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*Anchor tags show merit for short-term crab marking and recapture experiments.*

# Marking Fishes and Invertebrates. IV. A Nonpermanent Tag for King Crabs, *Paralithodes camtschatica*, and Tanner Crabs, *Chionoecetes bairdi*

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## ABSTRACT

*The National Marine Fisheries Service had need of an easily applied, short-term tag for marking king crabs,* Paralithodes camtschatica, *and Tanner crabs,* Chionoecetes bairdi. *A Floy anchor tag system was evaluated using 72 king crabs held in two 6- × 6-ft king crab pots and two Tanner crabs held in an aquarium. Tags were easily applied even under severe weather conditions and were retained up to 125 days. Damage to the animals was minimal as indicated by autopsies, showing the tag isolated between the carapace and underlying tissues.*

## INTRODUCTION

Kodiak Investigations personnel of the Northwest Fisheries Center, National Marine Fisheries Service (NMFS), had need of an easily applied tag for marking king crabs, *Paralithodes camtschatica*, and Tanner crabs, *Chionoecetes bairdi*. Demands of the marking program required that the tag provide identification of each crab, have a high retention rate, be nonlethal, and quick to apply. The recently developed Floy anchor tagging system[1] described by Thorson (1967) and Dell (1968) appeared to meet these qualifications. A study was initiated to test the efficiency of the anchor tag on king crabs under field conditions and on Tanner crabs in an aquarium.

[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

## MATERIAL AND METHODS

Seventy-two adult king crabs (including 36 tagged and 36 controls) were placed in two 6- × 6-ft × 34-inch king crab pots. The pots, their tunnel entrances closed with hand sewn nylon netting, were set in approximately 50 ft of water in Dog Bay, Saint Paul Harbor, Alaska. Two adult male Tanner crabs were also tagged and retained in an aquarium at Gibson Cove near Kodiak, Alaska.

At weekly intervals, the pots were examined by divers who recorded the number of live and dead crabs. After 125 days the remaining crabs were removed and the number of tagged and untagged crabs and the condition of each carapace at the point of tag insertion recorded. Three crabs were

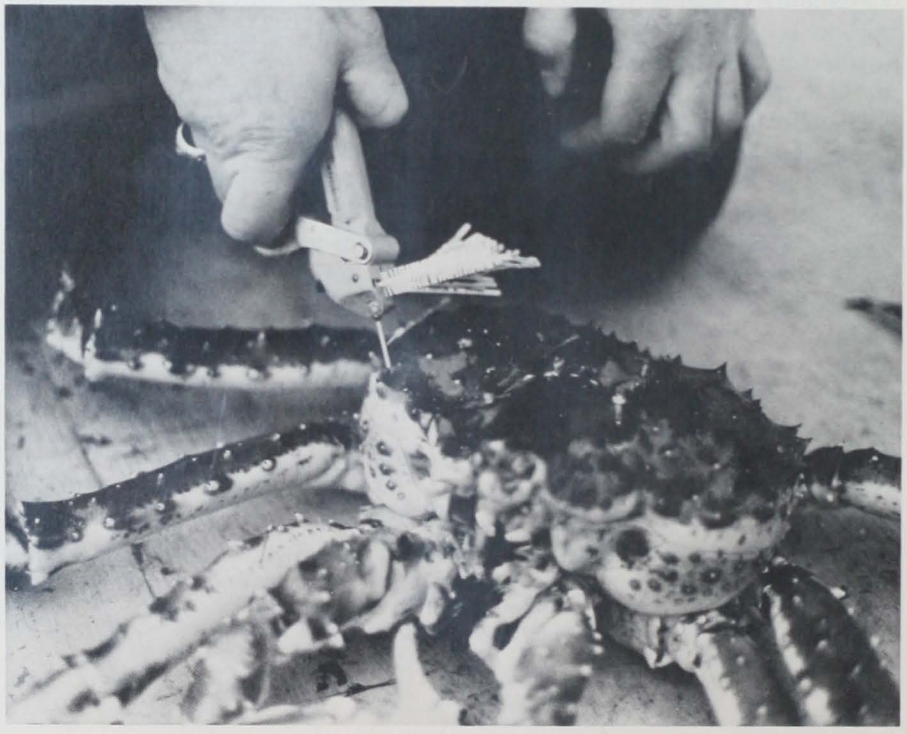

Figure 1.—Anchor tag being inserted into shoulder of king crab.

retained for examination of internal tagging scars.

