Abstract—Crab traps have been used extensively in studies on the population dynamics of blue crabs to provide estimates of catch per unit of effort; however, these estimates have been determined without adequate consideration of escape rates. We examined the ability of the blue crab (*Callinectes sapidus*) to escape crab pots and the possibility that intraspecific crab interactions have an effect on catch rates. Approximately 85% of crabs that entered a pot escaped, and 83% of crabs escaped from the bait chamber (kitchen). Blue crabs exhibited few aggressive behavioral interactions in and around the crab pot and were documented to move freely in and out of the pot. Both the mean number and size of crabs caught were significantly smaller at deeper depths. Results from this study show that current estimates of catch per unit of effort may be biased given the high escape rate of blue crabs documented in this study. The results of this paper provide a mechanistic view of trap efficacy, and reveal crab behavior in and around commercial crab pots.

An evaluation of the effects of blue crab (*Callinectes sapidus*) behavior on the efficacy of crab pots as a tool for estimating population abundance

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Population dynamics of blue crabs (*Callinectes sapidus*) can be studied by using a variety of fishery dependent and independent methods, such as the use of crab pots (Abbe and Stagg, 1996), bottom trawl data, and commercial fisheries landing statistics (Lipcius and Van Engel, 1990). Commercial fisheries data sets provide extensive information on blue crab landings which are related to population dynamics (Lipcius and Van Engel, 1990), but pots and trawl information are also used because of the need for independent assessments of population dynamics. Pots are viewed as an important method for assessing blue crab abundance through estimates of catch per unit of effort (CPUE) (Abbe and Stagg, 1996) because CPUE is generally assumed to be proportional to total abundance (Harley et al., 2001). However, previous studies have indicated that CPUE may not accurately correlate with changes in abundance (Harley et al., 2001). Factors that have been shown to bias CPUE for crustaceans include soaktime (Miller, 1974; Smith and Jamieson, 1989a), freshness of bait (Smith and Jamieson, 1989b), temperature (Sharov et al., 2003), and pot design (Miller, 1974; Smith and Jamieson, 1989b). The usefulness of surveys for population assessment depends on accurate methods to identify and control for these biases.

Behavioral factors, such as intraspecific interactions, affect crustacean catch rates and can lead to biased CPUE estimates. Studies have shown that interactions among conspecifics negatively affect portunid crabs and American lobster (*Homarus americanus*) catch rates (Williams and Hill, 1982; Jury et al., 2001), and Miller (1974) showed that catch rates of Dungeness crab (*Cancer magister*) decreased with increasing pot density. Jury et al. (2001) observed with the use of underwater videotape recordings that the aggressive behavior of American lobsters played a vital role in overall American lobster catch rates. What is not clear is whether there is a consistent relationship between aggressive species and pot catch rates.

The blue crab is an economically and ecologically important species to Chesapeake Bay (Van Engel, 1958) and has well documented intraspecific (Jachowski, 1974; Clark et al., 2000) and interspecific (deRivera et al., 2005) agonistic behavior. It is possible that blue crab behavior in and around crab pots may have a significant role on pot catch rate. To address this notion, we developed techniques to observe crab behavior in and around a crab pot.

Since the 1950s underwater video monitoring has been used in marine science to observe the behavior of fish and invertebrates (Barnes, 1963;

Myrberg, 1973). Early underwater video recording techniques, which are still in use, include towed video sleds (Chapman, 1979), hand-held video cameras (Potts et al., 1987), and remotely operated vehicles (ROVs) (Spanier et al., 1994). Although *in situ* video recording is ideal, high turbidity (as in Chesapeake Bay) can prevent the use of this technique. In the absence of *in situ* video surveillance, mesocosm studies are very effective because the environment can be manipulated to allow for accurate observation in representative constructions of the natural setting.

By combining *in situ* experimentation with mesocosm observation, we attempted to assess whether blue crab behavior affected crab pot efficacy. The specific objectives of this study were 1) to determine whether intraspecific interactions affect catch and escape rates with respect to crab size and abundance; 2) to determine if catch or escape rates are influenced by abiotic factors such as depth or the submersion time of pots; and 3) to assess the effects of blue crab behavior on crab pot efficacy.

