

Observations of Coywolves, *Canis latrans* × *lycaon*, Crossing Bridges and Using Human Structures on Cape Cod, Massachusetts

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I directly observed Coywolves (*Canis latrans* × *lycaon*; also called Eastern Coyote) successfully crossing over rivers/bays by traveling on paved (i.e., used by vehicles) bridges within their established territories. These data confirm that Coyotes/Coywolves use these narrow corridors in their travels, such as when colonizing new areas. I also report on breeding female, sick, and old Coywolves using human structures, including under overturned boats/canoes, under houses, and under sheds/decks. Breeding females ($n = 3$) used these sites as dens, and sick ($n = 2$) and old ($n = 2$) individuals used them for shelter.

Key Words: Coywolf, Eastern Coyote, *Canis latrans* × *lycaon*, bridges, buildings, corridors, human structures, movements, urbanized, Cape Cod, Massachusetts.

Coyotes (*Canis latrans*) and Coywolves (*Canis latrans* × *lycaon*; also called Eastern Coyote: Way et al. 2010) are very successful, having expanded their range and colonized offshore islands/peninsulas by using drifting pack ice or wide canals (see Way 2002 and Way 2007 and sources within), bridges (Sacks et al. 2006), and, remarkably, extremely urban New York City (Fener et al. 2005). However, there has not been a direct description of these unique colonization events, as most studies report cause and effect, e.g., a radio-collared individual makes it to the other side of Cape Cod Canal in Massachusetts and is found dead (Way 2002), one shows up in Central Park, New York (see Fener et al. 2005 and sources within), or the genetics of an individual strongly implicate it in crossing the 2 km Golden Gate Bridge into San Francisco, California (Sacks et al. 2006).

Urban Coywolves typically have large home ranges (Way et al. 2002), move daily long distances (Way et al. 2004), and usually den (e.g., under fallen trees or into roots on the side of hills: Way et al. 2001) and sleep (Way et al. 2004) in wooded parts of their territories. In essence, they behave similar to Coyotes and Coywolves from more rural areas (Harrison and Gilbert 1985; Harrison 1992a, 1992b; Patterson et al. 1999; Patterson and Messier 2001) and individuals likely disperse along an urban-to-rural gradient (i.e., they don't restrict themselves to a particular level of urbanization during their lives: Way 2007). Urban Coyotes/Coywolves naturally have many houses/buildings and residential neighborhoods within their territories (Grubbs and Krausman 2009), but use of human structures is not commonly reported (but see Way 2007*: 87-91). However, Grubbs and Krausman (2009) reported a pack of Coyotes in Tucson, Arizona, USA, using a culvert and utility easement between two rows of houses as den sites and quoted Froman (1961), who

reported dens in culverts under roads with heavy traffic, in basements of abandoned houses, and directly behind a drive-in movie screen.

Here I document (1) direct observations of radio-collared Coywolves using paved bridges located on main roads within the town of Barnstable on Cape Cod, Massachusetts, and (2) Coywolves using overturned boats/canoes, Coywolves under houses, and Coywolves under sheds/decks in Massachusetts.

Observations of Coywolves Crossing Bridges

I observed Coywolves crossing two bridges (Figure 1). The first bridge (Bridge 1), on South Main Street, separates the villages of Centerville and Osterville. The double-lane (i.e., one lane of traffic going in each direction) bridge is 9.8 m wide, not including 1 m sidewalks on each side, and is 161.5 m long, including 42.7 m of it that goes over the 30.5 m wide Bumps River (the eastern side of the bridge) and 118.9 m of it that goes over a marsh which floods during high tide (the western side of the bridge). It is relatively flat but on a slope going downhill to the west and elevated over the river and marsh. To get to the other side without swimming the river or crossing the bridge, Coywolves would have to travel approximately 1.6 km north to get around the river. This bridge was within the territory of the Craigville pack, consisting at the time of four or five full-sized (i.e., adult/yearling) individuals, two of which were radio-collared.

