



The Effects of Changes in Water Supply in Marshes on
the Species Composition of Fishes

by

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Quarterly Report

(December, 1966 through February 1967)

to

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Branch of River Basins
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Introduction

This report is in partial compliance with the terms of Research Grant Number 14-16-0004-56 to the Institute of Marine Science, University of Miami, from the Bureau of Sport Fisheries and Wildlife, Branch of River Basins.

The aims of the research are twofold: (1) to determine which species of fish occur in various parts of the marsh, and (2) relate kinds and numbers of fishes to variations in water level, salinity, dissolved oxygen, and other environmental factors.

Sampling program and preparation of the final report

The routine sampling will be terminated at the end of May. This should carry the study into the new water year, if normal spring rains begin, or if rains fail it will be the driest time of the present water year.

Work is already under way on the preparation of the final report. This will include not only the analysis of fish abundance in relation to habitat factors but will also include a prediction table which will permit an observer to determine the salinity in the Watson, Roberts and North rivers with precision by observing the height of the ground water above or below sea level at well P-38 (i.e., Mahogany Hammock). With the prediction table and data on fish kinds and abundance in relation to salinity, temperature and oxygen obtained during this and other studies in the region it should be possible to formulate an optimum

set of environmental conditions for the desirable animals. Furthermore it should be possible, granting adequate re-charge of the ground water from storage in Conservation Area 3, to manage the marsh environment and the adjacent estuary at more than one population level.

As background for the final report, the literature is being searched for data on physiological adaptations by fishes which would permit better understanding of the changes in abundance. The report will include a bibliography.

Hydrographic observations

During the quarter three sampling trips were made to the North River area. The salinity in the region rose during the three month period, from a near-fresh condition throughout to a brackish condition. During December and January salinity rose at all 22 stations but fell slightly in February at the North and Roberts river headwater stations. This decline, of 1 to 2 parts per thousand, in the headwater stations suggests that there was runoff, probably from locally heavy showers. The lack of a similar decline in the Watson River stations is taken as an indication that the nearby Shark River now has increased salinity that spills into the upper reaches of the Watson and masks the effects of local rainfall.

Readings at the Watson River stations were consistently higher than those found in the North and Roberts (Figures 1, 2 and 3). During December, January and February salinity readings at Watson River 4 averaged 3.5, 6.3 and 6.8 parts per thousand respectively while station 8A in the North River headwaters averaged 0.1, 0.9 and 0.0 parts per

Figure 1. Salinity of North River study area showing the 5.0 parts per thousand isohaline during December 1966.

