PRESENCE OF PARASITES IN SOCKEYE SALMON

OF

UPPER COOK INLET, ALASKA

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INTRODUCTION

In 1978 the Alaska Department of Fish and Game (ADF&G) initiated a sockeye salmon (*Oncorhynchus nerka*) stock identification program in Upper Cook Inlet (UCI), Alaska (Figure 1). The initial approach to stock identification was to use scale pattern analysis (Bethe and Krasnowski 1979). Unfortunately, the results of stock identification, using only scale patterns, have been inconsistent and overall disappointing. Model classification accuracy has been relatively poor and minor stocks contributions have been over estimated. Therefore, the identification of additional sockeye salmon stock discriminators is critical if UCI sockeye salmon stock identification is to advance.

Parasitological studies of chinook salmon (*O. tshawytscha*) and Southeast Alaska sockeye salmon indicated that the brain myxosporean parasite *Myxobolus neurobius* can be used to separate salmon stocks (Urawa and Nagasawa 1988, Moles et al. unpublished). In addition, the flesh parasite *Henneguya* sp. and the nematode *Philonema oncorhynchi* may offer additional salmon stock separation options. Infection of juvenile salmon by these parasites occurs only in freshwater and remains through adulthood. Therefore, examination of UCI sockeye salmon stocks for these three parasites was initiated in 1990.

METHODS

Sockeye salmon from 14 lakes or river systems were sampled for the presence of parasites (Table 1). Sockeye salmon were collected by a variety of methods including fishwheels and seines. A minimum of 50 samples were collected from each sampling site. A sample consisted of the head, body cavity contents, and approximately 7.5 cm piece of the caudal peduncle. A sample log was maintained for each location. A numbered spaghetti tag was attached to the head of each fish sampled. The head and caudal flesh were placed in a one gallon plastic bag. The body cavity contents were stored in a separate plastic bag and then placed in the original bag containing the head. All samples were frozen as soon as possible, usually within a few hours. In all cases samples were frozen within 24 hours. Visual field examination of samples for the presence of *Philomena* sp. was completed prior to freezing.

Samples were transmitted frozen to the National Marine Fisheries Service Auke Bay Laboratory for analysis.

RESULTS AND DISCUSSION

A total of 750 sockeye salmon were examined in UCI for the presence of parasites. All 14 sample location, within 8 major river systems, were negative for the presence of the brain parasite *Myxobolus neurobius* and the flesh parasite *Hennequya* (Table 1, Figure 1).

In contrast, the nematode *Philonema oncorhynchi* was present in all fish from the Kenai, Kasilof, and Crescent Rivers as well as 92% of Packer's Lake fish. Within the Susitna drainage the distribution of the parasite was extremely variable with Hewitt Lake infected at 86%, Sunshine Station at 50%, Yentna River at 36%, and Chelatna Lake at 22%. Nematodes were absent from Big Lake, Daniel's Lake, and Big River (Figure 2).

The usefulness of these parasites to separate sockeye salmon stocks in UCI is limited. *Philonema oncorhynchi* appears to have an infection rate of 100% in the major sockeye systems of the Central District with varying levels in the Northern District systems. Therefore, in the absence of *Philonema*, a fish sampled from the commercial fishery would have a high probability of Northern District origin (absence of the parasite from the Big River lake system is not considered significant as this stock is relatively small). The percentage of negative samples for *Philonema* would provide a minimum estimate of Northern District stocks. However, the total Northern District contribution and specific river system stock contribution would be difficult to assess. When used with other discriminators in a mixed model approach these difficulties may be over come. These options should be explored.

For inseason management, an identifiable marker needs to be recognized and data available in a timely manner (< 24 hrs.) . The examination of sockeye for *Philonema* is a relatively simple task requiring only the visual examination of the gut cavity. Results are immediately available for inclusion in stock identification programs. In addition, field crews were trained within a short period of time and failed to detect the presence of the nematode in only 7 out of 350 fish (2%). Further training should reduce this figure to less than 1%.

Future studies of *Philonema* in UCI should concentrate on sampling additional systems in UCI (within the Susitna River drainage, Chakachatna/McArthur) and replicate the major systems of the Central District.

LITERATURE CITED

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Urawa, S. and K. Nagasawa. 1988. Prevalences of two species of Myxobolus (Protozoa: Myxozoa) in chinook salmon, Oncorhynchus tshawytscha, collected from the North Pacific Ocean and the northwest coast of North America in 1987, with special reference to the stock identification of ocean-caught chinook salmon by the parasites. Document submitted to the annual meeting of the International North Pacific Fisheries Commission, Tokyo, Japan. Far Seas Fisheries Research Laboratory, Shimizu, Japan.