Materials and methods

Study site

The study took place during July and August of 2003 at the Smithsonian Environmental Research Center (SERC), in Edgewater, Maryland. Field experiments were conducted at Canning House Bay (CHB), a half-moon–shaped embayment of Chesapeake Bay in the Rhode River. CHB is characterized by sandy beaches intermingled with coarse woody debris, marsh plants, and ever-encroaching populations of common reed (*Phragmites* spp.). The Rhode River is a subestuary that connects to the mesohaline central Chesapeake Bay. Water temperatures in the Rhode River peaks in July, with an average of 27–28°C, and summer temperatures can exceed 30°C along the shore. Salinity varies seasonally in the river from 3 to 17 ppt. Mean tidal amplitude in the river is 0.3 m, and mean low tide level is 0.2 m above mean lower low water. Daily tidal action in the Rhode River is highly influenced by winds, and tidal fluxes greater than predicted can occur. Turbidity in the Rhode River is often high in summer, with Secchi depths <0.5 m (Everett and Ruiz, 1993).

Crab pots

We employed commercial crab pots used by waterman in Chesapeake Bay (Van Engel, 1962) to test crab-pot catch rates. The pots are square wire-mesh (3.8 cm) cubes 55.9×61.0×55.9 cm, with an upper and lower section. The lower section is called the kitchen or bait chamber, and the upper section is called the parlor or trap chamber. There is an entrance on each of the four sides of the kitchen, and a conical bait well is situated in the center. The kitchen and parlor are separated by a wire-mesh panel, raised in the middle to form an inverted V. There

are two openings along the apex of the V that lead into the parlor. The parlor contains two circular escape holes (cull rings) on either side to provide an exit for sublegal-size crabs (smaller than 127 mm). Pots were attached to floats with a 2.5-m line for retrieval.

Field experiment

Field experiments were conducted to assess the effects of blue crab size and water depth on catch and escape rates. Before the pots were set, test crabs were placed to seed (placing crabs in pots before experimental run) the pots in an attempt to initiate behavioral interactions amongst crabs to determine if the presence and size of a crab in a pot affected catch rates. Three water depths were examined: shallow (1 m); medium (2 m); and deep (3 m); the maximum depth of the study site was 5 m. These depths were chosen on basis of previous work at this site by Ruiz et al. (1993) who showed a difference in the abundance and size of crabs with depth. The pots were placed on a muddy substrate free of vegetation or other structured habitat. Test crab sizes were classified as large, small, and control. Large crabs were defined as greater than 155 mm carapace width (CW), small crabs were 127–130 mm CW, and a control of no crabs was also used. The crab size of 127 mm CW was the minimum size for legal catches in Maryland during 2003, and is the minimum size of crabs that cannot fit through the escape ring on the pot. This limit was set because of our interest in blue crabs that are considered legal catch. There were three sampling areas within Canning House Bay, and three pots were placed in each area. Areas were evenly spaced within CHB, and each area contained a deep, medium, and shallow water depth (1-, 2-, and 3-m depths). The pots and depths were distributed in a full 3×3 factorial design. Test crabs used for this experiment were collected predominantly by trawling, and occasionally in pot catches, both of which were undertaken separately from the experiment. To reduce behavioral variance, test crabs had all appendages and were males in molt stage C, an intermolt stage when crabs are presumed to exhibit standard behavior.

During an experimental run, a single test crab was measured, numbered, and placed in the kitchen of each pot before initial deployment. Test crabs were held in deck tanks until needed, and were fed chopped pieces of partially frozen alewife (*Alosa pseudoharengus*) until 24 hours before being placed in the experiment. Pots deployed in the field experiment were also baited with chopped pieces of partially frozen alewife. The bait was chopped, frozen, and then placed in the bait wells of pots before deployment. Catch rates of pots can vary with fresh and frozen bait; however, owing to logistics, frozen bait was used for this experiment. However, because of the summer heat, the bait became partially unfrozen by the time the sampling area was reached and pots were deployed. Pots were placed at depths of 1, 2, and 3 meters in each area of CHB for 48 hours. A single experimental run was 48 h, divided into two 24-h periods. After the first 24 hours, pots were

