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MORTALITY OF WALLEYE POLLOCK *Theregra chalcogramma* IN SOUTHEASTERN ALASKA DURING 1977

By:

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1978

ALASKA DEPARTMENT OF FISH AND GAME
Subport Building, Juneau, Alaska 99801

Ronald O. Skoog
Commissioner

ADF&G TECHNICAL DATA REPORTS

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MORTALITY OF WALLEYE POLLOCK *Theregra chalcogramma* in SOUTHEASTERN ALASKA DURING 1977

By

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Juneau, Alaska

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INTRODUCTION

Dying and dead walleye pollock, Theregra chalcogramma were first observed by Department of Fish and Game biologists in Tenakee Inlet and in lower Lynn Canal during April 1977. As observations continued in these areas, it became apparent that the occurrence might not be a local phenomenon nor of short duration. It was also realized that the mortality of pollock might be an effect, direct or indirect, of the previous unusually mild winter and spring.

In view of the increasing interest in the pollock of Southeastern Alaska as a potential food source and a fisheries industry base and as a potential predator on juvenile salmon, an attempt was made to determine the geographic extent, duration and possible causative factors of the mortality. In early June, a written request for observations was distributed to all Department fishery biologists and technicians within the Southeastern Region; those observations contributed substantially to this report. Several observations were reported by biologists of the National Marine Fisheries Service, Auke Bay Fisheries Laboratory and by other Juneau area residents.

DURATION AND EXTENT OF MORTALITY

Approximately 185 dead or dying pollock were observed on 87 occasions between April 24 and November 20, 1977 as follows:

Month	Occurrences 1/	Fish Observed
April	4	4
May	14	26
June	29	63
July	22	69
August	14	18
September	3	4
November	1	1
	87	185

1/ At least one dead or dying pollock observed on any one day by one observer.

Observations, including reports of "no pollock seen" were contributed by individuals listed in Appendix 1. The number observed and the number of positive observations were probably somewhat higher as a log of reports was not begun until early June. The observations suggest that the mortality of pollock peaked in mid-summer, however, the data does strongly reflect the opportunities for observation by Department fishery biologists and technicians. Field work and water-associated recreational activities were more frequent in mid-summer and it is highly probably that pollock mortality was about equally heavy in April, May, June and July. By August, the mortality was apparently decelerating whereas field surveillance activities continued at a high level. The numbers of dying or dead pollock actually seen were small, however, two factors suggest that true mortality may have been very much greater. First, the fish were vulnerable to predation or scavenging by other fish, marine mammals, birds and terrestrial fur bearers. In Tenakee Inlet the author observed numerous fish skeletons, which may have been pollock, beneath eagle roost trees. Pollock skeletons were also found on seal hauling rocks in Tenakee Inlet (K. Hazard, Personal Communication). Second, the fish tended to surface and die along the beaches where they would be missed by most water travelers especially in remote areas.

Dead or dying pollock were observed in several of the major inside passages and inlets of northern Southeastern Alaska (Fig. 1). Numerous reports from the Juneau vicinity (upper Stephens Passage, Auke Bay and lower Lynn Canal) and from Tenakee Inlet obviously reflect, in part, the more frequent opportunities for observation in those areas. However, salmon escapement surveys, pink salmon tag-recovery work, herring spawn surveys and other field programs covered many areas where dead or dying pollock were scarce or absent. In particular, none were reported in the vicinity of Sitka, Ketchikan, Wrangell or south of Petersburg. Schools of pollock, feeding and apparently healthy, were observed in Frederick Sound by trollers and in Tebenkof Bay by Department tagged fish recovery crews.

CHARACTERISTICS AND CAUSATIVE FACTORS

Most observers described the dying pollock as very thin, often with ectoparasitic copepods and skin inflammations or sores. Fish swam in circles or erratically, belly up or on their sides. Not infrequently fish seemed to be swimming onto the beach. Scuba divers from the Department and from the Auke Bay Lab reported that pollock in Auke Bay were often seen swimming slowly or resting at the bottom and could be easily approached and touched by the diver. Eyes were cloudy. Most dead