Table 1. Upper Cook Inlet sockeye salmon systems sampled for parasites in 1990.

System	Number Sampled	Sample Method
Kenai River:		
mainstem at RM 19.0	50	fish wheel
Hidden Lake	50	weir
Russian River	50	weir
Kasilof River:		
mainstem at RM 10	50	fish wheel
Susitna River:		
Yentna River at RM 4	50	fish wheel
Sunshine Station at RM 80	50	fish wheel
Chelatna Lake/Lake Creek	50	seine
Hewitt Lake	50	weir
Crescent River at RM 1.5	100	trap
Big Lake:		
Meadow creek	50	weir
Daniels Lake	50	seine
Packer's Lake	50	seine
Big River:		
Big River Lake/south fork	50	seine

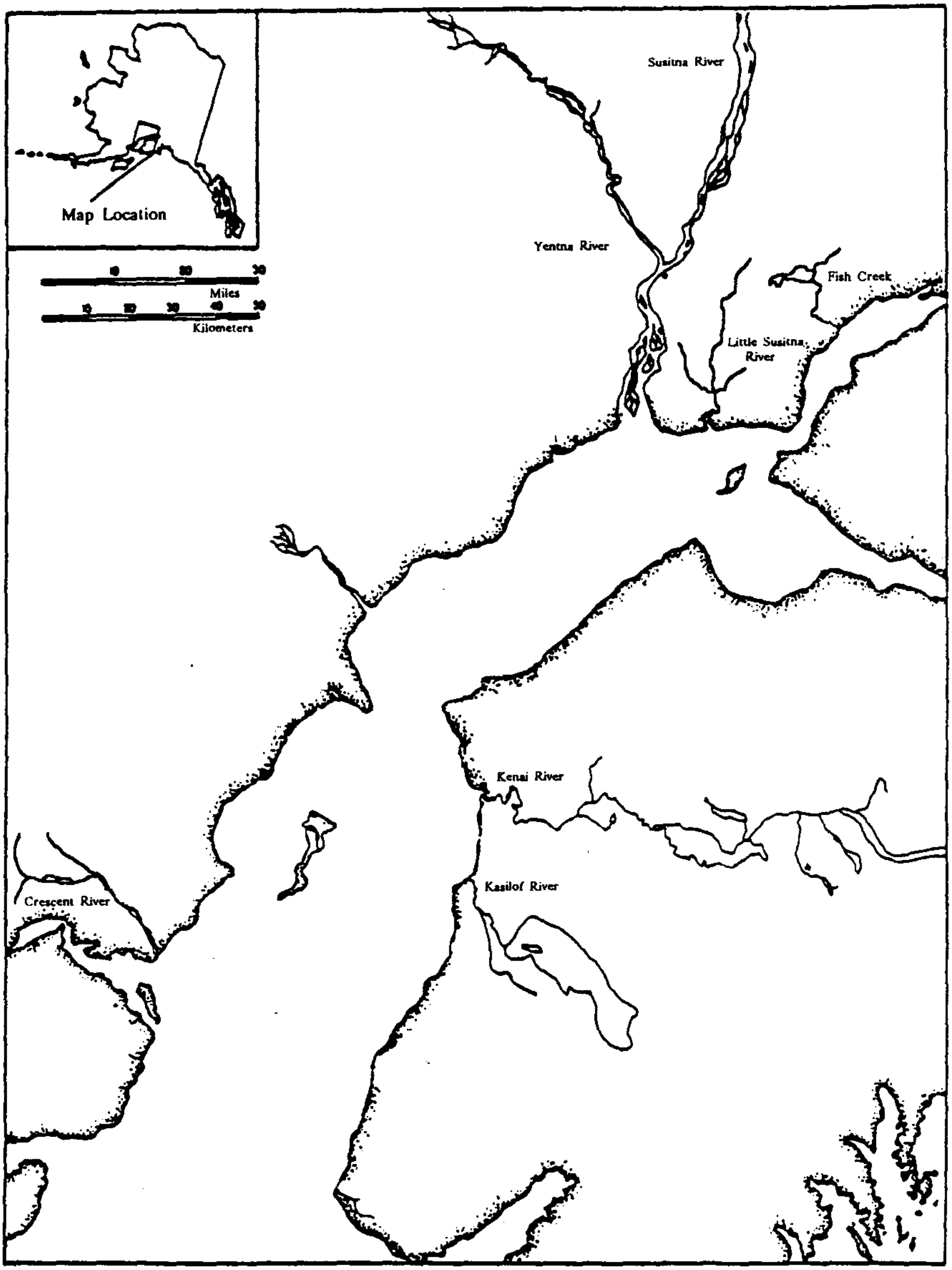

Figure 1. The Upper Cook Inlet area showing the locations of major salmon spawning drainages.

