

STATE OF NEW JERSEY  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATER RESOURCES  
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WINTER OUTAGE FISH SAMPLING PROGRAM

REPORT FOR THE PERIOD JANUARY - FEBRUARY 1983

Jersey Central Power and Light Company

GPU Nuclear Corporation

April 1983

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Information Resource Center



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Executive Summary

Samples of the fishes in the discharge canal of the Oyster Creek Nuclear Generating Station were collected in January and February in order to document the effects of the February 11, 1983 shutdown. The sampling effort indicated the presence of only one species that might be vulnerable to temperature shock associated with a winter shutdown. That species, the Atlantic menhaden, was present in small numbers in the intake and discharge canals throughout the January-February period. Monitoring of the discharge canal during and subsequent to the plant shutdown failed to produce any evidence of fish mortalities.

## Introduction -

This report documents the effects of the February 11, 1983 shutdown of the Oyster Creek Nuclear Generating Station on the fishes in Oyster Creek, based upon sampling conducted by GPU Nuclear Corporation. The fish sampling program was initiated on October 14, 1982 and continued through February 15, 1983. That period was punctuated by an unplanned station shutdown on December 9, 1982. An earlier report, dated January 1983, presented the results of the sampling conducted during the October-December, 1982 period. The present report covers the January-February, 1983 period.

The major objectives of the sampling program were:

- 1) To determine the species composition, abundance and distribution of fishes in Oyster Creek prior to station shutdown.
- 2) To quantify the extent of any shutdown induced mortalities.
- 3) To document any movement of fishes into or out of the discharge canal subsequent to plant shutdown.

Data collection for the period covered by this report began on January 20, 1983 and ended on February 15, 1983. The Oyster Creek Station, which was shutdown on December 9, 1982, was restarted on December 18, and operated continuously through February 11, 1983 when the planned refueling and maintenance outage began.

Materials and Methods -

Pre-Shutdown Survey -

Gill net and bottom trawl samples were collected, at the stations indicated on Figure 1, on January 20-21 and February 10-11, 1983. All sampling was conducted after dark.

Trawling was done with a 4.8 m semiballoon trawl with a 3.9 cm stretch mesh body, a 3.2 cm stretch mesh cod end and a 1.3 cm stretch mesh liner. One five minute trawl sample was taken at stations T1, T4 and T5 during each sampling period. At stations T2 and T3, the residential lagoons, a complete ice cover was present throughout the sampling period, precluding the collection of trawl samples.

At gill net stations G1 and G3 (Fig. 1), samples were collected with a 91.4 x 1.8 m monofilament net, with three 30.5 m panels of 38, 70 and 89 mm stretch mesh. At station G2, samples were collected with a 60 x 2.4 m monofilament net consisting of two 30 m panels of 38 and 89 mm stretch mesh. All gill nets were set for two hours.

All fish captured were identified and enumerated; lengths were measured for species considered to be vulnerable to the temperature shock associated with station shutdowns.

Temperature data were obtained from the continuous temperature recorders located at the condenser intake and discharge of the Oyster Creek Station and at the Route 9 bridge on Oyster Creek (Fig. 1). Temperature measurements were also taken with most trawl and gill net samples.

As the results discussed below will show, no species suitable for a mark and recapture study were present in Oyster Creek during the study period and therefore, this aspect of the sampling program was deleted.

During and Post-Shutdown Survey -

Oyster Creek was inspected for the presence of dead or stressed fish 8 times during and subsequent to the station shutdown. These inspections included the condenser and dilution pump discharges, the discharge canal between the condenser discharge and the Route 9 Bridge, the north bank of Oyster Creek across from the abandoned marinas, and the ends of the residential lagoons.

A severe winter storm hit the area on the evening of February 11 precluding the launching of the boat until February 15. At that time, trawl samples were collected at stations T1, T4 and T5 in order to determine whether any fish had died and sank to the bottom.

The severe weather also prevented the deployment of the 91.4 m gill net across the mouth of Oyster Creek. During the December shutdown, this technique had been used to document any movement of fishes into or out of Oyster Creek.

Diver surveys were not conducted during the post-shutdown sampling because there was no evidence of any dead or stressed fish in the discharge canal, and the formation of ice along the canal banks created a dangerous working environment.

Results and Discussion -

Pre-Shutdown Trawling and Gill Netting -

Trawling and gill netting in Oyster Creek on January 20 and 21 yielded a total of 47 individual fish and 7 species (Table 1). Water temperature in the discharge canal during the January sampling ranged from 33 to 35°F. Ambient temperature was in the 30-31°F range.

All of the fish found during the January survey were species that commonly occur in Barnegat Bay and contiguous waters during the winter months. No summer migrants were found. These results are not surprising because it was anticipated that the unplanned shutdown of December 9, 1982 would result in the effective removal of the summer migrants from Oyster Creek.

