
**Literature Compilation on Tagging Red King Crabs in Alaska
from Initial Efforts in 1954 through 1969**

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INTRODUCTION

Red king crabs *Paralithodes camtschaticus* have been the target species of one of the most lucrative commercial shellfish fisheries off the west coast of North America. The commercial significance of these fisheries has sponsored an international assemblage of biologists who have researched life history and fishery management aspects of this species.

This report documents the red king crab tagging-related literature for studies that occurred in Alaska during the 1950s and 1960s. Hard-to-locate sources have been found and archived at the Alaska Department of Fish and Game (ADF&G) office in Kodiak and ADF&G Fisheries Library in Douglas so that future researchers can more readily obtain this literature.

It has become apparent to me over years of research that (1) information gathered does not necessarily mean the information will be formally summarized in report form, and (2) information contained in reports is not always readily available because those documents may exist as obscure memoranda, gray literature, or unpublished government reports. Besides tagging-related investigations, a significant amount of data exist on red king crab mating, molting, sex ratios, and scuba-related life history observations that have not been made available in the published literature. Therefore, crab biologists working in the 1990s, even if fortunate enough to realize that red king crab tagging data were collected in the 1950s and 1960s, often have a difficult time accessing such data or the attendant reports. Eldridge (1975), in a doctoral dissertation on Kodiak stocks of red king crab, stated “It is obvious that much of the data needed to explain both the development and the present condition of the king crab fishery have never been collected. Conversely, other data have never been published.”

Beginning with Wallace et al. (1949) and subsequently during the 1950s and 1960s, U.S. and, to a lesser extent, Japanese biologists conducted the seminal work on red king crab biology in Alaskan waters. Research on the subjects of reproduction, growth, molting, migration, and effects of the developing commercial fisheries were mostly conducted through various tagging studies that resulted in the release of 111,598 tagged red king crabs (Figure 1).

Development of a red king crab tag in 1954 that was retained during molting is largely credited to Ed Huizer, an Alaska Department of Fisheries biologist (Huizer 1955; Gray 1965). This tag remains the primary tagging technique and is still the standard used in Alaska, although a number of variations to this tag and technique have been used. Cleaver (1963), however, gives development credit to the Japanese, who during the 1940s developed a tag that was retained through the molt, a tag referred to as the “spaghetti” tag. It is not clear from the literature whether Huizer was familiar with the Japanese work or whether both the Japanese and Huizer developed the same tagging technique independently.

Huizer’s first experimentation occurred in Kodiak during March 1954 (Huizer 1955). Initially, he employed a technique then commonly used for tagging blue crab *Callinectes sapidus* on the East Coast; this involved threading steel wire through the soft parts of the crab at a point on the epimeral line. This initial technique, tried with 6 male red king crabs, was not successful because their exoskeleton does not split at the epimeral line during ecdysis, as it does for the blue crab. During that same spring molting season, Huizer also tagged 2 male and 18 female red king crabs by threading the steel wire through the fleshy isthmus (arthral muscle) of the crabs. All 20 crabs molted successfully and retained their tags. Gray (1965) and Donaldson et al. (1992) provide a history of the de-

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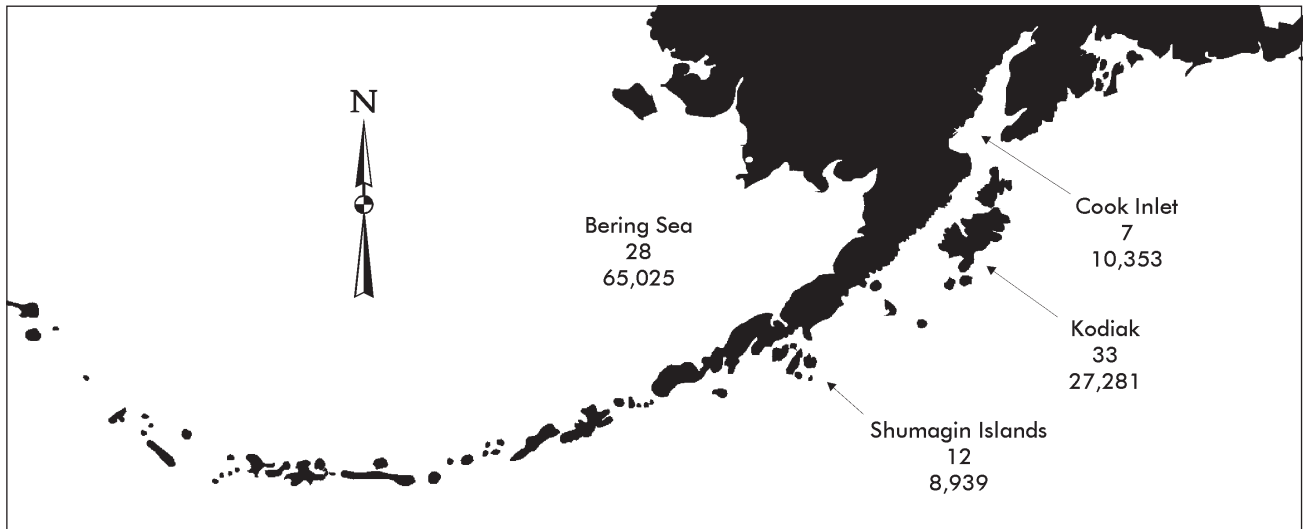


Figure 1. Geographic distribution and number of red king crab tagging documents (smaller number) from the bibliography (this report), followed by an estimate of number of crabs tagged and released (larger number), 1954–1969.

velopment of tags for king crab. Research reported in the papers presented in Tables 1a and 1b also chronicle development of various tagging techniques for red king crabs.