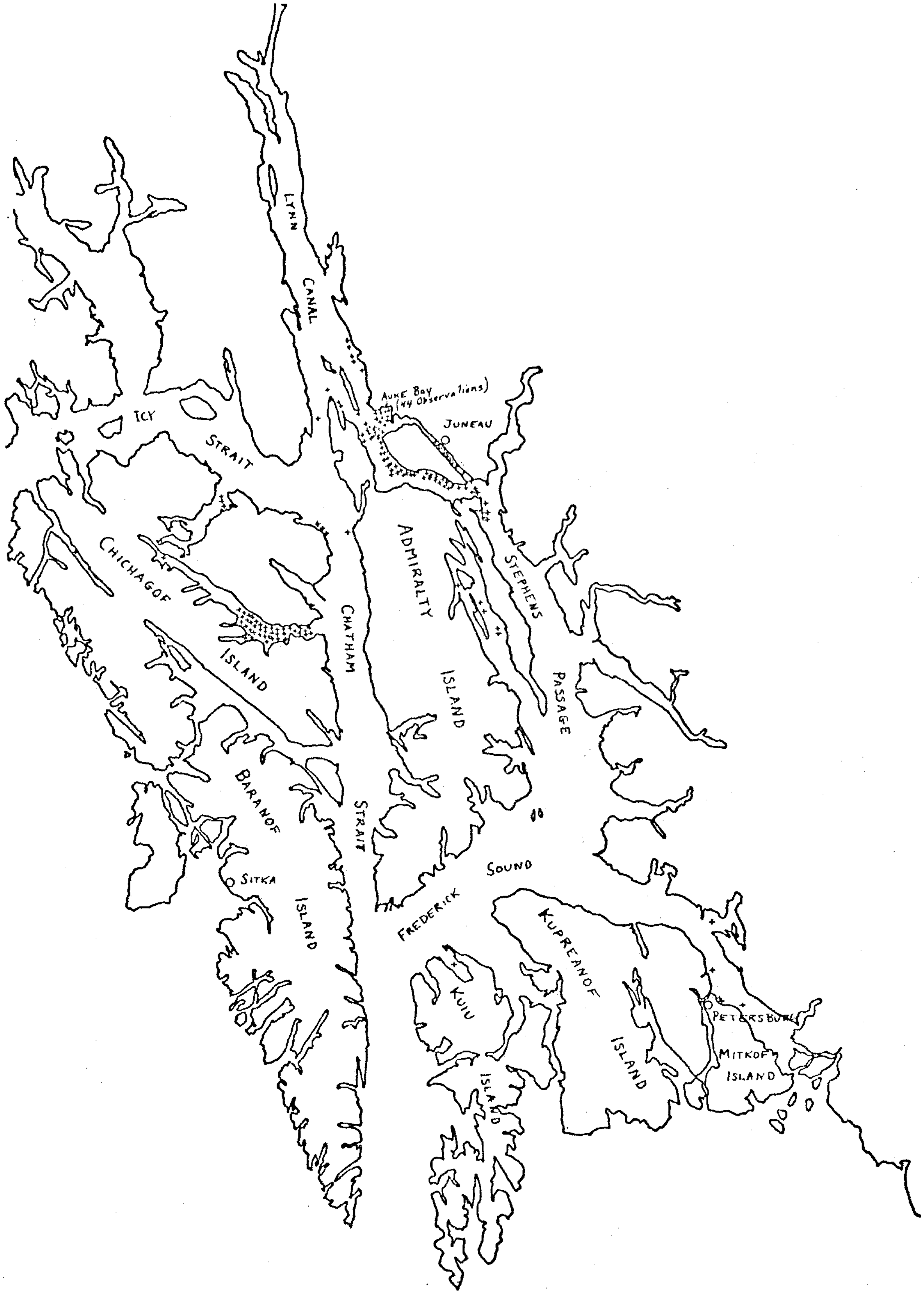

Figure 1. Observations of dying and dead walleye pollock, _Theregra chalcogramma_, April-September, 1977.

fish were found on the beach with the above characteristics, commonly with abdomen swollen by gases of decomposition.

Twenty-two specimens from Tenakee Inlet ranged from 330 to 555 mm fork length (mean 436 mm). Stomachs of 15 were empty or contained only parasites. The remainder contained small amounts of pink salmon fry, shrimp, other crustaceans or kelp. Six specimens from Auke Bay ranged from 430 to 620 mm (mean 532 mm). Of 27 specimens of dead or dying pollock which were dissected, 26 contained either nematodes, acanthocephala (spiny-headed worms) or both, or unidentified parasites. Nematodes were nearly always found in the liver, frequently in the mesenteries, or loose in the body cavity and were occasionally embedded in the flesh around the anus. One speciman had "clubbed" gill filaments. Parasite loads were not always heavy in dead or dying fish. About 20 pollock caught by the author while salmon trolling near Juneau over the course of the summer also contained light to heavy loads of the same parasites.

Six specimens were preserved and sent to the Department's fish pathology laboratory in Anchorage for examination. Four internal parasites were identified:

1) Protozoa - Microsporidia (tentatively, Glugea punctiferia) in muscle cysts;

2) Acanthocephala - Echinorhynchus gadi in the intestines;

3) Nematoda - Anisakis sp. in liver, gonads, mesentery, kidney and abdominal cavity;

4) Unidentified larval form - possible Cestode, encysted in mesentery.

Further comment from their report is quoted below:

"All species isolated do not usually kill the host fish so it is uncertain whether they are the cause of the observed mortality. However, the acanthocephalan and nematode infestations were unusually severe and it is possible that in combination they could be debilitating.