SALINITY
DECEMBER

LEGEND

- ⊙ HYDROGRAPHIC STATION
▲ SAMPLING STATION

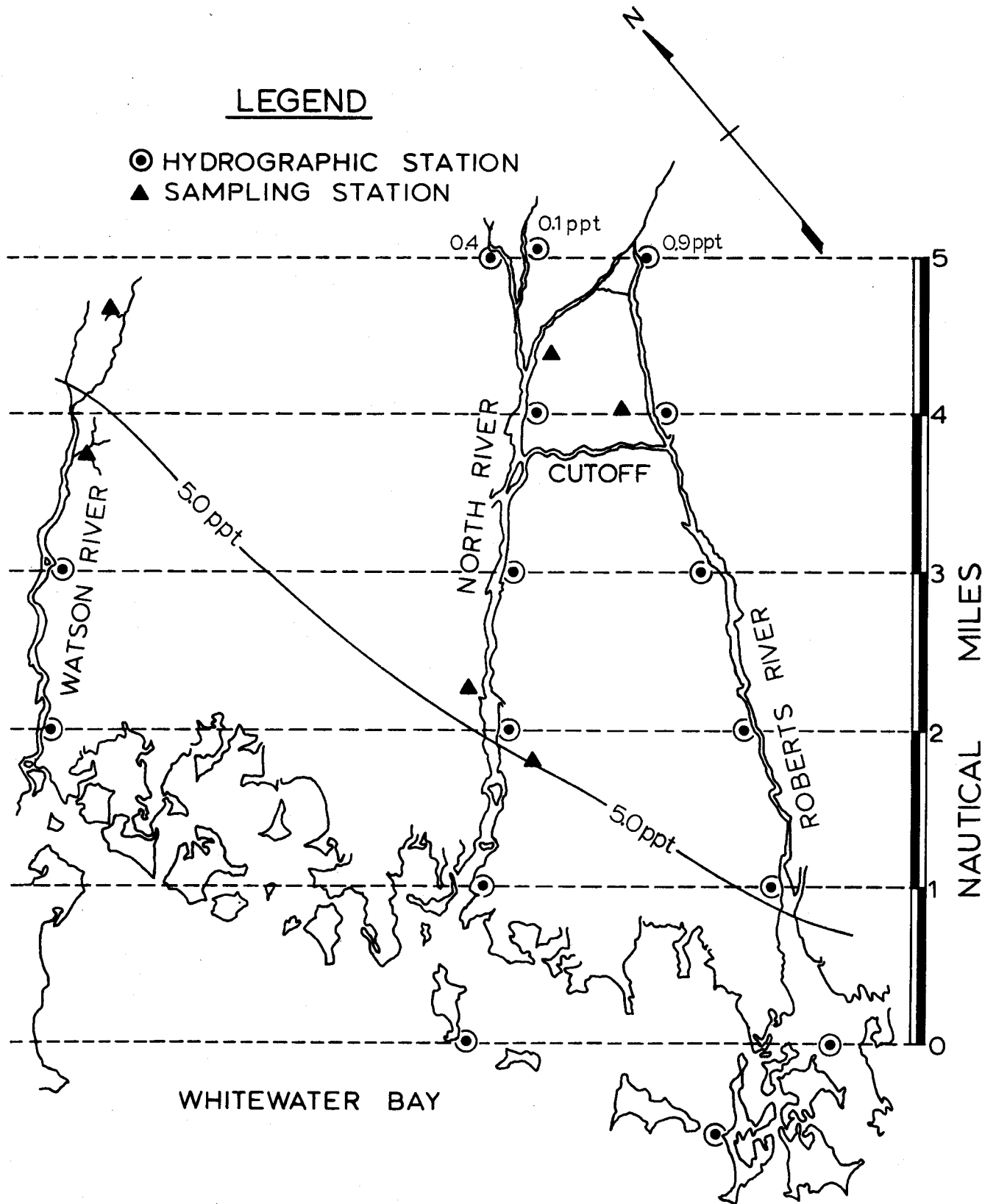


Figure 1

Figure 2. Salinity of North River study area showing the 5.0 and 10.0 parts per thousand isohalines during January 1967.

