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Incidental capture of American Crows in coyote-sized box traps

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ABSTRACT. American Crows (*Corvus brachyrhynchos*) are difficult to capture. I used a simple technique (box traps) to capture 151 crows incidental to my eastern coyote (*Canis latrans*) research at two study sites in eastern Massachusetts. Crows were captured at a higher rate during the spring (winter = 33 captures, spring = 70, summer = 22, and fall = 26). Among months, capture efficiency ranged from 0.7% in August to 8.5% in May, with an overall average of 4.1 crows captured per 100 trap days. Although other capture methods (e.g., net launchers and Australian crow traps) have been used to capture crows in greater numbers, box traps can be an important complement to the other capture techniques because they are transportable, easy to use, relatively cheap, and easy to obtain.

RESUMEN. **La captura incidental de cuervos en trampas caja para coyotes**

El cuervo (*Corvus brachyrhynchos*) es una especie difícil de capturar. Use un método simple, la de trampas caja, para capturar a 151 cuervos. Estos fueron capturados de manera incidental a un estudio sobre coyotes (*Canis latrans*) en dos sitios de estudio en el este de Massachusetts. La tasa de captura de los cuervos fue más alta en la primavera (invierno = 33 capturas, primavera = 70, verano = 22, otoño = 26). Entre meses, la eficiencia de la captura tuvo un rango desde 0.7% en Agosto hasta 8.5% en Mayo, con un promedio de 4.1 cuervos capturados para cada 100 días de trampeo. Aunque otros métodos de captura (ej., redes lanzadas y trampas Australianas para cuervos) han sido usados para capturar a cuervos en mayores números, las trampas caja pueden ser un importante método complementario a otros métodos de captura porque son portátiles, fáciles de usar, relativamente baratos y fáciles de obtener.

Key words: box trap, cage trap, capture, capture technique, crow, trapping

American Crows (*Corvus brachyrhynchos*) are difficult to capture and a variety of methods have been used to catch them, including Larsen traps, drop-in and walk-in traps, cannon and rocket nets, net launchers, net guns, and a remote-controlled snap trap (Baglione et al. 2002, Caffrey 2002, Marzluff and Angell 2005, Tsachalidis et al. 2006). Caffrey (2002) reported that crows can be captured in larger traps (e.g., Australian Crow traps and walk-in traps), but making and using such traps can be time consuming and, because of their large size, they can be difficult to transport. The Australian crow trap is reportedly the most successful trap used for capturing crows and has been used to capture hundreds of birds (Kalmbach and Aldous 1940, Tsachalidis et al. 2006). Net launchers and rocket nets have also been used to capture large numbers (>100) of crows (Caffrey 2002). Investigators using other methods, such as Larsen Traps (similar in design to box traps), mist nets, and oral sedatives (alpha-chloralose), have had less success capturing crows, but these methods might be useful for capturing specific individuals (Sakai and Jenkins 1983, Stouffer and Caccamise 1991, Tsachalidis et al. 2006).

In contrast to other types of traps or capture methods, box traps are available from a number of commercial sources (so need not be constructed) and are relatively small and easy to transport. However, the effectiveness of box traps for capturing crows has not been examined. Here, I provide information about capturing American Crows in box traps that were being used to capture eastern coyotes (*Canis latrans*).

METHODS

Trapping was conducted in two areas from March 1998 to December 2008, and my primary objective was to capture eastern coyotes for studies of their ecology in urban areas in eastern Massachusetts (e.g., Way et al. 2004, Way and Eatough 2006). One study area was Barnstable County

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(Cape Cod) in southeastern Massachusetts (approximately 250 km^2), with the town of Barnstable (155.5 km^2) being the primary study site. A second study area included cities on the north edge of Boston, Massachusetts (hereafter north Boston; Way and Eatough 2006), primarily Everett, Malden, Revere, Saugus, Melrose, and East Boston.

Box traps (Tomahawk Live Trap Co., Tomahawk, WI; Tomahawk models 610B [152.4 cm × 50.8 cm × 66.0 cm] and 610C [182.9 cm × 50.8 cm × 66.0 cm]) were used in an attempt to capture coyotes, and the methods used are described in detail in Way et al. (2002). These are large walk-in traps, with animals entering to feed on bait placed at the back of the trap. When set for capture, the animal steps on a pan in the back of the trap to close the front door (connected via a rod to the pan) that locks in place to prevent escape. Traps were bedded (i.e., the metal bottom covered with dirt, leaves, and pine cones) in a wooded area, typically 5 km from other traps to help insure capture of members of different coyote social units. Traps were typically wired open for 2–3 mo to condition coyotes to the traps and checked 2–3 times/week. Bait consisted of meat scraps (mainly cow and chicken) and, occasionally, road-killed animals (mainly gray squirrels, *Sciurus carolinensis*). When bait had been regularly (i.e., with traps checked every 2–3 days) taken from the back of a trap, it was set for capture. Traps were checked at dawn and dusk when set for capture.