checked, and the presence or absence and location of the original test crabs were noted. The size, sex, and molt stage of the additional captured crabs were recorded, and any unusual occurrences were documented. Captured crabs were numbered and placed back in their original locations (parlor or kitchen) in the pot. Pots were rebaited and set out for another 24-h period to assess escape rates from baited pots, to determine whether pots would reach some saturation point, and to establish the theoretical density when a pot cannot catch anymore crabs. After the second 24-h period, pots were retrieved, and similar information was recorded. It was noted whether crabs from the first 24-h period had escaped or were still present. Size, sex, molt stage, and location in the pot were recorded for newly captured crabs. After all information was documented, all crabs were released. This experiment was repeated four times, for a total of five trials. Both the size and number of crabs caught were analyzed with a 2-factor analysis of variance (ANOVA) with the factors of depth and test crab size. Additionally, Tukey's honestly significant difference test was used for multiple mean comparisons. All statistical tests were conducted with SAS® software (SAS, vers. 9.0.0, SAS Institute, Inc., Cary, NC).

Crab-trap video (CTV) system

The crab-trap video (CTV) was modeled after the lobster-trap video presented in Jury et al. (2001). It is a low cost tool for observing interactions between crabs in and around pots in a mesocosm. Although it was not used for *in situ* observations in our experiment CTV could be easily modified for *in situ* observations. CTV consists of a standard commercial crab pot matching the specifications described above with video camera equipment attached for observation. A low-light, black-and-white, Sony time-lapse video recorder, model EVT-820, was used to record images every minute for 24 hours. The camera was set 38 cm above the pot on a support system of four 93.9-cm long PVC pipes connected by four shorter PVC pipes 55.9 cm in length (Fig. 1). This configuration allowed the entire pot to be observed, as well as a few centimeters on each side of the pot. For nighttime recording, a red light, undetectable by crabs (A. Hines, personal commun.[1]), was affixed to one of the PVC legs and used to light the area. All images were recorded on Hi-8 tapes in an adjacent building connected to the mesocosm camera by cables. Connection cables were placed approximately 40 cm above the surface of the water surface in the mesocosm experiment. The system was capable of collecting data for at least 24 hours; therefore it continuously captured all crab interactions within the field of view for the experimental time-frame. The system also
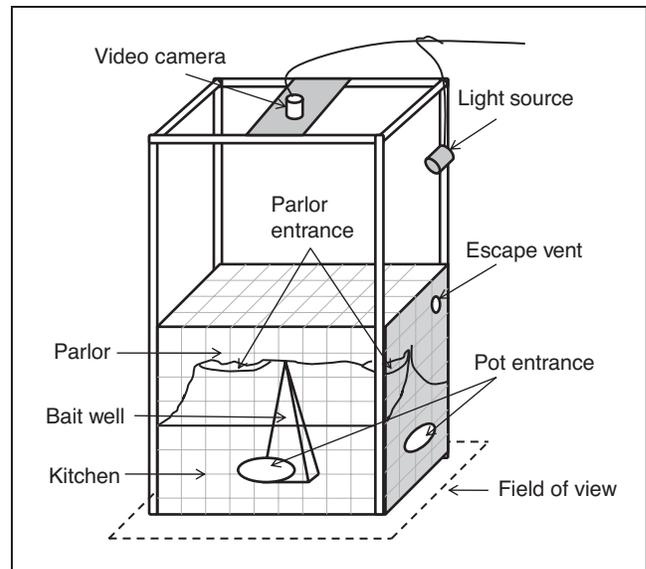
Figure 1

Diagram of the crab trap video (CTV) system. CTV is a time-lapse video recording system affixed to a standard commercial crab pot. The design allows the movements of crabs in and around the pot to be recorded during the day and night. Image not drawn to scale. Field of view=field of view from the camera lens.

recorded crab approaches, entries into the kitchen and parlor, and escapes of crabs.

Mesocosm experiment

A mesocosm experiment was conducted to determine the influence of crab behavior on pot catch. A large aboveground circular mesocosm (4.8 m×1.06 m, 18.6 m^3) set on preleveled ground was used for this experiment. A mesocosm was used because the high turbidity of the Rhode River made *in situ* observations impractical. Ambient water from the Rhode River was transferred into the mesocosm and filtered for two days to increase water clarity. Water was constantly filtered when experiments were not running, and filter bags were changed daily. During experimental runs, filters were turned off and removed from the mesocosm. Fine-grain sand was used to cover the bottom of the mesocosm in an attempt to mimic the muddy-sandy substrate of the Rhode River. Mummichogs (*Fundulus heteroclitus*) were placed inside the mesocosm to help control mosquito larvae populations and other insects but were removed before each testing to limit nonsubstantial variables. As with the field experiment, crabs were held in deck tanks and were fed chopped alewife until 24 hours before use in an experiment.