SALINITY
JANUARY

LEGEND

- HYDROGRAPHIC STATION
▲ SAMPLING STATION

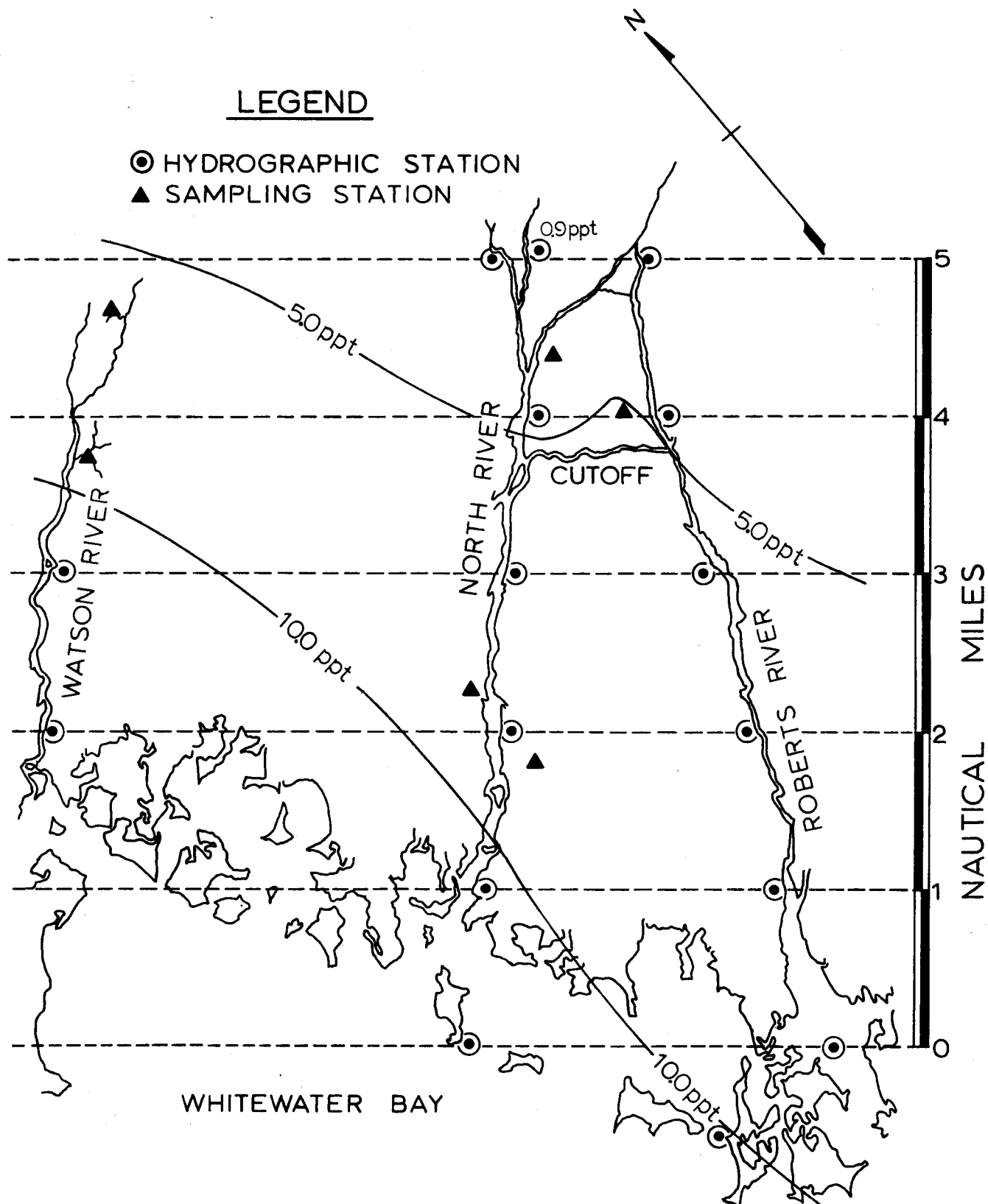


Figure 2

Figure 3. Salinity of North River study area showing the 5.0 and 10.0 parts per thousand isohalines during February 1967.