A capture was defined as when an animal was trapped and held until the next trap check (Way et al. 2002). A trap day was defined as one trap being in the field for one 24-h period, either wired open or set for capture. Trapping effort was the number of times trap sites were visited (e.g., prebaiting before trap was deployed in an area, baiting wired open traps, and checking traps twice/day when set). Capture efficiency was defined as the number of captures/100 set trap days, and effort efficiency as the number of captures/100 trapping efforts. I immediately released noncoyote captures, including crows, with the exception of raccoons that I sometimes left in traps during dawn checks and released at dusk (<24 h in traps) in an attempt to negatively condition them to the traps.

To examine possible variation in crow capture rates among months and seasons (winter = December–February, spring = March–May, summer = June–August, and fall = September–November), I used a χ^2 goodness-of-fit test. To avoid the effect of differences in trapping effort and the number of days that traps were set for capture (i.e., highest effort during May and lowest in September), I used the average of each month's and season's efficiency values (capture and effort) and not the overall efficiency value (i.e., all captures divided by all trap nights/efforts then divided by 12). Data from the two study sites were pooled to calculate capture and effort efficiency values. Significance was accepted at $P < 0.05$.

RESULTS

Traps were in the field for 19,014 trap days, with traps wired open on 13,922 days and armed for capture on 3713 days. Traps were visited 14,193 times and I captured 931 animals of 21 species, primarily mammals, but including 151 American Crows (as well as 53 Red-tailed Hawks [*Buteo jamaicensis*] and eight Turkey Vultures [*Cathartes aura*]). I captured multiple crows in a single trap on 24 occasions, including 19 pairs, four trios, and one group of six.

I captured the greatest number of crows in May (Table 1), and the number captured differed among seasons ($\chi^2_3 = 38.4$, $P < 0.0001$), with 70, 33, 22, and 26 crows captured during the spring, winter, summer, and fall, respectively. Capture efficiency (crows captured per 100 set trap days) ranged from 0.7 in August to 8.5 in May, with an overall average of 4.1 (Table 1). Capture efficiency differed significantly both among months ($\chi^2_{11} = 103.7$, $P < 0.0001$) and seasons ($\chi^2_3 = 25.2$, $P < 0.0001$), with efficiency highest in the spring and lowest in summer and fall. Similarly, effort efficiency was lowest during August (0.2%) and highest in May (2.8%), with an average of 1.1 crows captured per 100 trap visits (Table 1). Effort efficiency differed significantly among months ($\chi^2_{11} = 46.1$, $P < 0.0001$), but not among seasons ($\chi^2_3 = 5.0$, $P = 0.17$).

Because American Crows were a nontarget species, I released them without handling. Most flew away immediately, except for five wet crows that were released while it was raining. They climbed to tree limbs about 2 m off the ground and remained there as I left the area. Two trapped crows appeared to have broken wings and fresh

Table 1. American Crows captured per month in box traps in eastern Massachusetts along with monthly capture efficiency (captures/100 set trap days) and effort efficiency values (captures/100 trapping efforts).

Month[a]	Days traps were set	Effort[b]	Crows captured	Capture efficiency	Effort efficiency
January	414	1356	17	4.1	1.3
February	299	1184	8	2.7	0.7
March	302	1459	14	4.6	1.0
April	228	1244	11	4.8	0.9
May	531	1598	45	8.5	2.8
June	373	1132	10	2.7	0.9
July	266	1015	10	3.8	1.0
August	270	927	2	0.7	0.2
September	159	788	4	2.5	0.5
October	258	1081	9	3.5	0.8
November	314	1152	13	4.1	1.1
December	299	1257	8	2.7	0.6
Totals	3713	14,193	151	4.1	1.1

[a]For examination of seasonal variation in capture efficiency, I categorized the seasons as winter (December–February), spring (March–May), summer (June–August), and fall (September–November).
[b]Number of times trap sites were visited.

blood indicated that the injuries occurred when they were in the traps.