For each experiment, 16 male blue crabs (6 large [155 mm CW or greater], and 10 smaller [127–150 mm CW]) were used. Test crabs had all appendages, and only male crabs of molt stage C were used to reduce any behavioral variance. The number of crabs per unit of area

was chosen to simulate high density conditions (Clark et al., 1999). Crabs were placed in the mesocosm an hour before the start of the experiment and allowed to acclimate. An hour after acclimation, the CTV camera system was inserted into the center of the mesocosm.

At the end of the 24-h experiment, the CTV camera was removed, and the number of crabs caught was recorded. A new set of 6 large and 10 smaller male blue crabs were obtained for the next trial, and the procedure was repeated. All video recordings from the experiments were analyzed at SERC. The number of approaches, entries, escapes, and catch rates were recorded, as well as behavioral interactions between crabs. Crab behaviors were classified into three qualitative categories: aggressive, agonistic, or neutral. Aggressive interactions were characterized by the extension of both chelipeds, and cheliped embracing or grasping. Neutral interactions were defined as those where the chelipeds were in a resting position while the crabs passed within 3.8 cm (the diameter of a mesh ring) of each other (Jachowski, 1974). Agonistic interactions comprised any other interactions that occurred, such as shielding (using the cheliped as a shield), fending off predators, poking, leaning backward, or leaning to the side (Jachowski, 1974). Only one crab needed to exhibit an aggressive or agonistic act for the interaction to be recorded as such. If an aggressive and agonistic act co-occurred, the interaction was defined as aggressive.

Results

Field experiment

A total of 119 crabs were caught in 45 experimental runs for an average catch rate of 2.7 crabs per deployment. Crabs ranged in size from 81 to 179 mm CW (mean of 142 mm [SE ±1.8]). Size of test crabs had no significant effect on the size of crabs caught, nor was there a significant size by depth interaction (ANOVA, $P>0.05$, $F=0.63$, df=4). There was a significant effect of depth (Fig. 2A) on the size of crabs caught. Crabs caught at the 3-m depth were significantly smaller then crabs caught at 1 and 2 m (Tukey, $P=0.03$, $F=3.72$, df=4).

The size of test crabs had no significant effect on the number of crabs caught nor was there a significant depth-by-size interaction (ANOVA, $P>0.05$, $F=0.11$ df=4). There was a significant effect of depth on the quantity of crabs caught (Fig. 2B). At the 1-m and 2-m depths, the number of crabs caught did not significantly differ. The number of crabs caught at 3 m was significantly less than at the 1-m and 2-m depths (Tukey, $P=0.04$, $F=3.60$, df=4).

It is possible that the experimental design impacted the effect of the test crabs in our field experiment. In the field study, the test crabs were not tethered to the pot, therefore the possibility of escape existed. However, although the majority of experiments retained their test crab (~70%), if a test crab escaped from the pot before interacting with a conspecific, the pot essentially
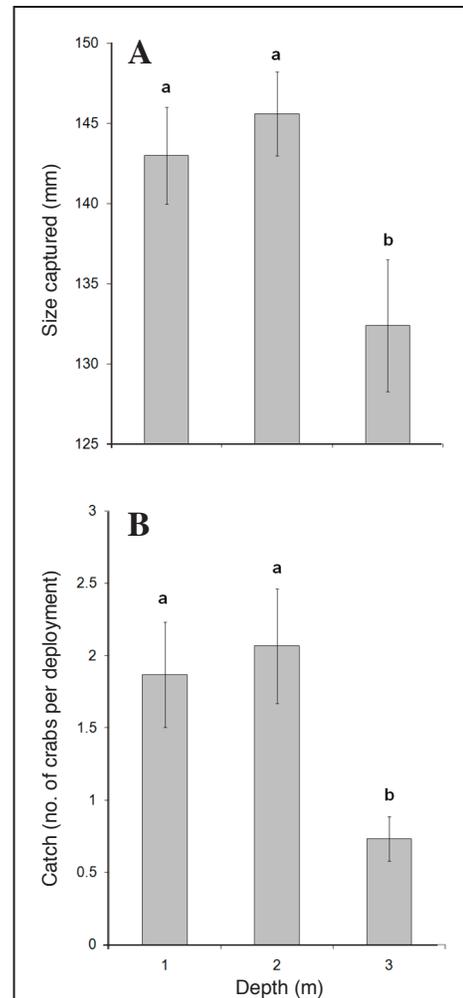

