditory stimuli of 6% was low, the summer VRR of 22% (Table 1) to the coyote howl stimulus is comparable to the VRR of 26% following 1,286 siren soundings in the months of June through August over a three-year period in Iowa (2). It also compares favorably with the VRR of 25% documented for 14 radio-

TABLE 1. Seasonal responsiveness of coyotes to three types of auditory stimuli along four south-central Indiana routes from June 1986 through May 1987. Thirty-six tests were conducted for each stimulus type each season for a total sample size of 432.

Stimulus Type	Number Of Group Responses	Response Rate (%)
Summer		
Coyote Howl	8	22.2
Siren Wail	2	5.5
Train Whistle	2	5.5
	12	11.1
Fall		
Coyote Howl	3	8.3
Siren Wail	4	11.1
Train Whistle	0	0.0
	7	6.5
Winter		
Coyote Howl	3	8.3
Siren Wail	0	0.0
Train Whistle	0	0.0
	3	2.8
Spring		
Coyote Howl	3	8.3
Siren Wail	1	2.8
Train Whistle	0	0.0
	4	3.7
All Seasons		
Coyote Howl	17	11.8
Siren Wail	7	4.9
Train Whistle	2	1.4
	26	6.0

telemetered coyotes following siren soundings and human howling in the Adirondack Mountains of New York during August to mid-October (9). The overall VRR in this study is similar to the average response rate (7%) of coyotes to taped wolf howls and siren wails throughout the year in another New York study (5).

Responsiveness of coyotes to broadcasts of the auditory stimuli in this study may have been higher than the data presented indicates. There were instances where as many as three identifiable coyote groups were heard vocalizing after broadcasts of the siren wail or coyote howl recording at one listening site. However for statistical analyses, multiple group vocalization data were not included because additional group vocalization may have been in response to the elicited vocalization rather than to the broadcast stimuli. A total of 35 coyote group vocalizations was recorded, 26 of which occurred within the summer and fall seasons.

The train whistle stimulus had little merit in elicting coyote vocalizations. However, the tape recorded train whistle used, may have been of a lower frequency and intensity than train engine whistles in use at sites where coyote vocalizations have been reported to occur. It also may be that coyotes whose home ranges fall within proximity to railroad crossings are stimulated to howl only after they're exposed to a number of train whistle blasts and vocalizations reported by others may have been conditioned responses.

Use of broadcast auditory stimuli appears to be most valuable for determining coyote occurrence within a proposed area. Broadcasts of either the siren wail or a coyote howl recording are satisfactory to detect coyote presence in Indiana. Use of broadcast auditory stimuli during the summer or fall season seems most efficient for rapidly determining if coyote family groups might be present in a defined area. In two instances, coyote pup groups vocalized from their den site in response to the coyote howl recording during April testing. Concentrated efforts to broadcast either the siren wail or coyote vocal recording during the spring season might be useful in locating and obtaining pups for a particular project.

Acknowledgment

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