

ESCAPE OF CAPTURED DUNGENESS CRABS FROM
COMMERCIAL CRAB POTS IN THE COLUMBIA RIVER ESTUARY

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Abstract

Escape of Dungeness crabs (Cancer magister) from baited commercial crab pots in the Columbia River estuary was examined. During a 28-day period (12 October-10 November 1982), 185 male crabs were captured and tagged. Sixty percent of the crabs escaped, the majority within 2 days. Size, leg loss, and leg regeneration were not significant factors in escapement.

There is concern about lost commercial crab pots continuing to collect Dungeness crabs (Cancer magister). In 1975-1976, Washington commercial crabbers lost an estimated 6,577 pots, which was a 17.6% loss and considered typical for a year (Northup 1978). The Oregon Department of Fish and Wildlife has considered requiring commercial Dungeness crab pots to contain a panel that would disintegrate if left in seawater for an extended period, thus allowing crabs to eventually escape.

National Marine Fisheries Service (NMFS) personnel conducted an experiment in the Columbia River estuary to determine the rate and degree of crab escapement from pots, and to determine if carapace width or leg loss or regeneration was a contributing factor. High (1976) examined the escapement rate and possible exit points of Dungeness crabs from pots in Puget Sound; our report of tests in the Columbia River estuary provides additional information to resource managers.

Methods

The experiment was done at the NMFS field station in Hammond, Oregon (Columbia River Kilometer 13). We used four standard commercial crab pots having a diameter of 105 cm, a height of 32 cm, and an approximate weight of 40 kg (see Hipkins [1972] for a general description of crab pots). Entrance tunnels were 13 x 20 cm and the escape holes were 10.5 cm in diameter. Entrance tunnels were equipped with dual triggers to reduce escapement. Pacific tomcod (Microgadus proximus) enclosed in a perforated container was used for bait and was changed daily. The pots were fished at depths of 9-16 m.

Pots were examined at approximately 0900 hours daily, from 12 October to 10 November 1982. Each crab captured was examined for a tag, leg loss, leg regeneration, and other injuries; untagged crabs were weighed, measured (carapace width), and tagged. Crabs were tagged by drilling a 2.8-mm diameter hole through the carapace at the base of the 10th anterolateral spine. A numbered plastic spaghetti tag--1.6 mm in diameter and approximately 25 cm in length--was inserted and fastened into a 2-cm loop by clamping with a monel band. All crabs were carefully returned to their original pot. When the pots were returned to the water, the entrance tunnel was oriented parallel to the current.

Tides ranged from a minimum of -0.73 m on 24 October to +3.23 m on 3 November. Bottom salinities ranged from 16.2 to 32.3‰, and bottom water temperatures ranged from 10.2 to 14.1 C; readings were taken each day at about 1000 hours and therefore may not represent the extremes.

Results And Discussion

During the study, 185 male crabs, ranging in carapace width from 132 to 188 mm, were captured and tagged. Only two female crabs (<88 mm) were captured, and these were not tagged or used in the analyses. A total of 111 crabs escaped (60%) and 35 died (19%). Unmarked crabs were recruited each day and previously tagged crabs escaped daily. There were no recaptures of crabs in the pots. Catch and escapement fluctuated with no apparent association to tide, temperature, or salinity.

The time to escape ranged from 1 to 21 days; however, the rate varied (Fig. 1). The majority of crabs that escaped did so during their first 2

days in the pot; relatively few escaped after 12 days.

The relationship between carapace width (5-mm increments) and escapement was examined (Fig. 2). Most of the crabs were in the size range of 150 to 175 mm. There was a small decrease in escapement for larger crabs, but the decrease was not significant ($G = 8.29$, $df = 5$, $P = 0.20$ [Sokal and Rohlf 1981]). High (1976) divided Dungeness crabs into two groups based on the minimum commercial size limit of 159 mm, and reported an escapement rate of 77% for sublegal males and 45% for legal males. By grouping our data in this manner, we obtained similar results--66 and 49%, respectively. Some Dungeness crabs captured in commercial fisheries are larger than the ones we captured in our study. The rate of escapement from pots for these crabs (>175 mm) is unknown.

Leg loss and/or regeneration could hinder a crab's ability to escape from the pots. The relationship between leg loss and escapement was examined (Fig. 3), but no significant relationship was found ($G = 5.50$, $df = 4$, $P = 0.20$). The relationship between leg regeneration and escapement (Fig. 4) also was not significant ($G = 0.24$, $df = 3$, $P = 0.90$).

At the conclusion of the study, nearly all of the 39 crabs remaining in the pots had lost weight. The greatest loss occurred for those crabs confined the longest, suggesting that they were deteriorating. This deterioration probably decreased their escapement rates.

Our results indicated that Dungeness crabs can escape from commercial crab pots in a short time regardless of size, leg loss, and/or leg regeneration; however, some crabs will remain in the pots and eventually die. Whether these dead crabs would attract more crabs into the pots is unknown. High and Worlund (1979) found that the presence of dead king crabs (Paralithodes camtschatica) in commercial pots did not attract live

king crabs. Hancock (1974) found that dead rock lobsters (Panulirus homarus) repelled live ones. Whether or not this is true for Dungeness crabs needs to be examined.

References

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Figure 1.--Relationship between time and the number of Dungeness crabs that escaped from commercial pots in the Columbia River estuary.

Figure 2.--Captures, escapes (percentages in parentheses), and/or deaths of Dungeness crabs, according to carapace width, in commercial pots in the Columbia River estuary.

Figure 3.--Captures, escapes (percentages in parentheses), and/or deaths of Dungeness crabs, according to the number of legs missing, in commercial pots in the Columbia River estuary.

Figure 4.--Captures, escapes (percentages in parentheses), and/or deaths of Dungeness crabs according to the number of legs regenerated, in commercial pots in the Columbia River estuary.