Figure 2
(**A**) Mean size (±1 standard error [SE]) of crabs caught in relation to depth. Depth had a significant effect on size of crabs caught ($P=0.03$, $F=3.72$, df=4). Pots at the 3-m depth caught significantly smaller crabs than pots at the 1- and 2-m depths. (**B**) Mean abundance (±1 SE) of crabs caught in relation to depth. Depth had a significant effect on the number of crabs caught ($P=0.04$, $F=3.60$, df=4). Pots at the 3-m depth caught significantly fewer crabs than pots at the 1- and 2-m depths. Different letters denote significance. $n=15$ for each of the three depth treatments. Results were based on an analysis of 119 crabs.

became a control pot. The opposite held true for control pots. Once a crab entered a control pot, the control pot basically became a test pot because it then harbored a single crab.

Of the crabs caught in the first 24 hours of the field experiment, 41% escaped before the end of the second

Table 1

Summary of data documented with crab trap video (CTV), used to observe behavior of male blue crabs (*Callinectes sapidus*) in and around crab pots. The observation time, number of approaches, entries, escapes, and captures are shown for each mesocosm video trial. These data were used to create the conceptual diagram of crab trap dynamics seen in Figure 3. Kitchen= the kitchen section of a crab pot; parlor=the parlor section of a crab pot.

Date	Observation period (h)	No. of crab approaches	No. of crab entries	No. of escapes (from the kitchen)	No. of escapes (from the parlor)	No. of crabs caught
07 Aug 03	17	232	58	51	2	4
12 Aug 03	25	146	8	5	0	3
14 Aug 03	23	158	22	17	1	5
15 Aug 03	16	113	37	29	0	8
16 Aug 03	23	179	43	37	0	6
Total	104	828	168	139	3	26

24 hours; and 10% of those that escaped were from sublegal-size crabs. There was no sign of cannibalism in any of the pots. Neither depth (ANOVA, $P>0.05$, $F=0.92$, df=2) nor test crab (ANOVA, $P>0.05$, $F=1.44$, df=2) had a significant effect on escape rate, nor was there a significant size-by-depth interaction on escape rate (ANOVA, $P>0.05$, $F=1.97$, df=4).
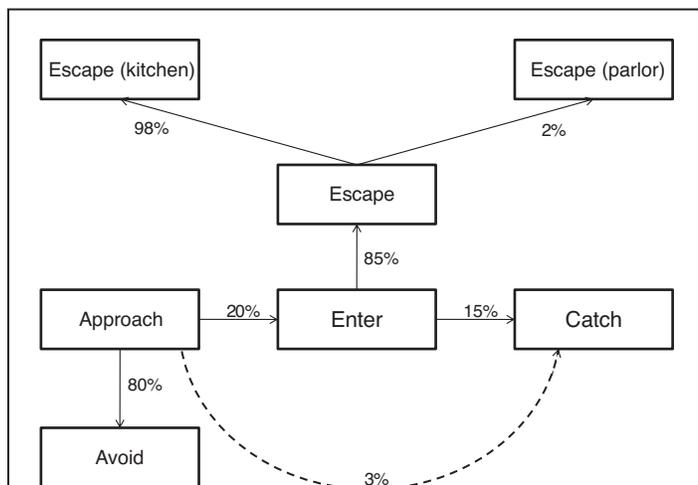
There was no significant difference between the number and size of crabs caught in the first 24 hours and the second 24 hours; this finding indicated that in our experiment, the pot submersion time did not appear to affect catch rate (*t*-test, $P>0.05$).

Mesocosm experiment

For the duration of each deployment, the approaches, entries, escapes, and catches of crabs were observed (Table 1). These data were then used to develop a model of trap dynamics (Fig. 3). In our analysis, the number of pots that were approached far exceeded those that were entered; only 20% of crab approaches resulted in an entry. The cause of pot avoidance in nearly 80% of approaches is unknown, but was not caused by conspecifics (discussed below). An interesting observation was the relative ease with which the crabs entered and exited the pots. During the duration of the mesocosm experiments, a total of 168 entries into the pots and 142 escapes from the pots were observed. The 85% escape rate in our mesocosm experiment consisted of 139 escapes from the kitchen, and three escapes from the parlor. The ability of crabs to exit the pot is clearly related to the section of the pot where the crab is located. Of the total escapes, 98% occurred from the kitchen and only 2% from the parlor.