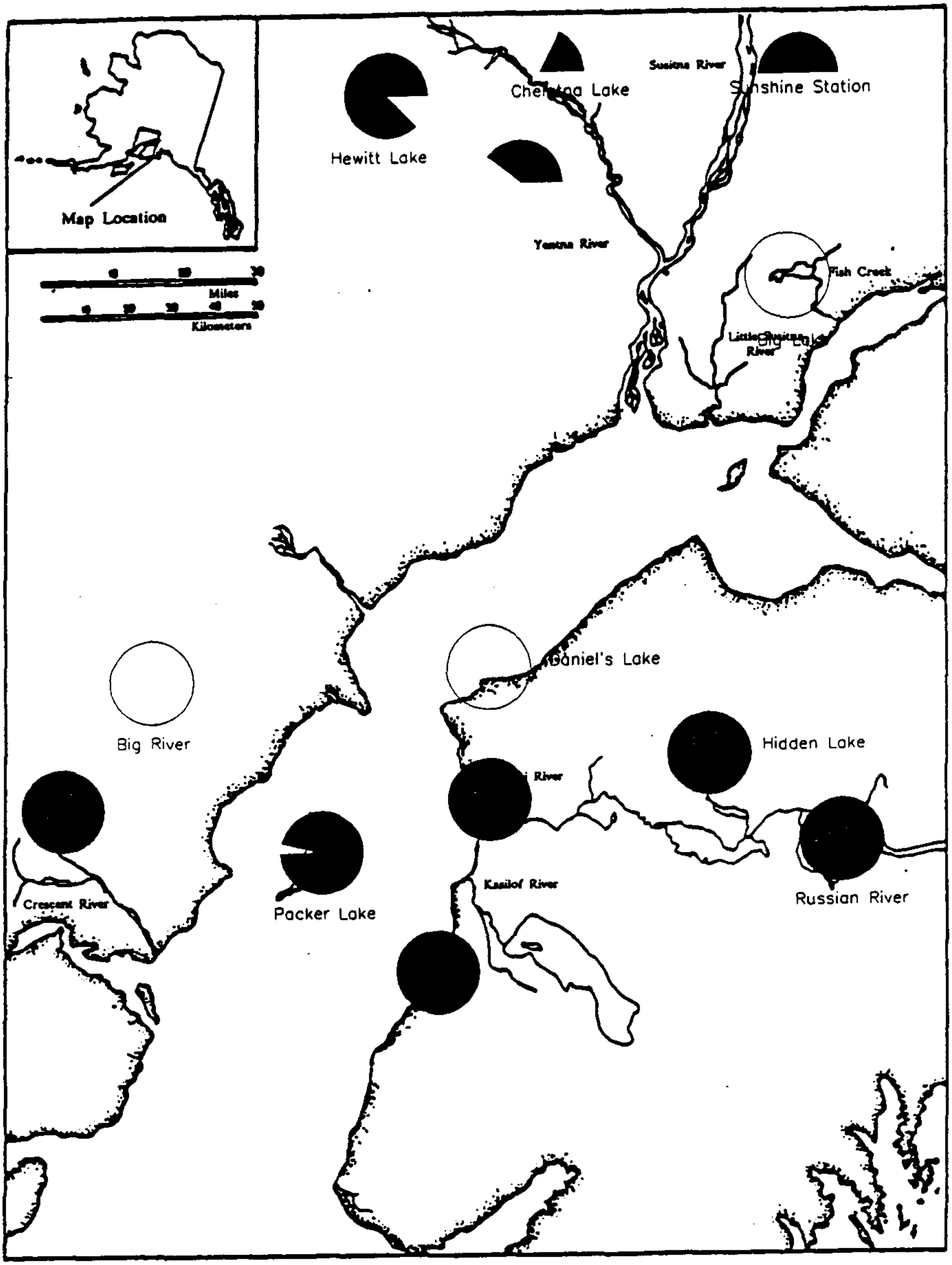

Figure 2. Presence of *Philonema oncorhynchi* in Upper Cook Inlet, Alaska (filled circle represents 100% infection).