The results of the sampling conducted on February 10 and 11, 1983, just prior to the shutdown, were similar to those discussed above. Seven species and a total of 25 individuals were found (Table 2). Discharge canal water temperature was in the 36-37°F range while ambient temperature ranged from 33-34°F.

One significant difference in the species composition of the February catch was the presence of young of the year Atlantic menhaden. All 16 menhaden were taken in the gill net at station G3 (Fig. 1), in the heated condenser discharge water. Since the monofilament gill net is an extremely

effective method of capturing Atlantic menhaden, and 600 square feet of mesh, small enough to catch young of the year, was fished for 2 hours yielding only 16 individuals, it is unlikely that large numbers of menhaden were present in the condenser discharge. In the past, when large numbers of menhaden were killed following the shutdown of the Oyster Creek Station, the fish could be observed congregating in the condenser discharge waters as water temperature dropped. This was not the case prior to the February 1983 shutdown.

During- and Post-Shutdown Survey -

The station shutdown commenced at approximately 2230 hours on the evening of February 11, 1983, when the ambient water temperature was approximately 30°F (Fig. 2). Condenser discharge temperature at that time was approximately 41°F and the Route 9 bridge temperature, 34°F. The condenser discharge temperature declined steadily until approximately 0230 hours when it equalled the intake temperature (approx. 31°F). Some residual heat was observed at the Route 9 bridge until 0330 hours when the temperature at that location finally reached ambient.

Oyster Creek was inspected for the presence of stressed or dead fish three times during the evening of February 11-12 (between 2230 hours on February 11 and 0600 hours on February 12). During that time no fish were observed. Additional

surveys were conducted at 1200 and 1500 hours on February 12, at 1000 hours and 1400 hours on February 13 and at 0900 hours on February 14. No fish were observed during those surveys.

On the morning of February 15, trawl samples were collected at stations T1, T4 and T5. Only live winter flounder and fourspine sticklebacks were found in those samples.

Summary -

Pre-shutdown trawling and gill netting in Oyster Creek indicated the presence of only one species that might have been vulnerable to the temperature shock associated with the February 11 shutdown. That species, the Atlantic menhaden, occurred in small numbers in the condenser discharge area. It is not unusual for young Atlantic menhaden to overwinter in mid-Atlantic estuaries and some attraction to the thermal discharge would be expected. In fact, this species was common in impingement samples in January, when ambient bay temperature fell below 30°F. It continued to occur in the intake canal in small numbers through February 22, eleven days after the shutdown.

Although no fish mortalities were observed, menhaden mortality related to the plant shutdown could have resulted from:

- 1) a drop in temperature below the lower lethal limit for the species
- 2) temperature shock due to rapid reduction in temperature.

During the February 11 shutdown, ambient water temperature was slightly above 30°F, a temperature which menhaden were able to tolerate in the intake canal prior to and subsequent to the shutdown. It is unlikely then, that any menhaden mortality could have occurred due to excessively low water temperatures.

The shutdown resulted in an 11°F reduction in temperature, during a 4-5 hour period in the condenser discharge, and a 4°F reduction, during the same period, in the remainder of the discharge canal (after mixing of condenser and dilution pump discharges). Experimental data (Ichthyological Associates, 1978) indicate that some mortality might be expected after an instantaneous temperature drop of 11°F. During the shutdown, the 11°F drop occurred over a period of 4-5 hours, and only in the area immediately around the condenser discharge. If any mortality occurred in that area, the number of fish involved must have been very small because no dead or stressed fish were observed. Based upon experimental data (Ichthyological Associates, 1978) it is unlikely that the 4°F drop in temperature in the remainder of the discharge canal caused any cold-shock mortalities.

#### Reference

Ichthyological Associates, Inc. 1978. Ecological studies for the Oyster Creek Generating Station, progress report for the period September 1976-August 1977, volume one fin- and shellfish. Report to Jersey Central Power and Light Company.

Table 1 - NUMBER OF INDIVIDUALS OF FISH SPECIES CAPTURED IN OYSTER CREEK, JANUARY 20-21, 1983

<u>Species/Station</u>	<u>G1</u>	<u>G2</u>	<u>G3</u>	<u>T1</u>	<u>T2</u>	<u>T3</u>	<u>T4</u>	<u>T5</u>	<u>TOTALS</u>
winter flounder	0	5	0	18	N O	N O	0	0	23
fourspine stickleback	0	0	0	12	S A M P L E	S A M P L E	3	0	15
Atlantic silverside	0	0	0	5			0	0	5
northern pipefish	0	0	0	1			0	0	1
American sandlance	0	0	0	1			0	0	1
red hake	0	0	0	1	D U E	D U E	0	0	1
blueback herring	1	0	0	0			0	0	1
					T O  I C E	T O  I C E			