DISCUSSION

Although American Crows were not the target species, I found that they entered baited box traps. Caffrey (2002) captured 393 crows in 17 yr (no data on effort given) of using net launchers at two study sites, suggesting that these devices are probably more practical (but more expensive, ~$4000 US) than box traps. In addition, Australian crow traps have been used to capture more crows than I did, with Tsachalidis et al. (2006) capturing 75 Hooded Crows (*Corvus corone cornix*) in 3.5 mo using two traps, and Kalmbach and Aldous (1940) capturing 714 crows in one trap in Oklahoma (including 177 in 1 day). Other methods have also been used to capture small numbers of crows, including mist nets ($N = 6$; Sakai and Jenkins 1983), alpha-chloralose ($N = 15$, including a 13.3% mortality rate; Stouffer and Caccamise 1991), and Larsen traps ($N = 1$; Tsachalidis et al. 2006). Although net launchers and Australian crow traps have been used to capture crows in greater numbers than I did, box traps can be an important complement to the other capture techniques because they are transportable, easy to use, relatively cheap ($400 US for the most expensive one), and easy to obtain. The ease of transport is a particular advantage because traps can be deployed at multiple locations, for example, in different breeding territories. However, a disadvantage of box traps (along with most other capture techniques) is that they take a lot of time per individual capture and overall capture success is less than for other documented methods.

Although I occasionally wired traps open to avoid capturing crows, I usually kept traps set to capture crows in the hope that they would subsequently avoid the traps. Although not specifically tested, this seemed to work in some locations, but not others. That is, few or no crows were captured in some traps after one or more crows had been captured, whereas crows were captured in some traps the day after crows had been captured and released. Because I did not mark captured crows, I was unable to determine the extent to which different crows were being captured or individual crows were being recaptured. In some areas, I observed large numbers (i.e., 25–50) of crows in the vicinity of traps, suggesting that I may have been capturing different individuals. However, in other areas, I regularly observed fewer crows (i.e., 5–8 individuals) near trap sites and, at those locations, some crows may have been captured more than once. Kalmbach and Aldous (1940) also recaptured many American Crows using Australian crow traps, including two crows that

were recaptured seven times and 110 crows at least twice. Caffrey (2002), in contrast, reported that few (~ 2%) crows were recaptured using net launchers.

When trying to avoid capturing crows, I did not hang bait at the back of traps. Early in the study, I used wire to attach bait to the top rear of cages to increase the probability that animals would step on trap pans and trigger the traps (Way et al. 2002). However, I captured a large number of crows using that technique so, thereafter, I usually placed bait on the ground behind the trap pan with a "trail" consisting of 3–5 small scraps of bait leading into the trap. Unfortunately, when trapping, I did not note if bait was attached to the top or placed on the ground so cannot quantify the possible effect of bait location on capture rates. However, attaching bait to the top of traps would likely result in more captures because crows jumping to access the bait would seemingly be more likely to hit the trap pan with sufficient force to close the trap. Investigators using my trapping method may want to examine the possible effect of bait location on capture success.

Those using box traps to capture crows may also want to evaluate the duration of the conditioning period. Baiting with open traps (not set for capture) twice a week for 2–3 mo as I did requires little time and allows animals to become familiar with and, thereafter, more likely to enter traps. However, if traps are placed near areas of known activity (e.g., near a roost site), crows may require less time to become conditioned to the trap. In addition, although not tested in my study, crows may become familiar with and enter traps sooner than coyotes would and, if so, the conditioning period could be shortened.

Although the traps I used were expensive (about $400 US) and relatively large, large traps may increase the likelihood of capturing crows. Crows had ample room to move around in the traps (hence the capture of multiple crows in the same trap on several occasions), and this may have increased their comfort level and willingness to enter the traps. Although not quantified, I also tended to see more crow activity at traps in open settings (e.g., fields) where they could likely see for a greater distance around the traps.

One possible negative feature of large box traps is that crows in traps may be injured attempting to escape. To minimize that possibility, I suggest that investigators trapping crows check traps more frequently than I did, perhaps every 2–3 h during the day rather than at just dawn and dusk. Because crows are diurnal, investigators could also watch traps from a distance (or, closer, from a blind) so that captured crows could be quickly removed from traps.

Most American Crows in my study were captured during the spring. Crow family groups were observed provisioning their offspring during that time of year (Chamberlain-Auger et al. 1990) and the increased need for food (especially the meat scraps that I used as bait) may have caused crows to more readily enter traps. Conversely, I captured fewer crows during the summer and fall when food availability is likely greater and, therefore, crows may be less likely to enter traps.

My results suggest that large box traps may be an effective method for capturing American Crows. Because I actually attempted to minimize the number of crows captured during most of my study, investigators may, by using somewhat different methods (e.g., by wiring bait to the top rear of the trap), have greater success at catching crows than I did. Future researchers should compare this technique with the two most successfully reported methods, net launchers and Australian crow traps.

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