A total of 286 intraspecific interactions were observed, and during 133 of these, crabs physically touched each other. Of all 286 interactions, the majority (178) took place in the kitchen, 12 in the entrance, 78 in the parlor, and 18 outside the pot. Approximately 10% of all observed interactions were aggressive, 42% were agonistic, and 48% neutral. Twelve interactions were observed at one of the four entrances. Of the 12 interactions, 1 was aggressive, 4 were agonistic, and 7 were neutral. In 4 of the 12 entryway interactions there was physical contact between crabs; all 4 of these interactions were agonistic. There were no interactions at the pot entrances that affected entry or exit of the pot.

Figure 3

Conceptual diagram of trap dynamics as observed with a crab trap video (CTV) camera system. Percentage values are means of data from Table 1. Of the blue crabs (*Callinectes sapidus*) that approached the pots, 80% avoided them and 20% entered them. Of the 20% that entered the pots, 85% escaped and 15% were caught. Of the 85% that escaped, 98% of the escapes occurred for blue crabs that entered the kitchen section only and 2% of the escapes were for blue crabs that entered the parlor. Overall, pots retained only 3% of all crabs that approached and entered the pots; the dashed curve line shows the final catch for those crabs that approached the pots.

Discussion

Intraspecific blue crab interactions did not affect crab trap efficacy, and although 52% of the observed interactions between crabs were aggressive or agonistic, none prevented entry or resulted in an exit from the pots. *In situ*, the presence of crabs in pots did not affect the catch rate. These findings are contrary to those from other studies where the relationship between crustacean behavior and catch rates was observed (Jury et al., 2001; Barber and Cobb, 2009). Jury et al. (2001) observed large American lobsters actively defending and preventing conspecifics from entering pots and accessing the bait, and Barber and Cobb (2009) observed Dungeness crabs guarding the entrance to pots and restricting entrance to conspecifics. Clark et al. (2000) showed that at high blue crab density, foraging success is hampered by intraspecific aggression; however, the caveat from our study is that feeding does not occur in crab pots. In American lobster pots the bait hangs down between the entrances to the pot. American lobsters can enter the pot only by coming in close proximity to a lobster feeding on the bait. Observations from work by Jury et al. (2001) described lobsters wielding the bait and fending off interested conspecifics. In standard commercial crab pots, unlike lobster traps, the bait is placed in a wire cage inside the pot and is inaccessible. The unattainable bait may change the nature of the intraspecific behavioral dynamics of crabs in the presence of food. In other studies showing that aggressive behavior impacts catch rate, the aggressive behavior may have been related to the defense of a habitat or territory. Barber and Cobb (2009) observed Dungeness crabs guarding the entrance to pots and not the bait. We found no evidence in the literature that blue crabs guard specific habitats or exhibit spatial fidelity. Male crabs, in tagging experiments where a similar size and molt stage were used, ranged widely, meandering on scales of 50 to 100 meters for several hours to days, but sometimes moving on a fairly constant course at rates exceeding 300 m/h (Wolcott and Hines, 1996).

Blue crabs may have been using the pots as a refuge from predators rather than entering them to feed. Blue crabs have been found in higher abundance in structured, woody debris (Everett and Ruiz, 1993) and sea grass (Eggleston et al., 1998) than in unstructured habitat. The design of the experiment is such that pots were a structured habitat relative to the surrounding environment. The crabs may have entered the pots in response to their value as structure. As further evidence that blue crabs may use pots for the structure that they provide, crabs have been found in unbaited pots (Guillory, 1993). These results may indicate a pot design by species interaction is important in the efficacy of pots.