The second bridge (Bridge 2), located on Bridge Street in the village of Osterville, is a drawbridge (i.e., it opens for passing ships). It goes over a river channel 68.6 m wide that separates North Bay from West Bay, with the bridge providing road access and connecting to the island of Oyster Harbors. The bridge is 131.1 m long from where Coywolves enter and exit the bridge area and has a distinct hump-like shape,

TABLE 1. Details of observations of Coywolves crossing two bridges within the town of Barnstable on Cape Cod, Massachusetts.

Date	Time	Number sighted ¹	Light level ²	Comments ³
Bridge 1 —South Main Street, separating the villages of Centerville and Osterville				
29 December 2008	23:07	3 (1)	N	Car off in distance; <i>Cost</i> leads the three across.
28 May 2009	06:39	2 (1)	C/D	Light out (just after dawn); <i>Ice</i> and a reddish uncollared Coywolf return to <i>Cost</i> 's den.
3 June 2009	06:05	1 (1)	C/D	<i>Ice</i> crosses bridge while it is light out (early AM).
30 October 2009	00:02	4 (2)	N	A most impressive sighting of four adults (including <i>Ice</i> and <i>Cost</i>) traveling together within 3–4 m of my truck.
Bridge 2 —Bridge Street in the village of Osterville				
30 June 2008	23:07	2 (1)	N	Took 87 minutes from initial observation to cross the bridge (<i>Mill</i> and the uncollared Coywolf stayed localized nearby). SUV approaches and brakes as <i>Mill</i> crosses bridge and runs under guard rail to escape.
20 July 2008	00:08	1 (1)	N	<i>Mill</i> and companion stop and look both ways before crossing over drawbridge.
24 July 2008	01:01	2 (1)	N	<i>Mill</i> and companion stop and look both ways before crossing over drawbridge.
20 December 2008	00:07	2 (2)	N	<i>Mill</i> and <i>Eb</i> jump over guard rail on ~20 cm of snow, stand on road for ~10 seconds looking around, then cross bridge together.
14 April 2009	19:31	1 (1)	C	<i>Mill</i> crosses bridge at dusk to return to his mate's (<i>Eb</i>) den.
2 September 2009	20:22	1 (1)	N	<i>Eb</i> turns away six times in 41 minutes before crossing with no cars approaching.
19 February 2010	22:26	2 (2)	N	<i>Eb</i> and <i>Mill</i> travel together side by side across.

¹Number of Coywolves observed crossing bridge with number of radio-collared Coywolves in parentheses.

²N = Night/dark, C = Crepuscular (dawn/dusk), D = Daytime.

³Radio-collared individuals: *Cost*—15-kg breeding female; *Ice*—18.8-kg young male; *Mill*—19.6-kg breeding male; *Eb*—16.5-kg breeding female.

including a grate 14.9 m long × 7.6 m wide at the crest. This grate allows the bridge to open for boats. On both sides of the bridge, there are narrow sidewalks 0.5 m wide and guard rails which are 33 cm and 63.5 cm from ground level to the bottom and top rails, respectively. This bridge is within the territory of the Osterville pack, which consisted of four or more individuals (two of which were radio-collared) during mid-winter (Figure 1).

During observations of bridge crossings, I positioned myself at a vantage point where I could see the bridge from my parked vehicle with the engine and lights turned off that was far enough away so that I would not disrupt animal movements. I used radio-telemetry gear to detect when radio-collared individuals were nearby, and both bridges had overhead street lights which aided my observations with binoculars.

I made 11 observations of Coywolves crossing these bridges, with 4 of the sightings on Bridge 1 and 7 on Bridge 2 (Table 1). Between 1 and 4 Coywolves were observed crossing bridges at the same time (mean = 1.9), and all observations involved one or two individuals that were equipped with a radio-collar. Eight of the sightings occurred at night, one at dusk, and two post-dawn, when it was fully light outside (Table 1).