Note: Anisakis sp. is a potential human pathogen which is also commonly found in herring. Fish intended for human consumption should be eviscerated promptly and cooked thoroughly.

Life cycle information for the two major forms are as follows:

Echinorhynchus - Adult in fish intestine. Eggs are released into the water with feces and are ingested by amphipods. A larval form encysts in the amphipod and is released when the amphipod is eaten by a fish. It develops to adulthood in the intestines of the fish.

Anisakis - The definitive host for adults is a marine mammal (seals, whales, dolphins, etc.). There it is found in the stomach and intestine, and eggs are released in feces. These are eaten by euphausids and an encysted larval form develops. The euphausids are eaten by either fish or marine mammals. In either case, five distinct juvenile phases are passed before an adult develops. If eaten initially by fish, Anisakis remains in a juvenile phase until a marine mammal is entered. Juveniles can be transferred between fish (for example, herring can pass juvenile Anisakis to salmonids, pollock or any other fish which eats them).

Anisakis produces pathology in man when living juvenile forms are ingested, usually as a result of eating raw or undercooked fish. Man is an abnormal host and the juveniles migrate through the body looking for a portal of exit. In this migration, they can damage the stomach, liver or any abdominal organ." [a]

[a] A.J. Didier, Parasitology Diagnostic Report of 6/24/77

It is recognized that hook-and-release mortalities of pollock caught incidentally by salmon trollers may have accounted for some of the observations reported here; however, the interference from this source was probably minimal. Dead and dying pollock appeared before trolling began and continued in closed waters and areas lightly fished. The characteristics of the naturally dying fish were, in the author's experience, distinctive (i.e., the poor external condition and prolonged circular swimming behavior). Further, the specimens examined bore no evidence of hook-and-release.

DISCUSSION

The reports described herein suggest the possibility of an unusually high natural mortality of walleye pollock in the inside waters of northern

Southeastern Alaska during the spring and summer of 1977. Populations to the west and south did not apparently incur the mortality if, in fact, sizeable populations exist in those areas. In recent years fishermen and fishery managers have observed large schools of pollock in the areas affected by the mortality this year.

The cause or causes of the observed mortality have not been clearly identified, however, the incidence of internal parasites in the dead and dying pollock that were examined was high. Perhaps the unusually warm sea water temperatures during the preceding winter, which continued into the summer months, favored the reproduction of those parasites to a degree which could not be tolerated by the pollock host. On the other hand, bacteriological tests were not performed and not all dissected specimens of the dead or dying pollock were heavily parasitized. The occurrence of high pollock populations in these waters in the last few years suggests the possibility of density-dependent mortality mechanisms.

Continued monitoring and expanded research on the pollock of Southeastern Alaska is badly needed if the stocks are to be properly managed. It is hoped that this report might serve as a base for comparative monitoring in future years.

Appendix 1. Contributors of reports of pollock mortality April-June 1977.

Name	Location	Agency
Bailey, Eric P.	Juneau	--
Bartlett, Larry	Ketchikan	Alaska Fish and Game
Bergmann, William R.	Petersburg	Alaska Fish and Game
Bethers, Michael R.	Juneau	Alaska Fish and Game
Bracken, Barry E.	Petersburg	Alaska Fish and Game
Cantillon, David C.	Juneau	Alaska Fish and Game
Carlson, Richard	Juneau	NMFS Auke Bay Lab
Clay, James	Juneau	Alaska Fish and Game
DeJong, Robert	Ketchikan	Alaska Fish and Game
Derby, Larry E.	Juneau	Alaska Fish and Game
Edgington, John R.	Petersburg	Alaska Fish and Game
Elliott, Steven T.	Juneau	Alaska Fish and Game
Enloe, Merle	Sitka	--
Finger, Gary	Juneau	Alaska Fish and Game
Francisco, Richard K.	Ketchikan	Alaska Fish and Game
Gray, Phillip	Juneau	Alaska Fish and Game
Gunstrom, Gary K.	Juneau	Alaska Fish and Game
Haight, Richard	Juneau	NMFS Auke Bay Lab
Hazard, Kathy	Juneau	USFS Forestry Sciences Lab
Hoffman, Steven	Juneau	Alaska Fish and Game
Jones, Jesse D.	Juneau	Alaska Fish and Game
Kissner, Paul D., Jr.	Juneau	Alaska Fish and Game
Koeneman, Timothy M.	Petersburg	Alaska Fish and Game
Larson, Paul R.	Juneau	Alaska Fish and Game
Pace, Christopher	Juneau	Alaska Fish and Game

Appendix 1 (continued)

Name	Location	Agency
Parker, James W.	Sitka	Alaska Fish and Game
Seidelman, Donald	Ketchikan	Alaska Fish and Game
Stellar, William	Saginaw Bay	--
Wilson, Merle G.	Juneau	Alaska Fish and Game

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