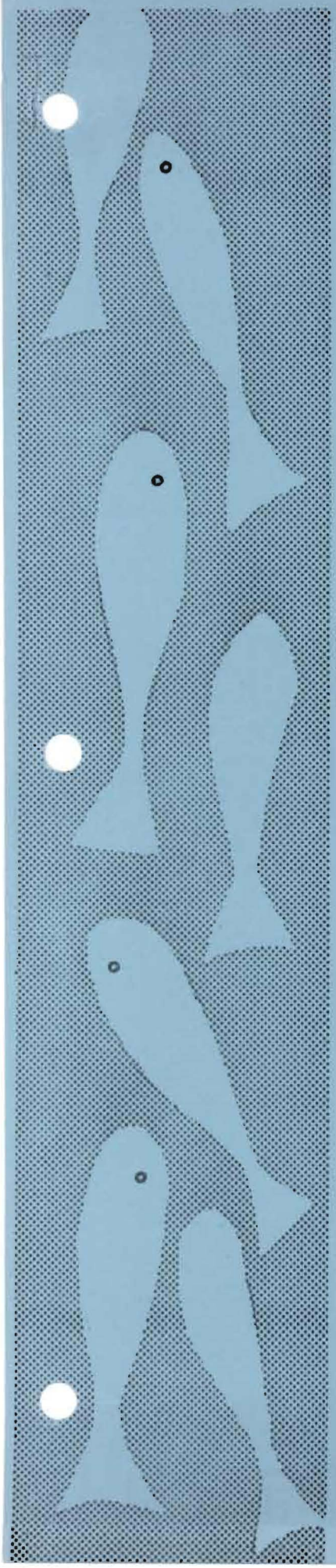

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COLUMBIA RIVER THERMAL EFFECTS STUDY

THERMAL DOSE AND EQUILIBRIUM LOSS IN CHINOOK SALMON FRY

Oncorhynchus tshawytscha - (Summary)

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In limited exploratory tests, conducted at the Seattle laboratory in March 1970, salmon fry were subjected to acute thermal shocks to simulate contact with high temperature discharges of waste heat. The purpose was to relate duration of heat exposure to loss of equilibrium and paralysis of the fish. Tested were fall-run chinook salmon fry, 45-48 mm in length, acclimated to 9 C and abruptly exposed to 30 C for intervals of 5, 10, 15, 20, 25, 30, and 35 seconds. At each interval, 25 different fish were tested three separate times, a total of 75 fish.

Results from the three trials at each exposure are combined and shown in Table 1. The fish were affected in direct proportion to duration of exposure. This appears linear.

The 5-second exposure caused no loss of equilibrium, but the test fish appeared excited and distressed. Recovery from equilibrium loss varied from minutes to hours, depending on length of exposure. But recovery as noted in the laboratory may have little real meaning when applied to the natural environment; fish in this condition probably can be considered ecologically dead (Coutant, 1969).

The tests suggest that migrant fish, comparable to the test fish, would be similarly affected if engulfed for brief intervals in water at high temperatures.

Table 1.--Equilibrium loss and paralysis* of chinook salmon fry (45-48 mm), acclimated to 9 C and exposed to 30 C for different time intervals; 75 fish were tested at each interval

Exposure time (seconds)	5	10	15	20	25	30	35
Percentage showing loss of equilibrium and paralysis	0	16	42	62	86	97	100

* Some of the fish were killed by exposures at 10 seconds and over. The rate increased with increasing exposure.

LITERATURE CITED

Coutant, Charles C. 1969. Temperature, reproduction, and behavior. Chesapeake Science Vol. 10, No. 3 and 4, p. 261-274.