SALINITY
FEBRUARY

LEGEND

- ⊙ HYDROGRAPHIC STATION
▲ SAMPLING STATION

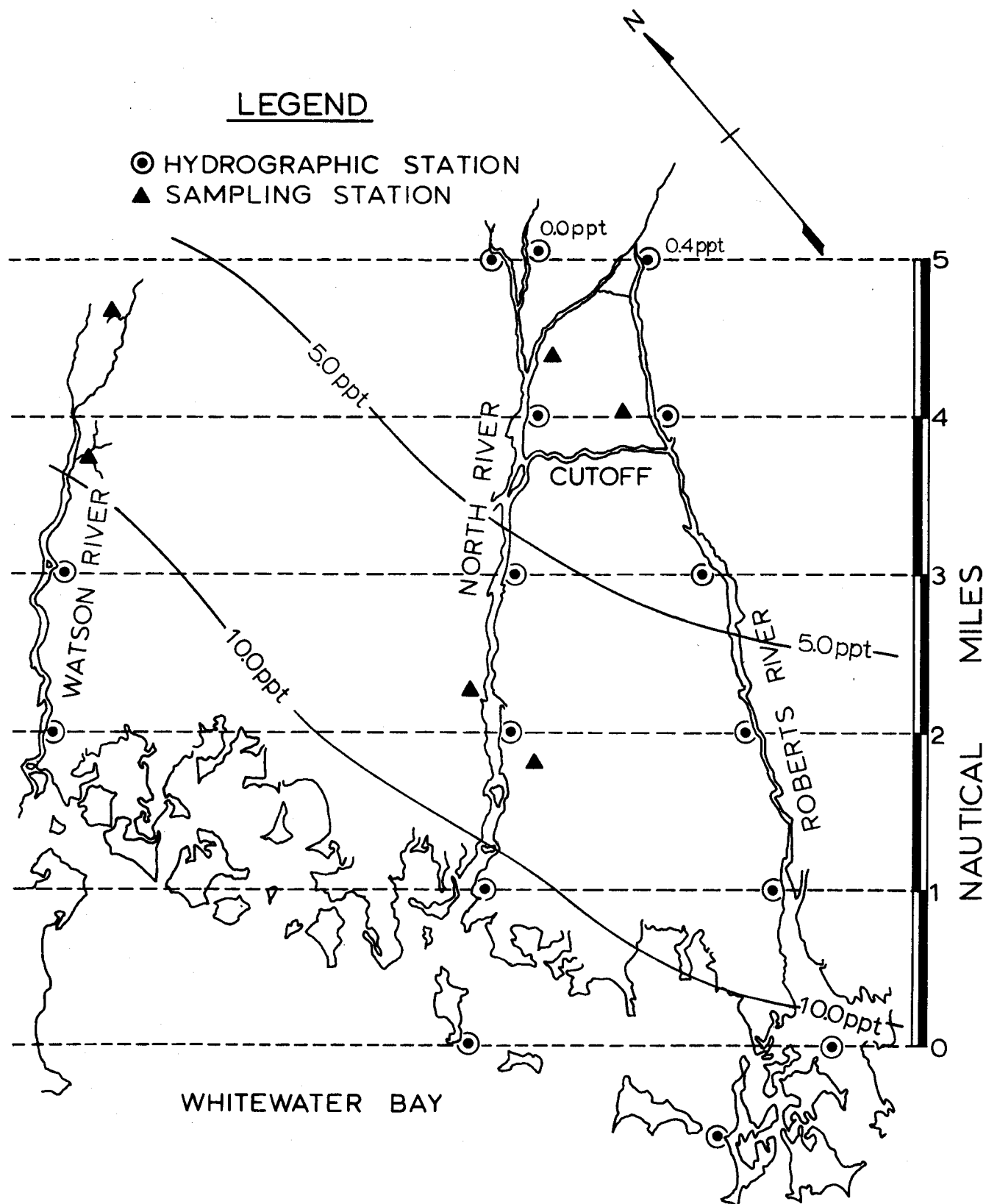


Figure 3

thousand. The uppermost station, 7, in the Roberts River, averaged 0.9, 2.3 and 0.4 parts per thousand. This illustrates the decline in salinity mentioned above.

Stations lower down in the rivers showed no such decline. Watson River 1 salinity averaged 7.9, 14.2 and 16.8 parts per thousand. North River station 12 averaged 6.4, 11.1 and 12.4 parts per thousand and Roberts River station 2 averaged 6.6, 9.1 and 10.6 during the months of December, January and February. All these lower river stations show the influence of the expected annual decline in fresh-water runoff.

Dissolved oxygen conditions at all stations are shown (Figures 4, 5 and 6). These are in general agreement with similar determinations made by the U. S. Geological Survey in the Shark River system. (Kolipinski, Higer and Meyer, 1966; Higer and Kolipinski, 1967).

Biological observations

Numbers of fish taken at trapping stations have been smaller this quarter than last, but a number of juvenile game fishes were taken. The samples included tarpon, Megalops atlantica, spotted seatrout, Cynoscion nebulosus, and red drum, Sciaenops ocellata. Some of these were collected at the fyke net stations 11 and 11A in the red mangrove habitat and a few small red drum were collected in the wood-and-wire trap at Coot Bay Pond.

In general, the catches at Coot Bay Pond were lower during the last two months of this quarter than during the same time in 1966 and far below the heavy catches taken during November, 1966. This is due in part to the heavier rainfall this year and a less severe dry-back which normally concentrates the fish.

Figure 4. North River study area showing dissolved oxygen (in parts per million) during December 1966.