Table 2 - NUMBER OF INDIVIDUALS AND LENGTH RANGE (mm, in parentheses) OF FISHES CAPTURED IN OYSTER CREEK, FEBRUARY 10-11, 1983

<u>Species/Station</u>	<u>G1</u>	<u>G2</u>	<u>G3</u>	<u>T1</u>	<u>T2</u>	<u>T3</u>	<u>T4</u>	<u>T5</u>	<u>TOTALS</u>
winter flounder	0	0	0	3	N O	N O	0	0	3
fourspine stickleback	0	0	0	0	S A	S A	0	1	1
Atlantic silverside	0	0	0	0	M P	M P	1	1	2
American sandlance	0	0	0	0	L E	L E	0	1	1
threespine stickleback	0	0	0	1	D U	D U	0	0	1
alewife	0	1	0	0	E	E	0	0	1
Atlantic menhaden	0	0	16 (102-128)	0	T O  I C E	T O  I C E	0	0	16

Figure 1

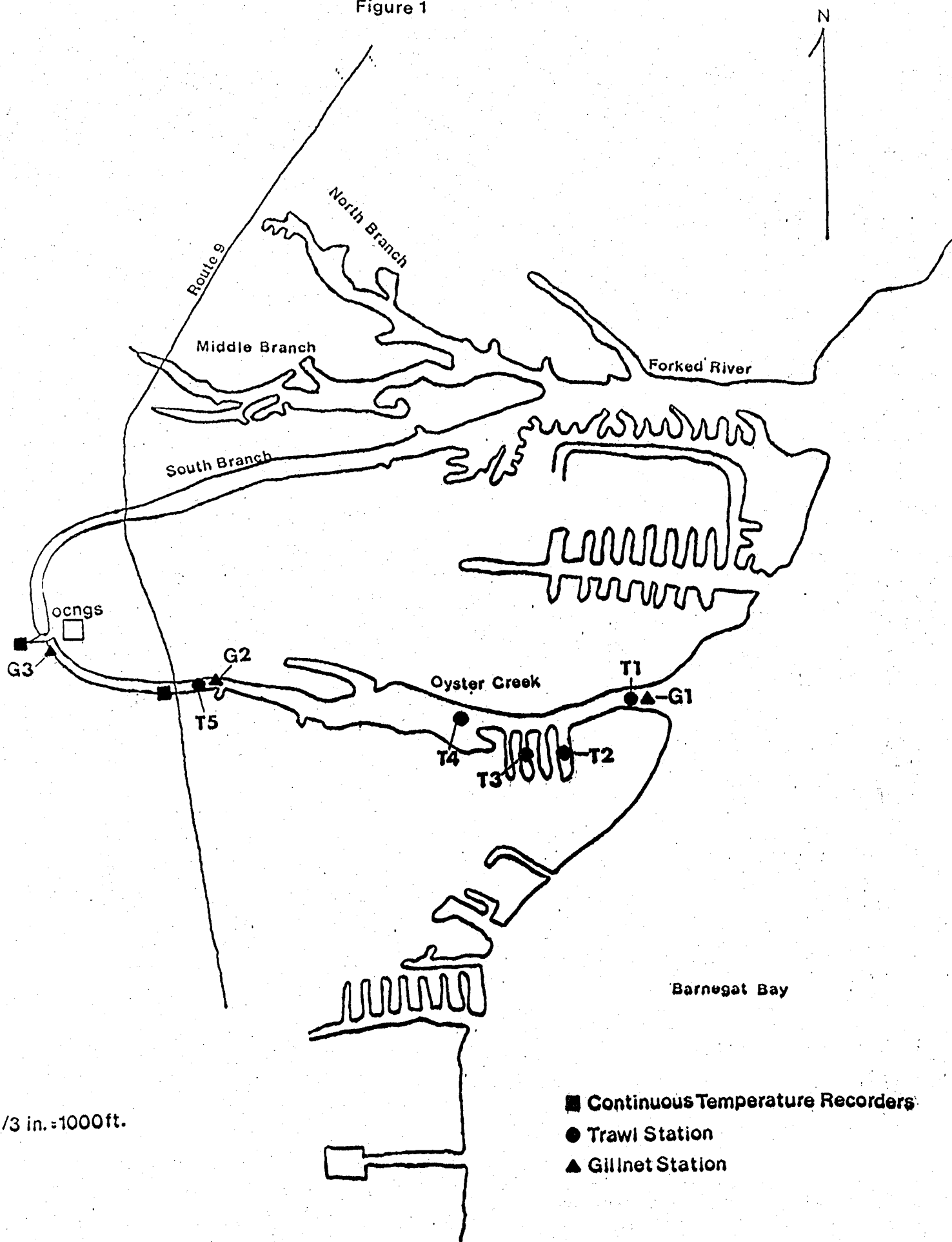


Figure 2