These bridges connect mainland sites and nearby small islands on Cape Cod. This paper provides veri-

fication of Coywolves traveling on paved bridges. Based on the behavior of these animals crossing the bridges (e.g., looking both ways before crossing and their familiarity with the area), this was probably a regular occurrence for both of these two packs as they traveled through their sizable territories (Figure 1). Way and Eatough (2006) noted Coywolf use of micro-corridors (e.g., hole/opening in fence) in a heavily urban area. Similarly, this paper details Coywolves using small, linear corridors (i.e., bridges), and provides evidence that the species probably uses these structures to aid in its colonization of seemingly disparate areas in its expanding geographic range (e.g., see Way 2002; Fener et al. 2005; Sacks et al. 2006).

Use of Urban Structures

I documented three breeding female Coywolves that gave birth under human structures. On 12 April 2002, I found a litter of nine ca. 25-day-old pups under a shed in a highly residential area (~0.1 ha lots) in downtown Falmouth (see Way 2007*). The mother, which was not radio-collared, was fed by people. She slept in backyards and used sheds and decks in multiple years (personal communication, Falmouth Department of Natural Resources).

On 28 March 2007, I observed a radio-collared 18.6 kg female denning under an overturned rowboat

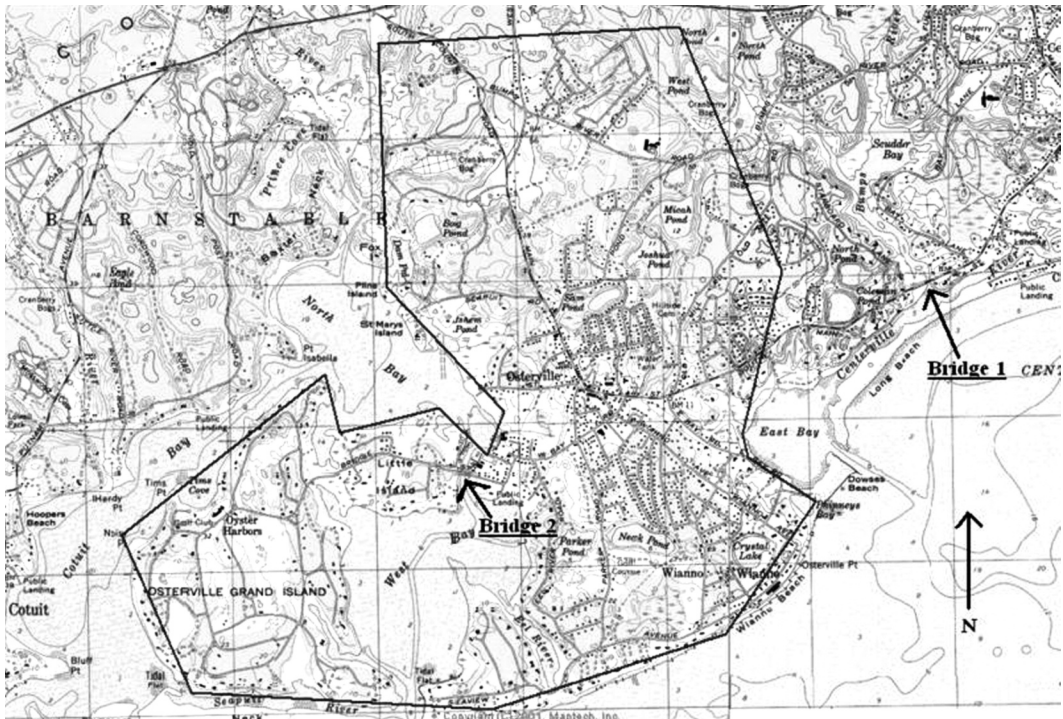


FIGURE 1. Location of the two bridges described in this paper with 1 km grids as scale. Territory size of Osterville pack is shown on this topographical map to illustrate how Bridge 2 connected their otherwise fragmented territory. The Centerville pack's territory bordered the Osterville pack's eastern boundary and went east off the map. Hence, Bridge 1 is in the southwestern part of the Centerville pack's territory.

about 5 m from a house at the northeastern edge of Long Pond in Centerville, within the town of Barnstable. I heard an unknown number of pups whimpering and observed the female nursing them. The residents of the house did not know she was there.