Although intraspecific interactions were not observed or quantified to have an effect on catch or escape rates, there was a significant effect of depth on catch rate in our field experiments. Blue crabs caught at the 3 m depth were significantly smaller and less abundant than crabs caught at the 1 and 2 m depths. Studies have shown the importance of shallow water as refuge habitat for juvenile fishes and crustaceans in this system (Ruiz et al., 1993). The shallow waters are associated with increased abundance and decreased risk of predation for smaller organisms (Ruiz et al., 1993; Clark et al., 2000). In our study, the increased catch rate of smaller crabs at deeper "riskier" depths may be a function of an increased risk of predation; the smaller crabs used the pots as a refuge, which allowed them to exploit deeper depths. Significantly fewer blue crabs were caught at the 3-m depth than at the 1- and 2-m depths. It is possible that the benthic secondary-production of the 1- and 2-m depths in CHB exceeds that of the 3-m depth enough to attract higher numbers of and larger crabs.

In our field and mesocosm experiments blue crabs escaped at high percentages of 41% and 85%, respectively. The field observations may actually underestimate and the mesocosm experiment may overestimate escape percentages. The percentage of crabs that escaped in the field experiment was calculated from tagged crabs placed in the pots. These point observations do not account for blue crabs that entered and exited before the pot was sampled. In the mesocosm study, we were unsuccessful in our attempts to individually identify crabs. We had no method of determining the number of times an individual crab entered and exited the pot, and this may have artificially inflated our observed escape rate. We observed crabs entering and exiting the kitchen section of the pot with relative ease. Most crabs only needed a few minutes to find the exit, and some swam in through one side and directly out another opening. It is important to note that once crabs entered the parlor, the rate of escape decreased dramatically; crab escape from the parlor was only 2%. Most crabs that entered the parlor explored for a few minutes before becoming inactive. However, one particularly determined crab crawled around the parlor for several hours before escaping into the kitchen. It is possible that blue crab population estimates that use pots should only rely on parlor captures as an accurate measure of relative crab abundance. The escape rate from the parlor was almost zero, but the ease and high escape rate from the kitchen will undeniably bias CPUE results if included in population estimates.

The escape rate of crustaceans from pots is a recognized factor in the trap fishery (Bennet, 1974). Traditionally, escape rates for blue crabs have focused on mechanisms for excluding sublegal crabs from the catch and on inferences from the impacts of derelict pots (Guillory, 1993; 1998). Jury et al. (2001) found that American lobster traps retained only 6% of their potential catch. In previous studies, the range of escape rate for lobsters and crabs was approximately 60–70% (Muir et al., 1984; Karnofsky and Price, 1989). High and Worlund (1979) found that an average of 80% of tagged king crabs (*Paralithodes camtschaticus*) escaped from pots. They identified a number of factors that impacted escape rate, such as presence of bait, soak time,

and crab size. Guillory (1993), one of few to evaluate blue crab escape from derelict pots, found an average of 45% of crabs that entered pots escaped. This number mirrors the 41% escape rate determined in our field study, and Guillory acknowledges that his 45% escape rate is likely an underestimate because of the number of crabs that enter and exit pots during the intermission between pot sampling.

Our mesocosm observations clearly showed the ability of blue crabs to freely enter and exit commercial crab pots. Crab behavior does not appear to play a substantial role in commercial crab trap efficacy, and it appears that behavioral dynamics of blue crabs, in relation to conspecifics, are different when food is accessible and inaccessible (Clark et al., 1999). This study is limited to adult blue crabs at molt stage C. A number of factors impact blue crab behavior and catch. The observed behavioral patterns exhibited in this study might have been different if female crabs or crabs in a different molt stage had been used. For example watermen in the Chesapeake Bay use male crabs as bait in pots to attract peeler females ("peeler" is a term applied to shedding crabs caught by soft-shell fishermen) .

Blue crab behavior effects crab pot catch and escape rates. Eighty-five percent of blue crabs that entered pots were shown to escape, and escape rates may have something to do with the accessibility of food in crab pots. However, the behavioral interactions between blue crabs were not observed or quantified as impacting catch or escape rates. Blue crabs in this study exhibited few quantifiable aggressive interactions, which is atypical of their documented aggressive nature (Clark et al. 1999; deRivera et al., 2005). The escape rates documented in this study may impact blue crab population dynamics based on CPUE and should be further investigated. We also demonstrate that in population studies, two species with similar agonistic behavior characteristics (such as the American lobster and blue crab) can behave differently under similar conditions and therefore require species-specific assessments. Moreover, we caution against broad generalizations about species with perceived similarities in their behavioral characteristics.

Acknowledgments

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