The crabs were tagged on the right anterior side of the carapace (Fig. 1) at the base of the first prominent spine or between the base of the first and second prominent spines. The T bar portion of the tag was inserted through the carapace into the anterior portion of the right branchial cavity. The anchor portion of the tag often failed to return to its normal shape after insertion. Care was taken, therefore, to insure that the T bar was pulled tight against the ventral surface of the carapace and at right angles to the tag shaft. Properly tagged king and Tanner crabs, ready for release, are shown in Figure 2.

## RESULTS

Tagging under even the severe conditions of 10°F (−12°C) with 15-25 mile per hour winds was accomplished with ease, requiring only 10-15 seconds to tag each crab. Occasionally the hardness of a crab carapace caused the spring driving the tag ejector piston to buckle; however, this resulted in little delay of the tagging operations.

As shown in Table 1, 37 crabs remained in the pots after 125 days. Only five known mortalities were observed during the 125-day period. These consisted of one tagged and two untagged crabs within the pots and two crabs trapped beneath the pots. Because of poor visibility, divers were unable to determine if the crabs trapped under the pot were tagged or untagged. The crabs were assumed to have escaped through the netting in the bottom of the pot, since the pot frame had settled several inches into the substratum and there was no evidence of crabs having burrowed under the pot frame.

**Table 1.—Number of tagged and untagged king crabs held in pots for 125 days.**

| Experimental group | Sex | Initial number of crabs | Final number of crabs | Percentage retained |
|---|---|---|---|---|
| Tagged | Male | 25 | 13 | 52 |
| | Female | 11 | 1 | 9 |
| Untagged | Male | 31 | 21 | 68 |
| | Female | 5 | 2 | 40 |
| Total | | 72 | 37 | 51 |