DISSOLVED OXYGEN DECEMBER

LEGEND

- ⊙ HYDROGRAPHIC STATION
- ▲ SAMPLING STATION

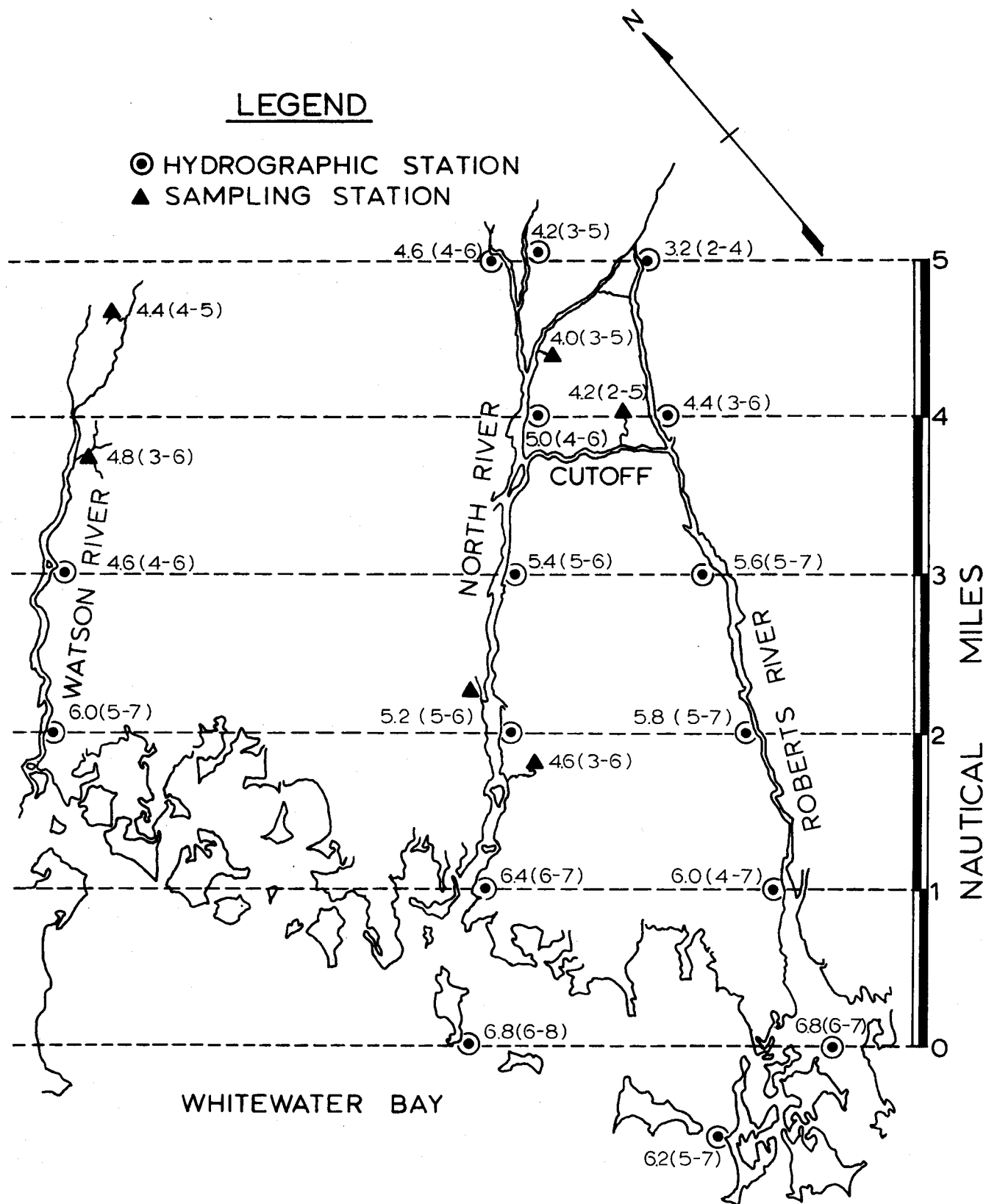


Figure 4

Figure 5. North River study area showing dissolved oxygen (in parts per million) during January 1967.