Not surprisingly, the fishing industry supported the initiation of king crab tagging studies. In a letter addressed to the U.S. Department of the Interior, dated January 19, 1954, Norman Ursin (Appendix A) wrote:

I am a local fisherman, and at present engaged in crabbing. I am very interested in a tagging program to better understand the habits of the crab. I have talked to the rest of the fishermen and will have their cooperation in such a program.

This paper identifies most of the early studies conducted on tag development and use of tags to describe red king crab life history and their management in the commercial fisheries. The literature in this bibliography provides insight into the early history of red king crab research and red king crab fisheries in waters off Alaska.

METHODS

I initially searched the ADF&G research files in Kodiak for any pre-1970 documents relating to red king crab tagging. I chose 1970 as the cutoff because documentation of tagging projects on or after this date was mostly restricted to annual population assessment work, whereas earlier work focused more on facets of life history. In addition, annual assessment work

and associated tagging after 1970 is well-documented in routine reports to the Alaska Board of Fisheries and in ADF&G Technical Data Reports, e.g., Peterson et al. (1986), which summarizes red king crab tagging around Kodiak Island from 1971 to 1985.

All red king crab documents that dealt with tag data from 1954 to 1969 were compiled into a bibliographic file that was alphabetically arranged by principal author and sequentially numbered. Information contained in each report was reviewed and classified into 26 subjects; i.e., 26 subject headings were defined and numbered to describe document contents. These 26 subjects were grouped into tagging-data and recovery-data categories, and the documents that contained information on each particular subject were noted. All literature cited sections and references were cross-checked for additional sources that potentially could be included in the bibliography. This bibliography was then compared to the bibliographies of Bartlett et al. (1983), Dawson (1989), and Kirkwood and Yancey (1968), and revisions were made when needed.

BIBLIOGRAPHY

A total of 68 references were reviewed and included in the bibliography. Seven references could not be located or were not available in English. These papers are listed at the end of the bibliography as not reviewed. In one instance, because of the age and condition of the document, the holding library was not able to provide me with a copy. Copies of the papers cited in

Table 1a. Red king crab tagging and recovery data from Cook Inlet to Adak, Alaska, 1954–1969, by subject, for source numbers 1–34.

Subject	Source																																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34					
Tagging Data																																							
Year (19) of Tagging	54–55	55	56	57	54–58	58–59	57–59	57–59	56–60	54–59	57–60	61	NA	62	62	NA	NA	NA	64	64	NA	65	63–66	66	61	67	66	67	63	54–61	62	61	54–60	57–62					
Holding Experiments	x	x			x	x	x	x																															
In Situ	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x		x	x	x	x	x					x	x	x				
Tag Type/Methods	x			x	x	x	x	x	x			x	x													x	x		x	x	x	x	x	x	x	x			
Pots	x		x	x		x	x	x							x					x							x									x			
Trawls	x															x						x						x								x			
Tangle Net																																							
Kodiak	x	x	x	x	x	x						x		x	x	x				x	x	x			x	x			x	x	x	x	x	x	x				
Shumagin Islands				x	x							x		x			x								x		x										x		
Aleutian Islands																																							
Cook Inlet								x	x					x													x				x					x			
Eastern Bering Sea																																							
Size			x		x	x	x	x	x																												x		
Sex			x			x		x	x					x																								x	
Number Tagged	x	x	x		x	x	x	x	x	x				x	x											x	x	x	x		x	x	x	x	x	x	x		
Depth						x										x																							
Recovery Data																																							
Location				x		x		x	x																														
Date						x	x	x	x																														
Size				x		x	x	x	x																														
Sex				x	x		x	x	x																														
Growth/Molting	x	x	x		x	x			x	x																													
Depth						x																																	
Migration				x	x		x	x	x	x																													
Number/Percent Recovered				x		x	x	x	x	x																													
Injuries	x																																						
Hist. of King Crab Fishery	x	x	x	x	x	x																																	

NA = not available

this report that are not published in the formal scientific literature can be obtained from the ADF&G shellfish files in Kodiak or from the ADF&G Fisheries Library in Douglas.

Tables 1a and 1b present a summary of the tagging and recovery data available in the 68 references reviewed. These documents are represented geographically in Figure 1.

I believe this bibliography is a nearly complete (not all-inclusive) listing of documents related to tagging red king crab in Alaska from 1954 to 1969.

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Appendix A

Seldovia, Alaska.
January 19, 1954.

United States Department of the Interior
Fish and Wildlife Service
Juneau, Alaska.

Dear Sir:

I am a local fisherman, and at present engaged in crabbing. I am very interested in a tagging program to better understand the habits of the crab. I have talked to the rest of the fishermen and will have their cooperation in such a program.

We would be indebted to you if you could furnish us with tags or inform us of the procedure in securing enough for a through operation.

Yours very sincerely,

/s/ Norman Ursin.

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