On 18 March 2009, I observed a 14.6-kg radio-collared female leave the general area of a canoe when I approached from a backyard on Bay View Road on the north side of Scudder Bay in Centerville. I saw two newborn pups under the overturned canoe, which was 50–75 m south of two houses. No adult Coywolves other than the breeding females were observed using these structures. The two mid-March whelping dates are about two weeks earlier than reported by Way et al. (2001) from the same study area.

I observed a total of four instances of sick ($n = 2$) and old ($n = 2$) Coywolves using human structures. In mid-June 2002, I found the remains of an 11-year-old 17.7-kg female dead under a shed separating two cranberry bogs (Way and Strauss 2004*). She had been located > 400 times and had never been documented using a human structure until her last (i.e., death) location (note: I did not track her for about 6 months before her death: see Way 2007*: 90).

On 18 February 2003, my colleagues and I tracked a 14.5-kg male with severe mange in the town of Saugus (north of Boston) to a wooded area that had a pile of plywood in 45 cm of snow. We saw two or three fresh sets of tracks leaving the area when we approached, but we located the radio-collared male in a plywood-like den in the wood pile. It appears that his pack mates, none of whom had mange, were bedded nearby while he was resting in a dry area (see Way 2007*: 88–89). The Coywolf ended up starving to death in March 2003 despite our leaving food/bait for him (Way 2007*).

I radio-tracked a large 25-kg breeding female (see Way and Proietto 2005) from 1998 to 2004 in the village of Cummaquid. The animal's behavior changed dramatically in January 2005, when, during a two-week period, 90 cm of snow fell. She was located on six occasions sleeping under sheds and/or decks in highly residential neighborhoods at the southeastern edge of her range. Most of these locations were in unoccupied summer houses. She had recently been displaced from (or had vacated) her breeding role and was nomadic until she was shot and killed in early February 2007 (Way and Timm 2008).

During observations from 22 to 25 November 2005, I saw a thin, young 14.5-kg radio-collared male come out from under a porch in a summer home (i.e., unoccupied at the time) in the town of Mashpee on Old Brickyard Road at the southeastern part of John's Pond. A house 50 m away was occupied by people, and there were many houses (~0.1 ha lots) in this neighborhood. He was sick, with shotgun pellets lodged inside his body (determined by X-ray after he died), neck chafing from the collar, and a slight case of mange. He left the house at night and returned during the daytime during those four days. In addition, on 4 December 2005, this animal spent one or two days under a shed at the southeastern part of Ashumet Pond ca. 1 km west of the November house. He was found dead on 22 December 2005 in the general area.

My presence/disturbance was enough to move Coywolves out of these structures, even though I tried to minimize my impact to avoid bothering/moving my study subjects. However, simply disturbing the area would likely have caused all animals to move to alternate locations, similar to breeding females moving dens upon disturbance (Way et al. 2001). In other words, our actions (e.g., either disturbing or leaving the area alone) will likely teach individual Coyotes/ Coywolves about the habitability of a particular location. While Coywolves typically prefer shelter in more wooded areas of their territories (Way et al. 2001, 2004), these accounts indicate that breeding females, sick, and old individuals do occasionally use residential areas/human structures for security, especially summer homes with little human activity. As successive generations of wild animals became increasingly used to living in urbanized areas, use of human structures by wild animals may become more commonplace as these objects may simply be viewed as a natural part of their landscape (i.e., habitable). Managers should prepare for these occurrences and educate the public about Coyote/Coywolf ecology and behavior and ways to avoid or minimize conflicts, such as accepting the presence of these animals (i.e., coexistence) or encouraging Coywolves to find a new shelter by disturbing the area.

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