DISSOLVED OXYGEN

JANUARY

LEGEND

● HYDROGRAPHIC STATION

▲ SAMPLING STATION

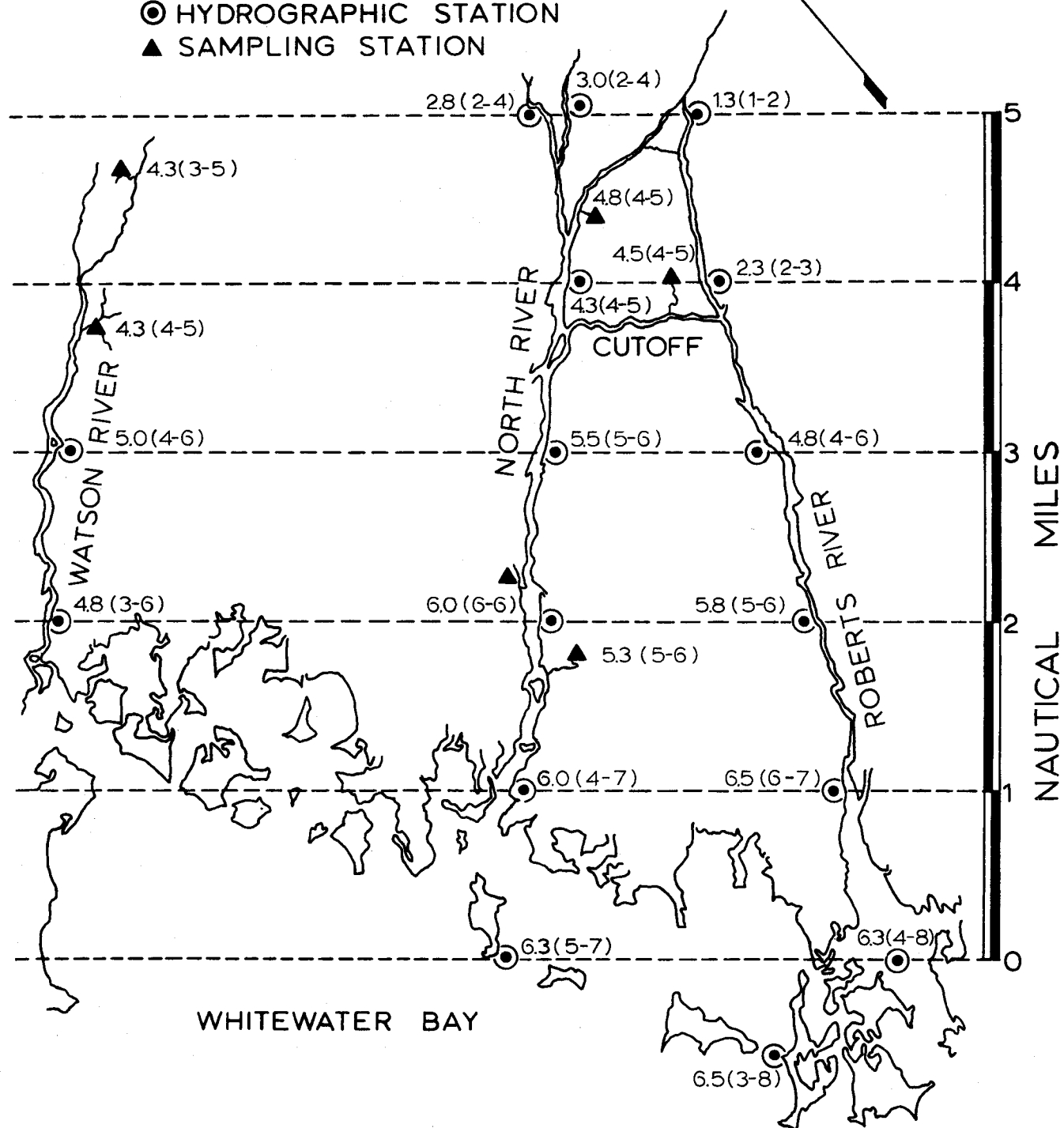


Figure 5

Figure 6. North River study area showing dissolved oxygen (in parts per million) during February 1967.