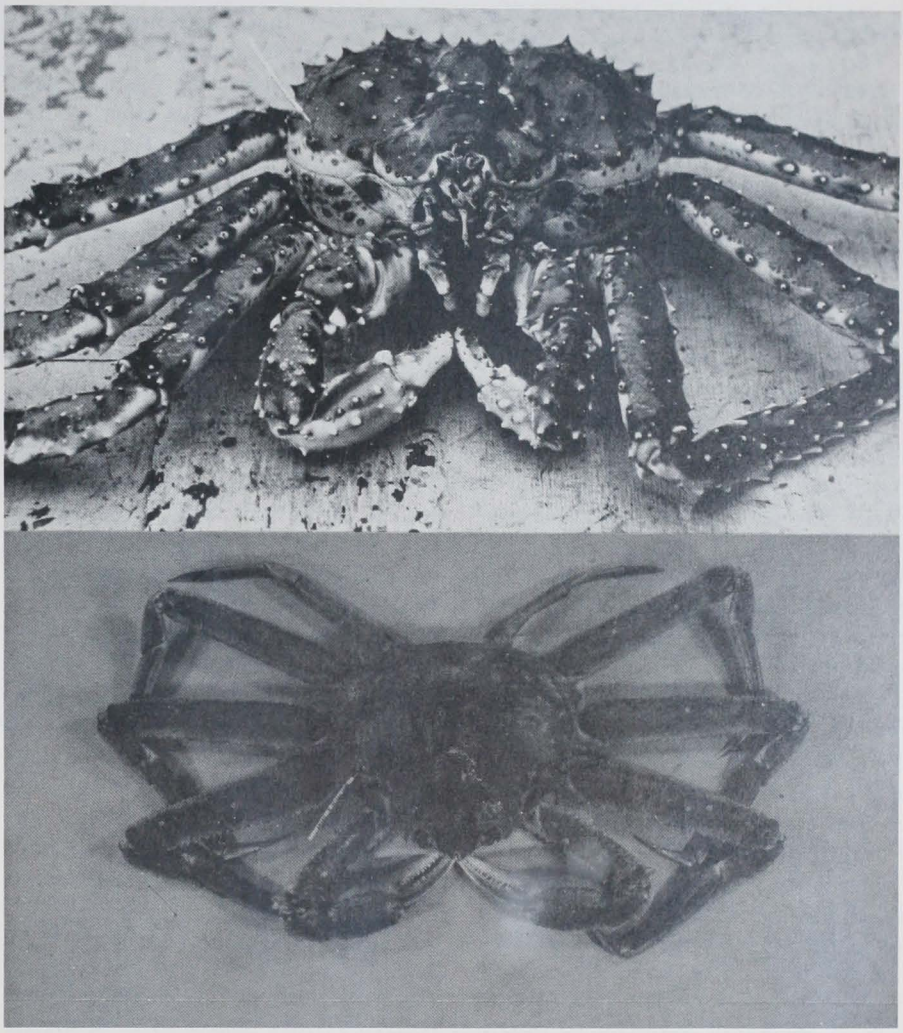

**Figure 2.—Tagged king crab (upper photo) and tagged Tanner crab (lower photo) ready for release.**

At the conclusion of the study the external tag scar of each of the remaining 14 tagged crabs was examined. Scars consisted of a hole ¼-⅜ inch in diameter surrounded by a blackened ridge ⅛ inch in thickness. In only one case was the hole large enough to allow removal of the tag.

Three king crabs were sacrificed and their internal tag scars examined. Soft tissues lining the ventral surface of the carapace showed no sign of infection, and the T bar had been isolated between the hard part of the carapace and the soft underlying tissue. On one crab, which was approaching ecdysis, the T bar was between the old shell and the underlying new shell, indicating the tag would have been lost at ecdysis.

Although controls were insufficient to determine total tag-induced mortalities, those caused by infection because of the T bar being lodged between the carapace and soft underlying tissue were assumed to be low.

The two tagged Tanner crabs held in the aquarium were sacrificed after 3 weeks and their tag scars examined. Scars and tissue condition found in the Tanner crabs were similar to those found in the king crabs. Scar tissues in the Tanner crabs, however, were not as well developed as those in the king crabs.

## DISCUSSION

The 4- to 5-inch (stretched mesh) hand sewn netting used to close crab pot tunnels was prone to slippage. Frequent manipulation of the netting by the captured crabs could have caused netting knots to slip, resulting in a hole large enough to allow them to escape. The total number of crabs in the pots decreased from 72 to approximately 41 after 2 weeks and to 37 after 125 days.

The disproportionate loss of tagged female crabs from the pots may have been due to increased mortality of those tagged. This seems unlikely, however, since only five mortalities were actually observed, suggesting that the crabs were indeed escaping from the pots. Female crabs are generally smaller than male crabs (Gray, 1963), which could increase their chances of working their way through the tunnel closures. Irritation from the tags may induce molting, and soft, freshly molted crabs may be more capable of escaping through pot netting.

Predation and cannibalism are two other possible causes for the reduction of the number of crabs in the pots. No evidence of these activities was observed in the pots, however.

The Floy anchor tag has also been used on crabs in various other studies. It was used successfully, for example, in a short-term tagging program involving Tanner crabs.[2] The study was conducted during the fall and winter of 1971 in Larson Bay on the northwest side of Kodiak Island. A total of 1,894 crabs was tagged and 102 were recovered, of which 27 had been at large for over 90 days. That the tags can be carried for extended periods with little apparent damage to the crab, is indicated by the preliminary results of a study conducted by the author which involved the tagging (with anchor tags) and release of 330 king and 25 Tanner crabs in a commercial fishing area. Nineteen of the king crabs were returned from the commercial fishery; five had been at large for approximately 335 days and one for approximately 660 days. Discoloration of tags, a problem reported by Chadwick (1963) who used dart tags of Resinite to mark striped bass, *Morona saxatilis*, was minimal in this study. The vinyl tubing section of the anchor tag showed little discoloration after 335 days. The tag which had been at large for 660 days was not examined by the author, but the fishing vessel captain who recovered the tag reported that it was legible and exhibited little discoloration.

The inexplicable loss of crabs from the control pots leaves the question of tag shedding and tag-induced mortality unanswered. This problem should be resolved by additional experiments. The recovery of a number of tagged animals, some of which had been at large for nearly a year, indicates that this tagging method has merit and would be suitable for short-term mark and recapture experiments.

[2] Pers. comm., G. M. Reid, NMFS Kodiak Laboratory, Kodiak, Alaska 99615.

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