DISSOLVED OXYGEN
FEBRUARY

LEGEND

- HYDROGRAPHIC STATION
▲ SAMPLING STATION

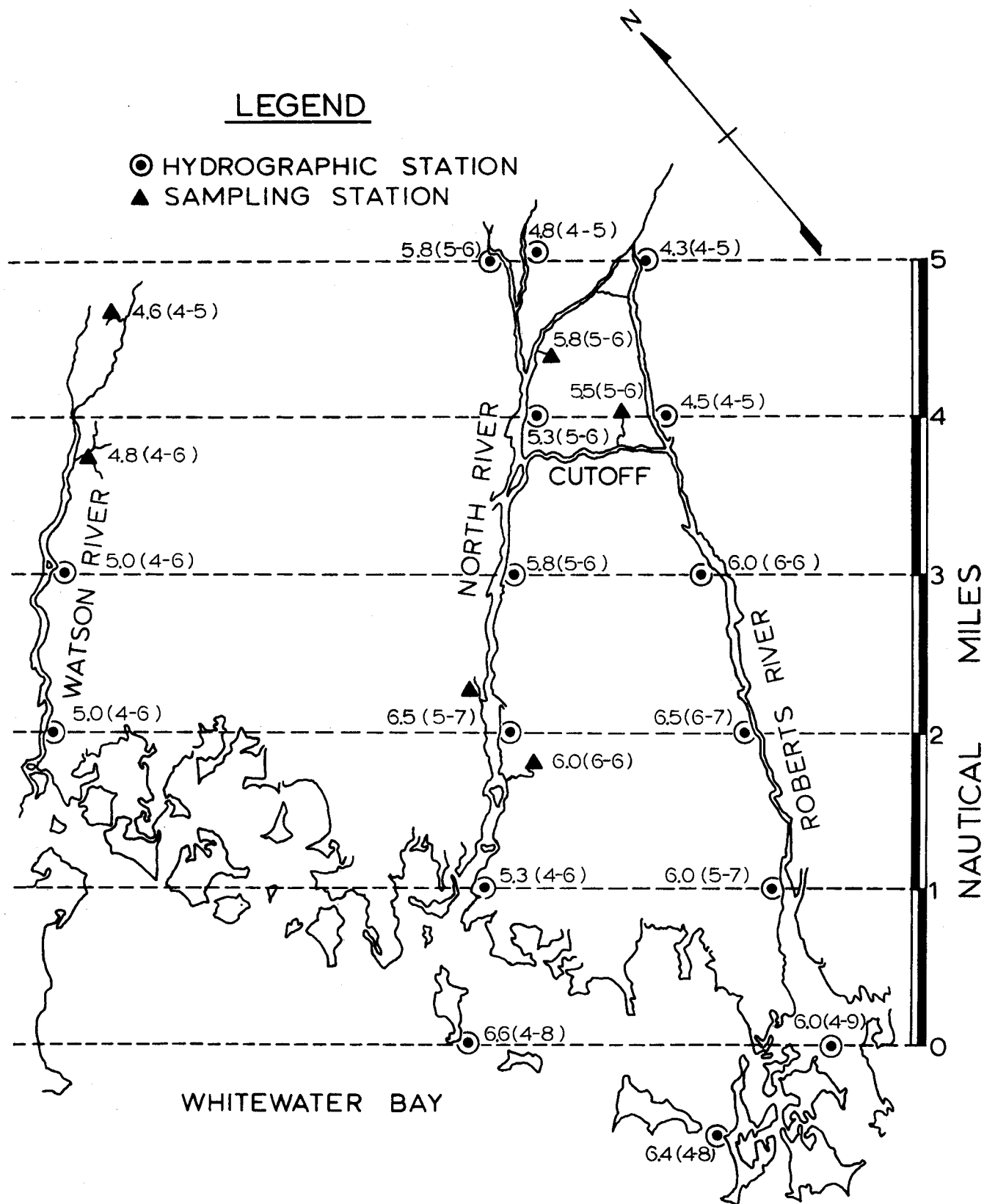


Figure 6

The plastic traps at North River stations 9A, B and C have produced increasing numbers of fishes during February as the drying reduces the water level in the ponds and concentrates the fish.

References

- Kolipinski, M. C., A. L. Higer and F. W. Meyer, 1966. Monthly analysis of water conditions in Shark River estuary, December. U.S. Geol. Sur. 13 pp.
- Higer, A. L. and M. C. Kolipinski, 1967. Monthly analysis of water conditions in Everglades National Park, January. U.S. Geol. Sur. 12 pp.